

## Prevalence of mechanical neck pain in Taif university female students: a survey study

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**Abstract:** This study was conducted to identify the prevalence and the associated risk factors of neck pain in female undergraduate students from Taif University in Saudi Arabia. Three hundred female volunteers' students from Taif University were participated in this study. Their ages ranges from 18 to 27 years old with a mean age of 20.49 years ( $\pm 2.14$ ) and a mean body mass index of 23.13 ( $\pm 3.32$ ). Self-administered questionnaire was used to gather data on the prevalence of neck pain and its associated risk factors. Additionally, all participants were assessed for neck disability (by using neck pain disability index questionnaire) and for cervical range of motion (by using CROM apparatus). The results showed that 54% of the participants reported experiencing neck pain. The prevalence of neck pain increased with higher level of study and it is commoner among clinical students. Postural bad habits and life style are the most common risk factors. It was concluded that Taif university female students had a high prevalence of mechanical neck pain. The future health of undergraduate students deserves consideration and they should be alerted to the likelihood of mechanical neck pain and its potential causes. However there is still uncertainty about factors leading to neck pain and more research is needed on this topic.

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### 1. Introduction

Neck region is one of the most mobile and the most utilized part. Neck pain is a common musculoskeletal symptom. Neck problems are not life threatening, but they do cause pain and stiffness, often resulting in utilization of healthcare resources, absenteeism from work, and disability (1). Mechanical neck pain is not attributable to a specific disease or disorder and is labeled as 'soft-tissue' rheumatism or muscular/mechanical/postural neck pain (2). In the absence of traumatic injuries, the main cause of mechanical neck pain is poor posture, which in turn results in abnormal forces and strain on musculature that must balance and control the head as the persistent pain may be caused by inadequately addressed compensatory posture (3).

Although the etiology of insidious mechanical neck pain is under debate, it is clear that neck pain is multifactorial in nature, with both physical and psychosocial contributors (4, 5) including one or more of the following: poor posture, anxiety, depression, neck strain, and sporting or occupational activities (6,7). In an estimated 50–80% of cases involving back or neck pain, an underlying pathology cannot be definitively determined (8). Regardless of the primary source of pain, the prognosis for individuals experiencing chronic neck pain is poor, as many patients continue to suffer from persistent pain and disability following conservative physical therapy intervention (9, 10).

University students seem to be a high risk group for neck pain (11). In addition to the factors predisposing to pain in the general population, students subject themselves to hours of prolonged reading (11, 12), writing and computer work (13) which make them high-risk group for neck pain (12). To our knowledge, there is a dearth of studies on the prevalence and pattern of neck pain among university undergraduates in Saudi Arabia. The objective of this study was to determine the prevalence and risk factors of neck pain in undergraduate students from Taif University in Saudi Arabia.

### 2. Subjects, Materials and Methods

#### Study population and procedures

These data were collected as part of a large cross sectional, observational study investigating the prevalence of mechanical neck pain and its associated risk factors in undergraduate university female students enrolled at Taif University, Taif city, Saudi Arabia.

Prior to beginning the study, Taif university scientific research review board approved the protocols for this study. All undergraduate female students enrolled in the university's bachelor program were eligible to participate in the study. The students were excluded if they had 1- Neck pain caused by cervical spondylosis or cervical disc prolapse, 2- Neurological diseases, bone injuries, infections, neoplasm, rheumatoid arthritis, ankylosing

spondylitis, and 3- Any pathology or injury of any joint of the upper and lower limbs. Full medical history taking and physical examination was conducted after taking their consent to participate in the study.

### Data Collection Instrument

#### a- Questionnaire

Self-administered questionnaire consisted of four sections designed to gather data on the prevalence of neck pain. It included the following parts:

**1-Demographic factors: include age** (18-22 or 23-27 years), weight, height (< 1.55 m or  $\geq$  1.55 m), body mass index (< 18.5,  $\geq$  18.5- < 25,  $\geq$  25-<30, or  $\geq$ 30 kg/m<sup>2</sup>) according to World Health Organization (WHO) classification system (14), residence place (rural or urban), field of the study (medical sciences, humanities, computer sciences or science), and student year level (first to fourth year).

