

**A case-control study investigating factors associated with neck pain in the indigenous African population in the greater Durban area.**

**By**

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***Dissertation submitted in partial compliance with the requirements for the Masters Degree in Technology: Chiropractic at the Durban Institute of Technology***

I, Prisca Zandile Ndlovu, do declare that this dissertation is representative of my own work in both conception and execution.

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## **DEDICATION**

I dedicate this work to my father, Enock Bhekuyise Ndlovu, for your love, support, guidance, words of wisdom and encouragement, patience, understanding, for being my role model, and for the sacrifices, you took. Having you in my life has been a true blessing and it has made me the person that I am today and for that, you will forever be inspirational, remembered and truly loved.

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## **ABSTRACT**

Neck pain is a common complaint and a common source of disability in the general population with a point prevalence of nearly 13%. Reports indicate that industry related neck disorders (lifetime incidence of nearly 50%) account for as many days of absenteeism as low back pain; one could compare the two clinical conditions in terms of these trends on a global scale.

To investigate whether similar trends do exist, 200 participants with neck pain and 200 asymptomatic participants (stratified sampling according to age and gender) that consented to the research were clinically assessed. These participants also completed a questionnaire addressing the factors that have been identified as related to neck pain at the consultation where they were assessed. This research did not involve the treatment of the participants, although a free treatment was given for patients that opted for one or to those that required it post participation in the study. If treatment was outside the scope of the chiropractic clinic, the participants were referred to the appropriate health care provider.

The aim of the study was to investigate factors associated with neck pain in the indigenous African population in the greater Durban area.

Data was analysed according to the following:

Descriptive statistics were interpreted by means of frequency tables, pie charts, bar graphs and / or in a tabular format in order to describe the sample characteristics of the population under study. Inferential statistics included regression analysis in order to determine any relationships between the patient's neck complaint characteristics and factors associated with the complaint. SPSS version 11.5 was used for data analysis (SPSS Inc, Chicago, Ill, USA). A p value of <0.05 was considered as statistically significant. Descriptive analysis involved presenting or graphing categorical variables as counts and percentages, and quantitative variables as medians and interquartile ranges due to the skewness of the data. Associations between factors and neck pain were examined bivariately using Pearson's chi square or Fisher's exact tests as appropriate for categorical factors, or Mann-Whitney tests in the case of quantitative non-parametric data. Finally in order to examine the adjusted independent effects of all factors which were found to be individually significant in the

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bivariate analysis, multivariate binary logistic regression analysis was done. A backwards elimination modelling technique was used, based on likelihood ratios, with entry and exit probabilities set to 0.05 and 0.010 respectively. Results were reported as odds ratios, 95% confidence intervals and p values. Chi squared analyses was utilised to assess the strength of the relationship and the degree of significance of the relationship. All statistics were analyzed at a confidence interval of 95% and a level of significance where  $\alpha \leq 0.05$  (p-value).

The symptomatic participants seemed to be less well educated than the controls. The cases seemed to be less in full time employment, less unemployed, and more self employed than the controls. Income was unevenly distributed among cases and controls. The cases who were working seemed to earn less than the controls who were working. The duration of having neck pain was mainly 1 month. The majority of cases classified their pain as mild. Most participants felt that their pain was worst in the afternoons or related to activities, while they felt their pain was least in the mornings.

Frequency of neck pain was mainly constant (36.5%), followed by frequent (32.5%) and seldom (25%). Symptomatic participants mostly reported that their pain began without injury, gradually in 67.5% and abruptly in 13.5%. Fewer symptomatic participants reported pain beginning after an injury (n=22 gradually and n=7 abruptly). The majority reported their neck pain to be stable (38%), while 34% felt it was getting worse and only 19% getting better. More than half of the cases reported difficulty with work due to neck pain. Fewer reported difficulties with daily activities such as washing (30%), sleeping (26%), and lifting (24%). Almost half of the cases rated their disability as none (48%). Only 16% reported severe disability. Thirty-three percent (n=66) reported having been absent from work due to neck pain. The duration of absence in those who were absent was mainly 0-1 week (89.4%). 59 (29%) reported being bed-ridden with neck pain. The most frequent duration was also 0-1 week (81.4%).

Ninety three point five percent reported no change in occupational status, while 6 (3%) were demoted, 5 (2.5%) boarded, and 2 (1%) fired. With respect to associated signs and symptoms, 156 (78%) reported to suffer from headaches.

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In addition, symptomatic participants were asked if they associated their neck pain with any other activities. The most commonly reported factor was stress (22%), followed by bad posture (17%). The other reported factors were reported infrequently. Participants who worked in occupations that involved driving, turning neck, answering the telephone, working in an air-conditioned room, and bending over a desk were significantly more at risk of being cases than controls.

Non-occupational factors which were associated with neck pain were worrying a lot, motor vehicle accident, not enough bed support, not using arms to support a book, sitting without back or arm support, not watching TV a lot, and exercising.

The results of the study suggest that neck pain within the indigenous African population is associated with the level of education, income, stress levels, bad posture, repetitive movements of the neck, and motor vehicle accidents. It was also found that most of neck pain patients do suffer from headaches. The findings show that neck pain is mostly classified as mild in nature with 1 month duration. Although neck pain was reported to be responsible for at least 7 days of absenteeism from work, causing difficulty with daily activities, most patients reported no disability as a result of neck pain.

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## **DEFINITION OF TERMS**

- Neck pain:** For the purpose of this study neck pain was defined as pain located between the occiput and the third thoracic vertebra (<http://www.jcca-online.org>, 2004; Cote, et al. 2003). Severity and duration was not considered in this definition.
- Cervical syndrome:** A general term referring to several conditions dealing with head, neck, and shoulders. It is caused by an injury to the cervical vertebrae and cervical intervertebral discs, and irritation of the cervical nerve roots, common related symptoms include: painful cramps in the shoulder muscles, pain and reduced mobility in the cervical spine, and in cases painful radiation into the arms (Tayyri and Smith, 1997:163)
- Incidence:** Is a measure of the number of people in a given population / the rate at which individuals develop a syndrome or a disease over a specific time / a defined period (James, et al. 1995).
- Prevalence:** Is defined as the number of people in a given population who have the syndrome or a disease at a particular time. Prevalence is defined by the time-period (James, et al. 1995).
- Neck and shoulder trouble:** Neck and / or shoulder trouble (NST) is defined as pain, ache or discomfort from the neck and shoulder area, experienced sometimes, often or very often during the last 12 months. Considerable neck and/or shoulder pain (NSP) is neck and / or shoulder trouble with “severe” or “very severe” functional impairment. “Severe” refers to having to take breaks during work and spare time, and “very severe” means having to be on the sick list periodically (Holmström, et al. 1992).

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**Work related musculoskeletal disorders (WRMSD):** which are also referred to as cumulative trauma injuries and repetitive motion disorders- are injuries and disorders of the muscles, tendons, ligaments, nerves, joints, cartilage and supporting structures (Dong-Chul and Blair, 2003). A progressive neuromusculoskeletal syndrome occurs as a result of repetitive micro trauma to tissues sustained over time through overload and/or overuse of the upper extremities, neck, shoulders and trunk (Street, et al. 2003). The resulting inflammatory response that occurs may lead to tendon and synovial disorders, muscle tears, ligamentous injury, degenerative joint disease, bursitis, or nerve entrapment (Rempel, et al. 1992).

**Indigenous African population in the greater Durban area:** for the purpose of the study and ethical issues this referred to the Black population group that was living in the greater Durban area at the time when the study was conducted.

# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 INTRODUCTION:**

Drews (1994) conducted a study in South Africa where complaints of neck pain in the teaching clinic (54.6%), were compared to those in private practice (57.4%). The results showed similar trends to international norms in terms of neck pain presentation at other such centres around the world (Aker, et. al. 1996; Gore, 1998; Cassidy, 1992; Borghout, et al. 1999; Cote, et al. 2000). This could presuppose that the patients presenting at the teaching clinic or those presenting in private practice are representative of the population that has neck pain within the South African ethnic context.

When the above assumption is applied to neck pain, it is assumed that a similar profile exists in South Africa as compared to international studies (Aker, et al. 1996; Gore, 1998; Cassidy, 1992; Borghout, et al. 1999; Cote, et al. 2000; James, et al. 1995). However, as no comparative studies have been completed in South Africa, let alone within the native ethnic groups, this assumption could be flawed.

With regards to the South African ethnic context trends similar to international norms could be seen, however the demographics may well be lead to erroneous conclusions based on differences in the ethnic profiles related to:

- ✚ The use of public transportation systems versus private transport, and the increased likelihood of traumatic injury (Nantulya and Reich, 2003).
- ✚ The percentage of white collar to blue collar workers, in addition to daily tasks required within the communities, requiring increased manual labour, especially within particular ethnic groups (Arokoski, et al. 2002; Palmer, et al. 2001 and Hildebrandt, et al. 2000). These have been linked to amongst others:
  - Carrying heavy shopping bags from the shops to the bus and/or taxi ranks and from the drop off-stops to their homes.
  - The use of wheelbarrows as a means of grocery and/or water / load transportation.



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- Carrying babies on their backs or front / chest.
  - Ploughing the gardens / large fields.
  - The ability / tradition of certain members within the ethnic group to carry large loads on their heads (Heglund, et al. 1995), placing increased stress on the cervical spine.
- ✚ The usage of old mattresses and pillows, and even sleeping on the floor among families with low socioeconomic status is common practice for certain native ethnic groups. Often, home made pillows are not made from a material that is conducive for spinal support, which the literature indicates is of importance in preventing neck pain (Persson and Moritz, 1998; Lavin, et al. 1997).
- ✚ The majority of neuromusculoskeletal diseases or problems are perceived as minor problems and often-medical help / treatment is not sought, in addition, people would resort to either traditional healing methods or homemade mixtures, which may or may not be effective. Often this is more common among the illiterate members of the ethnic group concerned or those stemming from a background of low socioeconomic status (Edwards, et al. 2005 and Tan, et al. 2005).
- ✚ Insufficient access to health services due to transportation problems, lack of funds or medical aids and / or understanding of the health care infrastructure (Exadaktylos, et al. 2005).
- ✚ One breadwinner and too many dependants in the family and / or the stress or depression due to greater percentage of unemployment (Lalloo, et al. 2004).
- ✚ The traditional and belief systems that predetermine rituals, daily routines or postures that are adopted for certain daily tasks (Lee, et al. 2004).

These concepts have been explored by Cote, et al. (2003), who indicates that there has been a slow but consistent increase need for research in respect of neck pain in the general population. However these authors note that not all ethnic groups have been studied and only a few population based studies on the epidemiology of neck pain in the general population have been conducted to include such diverse ethnic groups (Cote, et al. 2003), therefore limiting the generalisation of the data available.

Therefore, the recommendation from the authors (Cote, et al. 2003) that further such research is stimulated to develop comparable norms within different ethnic groups in respect of neck pain was taken up in this research. With the result that the aim of

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the study was to investigate the factors associated with neck pain in the indigenous African population in the greater Durban area by means of a case-control study.

### **1.2 AIM/PURPOSE OF STUDY:**

**Objective One** was to investigate factors associated with neck pain in the indigenous African population in the greater Durban area.

**Hypothesis One** stated that there would not be a difference in terms of the factors associated with neck pain in the indigenous African population, when compared to the literature.

**Objective Two** was to describe the relationship between the factors and neck pain.

**Hypothesis Two** stated that there would be a relationship between associated factors and neck pain within the indigenous African population.

### **1.3 RATIONALE FOR THE STUDY:**

In a South African study of demographic and epidemiological factors of private chiropractic practices and a chiropractic-teaching clinic (Drews, 1994), neck pain complaints were found to be as common as low back pain complaints. In a South African epidemiological study, neck pain formed 57.4% of the presenting complaints to 17 private chiropractic practices in Durban, in the period of February 1994 to the end of April 1994. During the same period, 54.6% of the patients from the similar sample presented to the Technikon Natal Chiropractic Day Clinic, complained of neck pain. This seems to support the findings of Cote, et al. (2000) and Cassidy (1992) in respect of the general population.

Thus, it would seem that the trends in low back pain and neck pain are comparable; however, a review of related literature seems to indicate that no epidemiological studies on neck pain have been conducted among the indigenous African population of South Africa. Thus, the assumption would have to be made that the psychosocial dynamics within the indigenous African population are similar to those within other ethnic groups, therefore allowing the predisposing factors of neck pain to be similar or the same as those predisposing other ethnic groups to neck pain.

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One such psychosocial dynamic that could influence the development of neck pain would be the ratio of office workers to manual workers or labourers within the ethnic populations (Arokoski et al. 2002; Palmer, et al. 2001 and Hildebrandt, et al. 2000). However, from most indications, this ratio is not comparable and therefore the assumption is flawed and requires further investigation. This can be seen in the graph below, where an indication exists that the different occupation allocations to different ethnic groups is disproportionate with respect to manual and non-manual labours (<http://www.statssa.gov.za/publications/P0210/P0210September2004.pdf>, as available from <http://www.statssa.gov.za>, 2005).

Main industry	Black African			Coloured			Indian/Asian			White			Total		
	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	7 874	4 610	3 261	1 298	701	597	419	277	142	2 016	1 158	857	11 643	6 772	4 866
Agriculture, hunting, forestry and fishing	822	529	293	159	109	50	*	*	*	77	62	15	1 063	703	359
Mining and quarrying	347	342	*	*	*	*	*	*	*	49	44	*	405	394	11
Manufacturing	1 031	655	376	248	150	98	115	80	35	319	231	87	1 714	1 117	597
Electricity, gas and water supply	61	49	13	12	*	*	*	*	*	25	17	*	99	74	25
Construction	638	583	55	94	88	*	15	14	*	76	61	14	824	747	77
Wholesale and retail trade	1 720	972	848	258	117	141	142	97	45	416	257	159	2 542	1 347	1 195
Transport, storage and communication	366	309	56	68	42	26	24	20	*	104	69	35	563	441	121
Financial intermediation, insurance, real estate and business services	535	394	141	122	63	59	51	29	22	430	208	222	1 147	697	450
Community, social and personal services	1 369	657	709	233	100	134	64	31	33	504	203	299	2 195	1 006	1 175
Private households with employed persons	971	211	760	93	16	78	*	*	*	*	*	*	1 075	229	845
Exterritorial organisations and foreign governments	*	*	*	*	-	*	-	-	-	*	*	-	*	*	*
Not adequately defined	*	*	*	-	-	-	*	-	*	*	*	*	11	*	*
Unspecified	*	*	*	*	*	*	*	*	*	*	*	*	11	*	*

\* For values of 10 000 or lower the sample size is too small for reliable estimates.

Totals include other and unspecified population groups.

Due to rounding, numbers do not necessarily add up to totals.

**Table 1**

**Labour Statistics (as available from**

**<http://www.statssa.gov.za/publications/P0210/P0210September2004.pdf>)**

**1.4 LIMITATIONS:**

The limitations of this study are related to the respondents completing the questionnaire completely and correctly, with open and honest answers that reflect the reality of the respondent at the particular time of completion of the question.

Notwithstanding the above limitation, this research was set out in order to determine, by means of a case-control study, the factors associated with neck pain in the indigenous African population in the greater Durban area.

**1.5 CONCLUSION:**

While assuming that similar trends could be seen when the African population is compared to other ethnic groups or international norms; however with the absence of information with respect to the indigenous African population and the factors associated with neck pain, and the fact that there is no study that has been conducted in this field (factors associated with neck pain) so far (within this population). It was therefore the aim of this study to investigate factors associated with neck pain in the African indigenous African population.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 DEFINITIONS RELATING THE PRESENTATION OF NECK PAIN**

**Neck pain** is most commonly defined as pain located between the occiput and the third thoracic vertebra (<http://www.jcca-online.org>, 2004; Cote, et al. 2003), with **acute neck pain** being defined as that pain with immediate onset and with a duration of 0 to 3 months (Weinstein, et al. 1995).

**Chronic neck pain** is defined as pain lasting more than 3 months in duration, regardless of the onset (Weinstein, et al 1995). Chronic neck pain, like acute neck pain, has also been found to be more common among females (Guez, et al. 2002; Cassou, et al. 2002; Waalen, 1993).

In addition to the acute and chronic forms of neck pain, it is also considered **sub-acute** if the onset is slow or gradual, with duration of 0 to 3 months or recurring if there is an interval of no symptoms but pain reappears again with similar signs and symptoms (Weinstein, et al.1995). Thus, it would seem apparent that even though neck pain has been classified as to its onset, duration, presentation and restriction of activity in order establish whether it is acute, sub-acute or chronic in nature, it is still a prevalent condition. Therefore, the next section has been dedicated to discussing the incidence and prevalence of neck pain.

#### **2.2 DURATION OF NECK PAIN**

Bovim, et al. (1994) reported that neck pain is a common complaint, with 34.4% of the respondents reporting neck pain within the year preceding the study and 13.8% of the study group reporting neck pain that lasted for more than 3 months in an adult Norwegian population. With respect to chronic neck pain Cote, et al. (1998) reported that 55.4% of Canadian adults reported having neck pain of more than 31 days in the previous 6 months, and that 4.6% experience pain that significantly restricts daily activity, influencing directly on work place and daily activity performance (Carroll, et al. 1998).

### **2.3 FREQUENCY OF NECK PAIN**

Kamwendo (1991) reported that 32% of medical secretaries reported occasional pain, whilst 17% suffered **constant neck pain** and shoulder pain respectively. They also found that of those that reported constant neck pain, 13% reported disability as a result. In support of this, Sauter, et al. (1991) reported that constant discomfort was experienced in the neck (27%) and shoulders (10-15%) of data entry workers. Both these studies support the assertions of Guez, et al. (2002), Cassou, et al. (2002) and Waalen (1993).

### **2.4 INCIDENCE AND PREVALENCE OF NECK PAIN**

According to Giles, et al. (1998), 35% to 40% of the general population will suffer from neck and arm pain, both of which can be a major source of mechanical spinal pain, with 30% of such patients developing chronic symptoms. Chronic neck pain is also a common source of disability in the general population (Cote, et al. 2003; Bland, 1994), with a point prevalence of nearly 13% and a lifetime prevalence of nearly 50% (Aker, et al. 1996; Cote, et al. 2000; Cote, et al. 2003; Cassidy, et al. 1992). In addition, it has been known for many years that neck pain can be associated with referred pain to the head, the shoulders, upper extremities and anterior or posterior portions of the chest, between the shoulders and the mid or lower back (Chaitow, et al. 2000; Travell, et al. 1999).

Furthermore, Silova, et al. (2004) reported an increase in weekly prevalence of neck and shoulder pain from 17% to 28% in a seven-year period, indicating that it is also time related. They found that asymptomatic individuals at the start of the investigation reported a 6-month incidence of occasional or weekly neck and shoulder pain with 59% reporting pain seven years later (Silova, et al. 2004).

In a South African descriptive cohort study conducted by Peek (2005) on advisory and administrative staff in a selected corporate banking environment in the greater Durban area the lifetime incidence of neck pain was 80.2%; the one-year prevalence of neck and shoulder pain was 77% and 49% with a point prevalence of 39% and 23% respectively.

In contrast to this, other studies indicate the following:

Lau, et al. (1996) conducted a household survey consisting of 800 men and women aged over 30 years in Hong Kong, where it was revealed that the lifetime prevalence of neck pain to be 31% in men and 27% in women and the 1 year prevalence was 15% and 17% respectively.

Whereas Bovim, et al. (1994) reported 1 year prevalence in Norwegian adults to be 34.4%.

Both of these studies indicate a slightly lower incidence and prevalence when compared to the discussion of the previous literature (Giles, et al. 1998; Silova, et al. 2004).

This could be accounted for by the severity of neck pain.

## **2.5 SEVERITY OF NECK PAIN**

Cote, et al. (2003) conducted a population- based cohort study of neck pain and its related disability in Saskatchewan. Fifty - four point two percent of the sample experienced neck pain in the six months before the survey, the majority of subjects had suffered from mild neck pain and 10.1% of the sample had suffered from intense neck pain, disabling neck pain affected 4-6% of the study sample. In addition, this six-month prevalence of mild neck pain gradually decreased from 20-29 year-old age group to the 60-69 year old age group however, the prevalence of intense and disabling neck pain did not significantly vary with age. All grades of neck pain were more common in women (58.8%) than in men (47.2%). Peek (2005) found that constant neck and shoulder pain was experienced by 5.5% and 4.5% of the participants. Thus, these figures suggested that while neck pain is very common in the population, most is mild in nature and does not interfere with activities of daily living and could therefore affect the reporting of such pain in different studies dependant both on patient perception and instruments used to collect the data.

Considerable neck and/or shoulder pain (NSP) is neck and/or shoulder trouble with “severe” or “very severe” functional impairment, where “severe” refers to having to take breaks during work and spare time, and “very severe” means having to be on the sick list periodically (Holmström, et al. 1992).

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Nevertheless, musculoskeletal disorders are a major cause of activity limitation and long-term disability in the population and whilst mortality associated with these disorders is generally low; they have a major impact on society in terms of morbidity and disability (Lee, 1994).

Therefore, it is imperative that physicians understand the possible causes of neck pain to reduce the major impact of morbidity and / or disability. However, in order to understand this, it is important to have a general understanding of the anatomy of the neck, in order to understand the clinical presentation and how best to intervene.

**2.6 ANATOMY OF THE NECK REGION**

The spine has typical vertebrae below the second spinal level (C2), whereas the C7 and vertebrae above the (C3) are atypical (Moore, et al. 1999; Giles, et al. 1998). The basic anatomical and functional unit of the vertebral column is the articular triad consisting of the fibro-cartilaginous intervertebral disc and the two synovial joints (Darby and Cramer, 1995). The mobile (motion) segment is subdivided into anterior and posterior elements and consists of all space between the two vertebrae where movement occurs. The elements consist of the intervertebral disc with its cartilaginous plates, the anterior and posterior longitudinal ligaments, the zygapophysial joints with their fibrous joint capsules and the ligamenta flava, the contents of the spinal canal and the left and right intervertebral canals, and the ligamentum nuchae (Giles, et al. 1998; Stephan, 1995).



**C1**

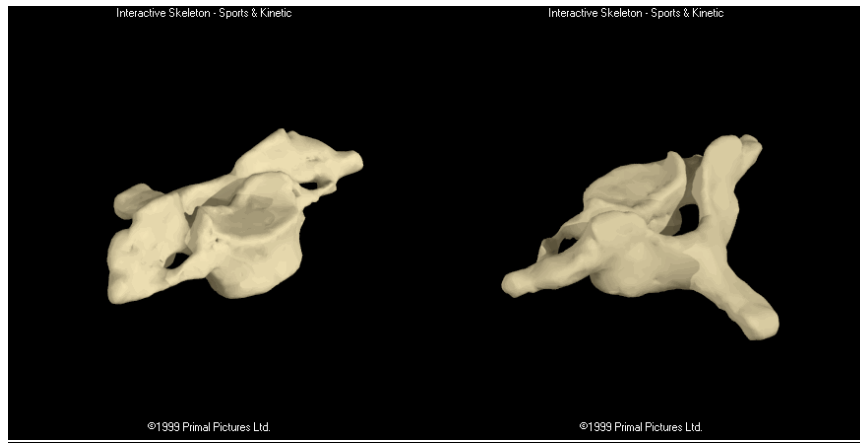
**C2**

**C7**

**ATYPICAL CERVICAL VERTEBRAE**

**FIGURE 1**





**C3 – C6**

**TYPICAL CERVICAL VERTEBRAE**

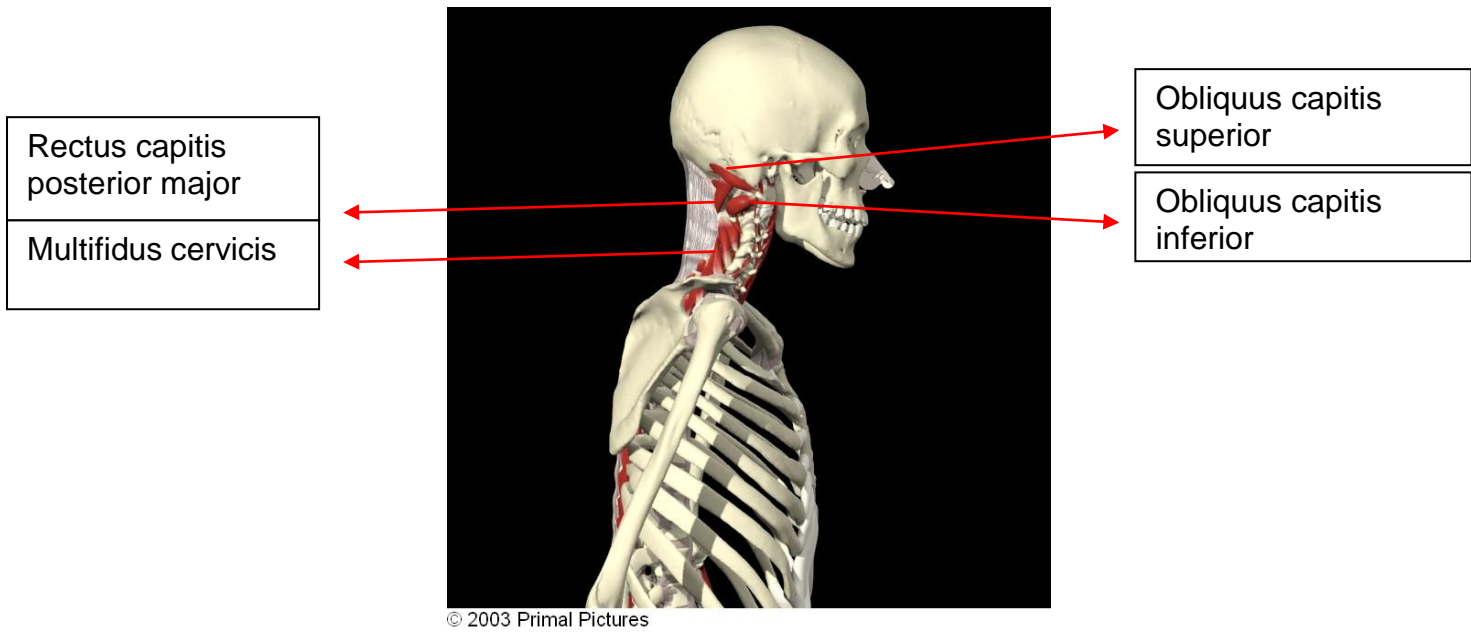
**FIGURE 2**

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The joints in the cervical spine are responsible firstly for flexibility, allowing a variety of movements such as flexion, extension, lateral bending, and axial rotation, and secondly, load transmission and shock absorption for axial and torsional strains primarily because of the intervertebral disc.

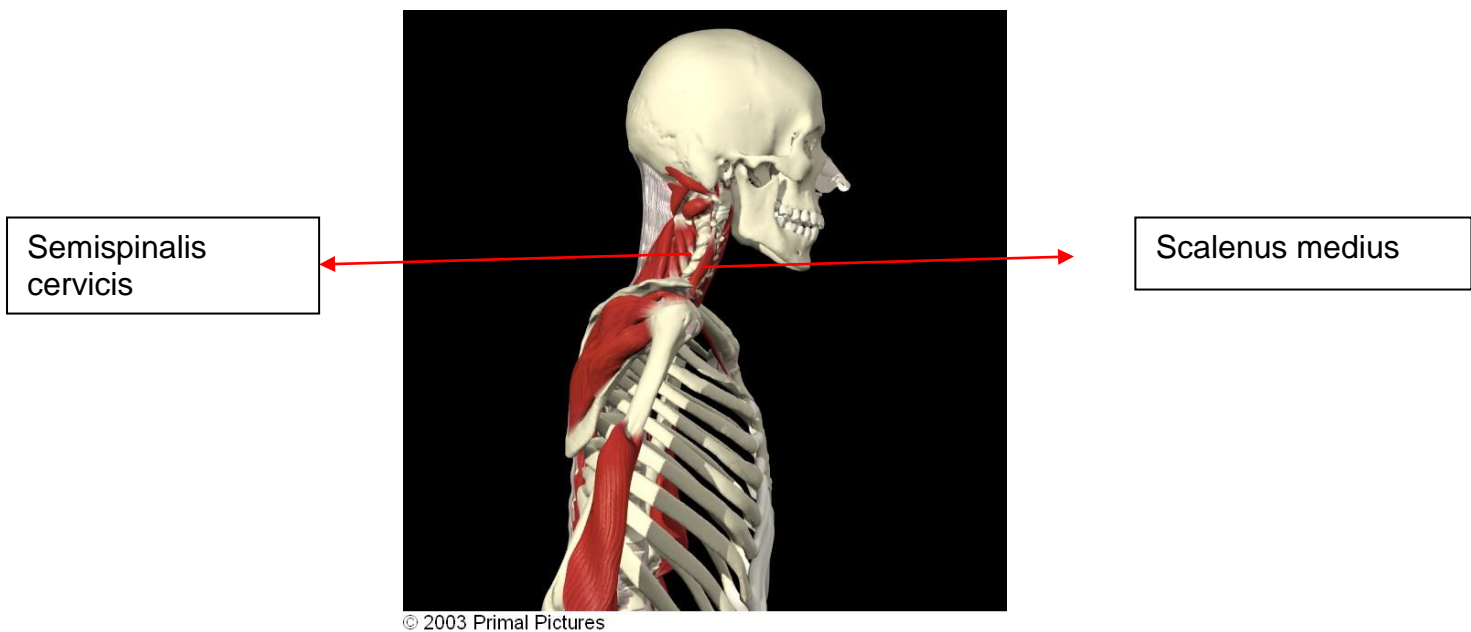
The above allow for establishment of static postures, whereas the musculature plays an important role in the posture of the cervical spine, which is often secondary to thoracic and lumbosacral spine postures (Giles, et al. 1998; Stephan, 1995; Darby and Cramer 1995; Gatterman, 1990).

