

The Prevalence and Associated Risk Factors of Shoulder Injuries in Primary School Teachers, Durban, South Africa

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Abstract

Background: Shoulder injuries are among the most common musculoskeletal disorders (MSD) that can present in teachers, due to the nature of the teaching profession.

Objective: To determine the prevalence and associated risk factors of shoulder MSD in primary school teachers, Durban, South Africa.

Methods: A cross-sectional study was conducted on 203 school teachers. A questionnaire to determine the prevalence of shoulder injuries and other common injuries experienced was completed. Descriptive statistics and chi-square and binomial tests were used to analyse the results.

Results: The prevalence of shoulder injuries among school teachers was 53.7%, which was significantly higher than neck injuries ($p=.037$). Participants who had had a previous injury to the shoulder were more likely to have experienced shoulder problems at work ($p = .006$). A significant 76.1% had not injured their shoulder in any way ($p < .0005$). Additionally, the shoulder problems prevented a significant 77% of the participants from performing their normal work for up to seven days during the previous 12 months ($p < .0005$).

Conclusion: Preventative and management strategies for shoulder injuries among school teachers are needed.

Keywords: musculoskeletal disorders, prevalence, school teachers, shoulder injuries.

1. Introduction

Musculoskeletal disorders (MSD) represent the second-most common cause of disability worldwide, following mental and behavioural disorders (Vos et al., 2012). Due to the increased demands on the teaching profession, teachers are reported as an occupational group with a high prevalence of MSD, relative to other occupational groups (Cardoso, De Queiroz Batista Ribeiro, Maria De Araujo, Carvalho, & Farias Borges Dos Reis, 2009). Such demands include prolonged standing, marking and preparing lessons, as well as writing on the chalk/whiteboard. Musculoskeletal disorders in teachers have been reported to result in various impediments, including chronic pain and functional impairment (Abdulmonem, Hanan, Elaf, Haneen, & Jenan, 2014), absenteeism (Cardoso et al., 2009; Darwish & Al-Zuhair, 2013), early retirement due to ill health (Maguire & O'connell, 2007), and poor productivity (Erick & Smith, 2011).

Chalk/whiteboard writing, in particular, involves overhead activity that utilises shoulder muscles. Injury to the shoulder joint can affect any of the structures of the shoulder, including bones, muscles, tendons, ligaments, nerves and bursae, all of which can alter the functioning of the shoulder joint (Terry & Chopp, 2000). The overuse involved in writing on the chalk/whiteboard can result in injury to one or more of these structures. The symptoms of such injuries may vary from stiffness, weakness and discomfort, to mild and severe pain (Mitchell, Adebajo, Hay, & Carr, 2005). Management of these shoulder injuries also varies depending on the severity and extent of injury, and includes relative rest, the use of analgesics, exercise rehabilitation and, in some cases, surgery (Brown, Park, & Bicknell, 2015; Mitchell et al., 2005).

A study reported a significant alteration of scapular position in teachers using the chalkboard for more than two hours daily. The presence of pain was associated with scapular alteration, and increased with years of teaching

experience (Rahman & Warikoo, 2013). The lateral scapular position was associated with increased overhead activities associated with chalkboard writing. Lateral scapular position increased excessive protraction and elevation, which caused muscle imbalances and reduction in subacromial space, resulting in pain and possible impingement of shoulder structures (Rahman & Warikoo, 2013).

In spite of the use of smartboards and other digital teaching aids, many schools in middle- to low-income countries continue to use chalkboards as a teaching tool. Studies continue to report the prevalence of MSD in the teaching profession (Cardoso et al., 2009; Eggers, 2016; Erick & Smith, 2015; Yue, Liu, & Li, 2012). However, there is limited research on shoulder injuries. Hence, the aim of this study was to determine the prevalence and associated risk factors of shoulder injuries among primary school teachers in the Kraanskloof circuit, Durban, South Africa.

2. Methods

2.1 Research Design

A cross-sectional, survey design was used.

2.2 Population and Sample

A list of primary schools from a local district was obtained from the provincial/state Department of Basic Education. The district consists of three circuit management centres. This selected district was further divided into five circuits. Public primary schools from the Kraanskloof circuit were purposively selected to participate in the study. The Kraanskloof circuit has a total of 23 public primary schools, located in both sub-urban and rural areas. Twenty-three primary schools were recruited, but teachers ($n=203$) from 19 schools consented to participate in the study. Office-based teachers were excluded from the study.