#### 2- Risk factors:

The questionnaire included questions related to postural bad habits during different body positions such as 1- sitting (the duration that students sat during studying in university and at home daily, especially when she fixes the head in specific posture for long time during reading, writing, watching T.V or P.C use), 2- standing (the frequency of inappropriate posture of the head and neck), 3- Sleeping (the appropriateness of the pillow height) and 4- Carrying weights (especially on one side of the body). Furthermore, there were questions regarding sleeping habits in sitting position especially during travelling, reading or watching the T.V, the direct exposure to air conditioner, the posture during use of phones/cell phones such as catching the phone between the head and shoulder. Life style: the students were asked about the type of abbaya either head or shoulder abbaya and the lack of sleep. Physical exercises: the frequency of practicing regular physical exercises. Each question was rated on four levels such as 0, no ; 1, sometimes; 2, often ; 3, always.

**3- Neck pain during the previous one year:** A picture of the body from the standardized Nordic questionnaire and the question "Have you experienced any neck pain lasting > 24 hours during the previous one year?" were included in the questionnaire (15).

#### b-Evaluation of range of motion (ROM) of the cervical spine

It was conducted by the use of cervical range of motion (CROM) device in the different directions including: flexion, extension, rotation and side bending towards both sides. In this study, limitation of ROM was classified into three categories; mild limitation: when ROM is  $\geq$  75 - <100% of the normal

ROM, moderate limitation: when ROM is  $\geq$ 50 - <75% of the normal ROM and severe limitation when ROM is less than 50% of the normal ROM.

#### C- The neck disability (NPD) index questionnaire

It was used as an instrument for measuring self-rated disability due to neck pain. It has been shown to be a valid indicator of disability in patients with neck pain. The questionnaire consists of 10 items addressing different aspects of functional capacities. Each item is scored from 0 to 5, for a total score of 50. The lower the score, the less self-rated disability (16).

#### Statistical analysis:

The statistical analysis was performed with SPSS software, version 14.0 (SPSS Inc., Chicago, IL, USA). *P* value < 0.05 was considered to be statistically significant. The variables are shown as frequency, percentages (for screening the prevalence of neck pain), mean and standard deviation (SD). The association of prevalence of neck pain and other variables was analyzed by the chi-square test.

### 3. Results

Of the 479 students surveyed, 125 students were excluded; of these, 25 were not meeting the inclusion criteria, 41 had missing questionnaire data due to clerical errors, and 59 refused to participate (Fig. 1). A total of 300 students completed the questionnaire with a response rate of 84.75%. The mean age of the respondents was  $20.49 \pm 2.14$  years old, mean weight was  $57.16 \pm 9.04$  kg, the mean height was  $1.57 \pm 0.07$  m, and the mean BMI was  $23.13 \pm 3.32$ . Most of the respondents were from the faculty of applied medical sciences encompassing students in physiotherapy, laboratory, nursing and radiology (68.33%) followed by the faculty of science, computer science and humanities (31.66%). Table 1 presents the demographic characteristics of the students who participated in this study.

#### Prevalence of neck pain:

Fifty-four percent (162 students) of the undergraduate university students reported experiencing neck pain during the previous one year that persists for more than 24 hours (Fig.2). In terms of demographic characteristics, there was no association between neck pain status and the height ( $p=0.4$ ), BMI ( $p=0.9$ ) and the residence place ( $p=0.1$ ). On the other hand, there was association between neck pain status and the field of the study ( $p=0.02$ ) and student year level ( $p=0.003$ ). The prevalence of neck pain increased substantially between the first (33.3%) and second years (44.3%) and continued at this higher level during the third (68.6%) and fourth year (80.3%) (Table 2).

There was association between neck pain status and the length of the study as greater percent of participants who had studied in the university for more than 1 year (second-fourth year students) reported neck pain compared with first-year students and they were at risk of developing neck problems.