The origin and insertion of these muscles were referenced from Darby and Cramer 1995; Moore, et al. (1999); Travell, et al. (1999) and Chaitow, et al. (2000).



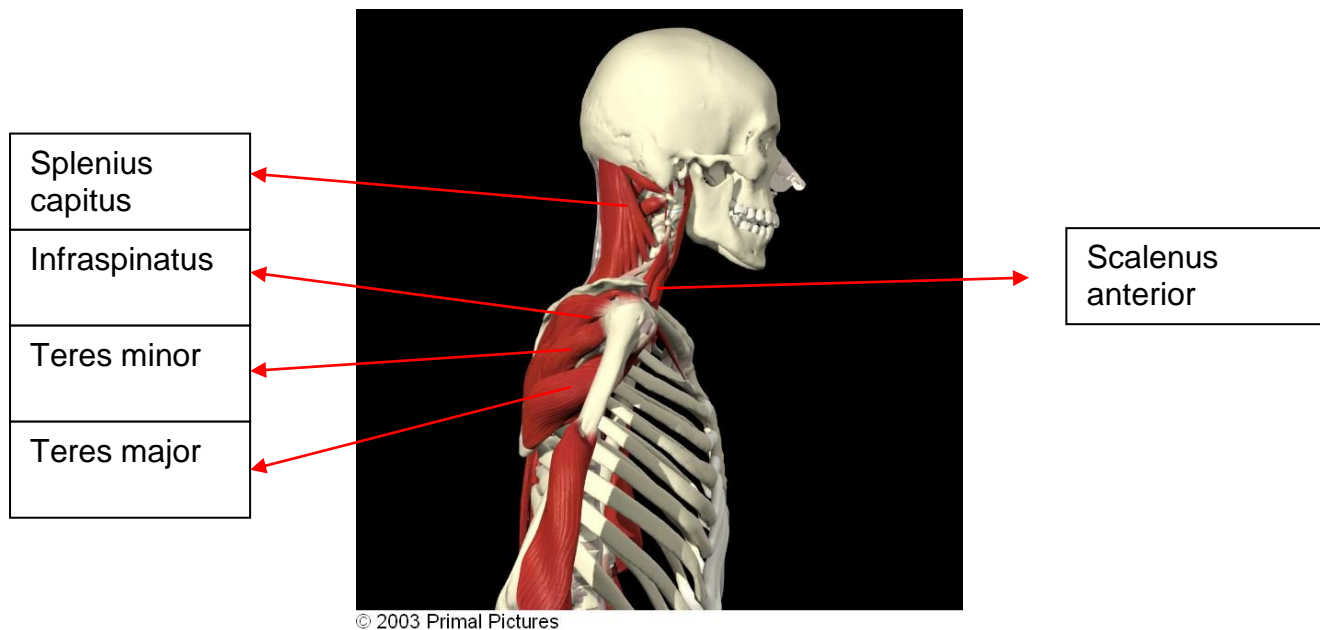
**FIGURE 3:** Muscles that influence the cervical spine (Suboccipital)

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**FIGURE 4:** Muscles that influence the cervical spine (Deep layer)

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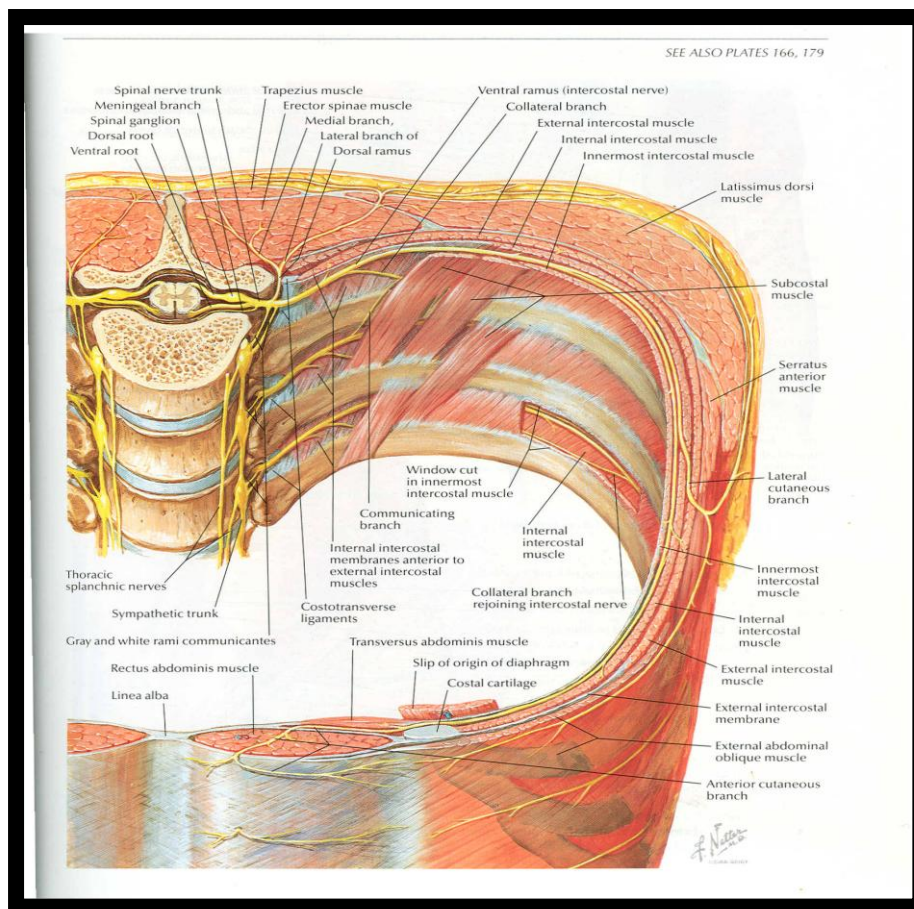
**FIGURE 5:** Muscles that influence the cervical spine (Superficial layer)

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Both the dynamic and static postures are controlled and integrated by the neurological innervation of the structures, principally by the primary dorsal rami of the spinal segmental nerve roots bilaterally from C1 through C7. Nevertheless, some of the muscles are innervated by the anterior rami of the segmental spinal nerves and these include the following muscles: longus coli, longus capitis, and anterior scalene and middle scalene (Moore, et al. 1999; Agur and Dalley, 2005; Chaitow, et al. 2000; Darby and Cramer, 1995).

From the above, it can be seen that there are a large number of muscles that control the dynamic posture of the neck, thus a degree of co-ordination is required in order to allow for fluid movement and neck stability. This is attained by the neurological structures present in the neck.

As an example, the following figure indicates that path and the component of the spinal nerve as well as the areas, which they innervate. (Please note that for the sake of simplicity the thoracic segment is shown here, as this most clearly elucidates the path and innervation area(s) of the spinal nerve).



**Figure 6:** Pathway of a spinal nerve (from the thoracic spine region)  
(Netter, 1998)

**Differences from the above pattern of distribution of the spinal nerves are found with respect to the upper cervical spinal nerves, where:**

- **C1:** supplies the small suboccipital muscles. Its anterior ramus joins the hypoglossal nerve but leaves it later to form the *descendens hypoglossi* (Faiz, et al. 2002).
- **C2:** the posterior ramus forms the *greater occipital nerve*, which is sensory to the scalp (Faiz, et al. 2002).
- **The posterior rami of C2, C3 and C4** provides muscular and sensory branches to the back. Their anterior rami provide muscular branches, including the *descendens cervicalis*. They also supply branches: the *greater auricular*, *lesser occipital*, *anterior cutaneous*, and the *supraclavicular nerves*.
- The greater auricular supplies the skin in the parotid region, the only sensory supply to the face, which is not derived from the trigeminal. The others supply the skin of the neck and the upper part of the thorax (Faiz, et al. 2002).

- **The remaining cervical nerves (C5-C8)** join the brachial plexus (Faiz, et al. 2002) and follow a similar distribution to the thoracic spinal nerves.

The above nerves are responsible for the production of pain when inflammation and / or pathological processes stimulate the nerve endings. Thus, the following section deals with the possible types and causes of pain.

## **2.7 PAIN AND THE CAUSES:**

Neck pain may be associated with the bony structures of the neck including anomalous cervical vertebrae such as

- ✚ Agenesis of the anterior and/or posterior arches of the atlas,
- ✚ Hemi-vertebra(e),
- ✚ Congenital block vertebrae or rudimentary or cervical rib(s),

which are thought to change the biomechanics of the neck and upper thoracic spine as well as (Leach, 1994 Giles, et al. 1998)

- ✚ Osseous spinal anomalies such as unilaterally or bilaterally enlarged C7 transverse process, which are thought to affect the subclavian artery and the lowest trunk of the brachial plexus as they arch over this transverse process (as opposed to the first rib on its way to the upper extremity), resulting in mechanical compression (Moore, et al. 1999; Giles, et al. 1998; Leach, 1994).
- ✚ This is also true for rudimentary cervical ribs,
- ✚ However, not true of block vertebrae which occur mostly at C2-3 or at C5-6, where the freely movable articulations above and below the blocked segment are placed under additional mechanical stress, which usually results in premature and arthrosis at the fully articulated levels.
- ✚ In addition to the above soft tissue anomalies such as conjoined nerve roots, or fibrous bands in continuation with rudimentary cervical ribs cause further irritation of normal anatomical structures, often resulting in pain, discomfort and / or compensatory changes with respect to head and neck postures (Leach, 1994 Giles, et al. 1998; Moore, et al. 1999)

It therefore appears that these factors predispose the patient to pain, as a result of faulty posture or unaccustomed hard labour which places undue demands on the limited range of motion of the cervical spine which can convert a latent congenital

condition into one causing pain or discomfort (Gatterman, 1990; Leach, 1994; Giles, et al. 1998; Moore, et al. 1999). An example of the above would be the joint injury that often results from motor vehicle accidents, which can result in whiplash, fractures and / or soft tissue injuries (Giles, et al. 1998; Esses, 1995; Leach, 1994), to which these congenital anomalies are especially prone.

## **2.8 SOME FUNCTIONAL CAUSES OF NECK PAIN WITH OR WITHOUT ARM PAIN:**

There are conditions which are not associated with congenital deformity, but are related to dysfunction of the structures in the neck, resulting in pain.

The first group of conditions which are considered serious when associated with decreased reflexes, muscle strength and / or decreased sensation in one or both arms, are nerve root entrapment syndromes. In this respect, the nerve root can be compressed and / or compromised by any one of the following anomalies within the suprapedicular, parapedicular and infrapedicular segments of the nerve root (or radicular canal) as the nerve leaves the vertebral canal to enter the intervertebral foramen at that particular level or a particular side:

- ✚ Adhesions between dural sleeves, the zygapophyseal joint capsule and the nerve root,
- ✚ Intervertebral disc herniation (Moore et al. 1999; Darby and Cramer, 1995; Gatterman, 1990; <http://www.spine-health.com>, 2005)
- ✚ Intervertebral disc degeneration and fragmentation (Leach, 1994), or
- ✚ Nucleus pulposus extrusion as well as
- ✚ Joint effusion with capsular tension which may exert pressure on a nerve root and encroachment of the intervertebral foramen lumen due to osteophytic enlargement or soft tissue or bony lesions (tumour or other space occupying lesion either benign or malignant); with subsequent encroachment of the intervertebral foramen and / or vertebral canal causing nerve root compression or nerve root chemical radiculitis (Giles, et al. 1998; Esses, 1995).

Another less sinister, but more common site of pathological lesions is that of the zygapophyseal joint, which includes, but is not limited, to the following possible conditions:



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- Mechanical derangements such as a cervical spondylolisthesis or a joint dysfunction,
- Joint capsule adhesions, joint derangement due to ligamentous injury and capsular instability;
- Joint capsule tension with resultant creep and thus instability and joint degeneration changes (e.g. meniscal incarceration, traumatic synovitis due to pinching of synovial folds, synovial fold tractioning against the pain-sensitive joint capsule and osteoarthritis) and
- Osteoarthritis of the cervical spine (<http://www.arc.org.uk/>, 2004; <http://www.spine-health.com>, 2005) (cervical spondylosis); which may all cause capsular pain and / or cause nerve root pain by direct pressure on the nerve root.

In addition to the involvement of the intervertebral disc in compromise of the nerve root, it is itself predisposed to certain conditions, which can result in pain. These conditions include, but are not limited to spondylosis (degenerative discogenic spondylosis), infection (e.g. tuberculous infection), inflammation (discitis) and herniation (Gatterman, 1990; Leach, 1994; Esses, 1995; Giles, et al. 1998; Darby and Cramer, 1995).

With changes in the disc there is often an associated decrease in disc height. This has been shown to increase the load (weight) carried by the zygapophyseal joints, predisposing them to arthritis of the spinal joints. In addition to this, these joints can also be affected by systemic arthritides which do not have their origin in spinal joints but manifest through changes in the spinal joints. Examples of these arthritides include rheumatoid arthritis, ankylosing spondylitis and osteoarthritis (Gatterman, 1990; Leach, 1994; Moore, et al. 1999; Esses, 1995, Giles, et al. 1998; <http://www.arc.org.uk/>, 2004).

Other external causes of spine / neck pain may result from infections of bone. These infections may result from a systemic infection (tuberculosis of the cervical spine), as well as more localised infection (for example pyogenic infection of the cervical spine resulting from external trauma much like an osteomyelitic infection). Furthermore, other external structures resulting in neck pain are non-vertebral structures, including the thyroid, larynx, chest or diaphragm (Leach, 1994; Esses, 1995; Giles, et al. 1998; Darby and Cramer, 1995).

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The resultant lack of understanding concerning poor posture and ergonomics often leads to pain from a myofascial origin, which has been shown to contribute widely to the presence of neck pain (Giles, et al. 1998; Brian, et al. 1998; Bland, 1994; Leach, 1994). This diagnosis is, however, commonly confused with fibromyalgia which has also been identified as a common source of pain in the neck.

Thus, according to Brian, et al. (1998) pain is a major presenting complaint, often poorly localized; signs may lack sensitivity and specificity or may be difficult to demonstrate. The clinical symptoms and signs in the neck range in the severity from minor or/ mild discomfort to severe burning pain, with minor complaints (e.g. grating or clicking sensations) in the neck being reported commonly and moderate to severe complaints being associated with stiffness, pain, spondylosis and / or hypomobility.

In respect of mechanical pain, or pain that arises from the musculoskeletal structures in the neck, it is sometimes be divided into pain involving either the upper cervical spine or the lower cervical spine. In addition, to being classified as acute pain it is most often caused by a muscle, ligament or tendon strain (such as from the sudden force or straining the neck), and will usually heal with time and conservative treatments to alleviate pain (such as ice and/or heat, medications and / or manipulation) (Spine-health.com, 2005).

On the contrary, patients with neck pain that lasts longer than two weeks but less than three months, where the neck pain is associated with arm pain, numbness, or tingling, there is often a specific anatomic problem (e.g. pain that radiates down the arm, and possibly into the hands and fingers, caused by a cervical herniated disc or foraminal stenosis pinching a nerve in the neck). Treatment options for the neck pain will differ depending on the specific diagnosis (<http://www.spine-health.com>, 2005; Esses, 1995).

Neck pain of a longer duration is normally more complicated and results from a combination of different contributing factors, thus the assessment and treatment of such patients will be more complex and result in a more varied treatment protocol within the constraints of patient presentation.



## **2.9 CLASSIFICATION OF PAIN:**

The most common form of neck pain is usually described as deep, dull, aching pain, usually not particularly severe, but often constantly present and made worse by sudden movements or most physical activities involving the neck (Spine-health.com, 2005).

As a result this vague description, pain is felt diffusely in the neck, interscapular region or shoulder and is commonly associated with stiffness. Pain may also be referred distally into the arms, but its site does not always indicate the spinal level of the disc degeneration. A previous history of acute attacks of pain is often present, with minor attacks of pain or stiffness felt in the same distribution may have occurred (Spine-health.com, 2005). Thus, as a clinician, one needs to classify pain by location and distribution (radiation) (Weinstein et al 1995), where:

**Local pain:** is most commonly defined as pain located between the occiput and the third thoracic vertebra. (<http://www.jcca-online.org>, 2004; Cote, et al. 2003).

**Referred pain:** pain is located in the area that shares a common embryologic origin with the region involved (viscerotome, myotome, dermatome or reflex changes within the associated sclerotome). A synonym for this type of pain is sclerotomal pain (Weinstein et al. 1995).

**Radicular pain:** pain is located along the dermatomal distribution of a spinal nerve root. It may be accompanied by sensory and motor deficits. A synonym is dermatomal pain (Weinstein et al. 1995).

## **2.10 NECK PAIN AS A SYNDROME:**

Neck pain disorders are common among the general population with lifetime prevalence of 70% and point prevalence of 25% (Mäkelä, et al. 1991; Bovim, et al. 1994; Lau, et al. 1996; Cote, et al. 1998 and Silova, et al. 2004). However, working population prevalence particularly of neck pain and shoulders has consistently been found to be high, ranging from 50% to 70% (Peek, 2005; Kamwendo, et al. 1991;

Holmström, et al. 1992; Bergqvist, et al. 1995: (a); Evans and Patterson, 2000; Palmer, et al. 2001; Chiu, et al. 2002 and Gerr, et al. 2002).

Due to the varied nature of the neck pain, the presentation can vary from symptoms that seem to be less severe and diffuse to more severe pain that is often combined with shoulder and arm discomfort or pain. According to Ashton-Miller (1999:77), stiffness, tenderness and muscle pain, particularly in the neck and shoulder regions are common work-related complaints. These complaints have further been divided into common related symptoms which include: painful cramps in the shoulder, muscle pain and reduced mobility in the cervical spine, and in some cases painful radiation into the arms (Tayyri and Smith, 1997:163).

## **2.11 FACTORS THAT HAVE BEEN ASSOCIATED WITH NECK PAIN:**

According to Ariëns, et al. (2001) risks factors associated with work related musculoskeletal injuries/disorders (WRMSDs) of neck are subdivided into three categories:

- ❖ Individual factors (gender, age, and lifestyle).
- ❖ Physical factors (working posture, job activity, work station set-up and design).
- ❖ Psychosocial factors.

### **2.11.1 Gender:**

From the preceding literature review, it has been shown that neck pain is a relatively common complaint (acute and/or chronic) affecting both sexes, but more commonly women (Peek, 2005; Cote, et al.1998; Cote, et al. 2003; Eriksen, 2003; Bergqvist, et al. 1995; Evans and Patterson, 2000; Chiu, et al. 2002; and Gerr, et al. 2002). According to Bland (1994) 12% of the adult female population and 9% of the adult male population experience pain in the neck at any specific time, and 35% of people can recall an episode of neck pain. This reflects the point prevalence of neck pain found to be 15% in men and 17% in women in a sample of 800 Chinese people aged 30 years and older living in two housing blocks in Hong Kong (Lau, et al. 1996), which supports Bland (1994).

In congruence with this, Borghouts, et al. (1999), in population-based studies from Northern Sweden of 8.356 subjects, found that of the 43% of the population that reported neck pain, more women (48%) than men (38%) were represented. This concurs with Gerr, et al. (2002) who conducted a longitudinal study on neck, and shoulder disorders in computer users, and found that after a 6 month follow up period, 42% of women and 27% of men had experienced neck and shoulder symptoms.

Further to these studies, Guez, et al. (2002), found the prevalence of neck pain to be 22% among women and 16% in men. These findings are supported by Cassou, et al. (2002) and confirm the earlier studies by Bovim, et al. (1994). In addition, Bovim, et al. (1994) found that the frequency of the complaints lasting one month or longer was higher in women than in men and 13.8% of their study group reported neck pain that lasted for more than six months.

This compares favorably with the studies in which the gender of the patient was an associated factor in the development of neck pain (Peek, 2005; Cote, et al. 1998; Cote, et al. 2003; Eriksen, 2003; Bergqvist, et al. 1995; Evans and Patterson, 2000; Chiu, et al. 2002; and Gerr, et al. 2002). Thus, it could be stated that the results of this study reflect that demographic variable more closely (Cassou, et al. 2002). However, it is unknown whether the researchers utilised gender as a modifier in their analysis.

Thus, it would seem that the presentation of neck pain can modify / be modified in terms of its presentation with respect to gender.

#### 2.11.2 Age:

Irrespective of the average age at which neck pain presents in either gender (Waalén and Waalén, 1993), the risk of developing neck pain seems to increase with age up to the age of 65 years (Borghouts, et al. 1999; Cote, et al. 2003; Bergqvist, et al. 1995(a); Evans and Patterson, 2000; Holmström, et al. 1992; Kamwendo, et al. 1991; Fredriksson, et al. 2000; and Gerr, et al. 2002). As the recurrence of neck pain increases, the resolution rate of chronic neck and shoulder pain decreases with age (Cassou, et al. 2002).

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In a population-based cross-sectional mailed survey in Canada, Cote, et al. (1998) investigated the distribution, determinants and risks of spinal disorders in the province of Saskatchewan, Canada. These authors found the lifetime prevalence of neck pain to be as high as 66.7% with a point prevalence of 22.2%. Waalen and Waalen (1993) indicated that the average age of female patients to present with neck pain was 31.7 years and comparatively 31.3 years for men. In addition to this Cassou, et al. (2002) indicates with respect to chronic neck pain (associated with shoulder pain) that is not only more frequent among women than men, but also increased with age (Cassou, et al. 2002).

Bland (1994) reported that working individuals between 25 and 29 years of age have a 25%-30% incidence of one or more attack of stiff neck. This figure rises up to 50% for those over 45 years of age and 45% of working men have had at least one attack. . In addition, it was seen by Borghouts, et al. (1999) that women of working age had more neck pain than older women, a phenomenon that is not seen among men.

### **2.11.3 Posture/ lifestyle:**

In normal posture, the line of weight bearing is perpendicular through the centre of gravity. The importance of this line is its relationship to the transverse axes of rotation of the joints of the vertebral column and the lower limbs since the body tends to fall forward or backwards due to gravity according to whether the line of weight passes in front of, or behind these axes respectively (Giles, et al. 1998).

Thus, posture and movement are related to the musculature of the back, which has two functions:

- ✚ first, to hold the central supporting organ of the body (the spinal column) and its proper shape and position and
- ✚ second, to supply the force for its movement.

The muscles situated near the body's surface and more peripherally, are highly effective motor agents, whereas muscles situated adjacent to the spinal column are mainly concerned with maintenance of the posture (Giles, et al. 1998; Darby and Cramer, 1995).

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A high degree of finely coordinated muscle balance is required to support and move the head and neck. Paired lateral groups of muscles attached to the skull and the spinous and transverse processes accomplish this. Converging, deep cervical muscles ascend in front of the spine to insert in the midline of the vertebral bodies and in the anterior arch of the atlas. These muscles operate with the sternocleidomastoids and the anterior neck muscles to help resist any sudden or accidental backward movement of the skull. The spinous process of C2 is much larger than the vertebra immediately below. From the axial spinous process and its neural arch, the various deep suboccipital muscles fan outward beneath the skull to insert in the occiput. These suboccipital muscles serve to balance the skull on the upper end of the spine. More superficially, the semispinalis muscle group, arising from the spine and attached to the occiput, constitutes the thick mass of muscles at the back of the neck (Bland, 1994; Darby and Cramer, 1995).

Poor posture, in which the head is thrust forward with excessive spinal curves in the sagittal plane, sloping or hunched shoulders, protruding abdomen and hyper-extended knees may be habitual or occupational, and can be related to poor muscle tone (Chiu, et al. 2002). This can cause chronic postural strain, which, in turn, is thought to cause myofascial pain (Travell and Simmons, 1999:436). Thus, it is important that good erect posture is maintained because poor posture can greatly increase the biomechanical stresses on the cervical spine (Giles, et al. 1998; Bland, 1994; Holmström, et al. 1992; Sauter, et al. 1991).

In addition to the above, if postures do not change for a prolonged period of time, such as trunk postures during computer work the task may be called static (Wells, 1999:779). In such static postures, with lower force demands, the overall posture of the body and the number of rest pauses largely determine the loading pattern on muscles (Viikari-Juntura, 1994:847). Therefore, the larger to the loading pattern due to incorrect postures, the greater the chance of developing neck pain / discomfort, especially if rests are not utilised during the course of the working day / time in front of the computer. Chiu, et al. (2002) found that computer use exceeding 4.45 hours per day without rest periods was a risk factor for neck pain. They added that having rest hours during computer processing helped reduce severity of neck pain in the population. This supported the findings of Bergqvist, et al. (1995:(b)) where similar results found that more than 20 hours of data entry per week was a risk factor for neck/shoulder discomfort. Bergqvist, et al. (1995: (a)) thus established that limited

rest break opportunities appear to be a major contributor to neck and shoulder discomfort and cervical disorders. Tayyri and Smith (1997:371) who suggested frequent breaks or rest and neck relaxation exercises during computer use confirmed this.

Although the above literature is centered mainly on the role and function of the muscles of the neck, the motion of the spine is under the control of active spinal musculature as well as the protective support that is achieved from the complex ligamentous system. Some ligaments have a dual role (e.g., ligamenta flava are not only involved in resisting but they also resist excess separation of adjacent vertebral laminae during flexion of the neck, thereby protecting the neural elements from associated osseous structures). Thus, there are additional elements that make the cervical spine vulnerable to stressors; these include some of its neurovascular structures, which include congenital or acquired anomalies of osseous and soft tissues; and the frequent inability to protect the spine from injuries, which may lead to joint dysfunction and degeneration (Giles, et al. 1998).

In order to protect against injury, Pietri-Taleb, et al. (1994) found that physical exercise was preventative in the development of neck pain in office workers and Silova, et al. (2004) reported upper extremity dynamic muscular activity was associated with a lower prevalence of neck and shoulder pain. These both support the findings of Holmström, et al. (1992) who found that neck / shoulder trouble was greater in sedentary, overweight workers.

In addition to the above, it appears that there is an informal association between smoking, sedentary workers and neck pain. Holmström, et al. (1992) and Pietri-Taleb, et al. (1994) found weak associations between smoking and neck and shoulder disorders. Mäkelä, et al. (1991) reported a relationship between smoking and chronic neck syndrome, particularly in men, whilst Fredriksson, et al. (2000) established that smoking was associated with female gender and neck and shoulder pain. In the context of a study conducted in Durban, it would seem that the evidence is inconclusive as to whether smoking has an effect on neck and shoulder pain (Peek, 2005).

#### 2.11.4 Occupational environment:

According to Andersen, et al. (2002), it has been indicated that contrast which centres over the role of individual versus workplace factors, such as ergonomic design and patterns of computer use, have been associated with neck pain. This is in congruence with Rempel, et al. (1992) who indicates that neck pain and other extremity disorders are costly in terms of treatment, individual suffering, and time lost due to work absenteeism.

It has been shown that neck pain had a great effect on absenteeism in the workplace, with 13.5% of patients having reported up to 7 days off in the last year. Shoulder pain, associated with neck pain, did not appear to have a great impact on productivity and absenteeism in the workplace (Peek, 2005).

In a similar approach, Chiu, et al. (2002) investigated the prevalence and risk factors associated with neck pain in university staff. They found the overall 1 year prevalence rate to be 58.9% and included subjects who reported having pain before becoming staff. After exclusion of these subjects, the 1 year prevalence of neck pain after becoming academic staff was 46.7%. Similarly in Sweden, Kamwendo, et al. (1991) reported 1 year prevalence rates of 63% and week prevalence rates of 33% for neck and shoulder pain respectively in medical secretaries. Evans and Patterson (2000) found similar results in their study of non-secretarial computer users with 65% of subjects reporting pain in both neck and shoulders. Similar to these findings, Bergqvists, et al. (1995: a) found the 1 year prevalence of neck pain in computer users to be 61.5%.

The assumption that occupational factors play a role in the development of neck pain is thus supported, and a prospective longitudinal investigation of chronic neck and shoulder pain, age and working conditions by Cassou, et al. (2002) confirmed this assumption. It was found that the prevalence of neck pain was 7.8% among men and 14.8% among women in 1990 in the study completed by Cassou, et al. 2002.