2.3 Procedures and Protocol

The study was approved by the university's Biomedical Research Ethics Committee (BF 225/18). Permission to conduct the study was granted by the provincial Department of Basic Education and school principals. Each participating school attended an information session, which explained the study in detail and teachers were given an opportunity to clarify aspects of the study. Participants who volunteered to participate in the study, were given one week to complete a simple demographics and work-related questionnaire, as well as the standardised Nordic questionnaire (SNQ).

The demographics data and work-related questionnaire include data on age, length of employment and working hours. The SNQ was administered in several studies (Darwish & Al-Zuhair, 2013; Erick & Smith, 2014a, 2014b; Juul-Kristensen et al., 2006) and is considered reliable in reporting musculoskeletal symptoms (Kuorinka et al., 1987). It is used to analyse musculoskeletal symptoms in an occupational health context (Darwish & Al-Zuhair, 2013). The questionnaire comprises 40 forced-choice items, which identify body regions with musculoskeletal problems. It includes a body map to easily indicate the site of pain on the picture provided. Additional questions relating to the neck, shoulder and lower back to further investigate these in detail were also included.

The reliability of the SNQ using the test-retest method found that a number of different answers ranged from 0-23%, and validity tested against clinical history and SNQ found a range of 0-20% disagreement (Crawford, 2007), which led to the conclusion that the questionnaire is an acceptable screening tool (Kuorinka et al., 1987). The questionnaire was also found to be a repeatable, sensitive and useful screening and surveillance tool (Palmer, Smith, Kellingray, & Cooper, 1999).

2.4 Statistical Analysis

Data was analysed using the statistical package for social sciences (SPSS) 21.0. Descriptive statistics were used, including means and standard deviations, where applicable. The chi-square goodness-of-fit-test was used on categorical variables to test whether any of the response options were selected significantly more or less often than the others. The chi-square test of independence was used on cross-tabulations to determine whether a significant relationship existed between the two variables represented in the cross-tabulation. When conditions were not met, Fisher's exact test was used. In addition, a binomial test was used to test whether a significant proportion of respondents selected one of a possible two responses. This was extended when data with more than two response options were split into two distinct groups. Friedman's/Cochran's Q test was also applied to test for significant differences between pairs of body regions for musculoskeletal disorders. Statistical significance was set at $p<.05$.

3. Results

The mean age of participants was 44 years (± 10.99). The average weight and height of the participants were 80.18 kg (± 18.66) and 1.62 m (± 0.10) respectively, with a BMI value of 30.6 kg/m². No correlation between BMI and

shoulder pain was found. Table 1 shows the demographics and work-related characteristics of teachers.

Previous, non-related work injuries in the previous 12 months, such as falls or accidents reported by teachers included lower back (22.7%), shoulder (13.3%) and neck (5.4%) injuries. Other previous injuries (5.4%) included ankle, elbow, knee and wrist injuries.

Table 1. Teacher demographics, physical exercise participation and work-related characteristics

Characteristic	Percentage (%)
Gender	
Female	84.7
Male	13.8
Race	
Black	77.8
Indian	20.2
White	0.5
Unspecified	1.5
Physical exercise per week	
0-60 mins	59.6
60-120 mins	23.6
120-150 mins	11.3
> 150 mins	4.9
Length of employment as a teacher	
0-5 years	29.6
6-10 years	12.3
11-15 years	13.8
>15 years	43.8
Number of weekly working hours	
20 hours	12.3
30 hours	31.5
40 hours	38.4
>40 hours	16.7
Number of classes taught	
1	33.0
2-3	38.9
4-5	16.7
>5	10.8
Number of subjects taught	
1	10.3
2-3	53.7
4-5	27.6
>5	7.9

Number of hours spent writing on the board daily	
0-2 hours	26.6
2-3 hours	25.1
3-4 hours	18.7
>4 hours	29.1

The results for the musculoskeletal disorders experienced by the teachers in the previous 12 months are represented in Figure 1.