There was association between the prevalence of neck pain and the possible risk factors mentioned in table 3 ( $p < 0.05$ ) except wearing shoulder abaya

( $p > 0.05$ ). As regarding to cervical spine ROM, there was no significant association between the prevalence of neck pain and the limitation of neck ROM in all directions except in rotation direction ( $p < 0.05$ ) (Table 4). Additionally, there was relationship between neck pain and the degree of neck disability according to the scores of NPD index questionnaire ( $p = 0.001$ ) (Table 5).

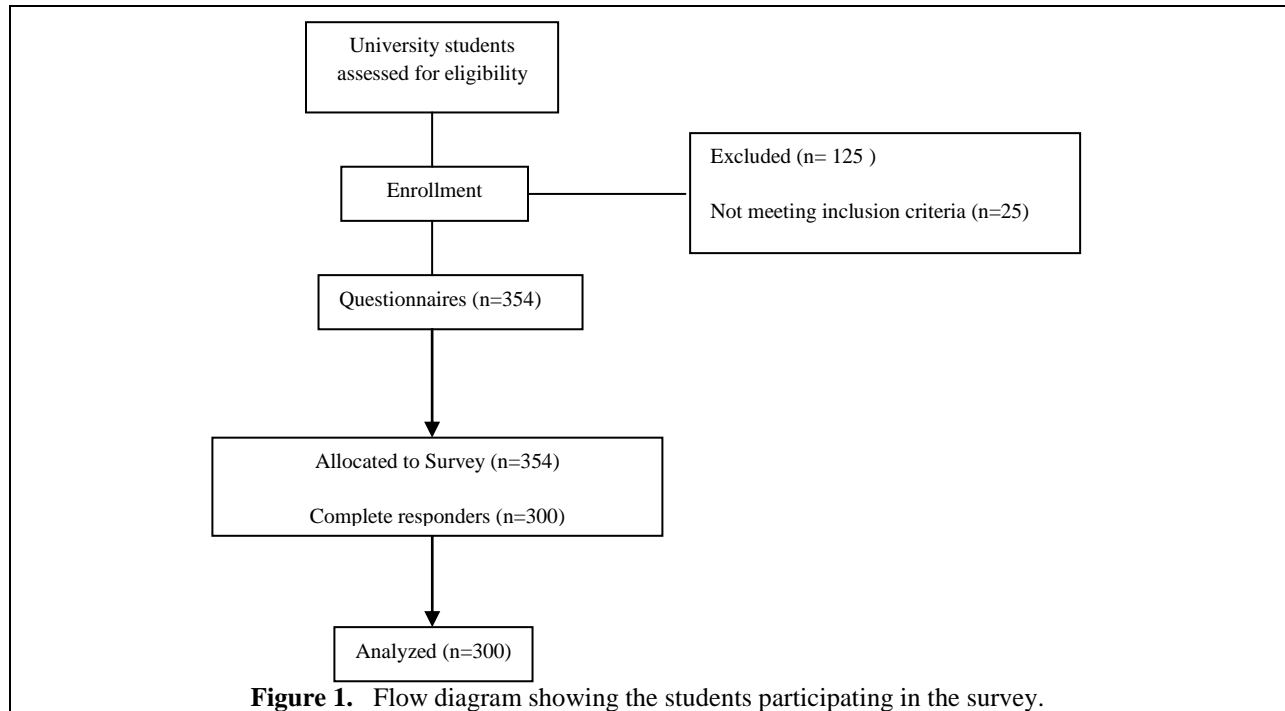


Table 1: Demographic characteristics of the study population.