In addition, it has been reported that the incidence of neck pain was 7.3% in men and 12.5% among women for the period from 1990-1995 (Cassou, et al. 2002).

According to research, greater demands placed on the working population, particularly on management and professional staff, are leading to an increase in the

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incidence of WRMSDs (Lau, et al. 1996). Changing patterns of work require non-secretarial staff to use computers more extensively in order to perform their work more efficiently. Often these personnel are not trained sufficiently in computer skills, such as typing. This is thought to lead to faulty postural habits, such as constantly looking down at the keyboard. Other factors that may vary in this group are prolonged and unvaried nature of computer use, along with its repetitiveness, associated static loads and restricted postures (Evans and Patterson, 2000).

On the converse, physically demanding work, particularly in the meat industry, has a high prevalence rate, as have jobs where there are requirements to maintain a certain head position or to bend or turn the neck frequently or for prolonged periods. Thus, prevalence rates are higher among dentists, data entry operators, and certain assembly line workers, with complaints of daily symptoms from 4% to 20% (Weinstein, et al. 1995).

People within the working environment that spend a high proportion of time travelling in vehicles, such as emergency medical care personnel, medical or other company representatives and long distance drivers that haul cargo or are responsible for long haulage (Vlok, 2005). This implication is congruent with the literature that indicates that patients suffer from cervicogenic headaches due to neck injuries (Giles et al; 1998). In addition, literature indicates that this is a major health problem in view of increasing number of motor vehicle accidents; that can cause a varied constellation of symptoms in the cervical spine (Giles et al; 1998). However, the literature does not differentiate between work and recreational motor vehicle accident.

Thus, it would seem that the frequency of neck pain in different industrial and commercial populations is quite high, approaching and sometimes surpassing, that of low back pain (Weinstein, et al. 1995). According to Dong-Chul and Blair (2003), in the United States, disorders such as carpal tunnel syndrome, tension neck syndrome and lower back pain are the most prevalent and expensive work-related injuries. In a review of current literature on this subject Street, et al. (2003) states that WRMSDs are implicated as the “prime disablers” of adult workers and are believed to account for nearly half of work related injuries.

Furthermore, Kamwendo, et al. (1991) demonstrated a significant relationship between psychosocial factors at work and neck and shoulder pain in 420 medical



secretaries. They found that lack of appraisal from superiors, high quantitative job demands and lack of job control had a significant impact on neck and shoulder pain. In addition, Carayon (1993) found a similar relationship with regard to lack of job control, but also emphasized the importance of career and future concerns as being a noteworthy contributor to these disorders. Associations between high job demands such as time pressure, high concentration and large work volume and shoulder disorders are also well established according to Viikari-Juntura (1999:847). More recently Chiu, et al. (2004) reported that perceived stress was an important contributor and should not be omitted in any work place assessment. In addition, to the above Hill, et al. (2004) conducted a study to determine the factors associated with persistent neck pain in a one year follow up study in the general population. These authors suggested that although psychosocial factors appear to be important contributors to neck pain persistence in the workplace, they are less influential as contributors in the general population as they are generic factors.

In support of the work by Kamwendo, et al. (1991), Tayyari and Smith (1997:371) further outlined some of the risks that favour the development of WRMSD's within the office environment. These authors primarily discussed the role of repetitive movements and defective or restricted postures that in turn may lead to nerve pinching, tendon irritation, and blood flow restriction. The following combination of factors is believed to have the greatest impact on the development (Tayyari and Smith, 1997:371):

- ❖ Repetitive motions with fast and forceful movements;
- ❖ Awkward work posture due to poor work habits and work station design, or improperly adjusted equipment;
- ❖ Insufficient rest breaks over long working periods, that is, uninterrupted, prolonged use of equipment.

According to Ashton-Miller, et al. (1997:77), in addition to the above-mentioned risk factors, the role of visual control and relatively high levels of mental concentration were identified as significant in the development of WMSDs (e.g. prolonged computer use). This concurs with Holmström, et al. (1992) who found that static workloads played a more significant role than dynamic work loads in the development of neck and shoulder complaints in construction workers. According to Evans and Patterson (2000) and Peek (2005), the prolonged and unvaried nature of

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computer use, along with its associated static loads and restricted postures, affect the development and progression of disorders.

Nevertheless, it has also been indicated that repetitive accumulative forces applied to tissues over prolonged periods in the same muscle group, joint or tendon may cause soft tissue microtears, trauma and the resulting inflammatory reaction may lead to tendon, synovial, muscle, and ligamentous disorders, degenerative joint disease, bursitis, and / or nerve entrapment (Rempel, et al. 1992).

To expound on the effect of WRMSDs, a population based case-control study was conducted in Sweden, 1993 to 1997 by Fredriksson, et al. (2002). It was found that strong associations exist between both physical (as supported by Van Mechelen, 2000 and, Ariëns, 2001) and psychosocial exposures. As subsequently found by Cote, et al. (2003), high quantitative job demands, low social or co-worker support, low job control, high and low skill discretion and low job satisfaction in the work environment and the pattern of care seeking for neck or shoulder pain are linked. The risk patterns differed for both sexes, and risk ratios exceeding 1.5 were more often found among women than among men.

Ariëns, et al. (2001) based the above study on a systematic review of the literature, where the systematic review of the literature was completed in order to identify the most important psychological risk factors of neck pain. It was found that a positive relationship exist between neck pain and

- ✚ Lack of job control
- ✚ High and low skill discretion
- ✚ Low job satisfaction
- ✚ High quantitative job demands: that requires sustained concentration
- ✚ Low social or co-worker support, non-meaningful work content, perceived stress, high-perceived workload and time pressure.

The above findings have been subsequently re-enforced by Luke et al. (2003) where they investigated each of the named factors more closely.

In order to quantify the exact ergonomic or work related stressors linked with the development of neck pain. Ariëns, et al. (2001) carried out a systematic review of the

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literature to identify risk factors for neck pain. The results showed some evidence for a positive relationship between neck pain and

- ✚ the duration of sitting with / without appropriate support,
- ✚ twisting ,
- ✚ bending of the trunk (hunched or crouched positions),
- ✚ neck flexion (hunched or crouched position),
- ✚ arm force,
- ✚ arm posture,
- ✚ hand-arm vibration and
- ✚ workplace design.

Inconclusive evidence was found for low supervisor support, conflicts at work and in leisure time, job strain, and low job security and limited rest break opportunities (Ariëns, et al. 2001). Some of the factors highlighted in the literature that are believed to have a significant impact in the development of neck and shoulder WRMSDs are repetition, awkward joint pressure and prolonged constrained posture. Combinations of these factors are said to significantly increase the potential for the development of WRMSDs (Rempel, et al. 1992).

In the face of the above literature, one would assume that firms would have assessed the work place for ergonomic hazards; however, Dong-Chul and Blair (2003) estimate that 80% to 85% of firms in the United States of America have not yet evaluated ergonomic hazards or implemented preventative training measures to reduce risks. Such figures would be comparable, if not greater, within the South African context, as the expertise and stake in South Africa is not as great as that from countries like the USA (Peek, 2005). In this respect Peek (2005) reported that in his study many of the participant workstations and postures were in need of rectification (mean workstation/posture score of 10.6 incorrect set-ups out of 25 per workstation). These results concur with those of Cote, et al. (2003).

### **2.11.5 Psychosocial / socioeconomic factors:**

In addition further results elaborated on in the study from Cote, et al. (2003) indicate that a positive relationship between neck pain and the following factors

- ✚ Level of education,
- ✚ Co morbidities,

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- ✚ Smoking,
- ✚ Self reported general health, and
- ✚ History of neck injury in a motor vehicle collision, have also been identified.

Again, it can be seen that level of education, smoking and self reported general health could be linked to neck pain.

Cote, et al. (2003) also stated that neck pain is more prevalent among lower socioeconomic status groups, those performing repetitive, static work or physically demanding work, those with previous neck trauma, and among those suffering from co morbid conditions such as depression, low back pain and headaches.

In a review of current literature Ariëns, et al. (2000: (a)), proposed three mechanisms that account for possible associations between psychosocial factors and musculoskeletal disorders: first, that psychosocial demands can exceed an individual's coping mechanism, resulting in stress response, increased muscle tension and static loading. Second, psychosocial demands may influence awareness and reporting of musculoskeletal disorders, or results in attribution to the work environment. Third, a psychosocial response may be indirectly associated with physical demands.

In a comparative study of three different occupational groups of working men, Pietri-Taleb, et al. (1994) found that psychosocial factors were the most influential factors in the development severe neck pain. Holmström, et al. (1992) found psychosocial factors at work and psychosomatic symptoms to be most influential and prominent factors associated with neck and shoulder trouble.

Many psychological factors are believed to contribute to the development, exacerbation and / or maintenance of chronic spinal pain (Giles, et al. 1998). High levels of distress and physical and psychosocial workplace factors are predictors of the onset of neck pain (depression, working hours per week, service sector, high job demands, and high level of distress) (Anderson, 2003; Eriksen, 2003; Carroll, et al. 2004). In addition, the use of backpacks, school bags, handbags can play a role in the occurrence of neck pain (Van Gent, 2003; Puckee, 2004; Sheir-Neiss, 2003).

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In addition to individual, biomechanical and ergonomic risk factors, psychosocial work factors and psychological stress have been linked to musculoskeletal disorders in the work environment (Peek, 2005; Kamwendo, et al. 1991; Holmström, et al. 1992; Bergqvist, et al. 1995: (a); Evans and Patterson, 2000; Chiu, et al. 2002; and Silova, et al. 2004). According to Ariëns, et al. (2001:(a)), most of the attention given to neck pain has focused on the physical risk factors, despite the fact that psychosocial risk factors also appear to play a significant role in the development of neck pain. Silova, et al. (2004) conducted a seven-year longitudinal study investigating the predictive factors for neck and shoulder pain in young adults. This study concluded that psychosomatic symptoms in adolescence were associated with a higher prevalence of neck and shoulder pain in adulthood.

One theory is that job stress may increase static muscle activity and that this may lead to increased lactic acid accumulation and loss of nutrient substrate within the muscle. The resultant pain is thus due to the inability of muscles to recover (Grieco and Molteni, 1999:1783).

### **2.12 CONCLUSION:**

Thus, neck pain has been found to be one of the most disabling conditions among other musculoskeletal problems, mostly chronic neck pain. While neck pain has been found to be very common in the population, it has been reported to be mild in nature and restricting daily activities.

The results of the studies indicate that neck pain is more common among women in the general population; women of working age tend to have more neck pain than older women and this phenomenon is not seen among men. The frequency of neck pain lasting 1 month or longer is reported to be high among women.

The frequency and risk of developing neck pain has been reported to be increasing with age. Individual lifestyle factors such as good posture and exercise may play a role in the prevention and progression of neck pain.

Literature suggests that neck pain has shown to have a great impact on work absenteeism in the work place. Job demands, the working environment, psychosocial factors at work play a role in the development of neck pain.

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Therefore, this study aimed to investigate factors associated with neck pain in the indigenous African population, in the greater Durban area by means of a case-control study.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.1 INTRODUCTION:**

This chapter is designed to address the following:

- ✚ Study design,
- ✚ Methodology used,
- ✚ Sampling procedures employed,
- ✚ Inclusion and exclusion criteria and
- ✚ Methods employed.

#### **3.2 RESEARCH DESIGN:**

A case-control study: This was questionnaire-based and required a quantitative analysis.

#### **3.3 ADVERTISING:**

Advertising was done by means of attracting people to the clinic by means of word of mouth, the use of advertising in newspapers, magazines and through pamphlet drops in areas where a high probability existed that patients would reside. Appendix I shows an advert sample that was utilised to attract the participants to this study.

As most of the respondents were predominantly Zulu speaking more frequent use was made of the Zulu advert, which was a translated version of the English counterpart, where it was requested that males and females between the ages of 21 to 60 years respond in order to participate and assist with the research study.

#### **3.4 SAMPLE:**

The ***sample method*** of choice in this study was that of convenience sampling (Black, 1999) post the advertising of the study, in that the participants that presented (***face-to-face interview***) at or phoned (***telephonic interview***) the Chiropractic Day Clinic, where scheduled to see the researcher if they met the criteria.

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Once accepted into the study, these symptomatic patients were then placed into the following stratification table to ensure that the patients were equally spread over the age and gender spectrum that was considered for this study. The reason for this was to maximize the validity of the results and make sure that the results were indeed as true as possible of the subject at hand (Black, 1999). The controls and cases were matched for a number of suspected confounders in order to isolate the effect of suspected risk factors for the disease under study.

**Table 2: Stratification table**

Age	21-30	31-40	41-50	51-60	Total
Male	25 (20)	25 (20)	25 (20)	25 (20)	100 (80)
Female	25 (20)	25 (20)	25 (20)	25 (20)	100 (80)
Total	50 (40)	50 (40)	50 (40)	50 (40)	200 (160)

\* Numbers in brackets indicate the minimum sample within each group.

The asymptomatic participants (controls) were recruited after the researcher had completed consulting all the symptomatic patients. In this respect, the researcher utilised purposive sampling (Black, 1999), where these asymptomatic patients were matched with their symptomatic counterparts in terms of age and gender. The reason for this was to provide balanced group sizes (Black, 1999).

The sample allocation for this study entailed both the application of stratified allocation as well as purposive sampling, in order to address the issues of accurate comparability of the group under study (Black, 1999).

**Sample size** was calculated at 400 people (200 symptomatic and 200 asymptomatic), to ensure that subgroup comparisons would be possible and allow for significant statistical analysis, as well as allow for generalisation of the results. The minimum numbers per group are indicated at the level of the \* below the table. In order for the participants to be included in the study, the following inclusion and exclusion criteria were applied.



### **3.4.1 Inclusion criteria:**

1. Participants had to be indigenous Africans residing in the greater Durban area.
2. Males and females were accepted into the study, as long as they were between 21 - 60 years of age. This age range was chosen in order to allow for a wide spectrum of possible causes of neck pain to be included as,
  - + Females seem to have a higher incidence of neck pain than males in the Caucasian population (Cote, et al. 1998 and Bovim, et al. 1994); however, this is not documented for the indigenous African population in the greater Durban area.
  - + Furthermore, the risk of developing neck pain seems to increase with age up to the age of 65 (Borghouts, et al. 1999).
  - + In addition, the study seemed to be a precursor for further research into the development of strategies in preventing economic loss for the business sector as related to neck pain, as neck pain has been identified as a cause of work disruption, absenteeism in a work place (Rempel, et al. 1992; Peek, 2005; <http://bmj.com/cqi> , 2003). This therefore, required that the participants needed to be within the working population which is roughly defined as being at
    - o Minimum those that have left school and completed further studies ([www.statssa.gov.za](http://www.statssa.gov.za) , 2005)
    - o Maximally until retirement, which is deemed as people that are no longer available for work or who are no longer economically active because of old age ([www.statssa.gov.za](http://www.statssa.gov.za) , 2005)
    - o Bland (1994) reported that working individuals between 25 and 29 years of age have a 25%-30% incidence of one or more attack of stiff neck. This figure rises up to 50% for those over 45 years of age and 45% of working men have had at least one attack.

3. Presentation:

Symptomatic participant needed to report pain in the neck region, which was defined as being pain (irregardless of what the duration and severity was) located between the occiput and the third thoracic vertebra. (<http://www.jcca-online.org>, 2004; Cote, et al. 2003) in order to be included in the symptomatic group.

The asymptomatic group was not allowed to have neck pain; however, they could have other musculoskeletal complaints outside of the region defined as the neck and shoulders bilaterally.

4. Signed Informed Consent Forms had to have been obtained from the participant prior to the study in order for them to participate in the study (appendix H2).
5. Only completed questionnaires (appendix G) were considered, as incomplete questions would result in data bias and a skewing of the results (Neuman, 1997).

**3.4.2 Exclusion criteria:**

1. By default people younger than 21 or older than 60 years of age, as defined by the inclusion criteria.
2. People that were not prepared to sign Informed Consent Form, as they would not agree to abide by the research parameters.
3. Any incomplete questionnaires, as incomplete questions would result in data bias and a skewing of the results (Neuman, 1997).

**3.4.3 Language as an inclusion / exclusion criteria:**

It should be noted that no restriction was placed on the ability of the patient to speak English or Zulu, as it was presupposed that when addressing this research one needed to have a questionnaire developed in the Zulu language in order to ascertain

accurately the parameters as found in this study (Kaschula, et al. 1995; Scollon, et al. 1995). This however, may have been limited by the degree of literacy found within the Zulu speaking community with regards to understanding in context all words used in an English questionnaire (Kaschula, et al. 1995; Scollon, et al. 1995), as only an English questionnaire had been developed by the researcher of the this study for the South African context. This element of translation bias would have skewed the results based purely in the participant's understanding and not that of their actual complaint (Kaschula, et al. 1995; Scollon, et al. 1995; Baynham, 1995).

Thus, a study in the concurrent validity of a developed Zulu questionnaire has been the desired forerunner for this type of research (Scollon, et al. 1995). However, with limitations in terms of resources in developing a concurrently validated Zulu questionnaire as well as the possibility that literacy (even with a Zulu questionnaire) (Kaschula, et al. 1995; Scollon, et al. 1995) could have placed the participant in the same position as with the English questionnaire, just for different reasons. It was deemed appropriate that, as the researcher is proficient in both languages, that the researcher would act as a translator and record the appropriate responses on the questionnaire (i.e. interview).

It is however, acknowledged that this approach to the research could have introduced a researcher bias (Scollon, et al. 1995; Kaschula, et al.1995), as the researcher could have had an influence in the recording of the participants responses. Methodological procedures to reduce researcher bias are indicated and discussed in context later in this methodology chapter (see questionnaire development in - 3.5.2.1).

### **3.5 DATA COLLECTION:**

#### **3.5.1 Procedure:**

When the potential participant presented to the Chiropractic Day Clinic at their scheduled time, they were presented with a Letter of Information (Appendix F) in order to familiarise them with the exact details of the research and allow them to ask further questions. Once the potential participant was satisfied that they understood what was required of them, they were requested to complete an Informed Consent Form (Appendix E)

The researcher then assisted with the completion of the form in one of the following ways:

- If the participant was able to complete the form the researcher would only assist with respect to questions raised in terms of clarity
- If the participant was unable to complete the questionnaire due to a language barrier, then the researcher would translate the question in Zulu.
- If the participant was unable to complete the questionnaire due to a literacy (unable to read) barrier, then the researcher would translate the question in a manner that was understood.

At the conclusion of this research, the participants that presented with a clinical complaint were eligible for an assessment, diagnosis and Chiropractic treatment.

Participants that were clinically asymptomatic were given a voucher (Appendix J) for a treatment of any clinical complaint. The vouchers could only be used within one month of having been a participant of this research.

### **3.5.2 Measurement tools:**

#### **3.5.2.1 Background to the development of the research instrument**

A lumbar spine questionnaire was used as a baseline (Docrat, 1999) for this current study. Understanding its limits in its application to the cervical spine, a cervical spine specific questionnaire was developed by the researcher according to a similar structure and in the context of a cervical spine literature, which addressed factors relating to the cervical spine (Scollon, et al. 1995) (Appendix G).

This questionnaire was then screened through a focus group. The function of the focus group was described as that of ensuring that the respondents responded to the questions in a way that the interpretation was congruent with the researcher's interpretation (Black, 1999).

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The focus group consisted of ten participants (Scollon, et al. 1995, Black, 1999; Bernard, 2000):

- ✚ Five students from the health sciences (three Chiropractic and two Homoeopathic students) (all bilingual: English and Zulu)
- ✚ An academic from the health sciences (bilingual: English and Zulu)
- ✚ A practitioner from the field
- ✚ An administration officer within the health department (bilingual: English and Zulu)
- ✚ The research supervisor (who also acted in the capacity of recording the focus group)
- ✚ And the researcher

These participants were enlisted via word of mouth.

Before commencing the focus group, each participant was required to:

- ✚ Read a Letter of Information (Appendix H1)
- ✚ Sign a Confidentiality Statement (Appendix H3)
- ✚ Sign an Informed Consent Form (Appendix H2)
- ✚ Sign a Code of Conduct (Appendix H4)

Thereafter, each member of the focus group was given a copy of the modified questionnaire. A short period was given for the participants to orientate themselves and read through the questionnaire, as well as write comments where they thought it appropriate on their copy of the questionnaire. The questions in the questionnaire were then sequentially discussed using a focus group procedure (Black, 1999). As this was done, comments were requested on the relevance of the questions in the context of cervical spine pain, the target population and the outcomes for the research. Any issues of ambiguity, uncertainty or confusion that arose with respect to any question in the questionnaire or problems related to layout of the questionnaire were discussed as they arose.

These discussions were required to come to a resolution in order to improve the ability of the questionnaire to meet the outcomes required in the research (Black, 1999). Thus as these inconsistencies were found and discussed and changes

proposed, a unanimous vote was required to institute change in order to achieve the questions of the final questionnaire (Appendix G) (Black, 1999).

At the end of the discussion, a chance was given for any comment on the questionnaire globally and a short review was completed in order to ensure that all omissions, additions and/or changes suggested had been captured (Black, 1999). A video of the proceedings was made and is available at the Department of Chiropractic as evidence of the individuals involved and the content of the discussion.

### 3.5.2.2 Rationale for the use of a focus group:

The reason why the focus group was chosen is that within a questionnaire one needs to address issues that surround validity, the components of which are (Bernard, 2000):

- ❖ Face validity,
- ❖ Content validity,
- ❖ Construct validity and
- ❖ Criterion / concurrent validity.

The following components of validity that were secured with a focus group were (Bernard, 2000):

1. **Face validity:** is based on a consensus among the researchers and those who participated in a focus group, that “on the face of it” the instrument seems valid, unambiguous and easily interpreted by a layperson.
2. **Content validity** is achieved when an instrument has appropriate content for measuring a complex concept, or construct.

In addition, the focus group acts as a forum in which many factors affecting language, culture / or ethnicity, gender, age, education, different parts of the country or even the city, income or occupational groups, personal histories and issues

related to understanding can be discussed and evaluated (Scollon, et al. 1995; Bernard, 2000; Black, 1999).

After completion of the focus group and in order to complement and strengthen the parameters set in place at the focus group, a ***piloting procedure*** was utilised in order to attain ***construct validity*** (this measures how accurately the answers to questions in a questionnaire reflect theoretical predictions of a particular construct) (Black, 1999).

The piloting was completed with five participants prior to the onset of the study in order to ensure issues of structure, layout and language were adequate for the layperson to understand. Small grammatical and layout issues were addressed at this phase, in keeping with the literature surrounding the functions of a piloting procedure (Black, 1999).

In addition, the piloting procedure allowed the researcher to fully familiarise herself with the questionnaire, as well as the possible questions from the participants. This assisted the researcher in giving similar responses to the participants during the data collection phase, which assisted the researcher to minimise the introduction of researcher bias (Black, 1999).

### **3.5.2.3 The structure of the questionnaire:**

A questionnaire was developed from that of Docrat (1999), which addressed the following and resulted in the final structural layout in sections of the questionnaire (Appendix G):

1. Demographics
2. Factors related to the neck pain
3. Clinical questions about neck pain

The first part of the questionnaire was designed for collecting personal information including age, gender, marital status, number of children, number of pregnancies, level of education, occupational status, type of occupation, and the duration the occupation.

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The second part of the questionnaire was designed for collecting information concerning the risk factors related to neck pain, which included the following:

Physical demands or static/and or bad postures in the work place or at home, work station set up and design, occupational factors, income, stress, means of transport, any previous motor vehicle accidents or neck trauma or episodes of neck pain, exercise, availability of medical cover and/or access to health services.

The third part of the questionnaire was designed for collecting clinical information concerning the current episode of neck pain and included the following:

The duration of neck pain, the intensity, what makes the pain worst in terms of the times of the day or activity, when is the pain better in terms of the times of the day, the frequency of the pain, the onset and progression, any disabilities and the perceptions of those disabilities and the knowledge of a possible cause of the neck pain, work absenteeism and the duration, any occupational status changes due to neck pain, and headaches.

### **3.5.2.4 The application of the questionnaire**

For purposes of obtaining the required outcomes of this study, the measurement frequency was one. This relates directly to obtaining information about a population group and not the progression of a patient over time. Therefore the application of the questionnaire was congruent with the outcomes (Black, 1999; Bernard, 2000).

## **3.6 STATISTICAL ANALYSIS:**

Data were analysed according to the following:

*Descriptive statistics* was interpreted by means of frequency tables, pie charts, bar graphs and / or in a tabular format in order to describe the sample characteristics of the population under study. Descriptive analysis involved presenting or graphing categorical variables as counts and percentages, and quantitative variables as medians and interquartile ranges due to the skewness of the data.



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*Inferential statistics* included regression analysis in order to determine any relationships between the patient's neck complaint characteristics and factors associated with the complaint. Associations between factors and neck pain were examined bivariately using Pearson's chi square or Fisher's exact tests as appropriate for categorical factors, or Mann-Whitney tests in the case of quantitative non-parametric data. Finally, in order to examine the adjusted independent effects of all factors which were found to be individually significant in the bivariate analysis, multivariate binary logistic regression analysis was done. A backwards elimination modelling technique was used, based on likelihood ratios, with entry and exit probabilities set to 0.05 and 0.010 respectively. Results were reported as odds ratios, 95% confidence intervals and p values. SPSS version 11.5 was used for data analysis (SPSS Inc, Chicago, Ill, USA). A p value of  $\leq 0.05$  was considered as statistically significant.

Chi squared analyses was utilised to assess the strength of the relationship and the degree of significance of the relationship. All statistics were done at a confidence interval of 95% and a level of significance where  $\alpha \leq 0.05$  (p-value).

## **RESULTS**

### **4.0 INTRODUCTION:**

The aims of this chapter are as follows:

- ✚ To report the results of the study,
- ✚ To interpret and discuss the findings of the study,
- ✚ To integrate and compare these findings with other studies,
- ✚ To discuss the limitations of the study and
- ✚ To discuss the hypotheses of the study.

### **DATA:**

Primary Data –

The primary data in this study was collected by means of the quantitative questionnaire developed specifically for this study.

Secondary Data

The secondary data included all data sourced in the development of the questionnaire and the writing up of this dissertation, which included but was not limited to books, journal articles, internet references, pamphlets, brochures as well as government publications.

### **KEY TERMS AND ABBREVIATIONS:**

Cases	-	Sympt	-	Symptomatic participants
Controls	-	Asympt	-	Asymptomatic participants

### **4.1 DEMOGRAPHICS:**

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**4.1.1 Age:**

The study design was a case-control ([servers.medlib.hscbklyn.edu/ebm/2500.htm](http://servers.medlib.hscbklyn.edu/ebm/2500.htm), 2006), it was therefore important that the cases and controls were similar in respect of their socio- demographic characteristics. There were similar proportions of case and controls within each age group, making them comparable in terms of age. There was no significant difference between the proportions (p=0.989). This is shown in Table 3.

**Table 3: Age group by case group (n=400)**

Pearson's chi square = 1.705, p=0.989			Group		Total
			symptomatic	asymptomatic	
Age group	18-20	Count	0	1	1
		% within Age group	.0%	100.0%	100.0%
	21-25	Count	30	30	60
		% within Age group	50.0%	50.0%	100.0%
	26-30	Count	25	25	50
		% within Age group	50.0%	50.0%	100.0%
	31-35	Count	21	24	45
		% within Age group	46.7%	53.3%	100.0%
	36-40	Count	24	20	44
		% within Age group	54.5%	45.5%	100.0%
	41-45	Count	31	31	62
		% within Age group	50.0%	50.0%	100.0%
	46-50	Count	19	21	40
		% within Age group	47.5%	52.5%	100.0%
	51-55	Count	28	27	55
		% within Age group	50.9%	49.1%	100.0%
	56-60	Count	22	21	43
		% within Age group	51.2%	48.8%	100.0%
Total		Count	200	200	400
		% within Age group	50.0%	50.0%	100.0%

Neck pain disorders have been found to be common among the general population with lifetime prevalence of 70% and point prevalence of 25% (Mäkelä, et al. 1991; Bovim, et al. 1994; Lau, et al. 1996; Cote, et al. 1998).

The prevalence particularly of neck and shoulder pain has consistently been found to be high, ranging from 50% to 70 % within the working population (Peek, 2005;

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Kamwendo, et al. 1991; Holmström, et al. 1992; Bergqvist, et al. 1995: (a); Evans and Patterson, 2000; Palmer, et al. 2001; Chiu, et al. 2002 and Gerr, et al. 2002).

From the above table it can be seen that individuals in this study between 21-25 and 26-30 years of age had a 50% rate of neck pain. In addition, individuals between 31 to 60 years of age had a 46.7% - 54.5% rate of neck pain. This may imply that the risk of developing neck pain does increase with age in this study. It is however noteworthy to realise that the average percentages in respect of prevalence is much lower in this study (Borghouts, et al. 1999; Cote, et al. 2003 Kamwendo, et al. 1991; Holmström, et al. 1992; Bergqvist, et al. 1995; Evans and Patterson, 2000; Fredriksson, et al. 2000 and Gerr, et al. 2002). This could indicate that there is a less of a predisposition of neck pain in the indigenous African population, however further analysis would need to be completed to support this implication.

