

Investigation of factors affecting the intensity of chronic neck pain in young adult population

Neck pain in young adults

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Abstract

Aim: Neck pain is a common health problem that most people experience throughout their lifetime. The aim of this study was to examine the factors associated with chronic neck pain intensity increasing in the young population over the last years.

Material and Methods: Two hundred and ninety- two young adults aged 18-30 years were included in the study. The severity of pain, disability level, general and spine-related quality of life, sleep quality and smartphone usage status of the participants were questioned. Binary logistic regression analysis was used to determine the factors affecting neck pain intensity.

Results: Smartphone usage in non-neutral position (Odds Ratio (OR): 2.116), decreased spine-related (OR: 0.980) and general quality of life (OR: 1.003), increased neck disability (OR: 1.079) are important factors that increase the severity of neck pain.

Discussion: Our results indicate the non-neutral position of the neck during a phone call, decreased level of spine-related quality of life and general quality of life, increased disability of the neck are major risk factors for moderate-severe neck pain. Informing the young population about these risk factors and providing the necessary training will contribute to reducing the intensity of neck pain.

Keywords

Chronic neck pain; Intensity; Smartphone; Quality of life; Neck disability

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Introduction

Neck pain is a common health problem that most people experience throughout their lifetime and is often encountered in different societies and at different ages [1]. The 1-year prevalence of neck pain was found to be 42-67% in young adults [2]. Additionally, between 2006 and 2016, neck pain population prevalence increased by 21%, making neck pain a global burden candidate [3]. There are studies in the literature examining risk factors for neck pain. However, there are no studies examining the factors that affect the intensity of neck pain in the way that this study targets.

Kim et al. (2018) in their systematic literature review reported that risk factors associated with neck pain included depressed mood, perceived muscular tension, and work in awkward/sustained postures. In this study, Kim et al. mostly linked neck pain with psychological factors but physical factors should be considered too [4].

In addition to these risk factors, the increased use of technological tools with developing technology is seen as a risk factor for neck pain. Among these technological devices, the use of smartphones (SP) has increased greatly. Namwongsa et al. (2019) reported that SP users with neck pain use their SP with more neck flexion and produce more muscle activity in the cervical muscles compared to painless users, and in addition, as the neck flexion angle increases, the severity of neck pain increases. Prolonged use of the SP can lead to abnormal forward head posture and harm to cervical structure [5].

In addition, 7.7% of Turkish youth smoke, and smoking rates are increasing in the young adult population [6]. The association of smoking with neck pain has been a subject of research. Smoking was investigated as a risk factor or associated factor in several studies, with many studies reporting no statistically significant relationship with neck pain [7]. However, in many studies, weak relations between smoking and neck pain intensity were identified and reported [8-9].

As another risk factor, studies are examining the effect of sleep quality on the intensity of neck pain. According to Juan et al. (2019), poor sleep quality leads to worsening of neck pain intensity and depression in chronic neck pain patients. Also, Juan et al. stated that exercise is a positive mediator of the relation between depression and neck pain intensity. However, there is insufficient data in the current literature on the effect of sleep quality and exercise on the intensity of neck pain.

In the present literature, it is stated that chronic neck pain is very common among young adults, a serious burden for health care systems, and that the neck health of these individuals should be carefully examined for future periods. However, there is still uncertainty about the factors leading to neck pain in young adults, and more research is needed in this area [10]. The aim of this study, unlike other studies focusing on neck pain presence in the current literature, was to analyze the pain-related variables in individuals with chronic neck pain.

Material and Methods

Participants

This cross-sectional study was conducted on voluntary 292 students (192 females; 100 males; mean age: 22.72±2.75 years) aged 18-30 years who had neck pain for at least 3 months and

met the inclusion criteria at Pamukkale University School of Physical Therapy and Rehabilitation (Figure 1). Exclusion criteria were as follows: specific neck pain history, numbness in the arms, the presence of musculoskeletal pain in another part of the body, spinal disorders such as scoliosis and spondylolisthesis, musculoskeletal surgery, orthopedic and neurological disorders, and the presence of communication problems that may affect the assessment process. The study was approved by Pamukkale University Medical Ethics Committee. We informed all students about the study protocol. All individuals included in the study signed the informed consent form.

According to its anatomical localization, neck pain is defined as pain that extends posteriorly between the superior nuchal line and the spina scapula, laterally to the superior of the clavicle and anteriorly to the suprasternal notch and may spread to the head, trunk and arms [11]. Participants used a body diagram to mark the localization of their neck pain. Participants who reported pain outside the neck area were excluded from the study. Participants were informed about filling out the sociodemographic data form and questionnaires. In order to prevent missing data, the forms were checked quickly after the participants completed the forms, and all missing parts were completed.

Outcome Measures

Pain Intensity

The Visual Analogue Scale (VAS) was used to assess neck pain intensity. On the basis of the VAS scores, Boonstra et al. classified pain experienced by patients with chronic musculoskeletal pain as mild (≤ 3.4 cm), moderate (3.5–7.4cm), and severe (≥ 7.5 cm) [12]. According to VAS scores, participants were divided into two groups: mild neck pain (Group I; 0.5-3.4 cm) and moderate-severe neck pain (Group II; 3.5 cm and above).