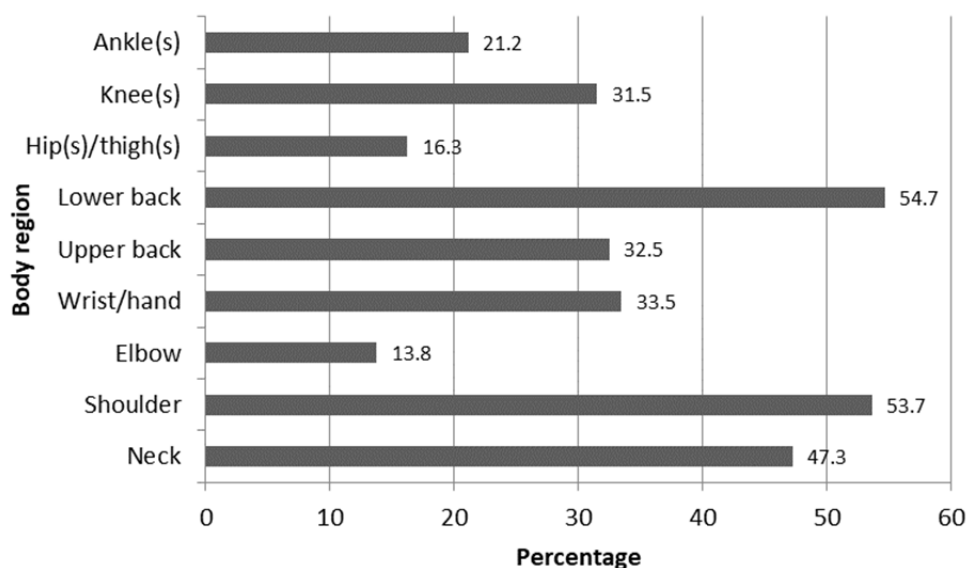


Figure 1. Musculoskeletal disorders experienced by the teachers over a 12 month period

Lower back (54.7%) and shoulder (53.7%) injuries were the most commonly reported MSD, followed by neck injuries (47.3%). Shoulder MSD were significantly more common than neck MSD ($p = .037$). Further analysis showed that a significant 76.1% of the 53.7% of shoulder injuries, had not injured their shoulder in an accident [$\chi^2(3)=154.450$, $p<.0005$]. A majority proportion (48.6%) of participants indicated that they had had a shoulder problem for between one and seven days during the previous 12 months [$\chi^2(3) = 33.055$, $p<.0005$]. The shoulder problem prevented a majority (77%) of participants from performing their normal work for up to seven days during the previous 12 months [$\chi^2(3) = 33.936$, $p<.0005$]. A majority (62%) of participants indicated that they did not consult with a healthcare professional (doctor, physiotherapist, chiropractor or other) for their shoulder problem ($p = .012$).

There was no significant difference between the number of participants who were forced to reduce work activity and those who did not have to reduce work activity because of the shoulder problem. A significant 61% indicated that they did not reduce their leisure activities during the previous 12 months because of a shoulder problem ($p=.035$). In addition, a significant 96% of teachers did not change jobs or duties because of the shoulder problem ($p<.0005$).

The results indicated no significant relationship between the shoulder problem during the previous 12 months and the variables: length of employment, working hours, hours spent writing on the boards, physical exercise, age and weight. There was a significant relationship between having had a previous shoulder injury and suffering from a shoulder injury in the past year (Fisher's exact=16.126, $p=.006$). A significant number who had a left/right shoulder injury before (e.g. from falls, accidents etc), complained of left/right shoulder problem at work in the previous year.

4. Discussion

The prevalence of shoulder injuries is reported to be one of the three commonly reported MSD among school teachers (Chong & Chan, 2010; Darwish & Al-Zuhair, 2013; El-Sayed Ebied, 2015), with the prevalence of MSD higher in school teachers than other occupational groups (Cardoso et al., 2009). Findings in the current study also found that the shoulder injuries among teachers (53.7%) was the highest reported MSD, closely followed by lower back (54.7%). Erick and Smith (2014b) reported that shoulder injuries were equally as prevalent as upper back and neck injuries in Botswana. Another South African study (Eggers, 2016) reported the prevalence of neck/shoulder injuries among school teachers at 83.1%. Similarly, studies in Hong Kong (Chong & Chan, 2010), Taiwan (Cheng, Wong, Yu, & Ju, 2016) and Nigeria (Ojukwu et al., 2018) reported shoulder injury as the most prevalent at 73.4%, 63.4% 62.3% respectively. On the other hand, a study in Egypt (El-Sayed Ebied, 2015) reported the lowest prevalence (15%) of shoulder injuries. However, there still remains a high prevalence of shoulder injuries, the need for interventions to prevent and manage shoulder injuries among school teachers is warranted, both locally and internationally.

Findings suggest that the shoulder problems experienced by the teachers in the current study was not severe enough to seek healthcare nor to reduce leisure activities and change duties. However, this also indicates that the teachers had to work with shoulder problems, which could potentially exacerbate the problem over time. On the other hand, the shoulder problem prevented a significant number of teachers from performing their normal day-to-day activities.