These results concur with those of Bland (1994) who reported that working individuals between 25 and 29 years of age have a 25%-30% incidence of one or more attack of stiff neck. This figure rises up to 50% for those over 45 years of age and 45% of working men have had at least one attack.

There were similar proportions of case and controls within each age group, making them comparable in terms of age. Therefore, the objectives of the stratification were met.

**4.1.2 Gender:**

There were similar percentages of each gender within each case group (Table 4 – p=0.920), thus the groups were comparable in terms of gender.

**Table 4: Gender by case group (n=400)**

		Group	Total

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			symptomatic	asymptomatic	
Gender	Male	Count	101	99	200
		% within Gender	50.5%	49.5%	100.0%
	Female	Count	99	101	200
		% within Gender	49.5%	50.5%	100.0%
Total		Count	200	200	400
		% within Gender	50.0%	50.0%	100.0%

Fisher's exact tests p=0.920

Since gender was utilized as a stratification variable, this resulted in similar percentages of each gender within each case group. It was therefore not possible to recognize the differences in the prevalence of neck pain between the two genders.

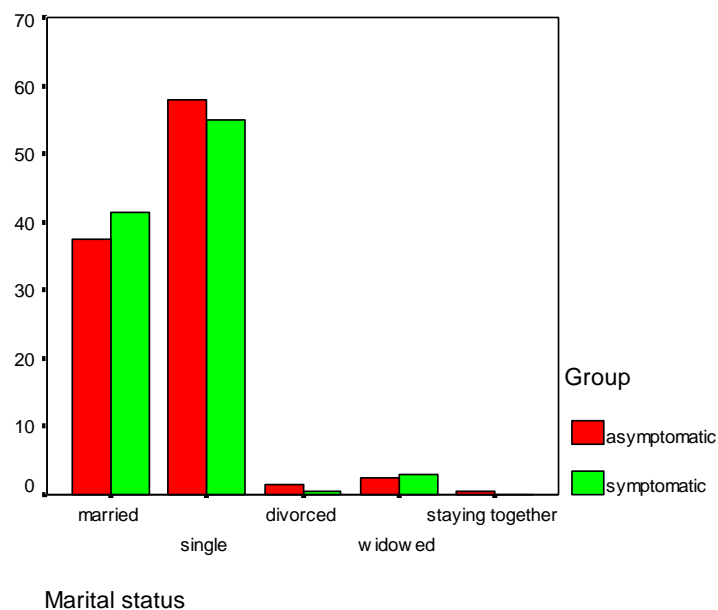
Cote, et al. (2003) conducted a population-based cohort study of neck pain and its disability in Saskatchewan, where 54.2% of the sample experienced neck pain in the last 6 months (prior to the survey). The majority of subjects had suffered from mild neck pain and 10.1% of the sample had suffered from intense neck pain, disabling neck pain affected 4-6% of the study sample. The 6-month prevalence of mild neck pain gradually decreased from 20-29 year-old age group to the 60-69 year old age group, and the prevalence of intense and disabling neck pain did not significantly vary with age. All grades of neck pain were more common in women (58.8%) than in men (47.2%).

It is however hypothesised in the literature (Peek, 2005; Cote, et al. 1998; Cote, et al. 2003; Eriksen, 2003; Bergqvist, et al. 1995; Evans and Patterson, 2000; Chiu, et al. 2002; and Gerr, et al. 2002) that women would have a higher risk of getting neck pain than males. In the African population, most married females are homemakers and young adult females that have finished school but are still unemployed staying at home (<http://www.statssa.gov.za>, 2005)

As it can not be assumed that all participants in this study had access to urban amenities it must be considered that they spend most of their time cleaning, cooking, taking care of the children, gardening, fetching water with wheelbarrows or carrying loads on their heads in order to complete daily tasks. All of these activities would be expected to add some strain to the neck and result in an increased reporting of neck pain in the female component of the study. However, this will only be seen in the correlation/inferential statistics as the demographic comparisons were predetermined.

#### **4.1.3 Marital status:**

Figure 7 shows that the proportions within each case group were similar in terms of marital status. The majority of respondents were single, followed by married, with very few in the other categories. Thus, the groups were comparable in terms of marital status.



**Figure 7: Percentage of participants by marital status and case group (n=200 per group)**

It would thus seem that although this was not a stratification variable, the groups ultimately showed proportions of marital status. This would support a suggestion that marital status should not affect any correlations (i.e. act as a modifier) between neck pain and further questions within the questionnaire, allowing for a more accurate comparison between the two groups in the study.

From the literature, however it would seem apparent that single people had a higher prevalence of neck pain compared to the other groups (i.e. divorced, widowed and staying together).

This could be associated with the fact that single people tend to be workaholics (type A personalities) (Chaitow, et al. 2000; Ariëns, et al. 2001) and therefore spend less time socializing or doing leisure activities, and lastly this could also be attributed to loneliness. The demographic results of this study however, indicate that these

factors are not necessarily pertinent to the indigenous African population, as the demographics between the marital statuses did not have a predilection for the symptomatic group. However, the correlation statistics would need to be assessed before final decisions can be made.

#### **4.1.4 No of children / pregnancies:**

The number of children and pregnancies was very similar in both groups ( $p=0.604$  and  $p=0.659$  respectively). The median number of children and pregnancies in both the cases and controls was 1. Both groups ranged from 1 to >10. This could be expected as both groups showed similarity in respect of marital status, thus predisposing to a similar number of children / pregnancies within the cases and controls.

The literature does not show that the number of children is associated with neck pain. However, having many children might predispose one to a certain amount of stress depending on the affordability to provide for those children. Making sure the children are provided for requires money (which might be difficult for people that are unemployed or do not earn enough) and time (which might be difficult for people that spent most of their time at work). In addition, in situations where the living conditions are poor there might be overcrowding, noise pollution, sleep deprivation, depression and malnutrition. This could result in stress causing tension in muscles and thus may predispose to causing neck pain. In addition, the number of children can be associated with the socioeconomic background (i.e. level of income, affordability to provide for the children ect.), level of education and therefore linked to neck pain. Lastly, it could be assumed that the number of children can be indirectly or directly linked to neck pain however only the inferential statistics discussed later would allow for this statement to be not rejected or rejected.

Nevertheless it is noted that the number of children was similar in both groups. This could be attributed to the fact that the study was done in areas around the city and most people in these areas would be expected to be aware of birth control measures and therefore would have fewer children. In the rural areas where people are either not aware of birth control methods, do not have sufficient access to such facilities (Worku, 2000) and/or because of their religion they might not believe in birth control measures (<http://www.catholic.com>; 2006). As a result, they will have quite a large

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number of children of which they do not have enough money to support or take those children to school. Therefore what occurs is parents become financially stressed and because the children do not have a lot to do besides housework tend to have their own and this becomes like a perpetual cycle of poverty which adds a lot of stress to individuals of the family.

**4.1.5 Educational level:**

The case groups were not similar with respect to highest educational qualification (Table 5). The cases seemed to be less well educated than the controls. There was a higher proportion of no schooling in the cases than in the controls. There was a higher rate of primary and secondary schooling in the controls, and the rate of tertiary education was similar in both groups. There was a significant difference in education level (p=0.002).

**Table 5: Highest education level by case group (n=400)**

Highest level of education		Group		Total
		symptomatic	asymptomatic	
Primary school	Count	25	40	65
	% within Highest level of education	38.5%	61.5%	100.0%
High school	Count	50	57	107
	% within Highest level of education	46.7%	53.3%	100.0%
Metric	Count	18	25	43
	% within Highest level of education	41.9%	58.1%	100.0%
No formal education	Count	30	9	39
	% within Highest level of education	76.9%	23.1%	100.0%
Tertiary	Count	77	69	146
	% within Highest level of education	52.7%	47.3%	100.0%
Total	Count	200	200	400
	% within Highest level of education	50.0%	50.0%	100.0%

Pearson's chi square = 16.805, p=0.002

In this study, individuals with no formal education had a higher prevalence of neck pain (76.9%) compared to the groups who had education ranging from primary school to tertiary (38.5%- 52.7%). This could lead to less knowledge or understanding in terms of what causes the pain / discomfort, available treatment

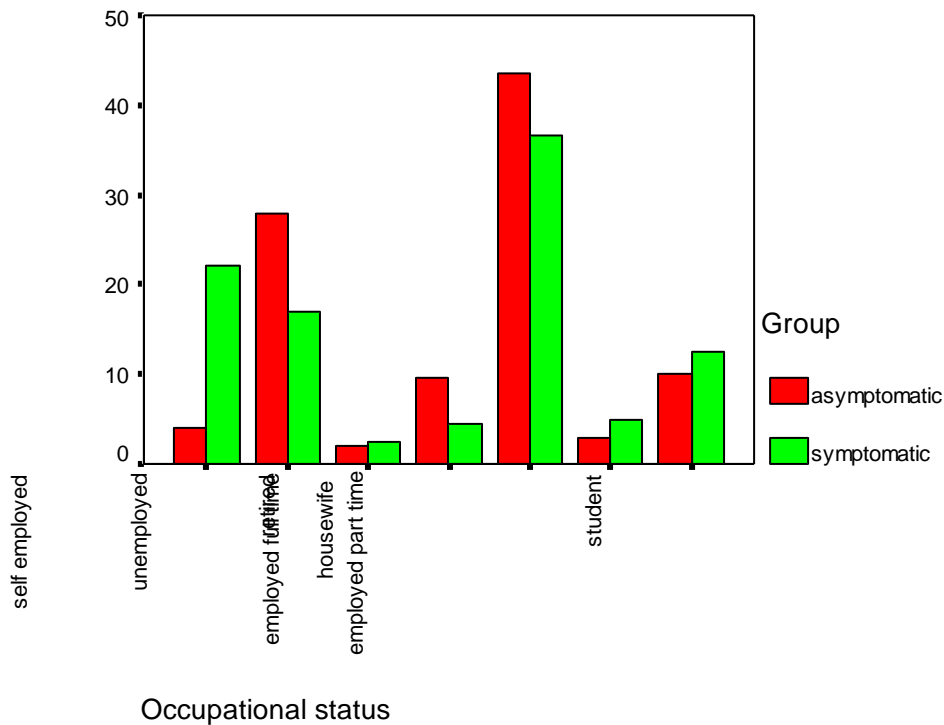


options, preventative measures, the level of seeking professional / health care, treatment affordability, and insufficient access to health services (Worku, 2000). This concurs with the findings that level of education seems to be one of the factors related to the development of neck pain (Cote, et al. 2003).

In addition and with respect to the South African context, the lower the level of education results in a greater chance that these individuals will work in factories or firms doing manual labour where it is perceived that little education is required. To add to this some of these same individuals will spend most time at home or leisure time doing housework and / or subsistence gardening (<http://www.statssa.gov.za> , 2005). This could involve strenuous physical activities, which could cause a lot of stress to the neck and shoulder area thus predisposing to neck pain (Weinstein, et al. 1995; Van Mechelen, 2000; Ariëns, 2001; Street, et al. 2003; Cote, et al. 2003).

#### **4.1.6 Employment:**

The percentage of cases seemed to be low in full time employment (ad hoc labour), less unemployed, and more self employed than the controls. This may be related to their educational status rather than their neck pain status as found in 4.1.5 (the previous section). Figure 8 shows the percentage of cases and controls in each employment category. There was a significant difference between the case groups in terms of employment status ( $p < 0.001$ ).



**Figure 8: Percentage of participants by employment status and case group (n=400)**

The working population's prevalence, particularly of neck and shoulder pain, has consistently been found to be high ranging from 50% to 70% (Peek, 2005; Kamwendo, et al. 1991; Holmström, et al. 1992; Bergqvist, et al. 1995: (a); Evans and Patterson, 2000; Palmer, et al. 2001; Chiu, et al. 2002 and Gerr, et al. 2002).

From the above results it could however be expected that those employed (part-time or full-time) would have a lesser stress than those that own businesses. It must be considered that people who are self-employed would be under a lot of strain due to greater job demands (managing the business or the staff), than those employed (part-time or full-time) (Lau, et al. 1996; Ariëns, 2001; Kamwendo, et al, 1991; Viikari-Juntura, 1999). Thus, it would seem that the cases in this study are congruent with the literature presentation in this regard.

In addition to the above, it is seen that due to high levels of unemployment (as per Figure 8) in the cases, there seems to be a correlation with increased neck pain.

This association could be based on one or more of the following factors:

- Financial status (Andersen, et al. 2002; Cote, et al. 2003),
- Increased manual labour (ad hoc) (Weinstein, et al. 1995; Van Mechelen, 2000; Ariëns, 2001; Street, et al. 2003; Cote, et al. 2003),
- Level of education (Cote, et al. 2003) and
- Perceived stress (Ariëns et al. 2001; Chiu et al. 2004).

Thus, the results seem to indicate that in the cases, they have a higher reporting of neck pain and that this could be related to:

- Less in full time employment (ad hoc labour),
- Less unemployed and as a result
- More self-employed.

The above results concur with those of Lau, et al. (1996) who reported that there are greater demands placed on the working population, particularly on management and professional staff, where there is an increased incidence of work related musculoskeletal disorders (WRMSDs).

#### **4.1.7 Previous occupational status:**

There were 90 unemployed participants (56 asymptomatic / controls and 34 cases). Table 6 shows their previous employment. The majority were not in previous employment. There was also a relatively high proportion of unskilled workers and labourers.

In order to facilitate understanding, the ***previous occupational status*** – in this study was defined as the occupation that the participants did before their current occupation, before they retired, or before they were fired, medically boarded, demoted or retrenched.

In this respect the cases should have had an increased change if having been unemployed previously as they will tend to work ad hoc or as toch labour or change jobs seasonally (dependant on were they can get employment) which may result that they have periods of time were they are not employed.

**Table 6: Previous occupation in participants who were currently unemployed (n=90)**

		Group		Total
		asymptomatic	symptomatic	
Previous occupation	Liberal profession	0	1	1
	Business	0	1	1
	Farmer	0	1	1
	Unskilled worker	20	8	28
	Housewife	1	0	1
	Sales	0	2	2
	Managerial	1	0	1
	Clerical	1	1	2
	Labourer	6	6	12
	Skilled worker	6	4	10
	Student	1	0	1
	Educator	1	0	1
	N/A	19	10	29
<b>Total</b>		<b>56</b>	<b>34</b>	<b>90</b>

N/A referred to the people that were unemployed at the time and have never worked prior to completing the questionnaire.

There were 90 unemployed participants (56 asymptomatic / controls and 34 cases). Table 6 shows their previous employment. The majority were not in previous employment. There was also a relatively high proportion of unskilled workers and labourers. **Note:** The artisan category is not shown on the table because there were no responses.

Unskilled work and labour involves many repetitive / prolonged physical demands particularly to the neck and shoulder muscles, joints or tendons, which places these structures under a lot of strain (Street, et al. 2003). This would result in micro-tears, trauma, and resulting in inflammatory reaction which may lead to tendon, synovial, muscle (stiffness and aching), and ligamentous disorders, degenerative joint disease, bursitis, and / nerve entrapment (Rempell, et al. 1992; Chaitow, et al. 2000; Cote, et al. 2003, Weinstein, et al. 1995; Van Mechelen, 2000; Ariëns, 2001). In addition to the above skilled labourers also have a high incidence of WRMSDs (Lau,

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et al. 1996). As a result, it was expected that the cases would present with a higher prevalence of complaints in contrast to the controls. This is however in contrast to the assumption made at the outset of the study that the stress of unemployment would be associated with neck pain. In addition the associated lack of economic participation with its associated stressors at the home would predispose the population under study to present with an increased likelihood of neck pathologies, which is not evident from the results. Therefore, it would seem likely that in this population there is a possible association between increased neck pain and being previously employed, however the direction of causality is not something that has been determined by this study and it is suggested that further research look into this relationship.

**4.1.8 Duration of previous occupational status:**

Of those who were employed prior to the current occupation, the most frequent duration of previous employment was 0-5 years (Table 7). Only 3 were employed for >30 years previously.

**Table 7: Duration of previous occupation in currently unemployed participants (n=90)**

***Previous occupational status*** – in this study was defined as the occupation that the participants did before their current occupation, before they retired, or before they were fired, medically boarded, demoted or retrenched.

		Group		Total
		Asymptomatic	Symptomatic	
Duration of previous occupation	0-5 years	17	10	27
	6-10 years	5	5	10
	11-15 years	6	3	9
	16-20 years	5	1	6
	21-25 years	2	4	6
	>30 years	2	1	3
	N/A	19	10	29
Total		56	34	90

**N/A** referred to the people that were employed at the time, which means they did not fall to the unemployed category.

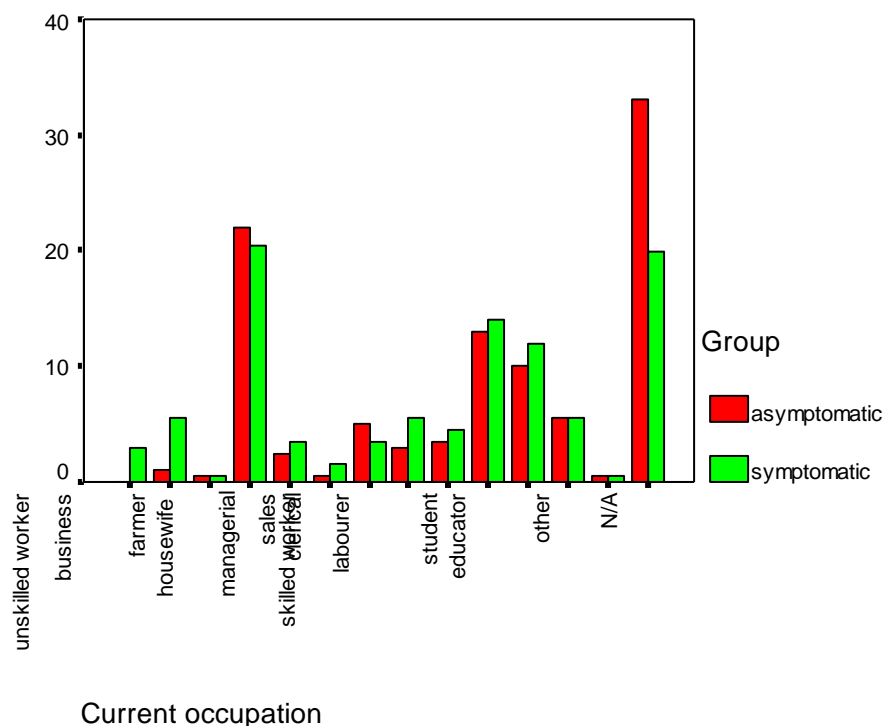
The most frequent duration of previous employment was 0-5 years; this could mean that these participants had part time jobs. In addition, this could mean that there was a high level of unemployment or low level of education among the Black population (<http://www.statssa.gov.za> , 2005). Results available in <http://www.statssa.gov.za> , 2005 indicate that when considering people that are unemployed, the number of people that have never worked is twice the number of people that have worked before and those that have worked before have done so for three years or more.

It would therefore seem that those participants that were previously employed and employed for longer periods had a decreased chance of presenting with neck pain (as per table 7); which indicates that they seem to have either developed financial coping strategies (for example savings) or alternatively have fewer financial demands (for example children have left the home or they are no longer needing to support themselves while studying).

The outcome of this result seems to support the possible association between increased risk of developing neck pain and being previously employed, however the direction of causality of neck pain as a result of previous occupational status is not something that has been determined by this study and it is suggested that further research look into this relationship.

#### **4.1.9 Current occupational status:**

Current occupation was similar in the cases and controls (Figure 9) with the major difference being that there was a higher percentage of N/A (unemployed) in the controls than the cases.



**Figure 9: Percentage of participants by occupation and case group (n=400)**

The above figure indicates that

- Asymptomatic (controls) – who are associated with unskilled jobs and unemployment are to a greater extent exposed to neck pain than
- Symptomatic (cases) – who are associated with liberal professions, business, labour, salesman, housewife, clerical, skilled worker and student

This is congruent with the discussion of the previous 3 sections (4.1.6, 4.1.7 and 4.1.8), as this section seems to indicate that the symptomatic cases seem to be more closely related to neck pain as compared to asymptomatic controls.

According to research, greater demands placed on the working population, particularly on management and professional staff, are leading to increase in the incidence of WRMSDs (Lau, et al. 1996).

However, this is not congruent with the literature, which indicates that unskilled work involves a lot repetitive/prolonged physical demands particularly to the neck and shoulder muscles, joints or tendons, which place these structures under a lot of strain. This would result in micro-tears, trauma, and resulting in inflammatory reaction which may lead to tendon, synovial, muscle (stiffness and aching), and ligamentous

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disorders, degenerative joint disease, bursitis, and/ nerve entrapment (Rempell, et al. 1992; Chaitow, et al. 2000; Cote, et al. 2003, Wenstein, et al. 1995; Van Mechelen, 2000; Ariëns, 2001). This therefore, seems to indicate that this group should have a greater predisposition to the presence of neck pain.

This is further supported by the fact that individuals who are unemployed would be expected to be under more stress due to their financial status, which could then predispose them to developing neck pain (Andersen, et al. 2002; Cote, et al. 2003). This would be supported by the fact that in the researchers experience, a lot of unemployed individuals in this population make a living by doing strenuous activities like collecting items for recycling and some of these items can be very heavy and they have to transport these manually to collection points. Some of them cut grass, fetch water (carrying it either by head or wheelbarrows), and / or do gardening. In addition to the stress of being unemployed these activities can strain the neck and shoulder structures resulting in stiffness and pain/discomfort.

Thus, it is strongly recommended that follow-up research concentrate more specifically on the effect of employment or lack thereof on the presentation of neck pain in the indigenous African population and as a result its effect on the commercial impact that it manifests on the indigenous African population.

### **4.1.10 Duration of current occupational status:**

There was a significant difference in duration of current occupation between the groups ( $p=0.004$ ). Table 8 shows that the employed cases seemed to have been employed for short durations or for very long durations, but the controls seemed to have been employed for 21-25 years. In addition, the controls seemed to report N/A (i.e. they were unemployed).



**Table 8: Duration of current occupation**

			Group		Total	
			Asymptomatic	Symptomatic		
Duration of current occupation	0-5 years	Count	30	48	78	
		Row %	38.5%	61.5%	100.0%	
	6-10 years	Count	22	26	48	
		Row %	45.8%	54.2%	100.0%	
	11-15 years	Count	27	34	61	
		Row %	44.3%	55.7%	100.0%	
	16-20 years	Count	26	32	58	
		Row %	44.8%	55.2%	100.0%	
	21-25 years	Count	23	8	31	
		Row %	74.2%	25.8%	100.0%	
	26-30 years	Count	6	10	16	
		Row %	37.5%	62.5%	100.0%	
	>30 years	Count	0	1	1	
		Row %	.0%	100.0%	100.0%	
	N/A	Count	66	41	107	
		Row %	61.7%	38.3%	100.0%	
	Total		Count	200	200	400
			Row %	50.0%	50.0%	100.0%

Pearson's chi square 21.010, p=0.004

This is variably congruent with the discussion of the previous 4 sections (4.1.6, 4.1.7, 4.1.8, 4.1.9).

Cases (symptomatic) seemed to have been employed for

- short durations (less than 20 years in the same occupation) or
- for very long durations (more than 26 years in the same occupation),

Controls (asymptomatic) seemed to have been employed for

- 21-25 years in the same occupation
- reported a high N/A (i.e. they were unemployed) – 61.7% of the asymptomatic group.

Individuals that were employed for 0-5 years had a higher risk (prevalence of 61.5%) of developing neck pain, which then gradually decreased up to 25.8% up to 20 years

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in the same occupation. This initial high reporting of neck pain could be due to stress (Viikari-Juntura, 1999; Ariëns, et al. 2001) that comes with responsibilities of a new job and / responsibilities and adjustments to the new environment.

In addition, the short period of employment indicates that the cases seem to be in a position whereby their employment status is unstable or indicates that they change more frequently as compared to the more educated controls, which have a more stable employment history, and therefore less stress than their “case” counterparts do.

These results seem to be congruent with those of 4.1.6, which indicate that in the cases, they have a higher reporting of neck pain and that this could be related to:

- Less in full time employment (ad hoc labour),
- Less unemployed and as a result
- More self-employed.

This is compounded by the fact that individuals that are unemployed would be expected to be under certain amount stress due to their financial status which could then predispose them to developing neck pain. It would however, seem that the respondents in the asymptomatic group showed a higher degree of no neck pain which would refute this assertion.

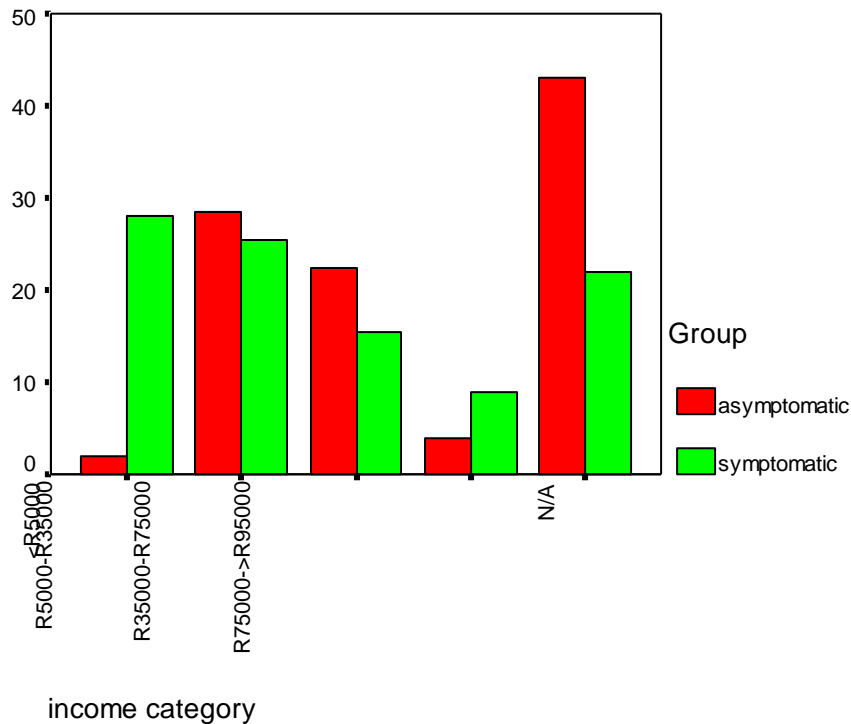
There is however, also an argument in the literature that indicates that individuals who have been employed for longer can be predisposed to neck pain. The results of the previous studies show a positive relationship between neck pain and the following factors:

- ✚ a low job satisfaction,
- ✚ high quantitative job demands,
- ✚ lack of stress coping mechanisms,
- ✚ low social or co-worker support, non-meaningful work content, perceived stress, high perceived work load (Weinstein, et al. 1995; Cote, et al. 2003; Ariëns, et al. 2001).

This is congruent with this study as it would seem that the cases are employed for longer periods the controls. Mid term (15-20 years) seems to be the best in respect of the controls and the lack of presentation of neck pain.

#### **4.1.11 Income:**

Income was unevenly distributed among cases and controls (Figure 10). The cases who were working seemed to earn less than the controls who were working. However, a higher percentage of the controls were not working (therefore N/A for income). This association was statistically significant ( $p < 0.001$ ).



**Figure 10: Percentage of participants by income level and case group (n=400)**

**N/A** means that the respondents were either unemployed, or still studying and therefore not getting any income.

Symptomatic – were highest in < R 5000 (income for living, health expenses, education etc are limited and cause stress, and the increased need for self-subsistence) and R75000 - R95000 (responsibility at work). In addition, research indicates that greater demands placed on the working population, particularly on management and professional staff, are leading to increase in the incidence of WRMSDs (Lau, et al. 1996).

Participants earning < R5000 would seem to have slightly higher risk of developing neck pain than other groups according to the literature, where poor people are particularly disadvantaged with regard to basic health services, including health education (Cote, et al. 2003; Giles, et al. 1999; Anderson, 2003; Eriksen, 2003;

Carroll, et al. 2004) which has been associated with increased stress generally as well as poor coping skills in as far as stress management.

According to Rempel, et al. (1992); Leach, (1994) and Giles, et al. 1998, neck pain and other extremity disorders are costly in terms of treatment, individual suffering, and time lost due to work absenteeism. This further compound the efforts of the participants earning less that R 5000 as they can ill afford to take leave of absence from work.

It would seem from this research, that a standard middle of the range occupation where income is stable and sufficient and meets the needs of the individual, is better then compared to the higher paid more demanding salaries or the lower paid insufficient salaries.