Characteristics	Frequency	%
Age (years)		
18-22	236	78.7
23-27	64	21.3
Height (m)		
< 1.55 m	95	31.7
≥ 1.55 m	205	68.3
BMI		
Under weight (<18)	30	10
Normal weight (18 -<25)	196	65.3
Over weight (25-<30)	55	18.3
Obese (≥30)	19	6.3
Residence place		
Rural	80	26.66
Urban	220	73.33
Field of the study		
Medical sciences	205	68.33
Humanities/science/computer	95	31.66
Student year level		
First	90	30
Second	79	26.33
Third	70	23.33
Fourth	61	20.33

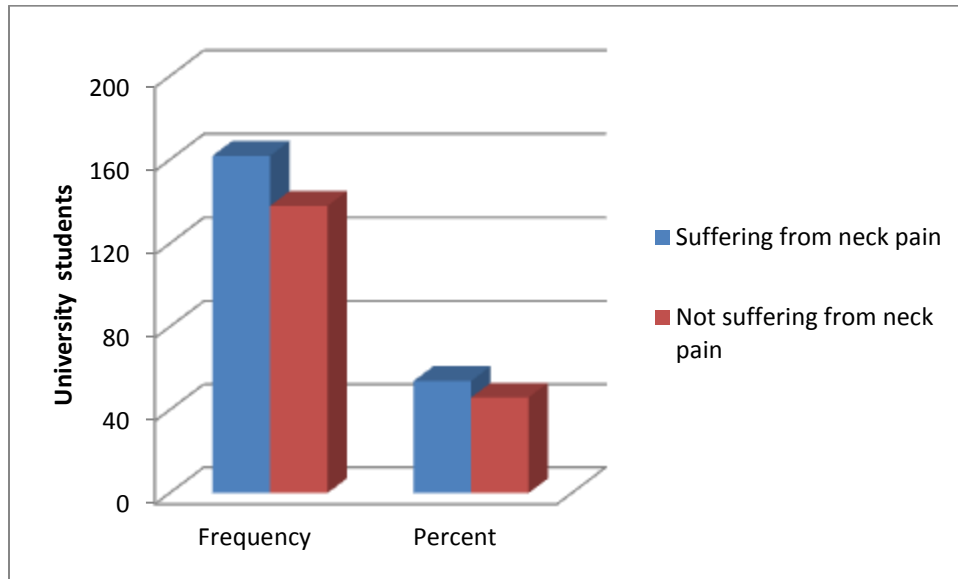


Fig. 2: The prevalence of mechanical neck pain in Taif university students.

Table 2: Association between the prevalence of neck pain and demographic data of the participants.

Characteristics	Total number in the sample (N=300)	Frequency (%) of students suffering from neck pain (N=162)	$\chi^2$ test	<i>p</i> -value
Height				
< 1.55 m	95	48 (50.5)	0.67	0.41
$\geq$ 1.55 m	205	114 (55.6)		
BMI				
Under weight (<18)	30	15 (50)	0.37	0.9
Normal weight (18 -<25)	196	107 (54.6)		
Over weight (25-<30)	55	29 (52.7)		
Obese ( $\geq$ 30)	19	11 (57.9)		
Residence place				
Rural	80	35 (43.8)	6.07	0.1
Urban	220	127 (57.7)		
Field of the study				
Medical sciences	205	122 (59.5)	15.31	0.02*
Humanities/science/computer	95	40 (42.1)		
Student year level				
First	90	30 (33.3)	16.9	0.003*
Second	79	35 (44.3)		
Third	70	48 (68.6)		
Fourth	61	49 (80.3)		

$\chi^2$  : Chi square test value

\* Indicates significant association ( $p < 0.05$ ) between the prevalence of neck pain and the demographic characteristics of the students.

Table 3: The association between the prevalence of neck pain and risk factors.

Risk factors	No	Sometimes	Often	Always	Total	$\chi^2$	p-value
<b>- Bad habits:</b>							
During sitting	5	19	55	83	162	8.09	0.03*
During standing	24	26	24	88	162	18.6	0.0001*
During sleeping	29	52	34	47	162	6.06	0.1*
Carrying weights	6	38	49	69	162	25.2	0.0001*
Sleeping habits in sitting position	41	64	27	30	162	10.07	0.018*
Exposure to air conditioner	11	51	60	40	162	18.37	0.0001*
Wrong posture during the use of the phone/cell phone	41	63	45	13	162	21.2	0.0001*
<b>- Life style:</b>							
Wearing shoulder abbaya	23	40	19	80	162	3.09	0.37
Wearing head abbaya	47	63	21	31	162	24.9	0.0001*
Sleep difficulty	66	65	18	13	162	38.3	0.0001*
Practice physical exercises	72	70	18	2	162	60.3	0.0001*

Total: Refers to the total number of students suffering from neck pain

$\chi^2$  : Chi square test value

\* Indicates significant association ( $p < 0.05$ ) between the prevalence of neck pain and the potential risk factor.