Furthermore, there was a significant relationship between having had a previous shoulder injury and suffering from a shoulder injury at work in the previous year. Erick and Smith (2014b) also reported an association between shoulder pain prevalence and previous shoulder injuries. This could be due to inadequate or improper rehabilitation of the previous shoulder injury, or overuse of the unhealed or untreated shoulder resulting in aggravating the previous injury and damaging more structures of the shoulder.

Previous studies have reported associated work characteristics with an increased prevalence of musculoskeletal disorders, including shoulder injuries (Erick & Smith, 2014b; Korkmaz, Cavlak, & Telci, 2011; Ono et al., 2002). Teachers with more than 14 years of employment were reported to have a higher prevalence of shoulder injuries compared to teachers with fewer years of employment (Cardoso et al., 2009). Another study reported that teachers who were employed for longer than five years were more likely to develop work-related musculoskeletal disorders compared to those employed for less than five years (Cheng et al., 2016). However, in the current study no significant relationship between the prevalence of shoulder injuries and work characteristics were found.

The awkward arm posture assumed when writing on the board has been associated with the prevalence of shoulder injuries among teachers (Erick & Smith, 2014b; Korkmaz et al., 2011). Chiu and Lam (2007) reported a relationship between overhead writing and neck and upper limb pain among secondary school teachers in Hong Kong. Spending two hours or more writing on the board daily was strongly associated with shoulder pain among teachers (Rahman & Warikoo, 2013). However, this study did not show association between the duration of writing on the chalkboard with shoulder pain. This could imply that spending even less than two hours writing on the chalkboard daily is enough to contribute to shoulder pain because shoulder pain was equally reported even for those teachers who were spending less time writing on the chalkboard. Furthermore, this could also imply that writing on the chalkboard is not the single factor that contributes to the development of shoulder injuries among teachers.

Studies have also associated the prevalence of shoulder injuries with increasing age, with the highest prevalence reported at age 40-49 years (Cardoso et al., 2009; Erick & Smith, 2014b; Yue et al., 2012). This has been reported to be due to natural wear and tear (Erick & Smith, 2014b), as well as less physical fitness and the slower physiological response of older teachers compared to younger teachers (Samad, Abdullah, Moin, Tamrin, & Hashim, 2010). Incidentally, teachers with a BMI of more than 28 kg/m² had a higher prevalence of neck/shoulder pain (53.5%) compared to teachers with a BMI of less than 28 kg/m² (49.4%) in a previous study (Yue et al., 2012). The current study found no correlation between BMI and shoulder pain among teachers.

Other associated risk factors reported in previous studies include high psychological job demands (Erick & Smith, 2014b), depression (Crawford, 2007), heavy workloads (Ono et al., 2002), high perceived stress levels (Mesaria & Jaiswal, 2015), less social support (Ariens, Van Mechelen, Bongers, Bouter, & Van De Wal, 2001), low job satisfaction (El-Sayed Ebied, 2015) and being female (Abdulmonem et al., 2014; Erick & Smith, 2014b; Korkmaz et al., 2011; Yue et al., 2012). However, these are associated risk factors for all musculoskeletal disorders and are not specifically for shoulder injuries; and therefore cannot be entirely associated with, or isolated from, the shoulder.

5. Conclusion

This study suggests that prevalence of shoulder injuries among primary school teachers exists. Shoulder and lower back pain are the most commonly reported musculoskeletal complaints among primary school teachers. This can prevent teachers from performing their normal work-related activities for a number of days. Care should be taken by teachers to minimise the prevalence of shoulder injuries. This could include postural correction, correct ergonomics when writing on the board, as well as adequate rehabilitation of any previous shoulder injuries the teachers might have had, as these may have an effect on shoulder MSD in the teaching profession over time. Further research is also recommended to assess the type of shoulder injuries experienced by teachers, as well as to develop measures to prevent and manage shoulder injuries among teachers.

6. Limitations

The study used a self-reporting questionnaire; therefore it is of importance to acknowledge the possible recall bias and self-reporting of shoulder injuries among teachers. The objective assessment of the prevalence of shoulder MSD among teachers would be recommended. Only possible associations between cause and injury were suggested in this study and no conclusion on the actual cause of shoulder MSD among teachers can be drawn. A larger sample size is required to reduce the risk of error in the study.

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Competing Interests Statement

The authors declare that there were neither personal, commercial nor financial relationships which may have influenced them to write this article.

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