From the above results, it can be seen that socioeconomic status is one of the factors that is related to neck pain. However, this research design cannot distinguish whether it was the socioeconomic status, which caused the neck pain or vice versa (reverse causality) and would therefore suggest future research in this area to elucidate they type and direction of the relationship.

## **4.2 CHARACTERISTICS OF CASES:**

### **4.2.1 Age first experiencing neck pain:**

Table 9 shows the reported age when the 400 symptomatic cases (200) and asymptomatic controls (200) first experienced neck pain. Only 78 controls reported never experiencing neck pain (39%). As expected, there was a highly significant relationship between group of the participant (case or control) and age at first experiencing neck pain (as per table 9). The main difference was in the N/A group.

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**Table 9: Age first experiencing neck pain in cases (n=400)**

			Group		Total
			Asymptomatic	Symptomatic	
Age first experienced neck pain	1-10 years	Count	4	16	20
		Row %	20.0%	80.0%	100.0%
	11-15 years	Count	8	5	13
		Row %	61.5%	38.5%	100.0%
	16-20 years	Count	16	14	30
		Row %	53.3%	46.7%	100.0%
	21-25 years	Count	15	21	36
		Row %	41.7%	58.3%	100.0%
	26-30 years	Count	5	30	35
		Row %	14.3%	85.7%	100.0%
	31-35 years	Count	25	24	49
		Row %	51.0%	49.0%	100.0%
	36-40 years	Count	19	32	51
		Row %	37.3%	62.7%	100.0%
	41-45 years	Count	8	23	31
		Row %	25.8%	74.2%	100.0%
	46-50 years	Count	13	20	33
		Row %	39.4%	60.6%	100.0%
	51-55 years	Count	9	11	20
		Row %	45.0%	55.0%	100.0%
56-60 years	Count	0	4	4	
	Row %	.0%	100.0%	100.0%	
N/A	Count	78	0	78	
	Row %	100.0%	.0%	100.0%	
Total		Count	200	200	400
		Row %	50.0%	50.0%	100.0%

Pearson's chi square 121.60, p<0.001

**N/A** refers to the people that could not remember or did not really know when their neck pain started (symptomatic) or never had neck pain (asymptomatic).

It would seem that many individuals started having neck pain between the ages 1-10 (80.0%). This could be attributed to this age being within the “dysfunctional” phase as defined by Kirkaldy-Willis and Burton (1992) and Leach, (1994). At the younger end of the spectrum, the neck pain may be because of birth trauma (Leach, 1994),

whereas the older age group would be related to childhood traumas or because of the need for the child to work within the home environment (and the increased need to assume more adult responsibilities and the responsibilities of care of oneself). Treatment of these conditions depends on the health knowledge; some of the parents will not take their babies / children for check ups in hospitals or other health care providers (access, financial status, educational factors would all play a role in this (van As, 2005). If there were complications at birth (Leach, 1994) i.e. brachial plexus tension at birth that child would be at risk of having arm/neck pain problems or alternatively trauma related injured would remain chronically or persistently.

Eighty five point seven percent (n=30) started experiencing neck pain at the ages 26-30. The increased risk of neck pain at this age group could be linked to stress, occupational factors, and changes in life that could involve moving out of home, getting married or starting a family. Bland (1994) reported that working individuals between 25 and 29 years of age have a 25%-30% incidence of one or more attack of stiff neck. This figure rises up to 50% for those over 45 years of age and 45% of working men have had at least one attack (Bland, 1994).

Thus, it would seem that the presentation of neck pain per age in the case of the symptomatic respondents is similar in distribution to the literature with a marked difference being noted between the cases and the controls.

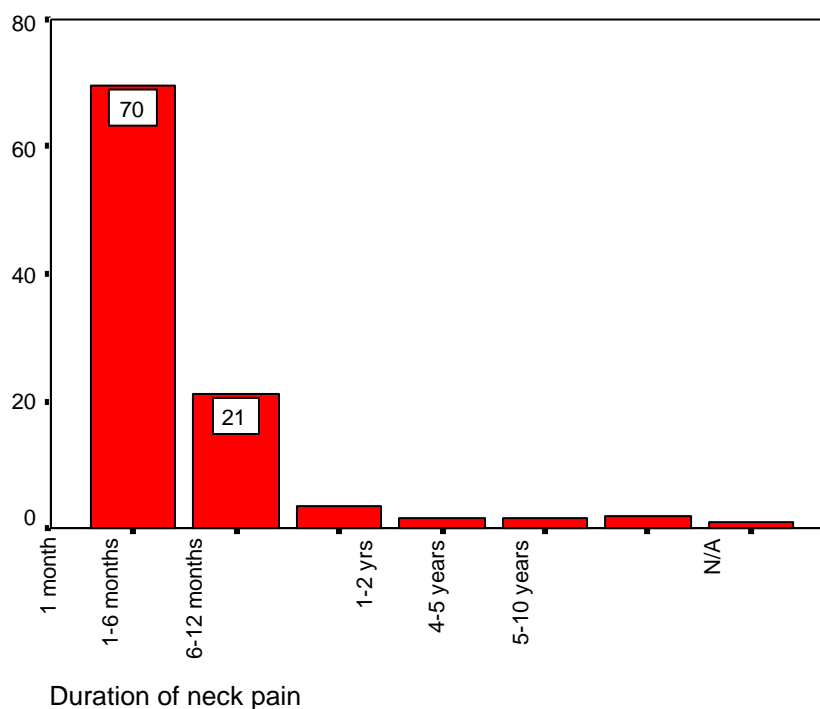
**NOTE:**

The remainder of this section deals specifically with the case group (symptomatic respondents) experienced neck pain, thus n = 200 for the description of neck pain within the case group (symptomatic respondents).

#### **4.2.2 Duration of the current episode of neck pain:**

Figure 11 shows that the duration of experiencing neck pain was mainly within 30 days or 1 month (n=139). There were 42 cases that had neck pain for the last 1-6 months, but the frequency with longer duration was small. Two respondents indicated N/A to this question, and similarly for subsequent questions these same 2 respondents answered as though they did not have neck pain even though they were classified as cases. Thus, they probably did not understand the questions or tried to please the researcher by stating what they thought that the researcher wanted to hear – this phenomenon is also referred to as respondent bias (Mouton, 1996).

In addition, these respondents could possibly not really have known the duration of their neck pain and may be there should have been a “not sure” option in the answers.



**Figure 11: Duration of having neck pain in cases (n=200)**

**Note:** there were no responses for the 3 to 4 years category.

Seventy percent of the symptomatic participants reported neck pain that has lasted for 1 month, and 21% reported neck pain with the duration of 1-6 months. This is in line with the findings of Cote, et al. (1998) who reported that 54.4% of Canadian

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adults reported having neck pain of more than 31 days in the previous 6 months. The remaining 9 % of more chronic pain noted in this study is similar to those of Bovim, et al. (1994) who reported that 13.8% of their study group had neck pain that lasted for more than six months.

Both of the above findings are in similar with Giles, et al. (1998), who found that 35-40% of the general population would suffer from neck and pain, both of which can be a major source of mechanical spinal pain, with 30% of such patients developing chronic symptoms. The only apparent difference is that there is a higher percentage of recent onset neck pain in the population under study in this study. It was further noted that the results of this study are greater than that of Peek (2005), who reported that neck pain was experienced more frequently than shoulder pain with 34.3% and 20% experiencing pain greater than 30 day in the last month.

It would therefore seem that although the findings of this study are congruent with the literature, it is noted that the symptomatic cases have a slightly higher predisposition to recent onset neck pain.

**4.2.3 Severity of current neck pain:**

The majority of cases classified their pain as mild (n=87, 43.5%). There were 55 cases each with moderate and severe pain respectively. This is shown in Table 10.

**Table 10: Severity of neck pain in cases (n=200)**

	Frequency	Percent
Mild	87	43.5
Moderate	55	27.5
Severe	55	27.5
N/A	3	1.5
Total	200	100.0

N/A referred to the participants that were unable to grade the pain

The majority of the symptomatic group (43.5%) reported their neck pain to be mild in nature. Cote, et al. (2003) conducted a population based cohort study of neck pain and its disability in Saskatchewan, where the majority of subjects had suffered from mild neck pain and 10.1% of the sample had suffered from intense neck pain, disabling neck pain affected 4-6% of the study sample. The 6-month prevalence of



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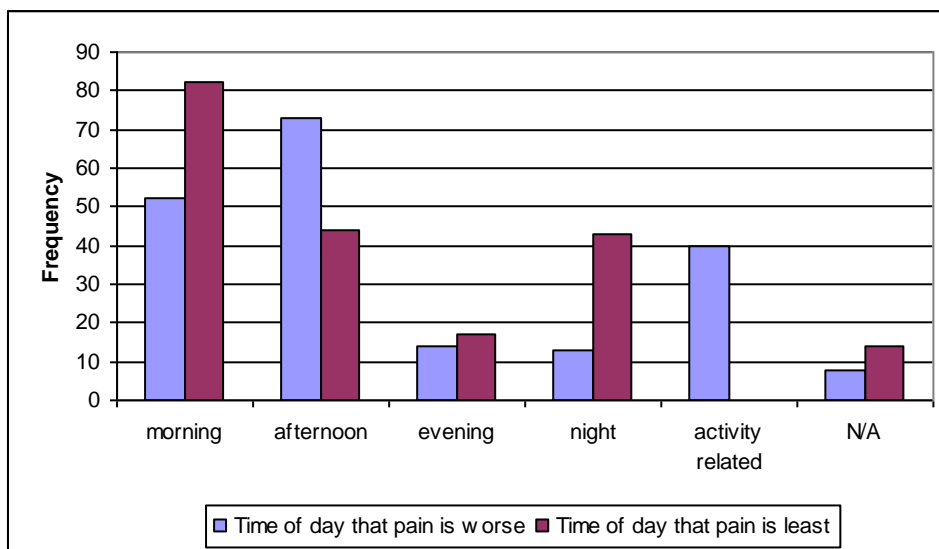
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mild neck pain gradually decreased from 20-29 year-old age group to the 60-69 year old age group, and the prevalence of intense and disabling neck pain did not significantly vary with age. All grades (mild, moderate and severe) of neck pain were more common in women (58.8%) than in men (47.2%).

Thus, when comparing the results with the literature the figures obtained suggest that while neck pain is very common in the population, most is mild in nature.

**4.2.4 Chronology of current neck pain:**

Most participants felt that their pain was worse in the afternoons or related to activities, while they felt their pain was least in the mornings. Figure 12 shows the frequencies of cases reporting time of day for worst and least pain.



**Figure 12: Time of day for worst and least pain in 200 cases**

The outcome of these findings suggests that the pain is / could be associated with different kinds of strain that the body is subjected to throughout the day, which result in stiffness and aching, and certain activities that might perpetuate pain in the already painful body part, whereas at night the body is much more relaxed which would result in less pain in the morning (Chaitow, et al. 2000).

This supports the earlier assertion that work or daily activity or stress is more strongly related to the development of neck pain.

#### **4.2.5 Frequency of current neck pain:**

Frequency of neck pain was mainly constant (36.5%), followed by frequent (32.5%) and seldom (25%). See Table 11.

**Table 11: Frequency of neck pain in cases (n=200)**

	Frequency	Percent
Seldom	50	25.0
Frequent	65	32.5
Constant	73	36.5
Intermittent	10	5.0
N/A	2	1.0
Total	200	100.0

From the above, it would seem that the respondents reported mainly constant pain, which is in similarity to Sauter, et al. (1991) who reported that constant discomfort was experienced in the neck (27%) and shoulders (10-15%) of data entry workers. In addition, Kamwendo (1991) reported that 32% and 29% of medical secretaries reported occasional pain, whilst 15% and 17% suffered constant neck pain and shoulder pain respectively.

A South African descriptive cohort study conducted by Peek (2005) on advisory and administrative staff in a selected corporate banking environment in the greater Durban area showed that constant neck and shoulder pain was experienced by 5.5% and 4.5% of the participants respectively.

However, the findings of Sauter, et al. (1991); Kamwendo, 1991 and Peek (2005) are in contrast to the fact that the majority of the symptomatics (cases) in this study were reported as being unemployed and/or employed as unskilled workers, therefore it is difficult to draw comparisons between these studies and the outcomes of this study in respect of this particular aspect of neck pain. It is therefore suggested that future research be more expansive in this area to elucidate more specific data in this regard.

#### **4.2.6 Origin of the current neck pain:**

Cases mostly reported that their pain began without injury, gradually in 67.5% and abruptly in 13.5%. Fewer cases reported pain beginning after injury (n=22 gradually and n=7 abruptly).

**Table 12: Origin of neck pain in cases (n=200)**

	Frequency	Percent
Gradually without injury	135	67.5
Gradually after injury	22	11.0
Abruptly without injury	27	13.5
Abruptly after injury	7	3.5
Unsure	7	3.5
N/A	2	1.0
Total	200	100.0

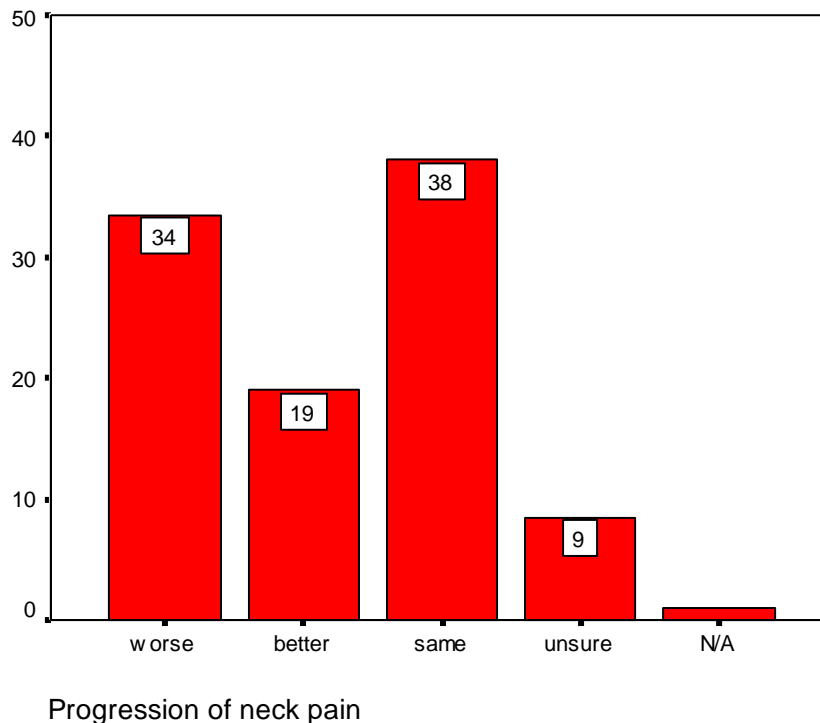
Participants mostly reported that their pain began without injury, gradually in 67.5% and abruptly in 13.5%. Fewer participants reported pain beginning after injury.

This seems to contradict the literature, where Guez, et al. (2002) found that more than 25% of the cases with chronic neck symptoms had a history of trauma and one third of these had sustained a whiplash type of injury. Guez's, et al. (2002) assertion supported Cote (2000) who stated that the prevalence of neck pain and disability is greater among individuals who have been involved in motor vehicle collision, and people who have had a lifetime history of neck injury.

However, the outcomes of this study are more congruent with Street et al. (2003) who stated that work related musculoskeletal disorders are implicated as "prime disablers" of adult workers and are believed to account for nearly half of work related injuries.

#### **4.2.7 Progression of current neck pain:**

The majority reported their neck pain to be stable (38%), while 34% felt it was getting worse and only 19% getting better. This is shown in Figure 4.2.7.



**Figure 13: Cases' perception on the progress of their neck pain (n=200)**

Most participants reported their neck pain to be stable (38%), where 34% of them said their neck pain was getting worse. These figures suggest that while neck pain is common in the population, most of it is stable in nature.

Pain has a subjective component and is perceived by the patients in relation to previous experiences with pain, usually from their early years. Many factors may influence the patient's perception of pain including the individual's general health, the nervous system's overall status, the pain's chronicity, and even the environment in which the patient lives in (Darby and Cramer, 1995).

Thus, the patient's perception about the status of the condition could vary considerably affecting the reporting of such pain in different studies dependant both on both patient perception and the instrument used to collect the data (Cote, et al. 2003).

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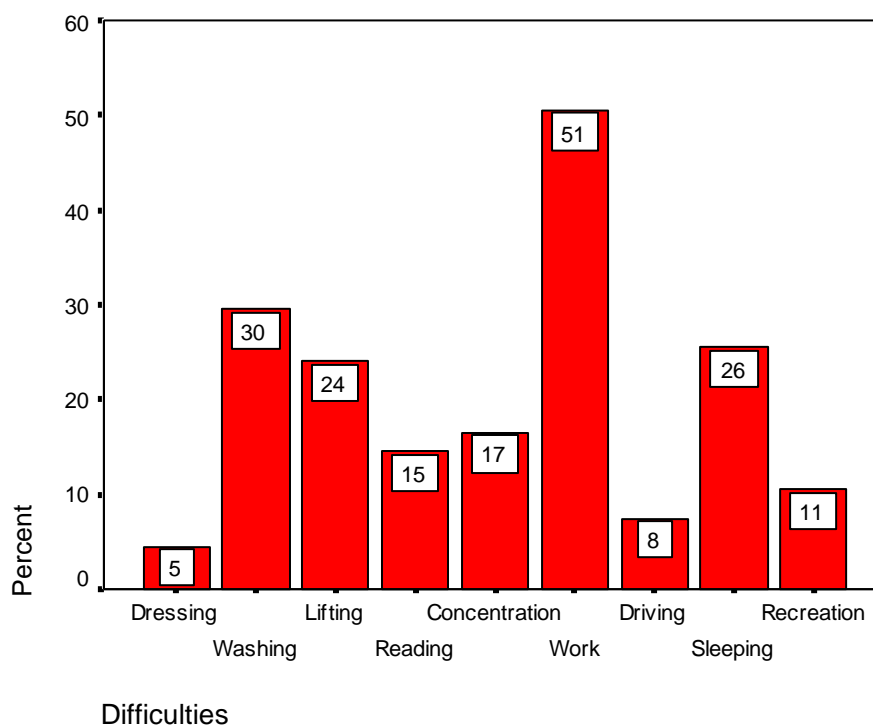
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The responses may also be directly related to the access to health care, education of the respondent in terms of health care options available to them as well as the financial ability to access health care (van As, 2005). Thus, the results may be more an indicator of an underlying problem than the neck pain itself.

It is therefore concluded that the scale on progression of neck pain in this study might have presented as a limited and gauged response to study. Therefore further research on the causality and change with time of the neck pain in relation to the various factors influencing neck pain is recommended.

**4.2.8 Activities related to current neck pain:**

More than half of the cases reported difficulty with work due to neck pain (Figure 14). Fewer reported difficulties with daily activities such as washing (30%), sleeping (26%), and lifting (24%).



**Figure 14: Percentage of cases reporting difficulties with certain activities (n=200)**

Musculoskeletal disorders are a major cause of activity limitation and long-term disability in the population, and whilst mortality is generally low, they have a major impact on society in terms of morbidity and disability (Lee, 1994). This was supported by Cote, et al. (1998) who reported that 55.4% of Canadian adults

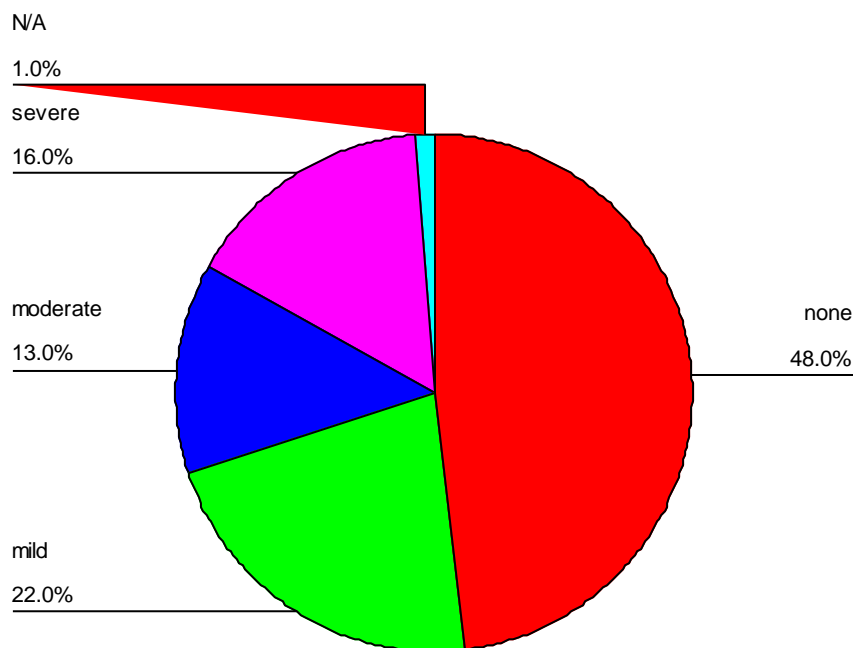
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reported having neck pain of more than 31 days in the previous 6 months, and that 4.6% experience pain that significantly restricts daily activity, influencing directly on work place and daily activity performance (Carroll et al. 1998).

These results suggest that due to pain, the participants could not perform to their best abilities. People that work in factories, do manual labour, or do many physical activities at home would not be able to perform their daily activities i.e. working, lifting, washing ect. Time is lost due to work absenteeism (Rempell, et al. 1992) and the costly treatment; both these factors could result in a lot of stress (Chaitow, et al. 2000).

**4.2.9 Disability due to current neck pain:**

Almost half of the cases rated their disability as none (48%). Only 16% reported severe disability. This is shown in Figure 15.



**Figure 15: Self-reported rating of disability in 200 cases**

Leach, (1994); Giles, et al. (1998) and Street et al. (2003) stated that work related musculoskeletal disorders have been implicated as “prime disablers” of adult workers and are believed to account for nearly half of work related injuries. Thus musculoskeletal disorders are a major cause of activity limitation and long term

disability in the population, and whilst mortality is generally low, they have a major impact on society in terms of morbidity and disability (Lee, 1994), which was also indicated by Cote et al. (2003) and Bland (1994).

Thus, it would seem that although the cases all reported neck pain the severity of the neck pain was not restrictive of their functional ability or alternatively the cases have / had found mechanism in order to deal with the presenting neck pain and yet continue with the tasks. This nevertheless, would have had an impact on the productivity of the cases. However, Peek (2005) reported that shoulder pain, as associated with neck pain, did not appear to have a great impact on productivity and absenteeism in the workplace.

Furthermore, the results are congruent with Cote, et al. (2003) who conducted a population based cohort study of neck pain and its disability in Saskatchewan. 54.2% of the sample experienced neck pain in the last 6 months before the survey, the majority of subjects had suffered from mild neck pain and 10.1% of the sample had suffered from intense neck pain, disabling neck pain affected 4-6% of the study sample. The 6-month prevalence of mild neck pain gradually decreased from 20-29 year-old age group to the 60-69 year old age group, and the prevalence of intense and disabling neck pain did not significantly vary with age. All grades of neck pain were more common in women (58.8%) than in men (47.2%).

Pain has a subjective component and is perceived by the patients in relation to previous experiences with pain, usually from their early years. Many factors may influence the patient's perception of pain including the individual's general health, the nervous system's overall status, the pains chronicity, and even the environment in which the patient lives in (Darby and Cramer, 1995).

Thus, the patient's perception about the status of the condition could vary considerably affecting the reporting of such pain in different studies dependant both on both patient perception and the instrument used to collect the data (Cote, et al. 2003).

It therefore, concluded that the scale on disability of neck pain in this study might have presented as a limitation in this study.

**4.2.10 Work absence / Bedridden related to current neck pain:**

Thirty-three percent (n=66) reported having been absent from work due to neck pain. The duration of absence in those who were absent was mainly 0-1 week (89.4%). 59 (29%) reported being bed-ridden with neck pain. The most frequent duration was also 0-1 week (81.4%).

**Table 13: Duration of absence from work and bed ridden (n=66 and n=59)**

	Frequency of duration of absence from work	Percent	Frequency of duration of being bed ridden	Percent
0-1 week	59	89.4	48	81.4
1-2 weeks	5	7.6	7	11.9
2-3 weeks	1	1.5	3	5.1
>4 weeks	1	1.5	1	1.7
Total	66	100.0	59	100.0

In section 4.2.8 fifty one percent of the cases reported difficulty with working. This could have resulted in them being absent from work.

These results concur with those of Rempel, et al. (1992) who reported that neck pain and other extremity disorders contribute to individual suffering and time lost due to work absenteeism. In addition, Peek (2005) found that neck pain had a greater effect on absenteeism in the work place: 13.5% reported having taken up to 7 days off in the last year.

These results suggest that neck pain does affect activity, work absenteeism, and bedridden in the population.

**4.2.11 Change in occupational status because of current neck pain:**

Ninety three point five percent reported no change in occupational status, while 6 (3%) were demoted, 5 (2.5%) boarded, and 2 (1%) fired (Table 4.2.11).



**Table 14: Change in occupational status due to neck pain**

	Frequency	Percent
Demoted	6	3.0
Boarded	5	2.5
Fired	2	1.0
None	187	93.5
Total	200	100.0

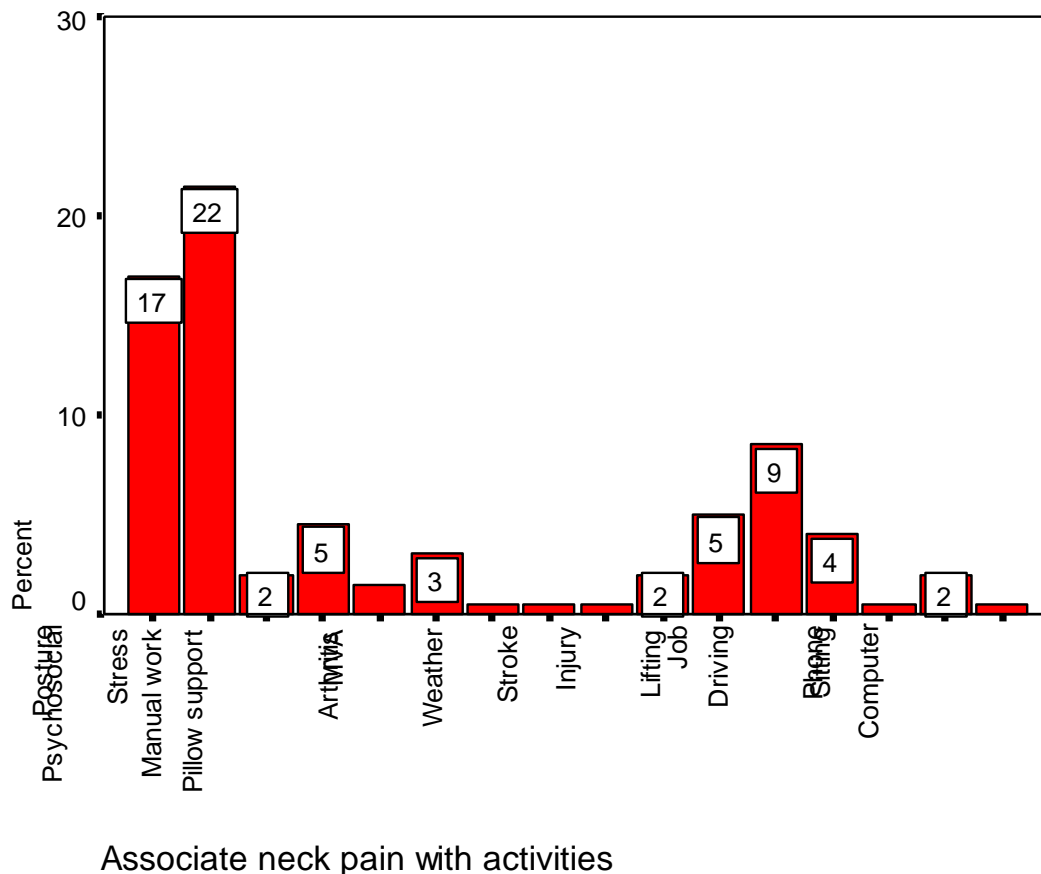
From the above sections (4.2.8, 4.2.9, 4.2.10) it appears, that neck pain does affect the people's activity, disability, work absenteeism and bedridden. However, occupational status it is not so remarkably affected.

#### **4.2.12 Associated symptoms of current neck pain:**

The majority (156=78%) of cases (n=200) reported to have suffered from headaches. This concurs with Cote et al. 2003, who indicate that headaches are more prevalent among those that are suffering from neck pain. This supported the work of Giles, et al. (1998) who indicated that many individuals suffer from cervicogenic headaches due to neck injuries. In addition, it was stated that this is a major health problem in view of increasing number of motor vehicle accidents, which can cause a varied constellation of symptoms depending on which structures are injured flexion-extension type of injuries of the cervical spine (Giles, et al. 1998)

#### **4.2.13 Related activities predisposing to current neck pain:**

Cases were asked if they associated their neck pain with any other activities. The most commonly reported factor was stress (22%), followed by bad posture (17%). The other reported factors were reported infrequently (Figure 16).