Table 4: Association between the prevalence of neck pain (as a frequency and percentage of the total number of respondents) and the degree of limitation of cervical ROM.

Neck movement	Degree of ROM limitation				$\chi^2$	p-value
	Complaining from neck pain		Not Complaining from neck pain			
	Mild	Moderate & severe	Mild	Moderate & severe		
Flexion	90 (50)	7 (4)	30 (43)	0 (0)	1.7	0.4
Extension	95 (48.6)	12 (5.3)	39 (45)	3 (1)	7.9	0.3
Right side bending	109 (51.3)	15 (2.6)	38 (45)	3 (1)	6.56	0.06
Left side bending	112 (52)	12 (2)	40 (46)	0 (0)	22.01	0.07
Right rotation	130 (47.6)	19 (6.3)	43 (43.3)	3 (2.6)	32.23	0.01*
Left rotation	122 (40.6)	22 (13.3)	45 (42.3)	3 (3.6)	10.67	0.02*

ROM: Range of motion.

$\chi^2$  : Chi square test value

\* Indicates significant association ( $p < 0.05$ ) between the prevalence of neck pain and the limitation of ROM

Mild limitation: ROM is  $\geq 75$  -  $< 100\%$  of the normal ROM

Moderate limitation: ROM is  $\geq 50$  -  $< 75\%$  of the normal ROM

Severe limitation: ROM is  $< 50\%$  of the normal ROM

Table 5: Relationship between the prevalence of neck pain and degree of neck disability the results of NPD index.

Student's neck pain	Degree of neck disability (N & %)				Total
	No	Mild	Moderate	Severe & complete	
Not suffering	81 (58.7)	57 (41.3)	0 (0)	0 (0)	138
Suffering	32 (19.8)	88 (54.3)	39 (24.1)	3 (1.9)	162
Total	113	145	39	3	300

$\chi^2 = 30.4$ ,  $p = 0.001^*$

$\chi^2$  : Chi square test value.

\* Indicates significant association ( $p < 0.05$ ) between the prevalence of neck pain and the degree of neck disability.

#### 4. Discussion

This is the first known study that reports on neck pain prevalence and associated exposures in undergraduate female students in Saudi Arabia. In this study, a cross-sectional survey was used to collect self-report data. Because this study was not longitudinal in nature, causal inferences cannot be drawn from the results (17). However, previous work on self-reported musculoskeletal disorders suggests that data gained from cross-sectional surveys are valid (18).

The findings of this study revealed a high prevalence (54%) of neck pain in the previous one year among Saudi female undergraduate students. A fairly large variation in the prevalence rates in different populations has been reported about neck pain (19). The prevalence rate observed in this study is comparable to finding of Kanchanomai *et al.*, (20) among undergraduate students (male & female) and found a prevalence of 46%. The higher prevalence in our study compared with the previous work might be attributed to the fact that the gender of our participants was only female who has a high risk of neck pain more than males. This comes in agreement with Habib *et al.*, (21) who reported a higher prevalence among females than males for all ages for several types of musculoskeletal disorders. Neck pain in the general population affects females than males, with ranges of 12.5-22% in females and 9.5-16% in males (9, 22, 23). On the other hand, Grimby-Ekman *et al.*, (24) reported that the annual incidence of neck or upper back pain in Swedish undergraduate students was 15%. The discrepancy between our and previous study may be due to difference in the definition of symptomatic case. Grimby-Ekman *et al.*, (24) defined the symptomatic case as an individual who experienced pain for > 7 days whereas in this study it was > 24 hours. Consequently, it is likely that a far greater number of subjects were identified as symptomatic cases in this study.