**Figure 16: Associated factors or activities for neck pain in 200 cases**

The most commonly reported factor was stress (22%), followed by bad posture (17%) and lifting (9%), which concurs with the suggestions in sections 4.1.4, 4.1.6, 4.1.11, 4.2.4, 4.2.8, 4.3.1, 4.3.2, 4.4 and seems to contradict section 4.3.1 in this study.

Psychosocial influences, (such as depression, anxiety traits, poor stress coping abilities, loneliness, fear etc.) biomechanical influences – including structural (postural or traumatically induced characteristics) or functionally induced changes (overuse, misuse) result in increased muscle tone (Chaitow, et al. 2000). Increased muscle tone will then result in a sequence of events: retention of metabolic wastes, localized oxygen deficiency, and the development of ischemia, oedema; all these factors will contribute to discomfort or pain (Chaitow, et al. 2000).

Poor posture, in which the head is thrust forward with excessive spinal curves in sagittal plane, sloping or hunched shoulders, protruding abdomen and hyper extended knees may be habitual or occupational, and can be related to poor muscle

tone (Chiu, et al. 2002). This can cause chronic postural strain, which in turn, cause myofascial pain (Travell, et al. 1999; Chaitow, et al. 2000). Thus, it is important that good erect posture be maintained because poor posture can greatly increase the biomechanical stresses on the cervical spine (Chaitow, et al. 2000; Giles, et al. 1998; Bland, 1994; Holmström, et al. 1992; Sauter, et al. 1991).

Furthermore, there is a strong association between neck pain and physically demanding work, psychosocial exposures and perceived stress in the working environment (Kamwendo, et al. 1991; Holmström, et al. 1992; Rempel, et al. 1992; Bergqvist, et al. 1995; Wenstein, et al. 1995; Tayyari and Smith, 1997; Giles et al. 1998; Evans and Patterson, 2000; Van Mechelen, 2000; Ariëns, 2001; Chiu et al. 2002; Fredrikson, et al. 2002; Andersen, 2003; Cote et al. 2003; Eriksen, 2003; Carroll et al. 2004; Chiu et al. 2004; Silova, et al. 2004 and Peek, 2005).

Thus, it would seem that the factors that predispose to neck pain as perceived by the respondents is similar irrespective of the social, cultural or ethnic backgrounds that act as points of reference for the various respondents in the cited literature.

### **4.3 FACTORS ASSOCIATED WITH NECK PAIN – BIVARIATE ANALYSIS**

#### **4.3.1 Occupational factors:**

Apart from the demographics factors already mentioned (income, education level and employment status) several other factors were also found to be associated with neck pain at the bivariate level. Table 15 below shows that those who worked in occupations that involved driving, turning the neck, answering the telephone, working in an air conditioned room, not working with arms overhead, and bending over a desk were significantly more at risk of being cases than controls.

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**Table 15: Occupational factors and neck pain (n=400)**

**Note: the table has been divided into sections that relate to the respondents generically, and then to the work environments.**

		Group				p value
		Asymptomatic		Symptomatic		
		Count	Row %	Count	Row %	
Lifting heavy objects	no	104	48.6%	110	51.4%	0.616
	yes	96	51.6%	90	48.4%	
Working on computer	no	168	51.7%	157	48.3%	0.200
	yes	32	42.7%	43	57.3%	
Computer monitor at eye level	yes	27	45.8%	32	54.2%	0.334
	no	10	38.5%	16	61.5%	
	N/A	163	51.7%	152	48.3%	

\* Statistically significant at 0.05 level

Based on the above **non-significant associations** it would seem that the respondent's occupation is ***not*** necessarily the only factor that is associated with the presence or absence of neck pain. This assertion was based on the fact that lifting heavy objects is most often completed as part of a manual labour functions as opposed to working at a computer is associated more with a skilled worker or white collar functions.

The above is re-enforced by the findings that the respondents **significantly** did ***not*** link their occupation **significantly** to the presence of neck pain.

Perceived neck pain as a result of occupation	no	151	75.1%	50	24.9%	<0.001
	yes	40	24.5%	123	75.5%	
	unsure	9	25.0%	27	75.0%	

\* Statistically significant at 0.05 level

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This concurs with the length of time in the occupation as well as the degree of stress perceived by the respondents (Ariëns. et al. 2001; Chiu, et al. 2004) – please note the sections where this was discussed.

		Group				p value
		Asymptomatic		Symptomatic		
		Count	Row %	Count	Row %	
Transport to work	own car	39	48.1%	42	51.9%	0.001*
	Taxi	116	46.6%	133	53.4%	
	Bus	30	61.2%	19	38.8%	
	Walking	0	.0%	4	100.0%	
	Train	15	88.2%	2	11.8%	
Sitting for long periods	No	50	39.1%	78	60.9%	0.004*
	Yes	150	55.1%	122	44.9%	
Turning neck	No	104	58.1%	75	41.9%	0.005*
	Yes	96	43.4%	125	56.6%	

\* Statistically significant at 0.05 level

Travelling in taxis, which is applicable to all respondents as it is the standard form of transport, seems to be one of the modifiers in respect of neck pain and its association to the work place. In addition, it is noted that perceived stress in the environment (Ariëns. et al. 2001; Chiu, et al. 2004) could be related to the presentation of stress. It is also noted that the association with transport may also be associated with the high number of motor vehicle collisions that often involve the taxis in South Africa as well as the association by the respondents of the possibility of collisions.

South Africa's road vehicle collision and fatality rates compare poorly with those of most countries. Every year 10 000 people are killed and 150 000 others are injured in approximately 500 000 crashes (<http://www.info.gov.za/aboutsa/transport.htm>, 2006; [driveandstatalive.com/info](http://driveandstatalive.com/info), 2006).

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Sitting for long periods may be applicable to any respondent as it could involve

- transport time,
- time sitting in front of the TV at home, time being immobile after activity, time at the office desk,
- working in an air-conditioned room , and answering a telephone a lot which often results in stiffness etc (Gatterman, 1990; Travell and Simmons, 1999; Chaitow and De Lany, 2000).

The results however, do not indicate that the factor is related to or inductive of pain development – i.e. the significant finding does not indicate the direction of causality.

The same is possible with respect to the turning of the neck. Although, restricted and static postures in the working environment: such as turning the neck a lot (as in answering a telephone ) posses a lot of strain on the cervical spine (Weinstein, et al. 1995; Peek, 2005; Evans and Patterson, 2000; Cote, et al. 2003; Holmström, et al. 1992; Bergqvist, et al. 1995; Silova, et al. 2004; Chiu, et al. 2002),

However, it is noted that in such postures (sitting for prolonged periods and turning the neck) people tend to thrust their heads forward with shoulders sloping or hunched and this can result in altered muscle tone resulting in pain or discomfort (Chaitow, et al. 2000; Chiu, et al. 2002).

		Group				p value
		Asymptomatic		Symptomatic		
		Count	Row %	Count	Row %	
Working in air conditioned room	no	172	53.4%	150	46.6%	0.008*
	yes	28	35.9%	50	64.1%	
Answering telephone a lot	no	175	52.6%	158	47.4%	0.032*
	yes	25	37.3%	42	62.7%	
Bend over desk	yes	31	34.8%	58	65.2%	0.002*
	no	169	54.3%	142	45.7%	

\* Statistically significant at 0.05 level

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Perceived stress in the working environment (Ariëns, et al. 2001; Chiu, et al. 2004) and working in an air-conditioned room seem to increase the risk of getting neck pain (Travel and Simons, 1999).

This has been shown in the literature where restricted and static postures in the working environment: such as bending over a desk (Holmström, et al. 1992; Bergqvist, et al. 1995; Weinstein, et al. 1995; Evans and Patterson, 2000; Chiu, et al. 2002; Cote, et al. 2003; Silova, et al. 2004; Peek, 2005) and answering a telephone a lot puts a lot of strain on the cervical spine.

Again, it must be noted that the direction of causality is not known, however the results do support the literature with respect of these actions being the origin of neck pain as found in (Holmström, et al. 1992; Weinstein, et al. 1995; Bergqvist, et al.1995; Evans and Patterson, 2000; Ariëns, et al. 2001; Chiu, et al. 2002; Cote, et al. 2003, Chiu, et al. 2004; Silova, et al. 2004; Peek, 2005).

Thus, it would seem to indicate that the results should favour an increase in neck pain in the working population.

		Group				p value
		Asymptomatic		Symptomatic		
		Count	Row %	Count	Row %	
Driving for long hours	no	175	52.7%	157	47.3%	0.023*
	yes	25	36.8%	43	63.2%	
Working with arms overhead	no	118	43.4%	154	56.6%	<0.001*
	yes	82	64.1%	46	35.9%	

\* Statistically significant at 0.05 level

It must be noted here that the direction of causality is not known, however the results do support the literature with respect of these actions being the origin of neck pain as found in (Chaitow, et al. 2000; Travell and Simmons, 1999). Thus, it would seem to indicate that the results should favour an increase in neck pain in the working population.

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Nevertheless, when looking at the overall results that were found after the analysis, the results concur with the literature, where it has been indicated that restricted and static postures in the working environment: such as bending over a desk (Weinstein, et al. 1995; Peek, 2005; Evans and Patterson, 2000; Cote, et al. 2003; Holmström, et al. 1992; Bergqvist, et al. 1995; Silova, et al. 2004; Chiu, et al. 2002), driving for long hours, turning the neck a lot, answering a telephone a lot pose a lot of strain on the cervical spine. In such postures people tend to thrust, their heads forward with shoulders sloping or hunched and this can result in altered muscle tone resulting in pain or discomfort (Chaitow, et al. 2000; Chiu, et al. 2002).

**4.3.2 Non-occupational factors:**

**Note: the table has been divided into sections that relate significance and insignificance.**

Non occupational factors which were associated with neck pain were worrying a lot, MVA, not enough bed support, not using arms to support a book, sitting without back or arm support, not watching TV a lot, and exercising.

**Table 16: Non- occupational factors and neck pain (n=400)**

		Group				P value
		Asymptomatic		symptomatic		
		Count	Row %	Count	Row %	
Neck trauma	yes	33	51.6%	31	48.4%	0.892
	no	167	49.7%	169	50.3%	
Duration of pillow use	0-1 years	30	38.5%	48	61.5%	0.317
	1-2 years	17	30.9%	38	69.1%	
	2-3 years	13	37.1%	22	62.1%	
	3-4 years	1	12.5%	7	87.5%	
	4-5 years	3	33.3%	6	66.7%	
	>5 years	57	43.8%	73	56.2%	
	N/A	1	14.3%	6	85.7%	
Number of pillow used	none	10	35.7%	18	64.3%	0.405
	1	127	52.0%	117	48.0%	
	2	59	48.8%	62	51.2%	



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	3	4	57.1%	3	42.9%	
	>3	0	.0%	0	.0%	
Holding telephone receiver between shoulder and neck	yes	59	45.7%	70	54.3%	0.285
	no	141	52.0%	130	48.0%	
Sleeping in an awkward position	yes	112	46.9%	127	53.1%	0.153
	no	88	54.7%	73	45.3%	
Sleeping on tummy	yes	97	53.0%	86	47.0%	0.316
	no	103	47.5%	114	52.5%	
Loads carried on head a lot	yes	39	47.0%	44	53.0%	0.622
	no	161	50.8%	156	49.2%	
Number of exercise sessions per week	1	5	31.3%	11	68.8%	0.081
	2	15	48.4%	16	51.6%	
	3	13	36.1%	23	63.9%	
	4	5	41.7%	7	58.3%	
	5	3	23.1%	10	76.9%	
	6	1	20.0%	4	80.0%	
	7	6	60.0%	4	40.0%	
	>7	1	50.0%	1	50.0%	
	N/A	151	54.9%	124	45.1%	
Medical cover	medical cover	46	50.5%	45	49.5%	0.993
	hospital scheme	1	50.0%	1	50.0%	
	N/A	153	49.8%	154	50.2%	
Sufficient access to health services	yes	131	50.2%	130	49.8%	1.000
	no	69	49.6%	70	50.4%	
Carry items on shoulder	yes	120	54.5%	100	45.5%	0.056
	no	80	44.4%	100	55.6%	

Neck trauma, duration of pillow use, number of pillow used, holding telephone receiver between shoulder and neck, sleeping in an awkward position, sleeping on tummy, loads carried on head a lot, carry items on shoulder, number of exercise

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sessions per week, medical cover and sufficient access to health services were found to have an insignificant relationship between themselves and their association with neck pain.

It is important to note that these are different in the literature in respect of the following: Guez, et al. (2002) found that more than one fourth of the cases with chronic symptoms had a history of trauma and one third of these had sustained a whiplash type of injury. Cote (2000) stated that the prevalence of neck pain and disability is greater among individuals who have been involved in a motor vehicle collision and people who have had a lifetime history of neck injury.

History of neck injury in a motor vehicle collision has also been identified by Cote, et al. (2003) as having a positive relationship with neck pain. In addition, literature indicates that this is a major health problem in view of increasing number of motor vehicle accidents; that can cause a varied constellation of symptoms depending on which structures are injured flexion-extension type of injuries of the cervical spine (Giles et al; 1998).

With respect to the duration and the number of pillows used, Persson and Moritz (1998) stated that an ideal pillow is the one with good shape, consistency and with firm support (soft and not too high) for the cervical lordosis. This also concurs with Lavin, et al. (1997); the arthritis research campaign's (<http://www.arc.org.uk/>, 2004); <http://www.ctds.info/chronic-neck-pain.html>, 2004) findings.

Literature states that a prolonged static posture (such as holding the telephone receiver between the shoulder and the neck, sleeping in an awkward position or sleeping on your tummy) increases the biomechanical stresses of the cervical spine. Thus affecting the development and the progression of the disease (<http://www.ctds.info/chronic-neck-pain.html>, 2004; Cote, et al. 2003; Ariëns, et al. 2001; Chaitow and DeLany, 2000; Travell and Simmons, 1999; Giles, et al. 1998; Tayyari and Smith, 1997; Bland; 1994; Holmström, et al. 1992; Sauter, et al. 1991). According Travell and Simmons (1999) heavy objects that are carried with an arm hanging down or when lifted above the shoulder level result in strain of the neck and upper arm or upper back muscles thus causing pain.

In order to protect against injury, Pietri-Taleb, et al. (1994) found that physical exercise was preventative in the development of neck pain in office workers and

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Silova, et al. (2004) reported upper extremity dynamic muscular activity was associated with a lower prevalence of neck and shoulder pain. These both support the findings of Holmström, et al. (1992) who found that neck / shoulder trouble was greater in sedentary overweight workers. According to Rempel, et al. (1992); Leach, (1994) and Giles, et al. 1998 neck pain and other extremity disorders are costly in terms of treatment.

**In terms of the significant findings, the following were noted:**

		Group				P value
		asymptomatic		symptomatic		
		Count	Row %	Count	Row %	
Worry a lot	yes	119	45.6%	142	54.4%	0.021*
	no	81	58.3%	58	41.7%	
MVA	yes	41	39.4%	63	60.6%	0.016*
	no	159	53.7%	137	46.3%	
Bed offer enough support	yes	184	57.9%	134	42.1%	<0.001*
	no	16	19.5%	66	80.5%	
Arms support a book	yes	134	59.6%	91	40.4%	<0.001*
	no	66	37.7%	109	62.3%	
Sit without back support	yes	61	37.2%	103	62.8%	<0.001*
	no	139	58.9%	97	41.1%	
Sit without arm support	yes	124	44.0%	158	56.0%	<0.001*
	no	76	64.4%	42	35.6%	
Watch TV a lot	yes	87	56.9%	66	43.1%	0.039*
	no	113	45.7%	134	54.3%	
Exercise	yes	49	39.8%	74	60.2%	0.009*
	no	151	54.5%	126	45.5%	
Time spent exercising (hours)	<1	7	38.9%	11	61.1%	0.005*
	1-3	25	41.7%	35	58.3%	
	4-6	3	14.3%	18	85.7%	
	7-9	6	66.7%	3	33.3%	
	>10	8	47.1%	9	52.9%	
	N/A	151	54.9%	124	45.1%	

\* Statistically significant at 0.05 level

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It was found that the symptomatic respondents had higher associations that were significant if the respondents:

- worried a lot (which concurs with the literature as depicted by Weinstein, et al. 1995; Peek, 2005; Evans and Patterson, 2000; Holmström, et al. 1992; Bergqvist, et al. 1995; Silova, et al. 2004; Chiu, et al. 2002; Cote, et al. 2000; Cote, et al. 2003; Kamwendo, et al. 199; <http://www.arc.org.uk/>, 2004),
- had had a previous MVA (which concurs with Giles, et al. 1998)
- sat without back support (Travel and Simons, 1999; Chaitow, et al. 2000; ) ,
- sat without arm support and (Travel and Simons, 1999; Chaitow, et al. 2000 )
- did exercise (Travel and Simons, 1999; Chaitow, et al. 2000).

In the asymptomatic group, it was found that their lack of neck pain had significant associations with them:

- slept on a bed which offered enough support,
- read with their arms supporting the book,
- watched TV a lot and
- spent little (or less time) time exercising.

### **4.4 FACTORS ASSOCIATED WITH NECK PAIN – MULTIVARIATE ANALYSIS:**

In a multivariate logistic regression analysis, the factors independently associated with neck pain were identified in Table 4.4. Having an occupation involving driving increased the risk 2.5 fold, turning the neck a lot by 2.2 times, and worrying a lot by 1.9 times. Working on a computer was protective for neck pain. The lower the income level, the higher the risk for neck pain. Those earning <R5000 per year were 11.5 times at higher risk than those earning above R75 000 annually. Insufficient bed support was a 4.7 fold risk, and sitting without arm support increased the risk by 2.7 times. Using arms to support a book was protective of neck pain. Some of these factors may have been related to neck pain due to their being consequences of the neck pain (e.g., those people with neck pain probably found it difficult to use their arms to support a book, which is the reason for this protective association found).

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**Table 17: Logistic regression analysis of factors associated with neck pain (n=400)**

**Note: the table has been divided into sections that relate to significant and insignificant findings.**

Factors that did not have a significant association with the symptomatic and asymptomatic groups of respondents included the income ranges from R 5000 through R 75000). **Insignificant** multivariate analysis results are as indicated on the table below.

	B	S.E.	Wald	df	p value	OR	95.0% C.I. for OR	
							Lower	Upper
INCOME (R5000- R35000)	.673	.355	3.598	1	.058	1.960	.978	3.927
INCOME (R35000 – R75000)	-.081	.450	.032	1	.858	.922	.382	2.227
INCOME (none)	1.089	.721	2.277	1	.131	2.970	.722	12.212

**Significant** multivariate analysis results are indicated on the table below.

	B	S.E.	Wald	df	p value	OR	95.0% C.I. for OR	
							Lower	Upper
DRIVING	.903	.424	4.530	1	.033*	2.466	1.074	5.662
TURNING	.780	.314	6.170	1	.013*	2.182	1.179	4.039
WORKING ON A COMPUTER	-.957	.422	5.143	1	.023*	.384	.168	.878
WORRY	.665	.300	4.921	1	.027*	1.945	1.081	3.501
INCOME (baseline R75 000 to R95000)			20.376	4	<.001*			
INCOME (<R5000)	2.441	.622	15.404	1	<.001*	11.480	3.393	38.836
INSUFFICIENT BED SUPPORT	1.554	.418	13.841	1	<.001*	4.728	2.086	10.719
ARMS SUPPORT A BOOK	-1.003	.287	12.192	1	<.001*	.367	.209	.644
SIT WITHOUT ARM SUPPORT	.993	.307	10.450	1	.001*	2.699	1.478	4.929
Constant	-2.697	.618	19.026	1	<.001*	.067		

\* Statistically significant at 0.05 level

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Driving, turning the neck, worrying, insufficient bed support and sitting without arm support are **significantly positively** related to neck pain. On the converse, working on a computer, having the arms supporting a book and neck pain being constant in frequency, seems to be **significantly negatively** related to the neck pain i.e. these factors decreased the risk of neck pain.

People within the working environment that spend a high proportion of time travelling in vehicles, such as emergency medical care personnel, medical or other company representatives and long distance drivers that haul cargo or are responsible for long haulage (Vlok, 2005). In addition, driving involves a lot of sitting, turning the neck and exposing the muscles to cold draft resulting in stiffness (Travell and Simmons, 1999).

It was found that when comparing the symptomatic respondents to the asymptomatic worrying was associated to a greater degree with the symptomatic respondents, which concurs with the literature as depicted by Weinstein, et al. 1995; Peek, 2005; Evans and Patterson, 2000; Holmström, et al. 1992; Bergqvist, et al. 1995; Silova, et al. 2004; Chiu, et al. 2002; Cote, et al. 2000; Cote, et al. 2003; and Kamwendo, et al. 1991.

According to Rempel, et al. (1992); Leach, (1994) and Giles, et al. (1998) neck pain and other extremity disorders are costly in terms of treatment. Pain and stiffness can be caused by a bed that is too soft and therefore not giving the spine the correct support needed (<http://www.arc.org.uk/>, 2004). Travel and Simmons (1999) stated that sitting in a chair without adequate armrests would result in biomechanical stresses in the neck. Reading in bed can cause neck strain especially if you are propped up on several pillows, bending your neck forward, and trying to hold the book with your arms out in order to support a book (Travell and Simmons, 1999; van Mechelen, et al. 2000; Ariëns, et al. 2001). The above studies seem to concur with the results of this study.

### **Contrary to the findings of this study:**

Evans and Patterson (2000) found that 65% of non-secretarial computer users reported pain in both neck and shoulders. Similar to these findings, Bergqvists, et al. (1995: a) found the 1-year prevalence of neck pain in computer users to be 61.5%.

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The results of this study showed that working on a computer a lot is significantly not associated with neck pain. Peek (2005) found no significant association between hours per day at a computer and severity of neck and shoulder pain.

It would seem that there is no significant association between the time spent working on a computer and neck pain, however this assumption needs to be investigated further.

### **4.5 LIMITATIONS:**

This study was essentially a case-control study due to the manner of selection of participants (based on their outcome status – i.e. neck pain), which is considered as a good design for identifying causal factors for diseases. The questionnaire was for the most part cross-sectional (i.e., asking participants about their behaviours now). Thus, the associations observed may be subject to reverse causality, i.e. the current behaviours may be due to the neck pain and not have caused it. Thus, this study does not necessarily identify factors which increase the risk of neck pain but rather a mix of causal factors, and factors, which are concurrently associated with having neck pain (and might be because of the neck pain). It is further recognized that those portions of the questionnaire that were retrospective in nature are subject to respondent's memory decay (Mouton, 1969).

### **4.6 SUMMARY OF THE RESULTS:**

The results of the study showed that there are significant demographic, occupational and non-occupational factors associated with neck pain in the indigenous African population. Individuals between 21-25 and 26-30 years of age had a 50% prevalence of neck pain, individuals between 31 to 60 years of age had 46.7% - 54.5% prevalence, and this profile is comparable to international studies (Drews, 1994; Aker, et al; 1996; Gore, 1998, Cassidy, 1992; Borghout, et al. 1999; Cote, et al. 2000; James, et al. 1995).

The cases seemed to be not as educated as the controls (Cote, et al. 2003). The cases also seemed to earn less than the controls who were working. Participants earning >5000 per year had slightly higher risk of developing neck pain than other

groups. Neuromusculoskeletal disorders have been found to be higher among lower socioeconomic status groups.

Poor people are particularly disadvantaged with regard to basic health services, including health education (Cote, et al. 2003; Giles, et al. 1999; Anderson, 2003; Eriksen, 2003; Carroll, et al. 2004). To complicate this and according to Rempel, et al. (1992), neck pain and other extremity disorders are costly in terms of treatment and therefore less accessible to the respondents.

The duration of neck pain was mainly 1 month (n=139). There were 42 cases who had neck pain for the last 1-6 months, but the frequency with longer duration was low (Bovim, et al. 1994). In contrast to these, previous studies (Peek, 2005; Giles, et al. 1998; Cote, et al. 1998; Cote, et al. 2003) reported that neck pain of more than 30 days duration was more frequently reported (30 – 50%). The majority of cases classified their pain as mild (n=87, 43.5%) and there were 55 cases each with moderate and severe pain respectively. This is comparable to Cote, et al. 2003.

Frequency of neck pain was mainly constant (36.5%) (Sauter, et al. 1991), followed by frequent (32.5%) and seldom (25%). Cases mostly reported that their pain began without injury, gradually in 67.5% and abruptly in 13.5%. These results differ from the international studies of Guez, et al. (2002) and Cote, (2000) who found that more than 25% of the cases had a history of neck trauma, and one third of these had sustained a whiplash injury/ or have been involved in a motor vehicle accident .

More than half of the cases reported difficulty with work due to neck pain (Cote, et al. 1998; Carroll, et al. 1998). Fewer reported difficulties with daily activities such as washing (30%), sleeping (26%), and lifting (24%). Almost half of the cases rated their disability as none (48%). Only 16% reported severe disability as comparable to Cote, et al. (2003); Street, et al. (2003); Lee, (1994); Bland, (1994). Thirty-three percent (n=66) reported having been absent from work due to neck pain as comparable to Peek, (2005). The duration of absence in those who were absent was mainly 0-1 week (89.4%) (<http://bmj.com/cg1>, 2003). One hundred and fifty six (78%) reported suffering from headaches, which supports the outcomes of Giles, et al. (1998); Cote, et al. (2003).



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Cases were asked if they associate their neck pain with any other activities. The most commonly reported factor was stress (22%), followed by bad posture (17%). The other reported factors were reported infrequently. Those who worked in occupations that involved driving, turning the neck, answering the telephone, working in an air-conditioned room, and bending over a desk were significantly more at risk of being cases than controls. Non occupational factors which were associated with neck pain were worrying a lot, motor vehicle accident, not enough bed support, not using arms to support a book, sitting without back or arm support, not watching TV a lot, and exercising.

## **CHAPTER FIVE**

### **CONCLUSION AND RECOMMENDATIONS**

#### **5.1 CONCLUSION:**

With respect to the objectives as outlined in chapter one, these are now revisited with respect to the outcomes in this study.

**Objective One** was to investigate factors associated with neck pain in the indigenous African population in the greater Durban area.

**Hypothesis One** stated that there would be a difference in terms of the factors associated with neck pain in the indigenous African population, when compared to the literature.

The results of the study show that individuals between 21-25 years of age and 26-30 years of age had a 50% rate of neck pain. In addition, individuals between 31 to 60 years of age had 46.7% - 54.5% rate of neck pain. Individuals with no formal education had a higher rate of neck pain (76.9%) compared to the groups who had primary school to tertiary (38.5%- 52.7%) educational qualification. The cases who were working seemed to earn less than the controls who were working. There was a highly significant relationship between the group of the participants (case or control) and age at first experiencing neck pain. Seventy percent of the symptomatic participants reported neck pain that has lasted for 1 month, and 21% reported neck pain with duration of 1-6 months. Most participants felt that their pain was worst in the afternoons or related to activities, while they felt their pain was least in the mornings.

The majority of cases classified their pain as mild (n=87, 43.5%). There were 55 cases each with moderate and severe pain. Frequency of neck pain was mainly constant (36.5%), followed by frequent (32.5%) and seldom (25%). Most participants reported their neck pain to be stable (38%), while 34% of them said their neck pain was getting worse. More than half of the cases reported difficulty with work due to neck pain. Fewer reported difficulties with daily activities such as washing (30%), sleeping (26%), and lifting (24%). Almost half of the cases rated their disability as

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none (48%). Only 16% reported severe disability. Thirty-three percent (n=66) reported having been absent from work due to neck pain. The duration of absence in those who were absent was mainly 0-1 week (89.4%). The cases (59 (29%) reported being bed-ridden with neck pain. The most frequent duration was also 0-1 week (81.4%).

Ninety three point five percent reported no change in occupational status, while 6 (3%) were demoted, 5 (2.5%) boarded, and 2 (1%) fired. One hundred and fifty six respondents 156 (78%) (n=200) reported suffering from headaches. Cases were asked if they associated their neck pain with any other activities. The most commonly reported factor was stress (22%), followed by bad posture (17%) and lifting (9%). The other reported factors were reported infrequently. Participants who worked in occupations that involved driving, turning neck, answering the telephone, working in an air conditioned room, not working with arms overhead, and bending over a desk were significantly more at risk of being cases than controls.

Non occupational factors which were associated with neck pain were worrying a lot, MVA, not enough bed support, not using arms to support a book, sitting without back or arm support, not watching TV a lot, and exercising. Due to the above findings, the **first hypothesis** is rejected.

**Objective Two** was to describe the relationship between the factors and neck pain.

**Hypothesis Two** stated that there would be a relationship between associated factors and neck pain within the indigenous African population.