Neck pain was found to be a common complaint among undergraduate students, as evidenced by the high prevalence rate of 54% in our sample. This is concerning, given the relatively young age of this sample (mean age = 20.49 ± 2.14 years), but supports findings in the literature suggesting that neck problems can occur at an early age (25-27) and often commence prior to graduation (11, 20, 28). Therefore, it appears that a significant proportion of newly graduating persons may enter the workplace with neck pain and be at risk of developing recurrent neck problems throughout their working lifetime.

The prevalence of neck pain in the fourth year was high as compared to the first year students. This

is in concert with the reports of Ayanniyi *et al.*, (11) where the frequency of neck pain since admission into the university was higher than before admission and the pain increased according to year of study. This implies that academic activities may contribute significantly to developing neck pain. Furthermore, high percent of the respondents with reported neck pain in this study are clinical students. Medical education is demanding and tedious and may predispose to neck pain. This is consistent with the report of Radcliffe *et al.*, (29) that medical education is long and emotionally tasking, involving levels of stress that can lead to disruption in physical and mental health.

However, we should not focus only on demographic factors or underestimate the effects of musculoskeletal mechanical factors when dealing with neck pain. We expect that neck pain also reflects the nature and the site of injury in university students. Cervical strains and sprains are the most common causes of neck pain, which can result from poor posture, sleeping habits, chronic muscle fatigue, and trauma [6,7]. Saudi university female students spend a lot of time sitting in a poor posture for computer use, reading and writing and during their lectures as a part of their academic activities. In addition, only some of the students used suitable pillow when sleeping or practiced regular physical exercises. Most of the students had their own cell phones and lab tops and used them mostly in poor ergonomic positions. Sleeping during sitting position, carrying heavy weights on one side of the body (mostly the hand bag) and direct exposure to air conditioner are factors presented high association with the prevalence of neck pain in Saudi female students. Therefore, these issues in Saudi university students might be important factors for the high prevalence of neck pain in this age group.

The findings of the present study revealed a significant association between the prevalence of neck pain and the degree of neck disability. Mild degree of disability was recorded in 54.3 % of the students with neck pain. This is consistent with previous reports that neck pain is mostly mild (30), typically not life threatening (31) and may not result in high disability (32). Furthermore, there was no significant association between neck pain and the limitation of cervical ROM except for rotation ROM. This is because ROM was not measured during the period of acute neck pain for the participants except only for about ten students. However, during the period of neck pain, there will be significant limitation of cervical ROM. Decreased cervical ROM could be referred to, based on EMG measurements from trunk muscles; it has been proposed that the anticipation of pain evokes a protective strategy that

stiffens the spine by increasing the amount of co-activation. The development of motor control strategies that stabilize the back and neck through increased co-activation of muscles could cause slow and jerky movements with low ROM. Another mechanism that might account for such movement characteristics is development of increased feedback-based motor control strategies to compensate for reduced acuity of the proprioceptive input or for disturbed feed-forward mechanisms (33).

There were several limitations to this study. First, we could not confirm the risk factors of the high prevalence of neck pain because this was a cross-sectional study and not a longitudinal or controlled study. Therefore, the cause and effect were difficult to establish. Second, the data was self-reported so we could not exclude recall bias. Third, subjects in this study were recruited from only one university, Taif University, Saudi Arabia and it is unlikely that this could be representative of all Saudi university students. Thus generalization of the results to other undergraduate student populations may be limited. In addition, all of the participants were female. However, neck pain has been found in males and females in the adult population (6). Therefore, further study is recommended to identify the prevalence and risk factors in Saudi university students including males and females.

### Conclusion

Saudi university female students had a high prevalence of mechanical neck pain. The prevalence increased with higher level of study and it is commoner among clinical students. We need further clinical attention for the high prevalence of neck pain among university students. An education program should be introduced for undergraduate students especially female ones regarding how properly to do computer work and to correct postural bad habits in order to avoid mechanical neck pain.

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