The cases seemed to be less in full time employment (ad hoc labour), less unemployed, and more self-employed than the controls. The above figure indicates that

- Asymptomatic (controls) – associated with unskilled jobs and unemployment to a greater extent than
- Symptomatic (cases) – liberal profession, business, labour, salesman, housewife, clerical, skilled worker and student

Participants mostly reported that their pain began without injury, gradually in 67.5% and abruptly in 13.5%. Fewer participants reported pain beginning after injury. Neck

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trauma, duration of pillow use, number of pillows used, holding the telephone receiver between the shoulder and neck, sleeping in an awkward position, sleeping on the tummy, loads carried on head a lot, number of exercise sessions per week, medical cover and sufficient access to health services were found to have an insignificant relationship between themselves and their association with neck pain.

On the converse, working on a computer, having the arms supporting a book and neck pain being constant in frequency, seems to be significantly negatively related to the neck pain. Due to these results ***hypothesis two*** is rejected.

The results of this study as discussed in chapter four, illustrate the nature and complexity of factors associated with the development and progression of neck pain in the indigenous African population. The results also show that there are similarities and differences when compared to the previous literature. However, this could have resulted from a smaller sample size, which might have not been the true representation of the population at large.

### **5.2 RECOMMENDATIONS:**

- In the literature review, it was mentioned that previous researchers have found inconclusive results about a relationship between smoking and neck pain; however, this factor was not investigated in this study. It is suggested that future studies do include this factor.
- Factors like gender, the number of children, stress and associations to neck pain need to be investigated further.
- During the data collection, it was observed that not many indigenous Africans were aware about Chiropractic and the neuromusculoskeletal disorders in general. Therefore a perception study about Chiropractic and neuromusculoskeletal disorders among the indigenous African population should be done. In addition, the population must be educated about the role of Chiropractors in providing basic health services.
- If the questionnaire is to be used for future studies it is suggested that certain questions be modified in order to be more specific, categories must not

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overlap, N/A must be included where necessary. Some of the available standard questionnaires must be used.

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Statistical release  
P0210

Isiphatshelwa lesi Afrika Borwa • Statistiek Suid-Afrika • Tshatshatshi la Afrika Borwa • Ukuqokokekwa kwamaqandisi eNingizimu Afrika

**Labour force survey**  
September 2004

Embargoed until  
31 March 2005  
13:00

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## **APPENDIX: A**

**DURBAN INSTITUTE OF TECHNOLOGY**  
**CHIROPRACTIC DAY CLINIC**  
**CASE HISTORY**

Patient: \_\_\_\_\_ Date: \_\_\_\_\_

File #: \_\_\_\_\_ Age: \_\_\_\_\_

Sex : \_\_\_\_\_ Occupation: \_\_\_\_\_

Intern: \_\_\_\_\_ Signature: \_\_\_\_\_

**FOR CLINICIANS USE ONLY:**

Initial visit

Clinician: \_\_\_\_\_ Signature: \_\_\_\_\_

**Case History:**

Examination:

Previous:  
Current:

X-Ray Studies:

Previous:  
Current:

Clinical Path. lab:

Previous:  
Current:

**CASE STATUS:**

PTT:	Signature:	Date:
------	------------	-------

**CONDITIONAL:**

Reason for Conditional:

.....

.....

.....

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Conditions met in Visit No:	Signed into PTT:	Date:
Case Summary signed off:		Date:

***A case - control study investigating factors associated with neck pain in the indigenous African population in the greater Durban area.***

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**Intern's Case History:**

- 1. Source of History:**
- 2. Chief Complaint: (patient's own words):**
- 3. Present Illness:**

	<b>Complaint 1</b>	<b>Complaint 2</b>
<input type="checkbox"/> Location <input type="checkbox"/> Onset : Initial: Recent: 1. Cause: <input type="checkbox"/> Duration <input type="checkbox"/> Frequency <input type="checkbox"/> Pain (Character) <input type="checkbox"/> Progression <input type="checkbox"/> Aggravating Factors <input type="checkbox"/> Relieving Factors <input type="checkbox"/> Associated S & S <input type="checkbox"/> Previous Occurrences <input type="checkbox"/> Past Treatment < <b>Outcome:</b>		

- 4. Other Complaints:**
- 5. Past Medical History:**
  - General Health Status
  - Childhood Illnesses
  - Adult Illnesses
  - Psychiatric Illnesses
  - Accidents/Injuries
  - Surgery
  - Hospitalizations

***A case - control study investigating factors associated with neck pain in the indigenous African population in the greater Durban area.***

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**6. Current health status and life-style:**

- Allergies
- Immunizations
- Screening Tests incl. x-rays
- Environmental Hazards (Home, School, Work)
- Exercise and Leisure
- Sleep Patterns
- Diet
- Current Medication
- Analgesics/week:
- Tobacco
- Alcohol
- Social Drugs

**7. Immediate Family Medical History:**

- Age
- Health
- Cause of Death
- DM
- Heart Disease
- TB
- Stroke
- Kidney Disease
- CA
- Arthritis
- Anaemia
- Headaches
- Thyroid Disease
- Epilepsy
- Mental Illness
- Alcoholism
- Drug Addiction
- Other

**8. Psychosocial history:**

- Home Situation and daily life
- Important experiences
- Religious Beliefs

**9. Review of Systems:**

- General
- Skin
- Head
- Eyes

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- Ears
- Nose/Sinuses
- Mouth/Throat
- Neck
- Breasts
- Respiratory
- Cardiac
- Gastro-intestinal
- Urinary
- Genital
- Vascular
- Musculoskeletal
- Neurologic
- Haematologic
- Endocrine
- Psychiatric

**APPENDIX: B – as per page 110**

***A case - control study investigating factors associated with neck pain in the indigenous African population in the greater Durban area.***

**PHYSICAL EXAMINATION: SENIOR**

**Patient Name :**  
**Student :**

**File no :**  
**Signature :**

**Date :**

**VITALS:**

Pulse rate:		Respiratory rate:	
Blood pressure:	R	L	Medication if hypertensive:
Temperature:		Height:	
Weight:	Any recent change? Y / N	If Yes: How much gain/loss	Over what period

**GENERAL EXAMINATION:**

General Impression	
Skin	
Jaundice	
Pallor	
Clubbing	
Cyanosis (Central/Peripheral)	
Oedema	
Lymph nodes	Head and neck
	Axillary
	Epitrochlear
	Inguinal
Pulses	
Urinalysis	

**SYSTEM SPECIFIC EXAMINATION:**

CARDIOVASCULAR EXAMINATION
RESPIRATORY EXAMINATION
ABDOMINAL EXAMINATION
NEUROLOGICAL EXAMINATION
COMMENTS

**Clinician:**

**Signature :**

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**APPENDIX: C**

**DURBAN INSTITUTE OF TECHNOLOGY  
REGIONAL EXAMINATION - CERVICAL SPINE**

Patient: ..... File No: .....

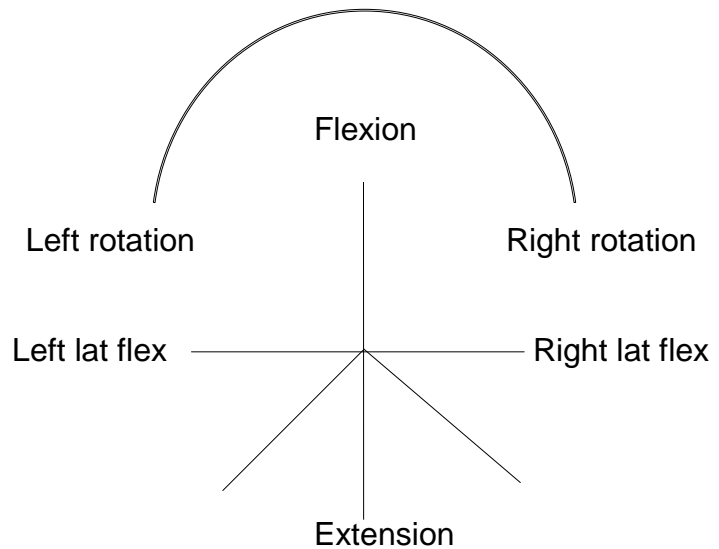
Date: ..... Student: .....

Clinician: ..... Sign: .....

**OBSERVATION:**

- Posture
- Swellings
- Scars, discolouration
- Hair line
- Body and soft tissue contours

- Shoulder position
- Left :
- Right :
- Shoulder dominance ( hand ):
- Facial expression:



**RANGE OF MOTION:**

- Extension ( 70°):
- L/R Rotation ( 70°):
- L/R Lat flex (45°):
- Flexion ( 45°):

**PALPATION:**

- Lymph nodes
- Thyroid Gland
- Trachea

**ORTHOPAEDIC EXAMINATION:**

Tenderness		Right	Left
Trigger Points:	SCM		
	Scalenii		
	Post Cervicals		
	Trapezius		
	Lev scapular		

	Right	Left		Right	Left
Doorbell sign			Cervical compression		
Kemp's test			Lateral compression		
Cervical distraction			Adson's test		

***A case - control study investigating factors associated with neck pain in the indigenous African population in the greater Durban area.***

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Halstead's test			Costoclavicular test		
Hyper-abduction test			Eden's test		
Shoulder abduction test			Shoulder compression test		
Dizziness rotation test			Lhermitte's sign		
Brachial plexus test					

***A case - control study investigating factors associated with neck pain in the indigenous African population in the greater Durban area.***

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**NEUROLOGICAL EXAMINATION:**

<b>Dermatones</b>	<b>Left</b>	<b>Right</b>	<b>Myotomes</b>	<b>Left</b>	<b>Right</b>	<b>Reflexes</b>	<b>Left</b>	<b>Right</b>
C2			C1			C5		
C3			C2			C6		
C4			C3			C7		
C5			C4					
C6			C5					
C7			C6					
C8			C7					
T1			C8					
			T1					
<b>Cerebellar tests:</b>			<b>Left</b>			<b>Right</b>		
Disdiadochokinesis								
<b>VASCULAR:</b>			<b>Left</b>			<b>Right</b>	<b>Left</b>	<b>Right</b>
Blood pressure						Subclavian arts.		
Carotid arts.						Wallenberg's test		

**MOTION PALPATION & JOINT PLAY:**

Left: Motion Palpation:

Joint Play:

Right: Motion Palpation:

Joint Play:

Upper Thoracics:

Motion Palpation:

Joint Play:

**BASIC EXAM: SHOULDER:**

Case History:

ROM: Active:

Passive:

RIM:

Orthopaedic:

Neuro:

Vascular:

Observ/Palpation:

**BASIC EXAM: THORACIC SPINE:**

Case History:

ROM: Motion Palp:

Active:

Passive:

Orthopaedic:

Neuro:

Vascular:

Observ/Palpation:



**APPENDIX: D**

**DURBAN INSTITUTE OF TECHNOLOGY**

<b>Patient Name:</b>		<b>File #:</b>	
<b>Page:</b>			
<b>Date:</b>	<b>Visit:</b>	<b>Intern:</b>	<b>Signature:</b>
<b>Attending Clinician:</b>			
<b>S:</b> Numerical Pain Rating Scale (Patient) Least 0 1 2 3 4 5 6 7 8 9 10 Worst	<b>Intern Rating</b> <input type="checkbox"/>	<b>A:</b>	
<b>O:</b>		<b>P:</b>	
		<b>E:</b>	
<b>Special attention to:</b>		<b>Next appointment:</b>	
<b>Date:</b>	<b>Visit:</b>	<b>Intern:</b>	<b>Signature:</b>
<b>Attending Clinician:</b>			
<b>S:</b> Numerical Pain Rating Scale (Patient) Least 0 1 2 3 4 5 6 7 8 9 10 Worst	<b>Intern Rating</b> <input type="checkbox"/>	<b>A:</b>	
<b>O:</b>		<b>P:</b>	
		<b>E:</b>	
<b>Special attention to:</b>		<b>Next appointment:</b>	
<b>Date:</b>	<b>Visit:</b>	<b>Intern:</b>	<b>Signature:</b>
<b>Attending Clinician:</b>			

## **APPENDIX: E**

### **INFORMED CONSENT FORM**

(TO BE COMPLETED BY THE PATIENT)

**DATE:** \_\_\_\_\_

**TITLE OF RESEARCH PROJECT: A clinical cohort study investigating factors associated with neck pain in the indigenous African population in the greater Durban area**

**NAME OF SUPERVISOR : Dr C. M. Korporaal**

**NAME OF RESEARCH STUDENT : Zandile Prisca Ndlovu**

**Please circle the appropriate answer**

**YES /NO**

- |                                                                                                                                                                                |     |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 1. Have you read the research information sheet?                                                                                                                               | Yes | No |
| 2. Have you had an opportunity to ask questions regarding this study?                                                                                                          | Yes | No |
| 3. Have you received satisfactory answers to your questions?                                                                                                                   | Yes | No |
| 4. Have you had an opportunity to discuss this study?                                                                                                                          | Yes | No |
| 5. Have you received enough information about this study?                                                                                                                      | Yes | No |
| 6. Do you understand the implications of your involvement in this study?                                                                                                       | Yes | No |
| 7. Do you understand that you are free to                                                                                                                                      |     |    |
| a) Withdraw from this study at any time?                                                                                                                                       | Yes | No |
| b) Withdraw from the study at any time, without reasons given                                                                                                                  | Yes | No |
| c) Withdraw from the study at any time without affecting your future<br>Health care or relationship with the Chiropractic day clinic at the Durban<br>Institute of Technology. | Yes | No |
| 8. Do you agree to voluntarily participate in this study                                                                                                                       | Yes | No |
| 9. Who have you spoken to regarding this study?                                                                                                                                |     |    |

**If you have answered NO to any of the above, please obtain the necessary information from the researcher and / or supervisor before signing. Thank You.**

**Please Print in block letters:**

Patient's Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Witness Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Researcher's Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Supervisor's / Co-supervisor's Name: \_\_\_\_\_ Signature: \_\_\_\_\_

## **APPENDIX: F**

### **LETTER OF INFORMATION**

Dear Patient

Welcome to this study!

**Title of the study:**

A clinical cohort study investigating into factors associated with neck pain in the indigenous African population in the greater Durban area.

**Supervisor:** Dr C. Korporaal (031-2042205)

**Research student:** Prisca Zandile Ndlovu (031-2042205)

**The purpose of the study:**

To investigate factors influencing neck pain in indigenous South African males and females between the ages of 18-60, who are living in the greater area of Durban in KZN.

**Procedure:**

400 participants will be required and you will have to meet the above-mentioned criteria. 200 participants will be required to have neck pain. These participants will have the first consultation, which will take place at DIT Chiropractic Day Clinic where you will be asked to answer questions from the preformed questionnaire, and then a full case history, physical examination and a cervical regional examination will be done. You will then receive free treatment on the day, according to the findings. The consultation will take approximately 2 ½ hours. The 200 participants that do not have neck pain will only be required to complete the questionnaire.

**Risks/ discomfort:**

You will not be exposed into any form of harm or discomfort, although some treatment techniques may cause transient discomfort, whilst you are being treated.

**Benefits:**

All participants will receive free treatment on the day of consultation at the Durban Institute of Technology Chiropractic Day Clinic. Those in the neck pain group will receive one treatment for the neck pain whereas those in the group not having neck pain will receive one free treatment for another complaint within one week of completing the questionnaire.

**Cost:**

The treatment will be free of charge and your participation is voluntary.

**Confidentiality:**

All your information is confidential and the results will be used for research purposes only. The supervisor and senior clinic staff may however be required to inspect the records.

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**Person to contact with problems or questions:**

Should you have any further queries about the study, you can contact me or my supervisor on the above mentioned telephone numbers or the secretary of the Ethics Committee - Mr. Vikesh Singh on 031-2042701.

Thank you for your participation.

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**Zandile Prisca Ndlovu  
(Chiropractic intern)**

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**Dr. C. Korporaal  
(Supervisor)**



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9. What was the duration of the above occupation? (years\_)

0-5 (\_1\_)      6-10 (\_2\_)      11-15 (\_3\_)      16-20 (\_4\_)  
2 1-25 (\_5\_)      26-30 (\_6\_)      >30 (\_7\_)

10. If employed what type of occupation do you do?

Liberal profession (\_1\_)      Businessman (\_2\_)      Artisan (\_3\_)  
Farmer (\_4\_)      Unskilled worker (\_5\_)      Housewife (\_6\_)  
Salesman (\_7\_)      Managerial (\_8\_)      Clerical (\_9\_)  
Labourer (\_10\_)      Skilled worker (\_11\_)      Student (\_12\_)  
Educator (\_13\_)      other (\_14\_) \_\_\_\_\_

11. For how long have you been in this occupation? (years\_)

0-5 (\_1\_)      6-10 (\_2\_)      11-15 (\_3\_)      16-20 (\_4\_)  
2 1-25 (\_5\_)      26-30 (\_6\_)      >30 (\_7\_)

**(B) RISK FACTORS**

12. Does your occupation involve any of the following?

Lifting heavy objects (\_1\_)      Sitting for long periods (\_2\_)  
Driving for long hours (\_3\_)      Causes your neck to turn a lot (\_4\_)  
Answering telephone a lot (\_5\_)      Working on a computer a lot (\_6\_)  
Working with arms overhead (\_7\_)      Working in an air-conditioned room (\_8\_)

13. If you use a computer a lot, is the monitor in line with eye level?

Yes (\_1\_)      No (\_2\_)

14. Do you feel that your job makes you vulnerable in any way to get neck pain?

Yes (\_1\_)      No (\_2\_)      Unsure (\_3\_)

15. Total annual income of interviewee alone?

R1 -R5000 (\_1\_)      R5000 - R15000 (\_2\_)  
R15000 - R25000 (\_3\_)      R25001-R35000 (\_4\_)  
R35001 -R45000 (\_5\_)      R45001 -R55000 (\_6\_)  
R55001 -R65000 (\_7\_)      R66001 -R75000 (\_8\_)  
R75001 - R85000 (\_9\_)      R85001 - R95000 (\_10\_)  
>R95000 (\_11\_)      N/A (\_12\_)

16. Do you worry a lot?      Yes (\_1\_)      No (\_2\_)

17. What type of transport do you utilize most often to get to and from work?

Own Car (\_1\_)      Bus (\_3\_)      Bicycle (\_4\_)  
Taxi (\_2\_)      Walking more than 5 km (\_5\_)

18. Have you been involved in a motor vehicle accident?      Yes (\_1\_)      No (\_2\_)

19. Have you had any neck trauma?      Yes (\_1\_)      No (\_2\_)

20. Do you bend over a desk for hours?      Yes (\_1\_)      No (\_2\_)

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21. How many pillows do you use?

None ( \_1\_ )                      One ( \_2\_ )  
Two ( \_3\_ )                      Three ( \_4\_ )  
>3 ( \_5\_ )

22. For how long have you been using the same pillow/s?

0-1 year ( \_1\_ )    1-2 years ( \_2\_ )    2-3 years ( \_3\_ )    3-4 years ( \_4\_ )  
4-5 years ( \_5\_ )    >5 years ( \_6\_ )

23. Do you normally carry items on one shoulder?                      Yes ( \_1\_ )    No ( \_2\_ )

24. Do you hold the receiver between your shoulder and neck?  
Yes ( \_1\_ )    No ( \_2\_ )

25. Do you usually fall asleep in an awkward position?                      Yes ( \_1\_ )    No ( \_2\_ )

26. Does your bed offer enough support?                      Yes ( \_1\_ )    No ( \_2\_ )

27. Do you sleep on your tummy?                      Yes ( \_1\_ )    No ( \_2\_ )

28. Do you hold your arms out to support a book?                      Yes ( \_1\_ )    No ( \_2\_ )

29. Do you sit without back support?                      Yes ( \_1\_ )    No ( \_2\_ )

30. Do you sit without arm support?                      Yes ( \_1\_ )    No ( \_2\_ )

31. Do you watch television a lot?                      Yes ( \_1\_ )    No ( \_2\_ )

32. Do you carry loads on your head frequently?  
(More than twice per week)                      Yes ( \_1\_ )    No ( \_2\_ )

33. Do you do any exercise?                      Yes ( \_1\_ )    No ( \_2\_ )

34. What type of exercise do you do most of the time?

Running ( _1_ )	Swimming ( _7_ )	Squash ( _13_ )
Soccer ( _2_ )	Cricket ( _8_ )	Aerobics ( _14_ )
Rugby ( _3_ )	Tennis ( _9_ )	Yoga ( _15_ )
Fishing ( _4_ )	Cycling ( _10_ )	Gymnastics ( _16_ )
Boxing ( _5_ )	Martial arts ( _11_ )	Walking ( _17_ )
Badminton ( _6_ )	Weight training ( _12_ )	other ( _18_ ) _____

35. Number of exercise sessions per week/ combined if more than one sport is played.

1 ( \_1\_ )    2 ( \_2\_ )    3 ( \_3\_ )    4 ( \_4\_ )  
5 ( \_5\_ )    6 ( \_6\_ )    7 ( \_7\_ )    >7 ( \_8\_ )

36. What is the total amount of time spent each week doing exercise? (Hours)

<1 ( \_1\_ )    1-3 ( \_2\_ )    4-6 ( \_3\_ )    7-9 ( \_4\_ )    >10 ( \_5\_ )

37. Do you have a medical cover? ( \_1\_ )    Do you have a hospital scheme? ( \_2\_ )  
N/A ( \_3\_ )

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38. Do you feel that you have sufficient access to health services?

Yes (\_1\_) No (\_2\_)

39. What was your age when you first experienced neck pain? (Years)

0-10 (\_1\_) 11-15 (\_2\_) 16-20 (\_3\_) 21-25 (\_4\_)  
26-30 (\_5\_) 31-35 (\_6\_) 36-40 (\_7\_) 41-45 (\_8\_)  
46-50 (\_9\_) 51-55 (\_10\_) 56-60 (\_11\_) 61-65 (\_12\_)  
66-70 (\_13\_)

**(C) CLINICAL: only participants with neck pain can answer this section.**

40. How long have you had neck pain? (Recent episode)

1 month (\_1\_) 1-6 months (\_2\_) 6-12 months (\_3\_) 1-2 yrs (\_4\_)  
2-3 yrs (\_5\_) 3-4 yrs (\_6\_) 4-5 yrs (\_7\_) 5-10 yrs (\_8\_)  
11-15 yrs (\_9\_) 16-20 yrs (\_10\_) 20 yrs (\_11\_)

41. How severe is the pain? Mild (\_1\_) Moderate (\_2\_) Severe (\_3\_)

42. At what time of the day is the pain worst?

Morning (\_1\_) Afternoon (\_2\_) Evening (\_3\_)  
Night (\_4\_) Activity related (\_5\_) N/A (\_6\_)

43. At what time of the day is the pain at its least?

Morning (\_1\_) Afternoon (\_2\_) Evening (\_3\_) Night (\_4\_) N/A (\_5\_)

44. How often do you experience neck pain?

Seldom (\_1\_) Frequently (\_2\_) Constantly (\_3\_) Intermittently (\_4\_)

45. How did your neck pain begin?

Gradually without injury (\_1\_) Gradually after injury (\_2\_)  
Abruptly without injury (\_3\_) Abruptly after injury (\_4\_)  
Unsure (\_5\_)

46. Progression of neck pain?

Getting worse (\_1\_) Getting better (\_2\_)  
Staying the same (\_3\_) Unsure (\_4\_)

47. Do you have trouble in doing any of the following things because of neck pain?

Dressing (\_1\_) Washing (\_2\_)  
Lifting (\_3\_) Reading (\_4\_)  
Concentration (\_5\_) Work (\_6\_)  
Driving (\_7\_) Sleeping (\_8\_)  
Recreation (\_9\_)

48. How would you rate your overall disability because of your neck pain?

None (\_1\_) Mild (\_2\_)  
Moderate (\_3\_) Severe (\_4\_)

49. Have you ever had to stay away from work because of your neck pain?

Yes (\_1\_) No (\_2\_)



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50. For how long?

0-1 week ( \_1\_ ) >1-2 weeks ( \_2\_ )

>2-3 weeks ( \_3\_ ) >3- 4 weeks ( \_4\_ )

>4 weeks ( \_5\_ )

51. Have you ever been bed ridden because of neck pain? Yes ( \_1\_ ) No ( \_2\_ )

52. For how long?

0-1 week ( \_1\_ ) >1-weeks ( \_2\_ )

>2-3 weeks ( \_3\_ ) >3- weeks ( \_4\_ )

>4 weeks ( \_5\_ )

53. Have you ever been demoted ( \_1\_ ), medically boarded ( \_2\_ ), fired ( \_3\_ ) because of neck pain?

54. Do you suffer from headaches? Yes ( \_1\_ ) No ( \_2\_ )

55. Do you associate your neck pain with any other activities (e.g. customs, social activities etc?)

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## **APPENDIX: H1**

### **LETTER OF INFORMATION – FOCUS GROUP**

Dear Participant,

I would like to welcome you into the focus group of my study, the title of my research project is:

An epidemiological investigation into factors influencing neck pain in indigenous South African males and females between the ages of 18-60, who are living in the greater area of Durban in KZN.

The purpose of this focus group is to validate the use of the Coded Questionnaire (attached) in terms of gathering information from participants in various age groups (18-60), with respect to factors influencing their neck pain. However due to the limitations of this study the participants will only be defined as those who will respond to advertisement by coming to the Chiropractic Day Clinic at Durban Institute of Technology, hence the use of a slightly modified questionnaire.

The process of validating of a questionnaire in this focus group is a critical analysis of the questionnaire with view to that information which will be collected in terms of the factors that actually influence neck pain as well as the diagnosis in terms of the type of neck pain.

Thus, with discussions we will focus on the main trends that by experience (by you) have been found to potentially contribute to neck pain.

You are at any point permitted to disagree with the findings / suggestions of the group. If such is the case, however please give your reasons for disagreement, as this will help in the research process.

Your participation in this study is much appreciated and you are assured that your comments and contributions to the discussion will be kept confidential. The video recording that will be taken will be kept for the researcher's reference. The proceedings will be typed into a transcript format, omitting identifying details to you the participants, during the process of publication and dissemination of the results. The results of the discussion will only be used for research purposes with access thereto limited to the researcher, research supervisor and only on request to the Faculty of Health Sciences Ethics committee.

If you have any further questions please feel free to contact my supervisor/ co-supervisor or myself.

Zandile Prisca Ndlovu  
Research student

Dr C. Korporaal  
Research supervisor

## **APPENDIX: H2**

### **INFORMED CONSENT FORM**

(TO BE COMPLETED BY THE PARTICIPANTS OF THE FOCUS GROUP)

**DATE:** \_\_\_\_\_

**TITLE OF RESEARCH PROJECT :** An epidemiological investigation into factors influencing neck pain in indigenous South African males and females between the ages of 18-60, who are living greater area of Durban in KZN.

**NAME OF SUPERVISOR** : Dr. C. M. Korporaal

**NAME OF RESEARCH STUDENT** : Zandile Prisca Ndlovu

**Please circle the appropriate answer**

**YES /NO**

- |                                                                                                                                                                          |     |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|----|
| 10. Have you read the research information sheet?                                                                                                                        | Yes | No |
| 11. Have you had an opportunity to ask questions regarding this study?                                                                                                   | Yes | No |
| 12. Have you received satisfactory answers to your questions?                                                                                                            | Yes | No |
| 13. Have you had an opportunity to discuss this study?                                                                                                                   | Yes | No |
| 14. Have you received enough information about this study?                                                                                                               | Yes | No |
| 15. Do you understand the implications of your involvement in this study?                                                                                                | Yes | No |
| 16. Do you understand that you are free to                                                                                                                               |     |    |
| a) Withdraw from this study at any time?                                                                                                                                 | Yes | No |
| b) Withdraw from the study at any time, without reasons given                                                                                                            | Yes | No |
| c) Withdraw from the study at any time without affecting your future Health care or relationship with the Chiropractic day clinic at the Durban Institute of Technology. | Yes | No |
| 17. Do you agree to voluntarily participate in this study                                                                                                                | Yes | No |
| 18. Who have you spoken to regarding this study?                                                                                                                         |     |    |

**If you have answered NO to any of the above, please obtain the necessary information from the researcher and / or supervisor before signing. Thank You.**

**Please Print in block letters:**

Focus Group Member: \_\_\_\_\_

Signature: \_\_\_\_\_

Witness Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Researcher's Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Supervisor's Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Co-supervisor's Name: \_\_\_\_\_

Signature: \_\_\_\_\_

## APPENDIX: H3

**IMPORTANT NOTICE: THIS FORM IS TO BE READ AND FILLED IN BY EVERY MEMBER PARTICIPATING IN THE FOCUS GROUP, BEFORE THE FOCUS GROUP MEETING CONVENES.**

### **CONFIDENTIALITY STATEMENT – FOCUS GROUP DECLARATION**

1. All information contained in the research documents and any information discussed during the focus group meeting will be kept private confidential. This is especially binding to any information that may identify any of the participants in the research process.
2. The participant files will be coded and kept anonymous in the research process.
3. None of the information shall be communicated to any other individual or organisation outside of this specific focus group as to the decisions of this focus group.
4. The information from this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

Once this form has been read and agreed to, please fill in the appropriate information below and sign to acknowledge agreement.

**Please print in block letters:**

Focus Group Member: \_\_\_\_\_ Signature: \_\_\_\_\_

Witness Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Researcher's Name: \_\_\_\_\_ Signature: \_\_\_\_\_

Supervisor's /  
Co-supervisor's Name: \_\_\_\_\_ Signature: \_\_\_\_\_

## **APPENDIX: H4**

### **CODE OF CONDUCT**

This form needs to be completed by every member of the Focus Group prior to the commencement of the focus group meeting.

As a member of this committee, I agree to abide by the following conditions:

1. All information contained in the research documents and any information discussed during the focus group meeting will be kept private and confidential. This is especially binding to any information that may identify anyone in the research process.
2. None of the information shall be communicated to any other individual or organisation outside of this specific focus group as to the decisions of this focus group. Even though this session will be video taped for the researcher's reference, this will not be made public domain and access will be restricted to the researcher, research supervisor only and the Ethics committee, only if such is requested.
3. The information from this focus group will be made public in terms of a journal publication, which will in no way identify any participants of this research.

	<b>Member represents</b>	<b><u>Member's Name</u></b>	<b><u>Signature</u></b>	<b><u>Contact Details</u></b>
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				

## APPENDIX: H5

### TRANSCRIPT: FOCUS GROUP

**Zandile:** This is Dr Korporaal my supervisor, and if u can please sign everything that needs to be signed and we will start shortly.

**Everyone signs the documents.**

**Zandile:** Has everybody read the two letters, and if u can at the bottom there please.

**Zandile:** Basically as you have read the information sheet, I'm doing research on neck pain; investigating the risk factors but, only among the Black community. So what we are going to be doing is you guys will be looking at the questionnaire to see if the questions asked are related to neck pain or not. Therefore, if you think the question is not relevant and you feel that we should leave it out you need to at least give reasons as to why you think so and discuss everything amongst yourselves.

**Dr Korporaal:** And if you can please go through the questions sequentially, and when you guys talk can u please talk loud enough so that the camera can record everything you actually said.

**Zandile:** The questionnaire has 63 questions but, they are short and did everyone sign?

**Barry:** Can we start?

**Zandile:** Ja

**Dr Korporaal:** Can you read the question and then go through each question.

**Zandile:** No.1 how old are you?

**Barry:** Why did you start on 20 and not 18? Because I think, you are missing a certain population.

**Dr Korporaal:** No particular reason, if you have suggestions please do make them.

**Barry:** I was going to say that you might want to take it to 18, because most people would have finished school by then and you miss two population dynamics. I do not know if you left it out because of legal issues.

**Dr Korporaal:** So what you are saying is it would be better to look at the working population?

**Barry:** If you take it to 20-25, you are looking at the working population, but I think you should start at 18-25.

**Dr Korporaal:** And the upper limit, are we looking at the workers only or....

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**Barry:** It you take the upper limit to of 70 most people are going to be retired or they would have been forced into retiring at that stage for last I think 70 should be ok, but I would certainly lower it to 18.

**Dr Korporaal:** How does the rest of the group feel?

Promise: Ja.....

**Kumaran:** I think we should have it lower because sometimes you get many street kids and there is a lot of poverty around, although they are less likely to come to the clinic but I think we should limit to 15-19 as our no. 1 instead of 18-25.

**Barry:** The problem might be with the legal issues because you will need their parents to sign the informed consent form. Whereas if take it up to 18 you would have passed that point.

**Kumaran:** Ethics.....

**Jabu:** What does the stats say because that also counts and it helps to know when is the neck pain prevalence.

**Dr Korporaal:** We do not have that information now.

**Promise:** Is it not because the study is focusing on that age group?

**Barry:** 20-70

**Promise:** Ja because if you se the title...

**Barry:** You can change it if you want to, I just know that by 18, most people are coming out school, and if you take it to 20, you are missing out on two people who are already working and years of probably having neck pain.

**Quentin:** Students study hard and sitting on a desk....

**Barry:** So is everybody happy with 18?

**S'boniso:** 18 is ok

**Zandile:** Ok no. 2 gender. Male or female

**Barry:** That is fine

**Zandile:** No. 3 height

**Quentin:** You should put it in cm.

**Zandile:** Ok can we move on? No. 4 weight. From 0-25 up to >200 kgs.

**Barry:** Ja that's fine.

**Zandile:** no. 5 marital status; married, single, divorced, separated, widowed, cohabiting.

**Jabu:** Cohabiting, some people would feel a bit insulted. Is there a nicer word?

**Dr Korporaal:** Would common law spouse be more preferable?

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**Jabu:** Ja.

**Quentin:** Is there a male term for a widow?

**Dr Korporaal:** Widower?

**Tuto:** Cohabiting and common law spouse I think those are two different things.

**Quentin:** Common law spouse amounts to the time you have been together.

**Tuto:** Does it have to be one word?

**Dr Korporaal:** Does not have to be.

**Tuto:** Staying together. How is that?

**Dr Korporaal:** That is fine.

**Zandile:** Just to check if I am on the same page with you guys. We are adding widower and for cohabiting- staying together or common-law spouse?

**Quentin:** I do not think we need to add widower.

**Barry:** Staying together will be fine.

**Zandile:** Ok no. 6 number of children from N/A to >10

**Tuto:** That is fine

**Quentin:** If the children were deceased would that be included, if yes you need to state that. In addition, things like stillbirth.

**Dr Korporaal:** Could be a factor.

**Barry:** Abortion?

**Dr Korporaal:** Through your questions you might not, necessary want to look at stillbirth and things like that you might also want to look at deceased children that are older.

**Barry:** Ja

**Quentin:** Would you not get that from the no. of children and pregnancies?

**Dr Korporaal:** But you do not know if the children are pregnancy terminated or actually lived to a certain age?

**Barry:** Does it actually make a difference?

**Dr Korporaal:** I do not know is it more stressful to loose a child earlier on or later.

**Tuto:** Later for sure.

**Dr Korporaal:** Would that be a causative factor for neck pain? Stress can be involved....

**Tuto:** Ja in general.

**Dr Korporaal:** So what would be the recommendation for the question?

**Quentin:** May be you can ask a question about loss of a child or a family member. In addition, you can least categories like husband, wife, mother father, child etc.



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**Zandile:** Ok no.7 no. Of pregnancies from 0->10.

**Quentin:** Twins, triplets etc. How would that affect the pregnancies?

**Dr Korporaal:** That could be a stress factor. But is related to neck pain?

**Barry:** Just put in twins.

**Tuto:** Are we saying is it more stressful to loose twins as opossed to loosing one child?

**Barry:** Just put in single child, and multiple pregnancies?

**Zandile:** Ok can we move on? No. 8 highest level of education; primary school, high, school,

matriculated, no formal education, tertiary, and other.

**Jabu:** If other.....explain.

**Barry:** Specify

**Zandile:** Ok no. 9 present occupational status. Self employed, unemployed, retired, Housewife, employed full time/ part time, student.

**Promise:** What about contract employment?

**Quentin:** That is part time employment.

**Dr Korporaal:** May be put in temporal jobs.

**Quentin:** And contract employment.

**Dr Lakhani:** Also you might get someone who is a scholar and not a student.

**Dr Korporaal:** If you use learner then you can't differentiate between the two, but if you need to differentiate the you need to use two terms.

**Zandile:** Ok no. 10 If unemployed or retired, what occupation were you in for the longest period previously? Liberal profession, bussinessman, artisan, farmer, unskilled worker, housewife, salesman, managerial, clerical, labourer, skilled worker, student, educator, N/A.

**Quentin:** Instead of N/A put other/ specify.

**Zandile:** No.11. What was the duration of the above occupation? (years) from 0-5 up to > 30.

**Jabu:** Do most people that stay at home call themselves housewives?

**Quentin:** Home exucutives.

**Dr Korporaal:** If they start working at the age of 20 could they still be workinh at the age of 50?

**Quentin:** Ja

**Dr Korporaal:** So do we need to break that down anymore or just say above 30?

**Barry:** >30.

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**Dr Lakhani:** Are they meant to answer that question if they are employed or unemployed?

**Zandile:** The next question applies to people that are still working, so this one only applies to people that are unemployed.

**Dr Lakhani:** Maybe you should say if unemployed or retired answer the two following questions? If not skip to the next questions.

**Zandile:** It is supposed to be if employed what type of occupation do you do? ? Liberal profession, businessman, artisan, farmer, unskilled worker, housewife, salesman, managerial, clerical, labourer, skilled worker, student, educator.

**Kumaran:** What is a liberal profession? I don't know what it is and a lot of people won't know.

**Dr Korporaal:** Does everybody find it necessary to be there or not.

**Dr Lakhani:** Was it found from another questionnaire?

**Dr Korporaal:** This was compiled from another questionnaire, but it may not necessarily be applicable.

**Tuto:** Maybe we should define liberal.

**Barry:** If we are having difficulty maybe we should leave it out.

**Dr Korporaal:** Just remember you might be the patient.

**Kumaran:** Maybe put liberal profession and then in brackets put an example or definition of what it is. And how do you define skilled and unskilled worker?

**Quentin:** Unskilled would be hard labour.

**Kumaran:** Labourer could be both skilled and unskilled.

**Dr Lakhani:** Can they answer for more than one?

**Zandile:** No only one.

**Quentin:** Then I would say take out labourer.

**Kumaran:** And state that they can only answer for one option.

**Jabu:** If they are doing manual labour how will they know if that is skilled or unskilled work?

**Dr Lakhani:** Maybe manual labour would be better than unskilled worker.

**Zandile:** So do we all agree on manual labour.

**Tuto:** That is better.

**Jabu:** If say they can only tick one, so for somebody who does more than one job how will you know if that plays a role in their neck pain?

**Dr Korporaal:** Like multiple part-time jobs?

**Quentin:** Somebody could be student and waitressing at the same time.

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**Dr Korporaal:** So how are we going to construct this one?

**Kumaran:** May be include a question asking them how many hours they spend in their job. As in do they spend more hours being students or waitressing.

**Dr Korporaal:** Either that or two options that indicate the principal one. So you can run your stats on the principal one but you know that they are doing more than one.

**Jabu:** And you should stick to one word: occupatoin instead of interchanging it with work.

**Zandile:** Ok can we move on? No.13 For how long have you been in this occupation? (years) 0-5 up to >30/ N/A.

**Quentin:** Take out N/A.

**Jabu:** And people that have been working for a few months?

**Quentin:** They will tick 0-5 years.

**Zandile:** No.14 Does your occupation involve any of the following? Lifting objects, sitting for long preiods, driving for long hours, causes your neck to turn a lot.

**Barry:** So can they tick more than one for this one because some peple could be doing two or even all of those things?

**Dr Lakhani:** Can we add cumputer use? Because a lot of people spend a lot of time infront of the computer , typing, surfing the internet and answering e-mails.

**Tuto:** And the coding shuold be 1,2,3.....

**Kumaran:** What about students?

**Quentin:** That is sitting for long periods.

**Promise:** Moving from one venue to the next or office to office?

**Jabu:** And people that have to walk long distances to get to work ?

**Tuto:** But that only affect the legs.

**Quentin:** What about all the African ladies that carry big pots on the head. There should be a question on carrying things on the head.

**Dr Lakhani:** And there are a lot of teachers that take buses and then have to walk certain distances to get to schools.

**Jabu:** Seeing that housewife was mentioned under occupation, may be we should include a question about carrying babies on their back.

**Zandile:** Would that not be covered under lifting?

**Jabu:** Lifting invloves the upper body and not the back.

**Dr Korporaal:** May be another question saying do you carry objects and if you do do you carry them with your arms, on your back, or your head, and what is the weight of the object.

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**Dr Lakhani:** And how many times approximately in a week/ daily.

**Kumaran:** Has indigenous been defined in your study?

**Barry:** Black population?

**Dr Korporaal:** You just need to be careful with ethics.

**Dr Lakhani:** I think you should say indigenous Black South African population.

**Zandile:** Do you feel that your job makes you vulnerable in any way to get neck pain? Yes/ no.

**Kumaran:** Unsure. Because some people won't know.

**Barry:** I think yes/no is fine because you are either vulnerable or not.

**Dr Korporaal:** It is a psychological perception of whether your job makes you susceptible to neck pain or not.

**Tuto:** I think unsure will be relevant.

**Zandile:** No.16 Total annual income of the interviewee alone. From R1 up to >R95000.

**Quentin:** How many people would answer that question honestly and what relevance does it have to neck pain?

**Dr Korporaal:** I do not know.

**Dr Lakhani:** May be people that earn low income have more stress than people that earn more income or vice versa.

**Zandile:** No.17 Are you suffering from or have suffered in the past from any serious disease or illnesses? Muscular system, nervous system, lymphatic system, haemopoietic system, skeletal system, psychiatric system, reproductive system, endocrine system, system.

**Barry:** You are going too in depth. A lot of people will not know what these mean. For everything you should put it in simple terms like muscle, blood problems etc.

**Dr Lakhani:** Is it not possible to ask if they have any illnesses, if yes state?

**Dr Korporaal:** And Zandile can classify them. and as part of your research you need to clarify what is a serious illness.

**Jabu:** Are they going to be protected? Because some might reveal their HIV/AIDS status.

**Quentin:** It is all confidential.

**Jabu:** What I mean is it stated in the beginning of the procedure that they are allowed to disclose whatever information if they want to and that they are not forced.

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**Dr Korporaal:** Zandie is going to be using the normal clinic standard which gives the patients assurance that the information is confidential and that they are not forced to anything they are not comfortable with.

**Barry:** Question 18. should include passive smoking as well.

**Zandile:** No. 19 How much do you smoke a everyday? 1-5 up to > 40.

**Dr Lakhani:** You should say how many cigarretes do you smoke a day. cardoivascular system, excretory system, skin, respiratory system, gastrointestinal

**Zandile:** No. 20 For how long have you been smoking?(years) 0-5 up to >40.

**Barry:** It should be 0-5.

**Zandile:** No. 21 If you presently do not smoke but was a former smoker then how much did you smoke in the past? 1-5 up to >40.

**Dr Lakhani:** 0-5 and how many cigarretes per day.

**Kumaran:** Is it was or were?

**Dr Lakhani:** Were.

**Zandile:** How long ago did you quit?(years) 1-5 up to >40.

**Quentin:** 0-5.

**Zandile:** No. 23 For how long did you smoke before you quit?(years) 1-5 up to >40.

**Quentin:** 0-5.

**Jabu:** What is the difference between 22 and 23?

**Quentin:** If a person for van example smoked for 1 year, qiuted for 15 years and then started smoking over the last 5 years.

**Jabu:** Ok.

**Zandile:** No.24 Do you presently have a cough? yes/ no.

**Barry:** Do you want to know if the cough is related to smoking if the person does smoke or are you generally looking to see if they have TB or flue?

**Zandile:** We are looking at the active and passive smokers.

**Barry:** People might not know what causes their cough.

**Quentin:** And do you want to know if it is productive or not?

**Dr Korporaal:** Is it relevent to neck pain?

**Quentin:** I think it could be because if you are a smoker you are going to have a productive cough.

**Dr Korporaal:** Relevent to smoking but to neck pain?

**Quentin:** That is what Zandie is looking for is in it?

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**Dr Korporaal:** Why don't you ask if they have a smoker's cough?

**Tuto:** Then it becomes too complex once you start defining it.

**Zandile:** no. 25 For how long have you had it ? 0-6months up to >3 years

**Dr Korporaal:** Had what?

**Zandile:** The cough

**Quentin:** Just delete the >'s

**Barry:** 25 was done twice

**Zandile:** 26 Do you do any exercise? Yes or no.

**Dr Korporaal:** Before you go on are there any other factors that you guys want to discuss that you think are relevant to neck pain.

**Quentin:** Well if you look at smoking, what about environmental hazards like in factories where people work in dust and pollution ect.

**Dr Korporaal:** I was looking more along the lines of MVA, accidents, do we have those type of questions in the questionnaire Zandile?

**Zandile:** No

**Barry:** Whiplash injuries.

**Dr Korporaal:** I think the rest goes more into the actual type of pain, its description, and exercise as opposed to the actual factors.

**Barry:** I think you should include things like pillows, sleeping ect.

**Dr Korporaal:** That is what I was thinking because the rest of the questionnaire goes into describing pain and I do not think that is as important as what causes neck pain so I think we might have replace the later ones with what actually causes pain.

**Dr Lakhani:** Most of these questions are occupational and do not involve any general factors.

**Tuto:** I agree as well.

**Quentin:** Like how many people you share a bed with?

**Dr Lakhani:** I am thinking for no.24 should we not ask them if they have a persistent cough, is it not what we are trying to get because we are not trying to get any mild cough.

**Dr Korporaal:** That might be a better way.

**Tuto:** Is not covered at no.25?

**Dr Korporaal:** True

**Quentin:** What about bronchitis and a recurrent cough.

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**Dr Lakhani:** If we start to classify it as persistent. Some people might have a recurrent cough but it does not necessarily mean that it has been persistent or there forever. And the coding for no.27.

**Quentin:** Change other to specify

**Zandile:** Before we go on are there any other factors you would like to include?

**Dr Lakhani:** Related to exercise?

**Zandile:** Any other factors related to neck pain.

**Kumaran:** The major ones would be MVA, sleep patterns, trauma.

**Quentin:** Also questions like what type of bed do you sleep in? how many people do you share the bed with? Do you sleep on your side, your back, or your tummy?

**Barry:** Then you can categorise them into general and clinical.

**Zandile:** No. 28 number of exercise sessions per week/ combined if more than one sport is played? From 1 up to >7.

**Quentin:** May be you should state that if you do any exercises answer the following questions if not skip to no.....

**Dr Lakhani:** N/A's should disappear.

**Zandile:** no.29 what is the total amount of time spent in each week doing exercise? (hours)<1 up to >10.

**Quentin:** That is fine.

**Zandile:** No.30 if played sports in the past, what sport/s or form of exercise did you do then? Running soccer, rugby, fishing, boxing, badminton, swimming, cricket, tennis, cycling, martial arts, weight training, squash, aerobics, yoga, gymnastics, walking, other.

**Barry:** other- specify.

**Quentin:** Is that question only related to people that do not play sport at the moment?

**Zandile:** ja. No. 31 for how long have you been involved in the above sport/s in the past?(years)

**Quentin:** You must stick to the same terminology because some people might see sport and exercise as different. And are they only allowed to tick one? Because some people might be doing more than one sport.

**Dr Korporaal:** They can tick the primary one and then the secondary one.

**Quentin:** And you must ask them to state which one is principal.

**Zandile:** No. 32 do you have a medical aid? Yes/no.

**Barry:** A lot of people have hospital schemes instead of medical aids.

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**Dr Korporaal:** May be call it a medical cover.

**Quentin:** ja.

**Zandile:** No. 33 do you feel that you have sufficient access to health services? Yes/no.

**Everyone:** That is fine.

**Zandile:** No. 34 have you ever experienced neck pain? Yes/ no.

**Everyone:** That is fine.

**Zandile:** No. 35 what was you age when you first experienced neck pain? 0-10 up to 66-70/ N/A

**Kumaran:** Some people are older than 70.

**Barry:** The study is from 20-70/ 18-70.

**Kumaran:** Ok

**Dr Korporaal:** Do we need to make the categories as small as they are or do need to change them to 10 year difference?

**Quentin:** I think 5 year difference is fine because if we increase it to 10 then we start to miss certain age groups.

**Dr Korporaal:** Question 36 isnot applicable because a lot of people that will present to Zandie will have neck pain.

**Dr Lakhani:** Are you saying only people with neck pain are going to answer this questionnaire?

**Dr Korporaal:** What I am saying is we need to look at factors that are related to neck pain.

**Dr Lakhani:** But it could mean that they had neck pain but they do not have it now.

**Quentin:** Why would you then ask if they ever experienced neck pain-34? Because if they are coming with neck pain you do not need to ask that question.

**Dr Korporaal:** We want to know if it is recurrent.

**Dr Lakhani:** Have had previous episodes may be?

**Barry:** What was your age when you first experienced neck? Would that not be covered in 34?

**Quentin:**May be ask how often they experience neck pain.

**Dr Korporaal:** And ask the times

**Quentin:** once, twice a year ect.

**Tuto:** I am just thinking how often would you remember how many times you have the pain?

**Quentin:** You keep a record. If you have recurrent episodes of pain you would remember.



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**Tuto:** So would estimate?

**Dr Korporaal:** It is much more easier to remember when you had pain than when you were pain free.

**Zandile:** So we are taking out 34, and 36?

**Barry:** I think we take out 35, 36, and 34.

**Quentin:** And put in how often do you experience neck pain.

**Promise:** A year.

**Dr Korporaal:** Any time you can decide.

**Promise:** A week.

**Zandile:** No. 37 how long have you had neck pain? From >1month up to >20 years.

**Quentin:** You can take out >s.

**Dr Lakhani:** Is this question refering to a previous or current episode?

**Barry:** Current

**Dr Lakhani:** I think we need to ask how long the previous episode lasted for as well.

**Zandile:** No. 38 How severe is the pain? Mild, moderate, severe, N/A.

**Barry:** You can take out the N/A.

**Jabu:** It seems like we are completly cganging the format, from numbers to words.

**Quentin:** So you wanna keep the same format? May be we could put a NRS scale or a line with numbers from 0-10 where they can actually mark off.

**Dr Korporaal:** That might be easier.

**Kumaran:** I thought Zandie was going to be asking the questions.

**Dr Korporaal:** So she can ask them to rate it between 0-10?

**Kumaran:** Then she can decide whether it is mild, moderate, or severe.

**Dr Korporaal:** Then she would to define those terms.

**Quentin:** NRS is already done.

**Dr Lakhani:** I am assuming that from 37 to I am not sure what number the information required is for the current neck pain.

**Quentin:** Yes.

**Dr Lakhani:** May be you should state that the following questions are applicable to the current episode.

**Zandile:** 39 At what time of the day is the pain worst? Morning, afternoon, evening, night, activity related, N/A.

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**Quentin:** What is the difference between night and evening? I think you should take out night.

**Jabu:** And ask if the pain is there all day.

**Dr Lakhani:** I think night is different because that is when you are sleeping.

**Quentin:** Then you can add sleeping.

**Kumaran:** Are we bot mixing factors? Activity related does not belong there.

**Dr Korporaal:** We have already asked too many questions on activity.

**Zandile:** So we are taking out activity related?

**Quentin:** I do not think we have asked if the pain is related to activity.

**Dr Korporaal:** That is one of the factors we need to consider.

**Dr Lakhani:** May be we ask if the pian gets worse with activity or at certain times of the day.

**Quentin:** If activity related, specify- time of the day, then you can ask if it is when thet are sleeping.

**Dr Lakhani:** ja.

**Quentin:** I would say the same goes for no.40.

**Zandile:** How often do you experience neck pain? Seldom, frequently, constantly, intermittently, N/A.

**Dr Korporaal:** Have we not asked a question like that already.

**Quentin:** I think we have passed something like that.

**Dr Korporaal:** We created a question with a certain time period. The one we suggested for 35.

**Sboniso:** Ja

**Dr Lakhani:** I do not think it is the same.

**Quentin:** I is definitely the same.

**Zandile:** So we are deleting 36 or 41?

**Tuto:** 41 is more specific so we are leaving that one.

**Zandile:** No. 42 how did your neck pain begin? Gradually without/after injury, abruptly without/after injury, N/A.

**Barry:** Take out N/A.

**Promise:** Unsure, because some people will not know.

**Tuto:** Unsure will be relevent.

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**Zandile:** No. 43 progression of neck pain? Getting worse, getting better, staying the same, N/A.

**Quentin:** just put unsure.

**Zandile:** No. 44 do you experience any difficulty in doing any of the following thing as a result of neck pain? Dressing, washing, lifting, reading, concentration, work, driving, sleeping, recreation.

**Quentin:** the coding

**Kumaran:** other/specify

**Dr Lakhani:** you must try and keep the same format as in all words end with –ing.

**Zandile:** No. 45 do you suffer from headaches? Yes/ no.

**Kumaran:** That is fine

**Zandile:** No. 46 how would you rate your overall disability as a result of neck pain? Mild, moderate, severe, N/A.

**Kumaran:** same as no.38

**Dr Korporaal:** do a NRS type scale.

**Quentin:** Instead of disability put- daily activities.

**Zandile:** No.47 have you ever had to stay away from work as a result of neck pain? Yes/no.

**Everyone:** that is fine

**Zandile:** No.48 for how long? From 0-1week up to >4 weeks.

**Quentin:** you can take out the >s.

**Zandile:** No. 49 have you ever been bed ridden because of neck pain? Yes/ no.

**Tuto:** Are we still talking about the current neck pain?

**Dr Korporaal:** I would suggest that we group them with the past history.

**Zandile:** No.50 for how long? From 0-1week up to >4 weeks.

**Quentin:** you can take out the >s.

**Zandile:** No.51 have you ever had to change your job due to neck pain? Yes/ no.

**Barry:** that is fine.

**Zandile:** No. 52 have you ever lost your job due to neck pain? Yes/ pain

**Dr Korporaal:** Would that not be the same as 51?

**Quentin:** No. 53 because losing will be involuntary and changing will be voluntary.

**Zandile:** No.54 Were you ever treated for neck pain? Yes/ no.

**Dr Lakhani:** That is ok.

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**Zandile:** No. 55 Where are/were you treated for neck pain? General practitioner, chiropractor, acupuncturist, pharmacist, traditional healer, state hospital, physiotherapy, reflexologist, orthopaedic specialist, homeopath, neurologist, neurosurgeon, other.

**Barry:** If they are being treated are they being treated as a result of the study or treated by somebody else and should that be an exclusion?

**Quentin:** other- specify and what about self medication/ treatment some people will not see that as being treated.

**Dr Korporaal:** Pharmacist does not necessarily mean that you have to go a pharmacy to get medication.

**Zandile:** No. 56 For how long have you been receiving treatment for neck pain now?  
From <1month up to >1 year.

**Quentin:** Is it per episode or ever since they had neck pain?

**Promise:** or since the first time they had neck pain.

**Dr Lakhani:** or for how long have you been receiving treatment and delete now?

**Zandile:** No. 57 For how long have you been treated for neck pain in the past?  
From <1month up to >1 year.

.....  
**Zandile:** No.58 Which treatment helped or is helping you to get the most relief? General practitioner, chiropractor, acupuncturist, pharmacist, traditional healer, state hospital, physiotherapy, reflexologist, orthopaedic specialist, homeopath, neurologist, neurosurgeon, other.

**Dr Lakhani:** if yes to 57 which treatment was giving most relief?

**Zandile:** No. 59 are you presently on any medication? Yes/ no.

.....  
**Zandile:** No. 60 Who prescribed the medication? General practitioner, chiropractor, acupuncturist, pharmacist, traditional healer, state hospital, physiotherapy, reflexologist, orthopaedic specialist, homeopath, neurologist, neurosurgeon, other.

**Barry:** May be you should say if presently on medication who prescribed the medication.  
Because no 59 + 60, 55 + 58 are actually the same.

**Kumaran:** You need to limit the list of who can prescribe.

**Dr Lakhani:** 59 + 60 should be deleted.

**Zandile:** No.61 Does the treatment you receive for neck pain help? Yes/ no.

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**Barry:** you should add a scale: agree, strongly agree/ disagree, ect and change medication to treatment.

**Zandile:** No. 62 how much do you pay for medication every month? From R1-R30 up to >R100.

**Dr Lakhani:** If the treatment is free? And change medication to treatment.

**Quentin:** R0-R30.

**Zandile:** No.63 Excluding medication how much does your treatment cost you per month?

**Kumaran:** Should change 62 and delete 63.

**After the discussion the group decided to review the whole questionnaire. The following questions were taken out of the questionnaire because the group felt that they were irrelevant to neck pain: question no. 3, 4, 21, 22, 23, 24, 25, 30, 31, 34, 36, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63.**

**And they suggested that the following factors must be added to the questionnaire:**

**Trauma, MVA, posture, sleeping, occupational stress, computer use, pillow/mattress support**

**The end!!!!!!!!!!!!**

## APPENDIX: I

### ADVERTISEMENT:

*Are you between the ages of 21 and 60 and  
Suffering from*

# Neck Pain

Research is currently being carried out at the Durban  
Institute of Technology Chiropractic Day Clinic

**FREE ASSESSMENT AND TREATMENT**

**for those who qualify to take part in this  
study**

**For more information contact [Zandile](#) on  
204 2205 / 2512**

## **APPENDIX: J**

Thank you, for participating in the study. This voucher qualifies a patient **one free treatment** at the Chiropractic Day Clinic (at the Durban Institute of Technology).

**Patient Name:**

**Voucher NO.:**

**Researcher:** ZANDILE \_\_\_\_\_