Disability

The disability associated with neck pain was evaluated with the Neck Disability Index (NDI), a reliable and valid measurement instrument. The index consists of a total of 10 items (pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping, and recreation). In the questionnaire, where each section is scored between 0-5, 50 points indicate the maximum disability [13]. The questionnaire has a Turkish reliability and validity study [14].

General Quality of Life

Nottingham Health Profile (NHP), which measures physical, psychological, and social effects and consists of 38 questions, was used to assess the general quality of life. This valid and reliable scale to measure the quality of life consists of six subtitles: pain, physical mobility, energy, sleep, social isolation, and emotional reactions. An increased score indicates a decrease in the general quality of life [15].

Spine-Related Quality of Life

The Spine Functional Index (SFI) was used to measure spine-related patient-reported outcomes, such as disability and quality of life. This index consists of 25 statements, represents spine functions as a percentage, and a high percentage expresses well spinal function [16].

Sleep Quality

To assess sleep quality and sleep disturbances, the Pittsburgh Sleep Quality Index (PSQI) that has 7 components (subjective

sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction) was used. A total PSQI score higher than 5 indicates poor sleep quality [17].

Questioning Information Related to Smartphone Usage

SP usage habits have been assessed via 3 questions, including usage time in hours per day, screen sizes (below/above 5 inches) in inches, and position of the neck as neutral or non-neutral during calls. The neutral anatomical position of the neck was demonstrated to the participants in the picture and they were asked to compare their neck position during calls with this neutral position.

Statistical Analysis

The school where the study was conducted was accepted as the universe of the study and all students were reached. Therefore, there was no need for power analysis. Descriptive data are given as frequency, percentage, and mean ± standard deviation. Binary logistic regression analysis was used to determine the factors affecting neck pain intensity. The dependent variable is neck pain intensity; independent variables are Body Mass Index (BMI), gender, questions about smartphone usage, SFI, NDI, NHP and PSQI. The Mann-Whitney U test was also used to compare Group I and Group II. SPSS v22.0 package program was used for statistical analysis and to assess statistical significance, the level of α-error was accepted as 0.05.

Results

Descriptive data of the participants, questionnaire scores and smartphone usage variables are presented in Table 1.

The binary logistic regression analysis demonstrated that the non-neutral position of the neck during a phone call, decreased level of spine-related quality of life and general quality of life, and increased disability of neck are associated with neck pain for moderate-severe neck pain (Table 2).

Table 1. Descriptive data of participants

Independent variables	Group I (n=114) Mean ± SD	Group II (n=178) Mean ± SD	p
Age (yrs)	22.57±2.63	22.82±2.83	0.673 ^a
BMI (kg/m ²)	22.00±3.21	22.26±3.05	0.524 ^a
VAS (cm)	2.07±0.87	5.51±1.36	0.0001 ^{a *}
Smoking Habit (pack year)	5.06±3.95	3.60±4.08	0.127 ^a
SP usage per day (hrs)	5.96±4.21	5.84±3.78	0.82 ^a
SFI (%)	81.15±17.66	75.19±17.93	0.001 ^{a *}
NDI	6.71±5.68	8.78±5.06	0.0001 ^{a *}
NHP	101.20±110.08	136.13±122.54	0.007 ^{a *}
PSQI	6.14±3.89	6.90±3.91	0.082 ^a

	Frequency (%)	Frequency (%)	
Gender			
Male	43 (37.7%)	57 (32%)	0.317 ^b
Female	71 (62.3%)	121 (68%)	
SP screen sizes			
5"<	47 (41.2%)	71 (39.9%)	0.737 ^b
≥5"	64 (56.1%)	105 (59%)	
SP usage in neutral position			
Yes	40 (35.1%)	37 (20.8%)	0.005 ^{a *}
No	71 (62.3%)	139 (78.1%)	

*p<0,05 statistically significant; a: Mann-Whitney U Test; b: Chi -Square Test; SP: Smartphone, BMI: Body Mass Index, VAS: Visual Analog Scale, SFI: Spine Functional Index, NDI: Neck Disability Index, NHP: Nottingham Health Profile, PSQI: Pittsburgh Sleep Quality Index

Table 2. Results of binary logistic regression analysis

Variables	Odds ratio	95% CI	p
BMI			0.490
Gender			0.317
Smoking habit (pack year)			0.197
SP usage per day			0.813
SP screen sizes			0.737
SP usage in neutral position	2.116	1.245-3.598	0.006*
SFI	0.980	0.967-0.995	0.007*
NDI	1.079	1.029-1.132	0.002*
NHP	1.003	1.001-1.005	0.016*
PSQI			0.107

*Statistically significant; p: Significance level; SP: Smartphone, BMI: Body Mass Index, SFI: Spine Functional Index, NDI: Neck Disability Index, NHP: Nottingham Health Profile, PSQI: Pittsburgh Sleep Quality Index

The risks from the binary logistic regression analysis were as follows:

- During phone calls, people whose neck is in a non-neutral position are 2.116 times more likely to be in the moderate-severe neck pain category than those who have a neutral neck position.
- Increment in the score of SFI creates 0.98 times less risk in young adults.
- One unit of NDI and NHP scores produces 1.08 and 1.003 times more risk for moderate-severe neck pain, respectively

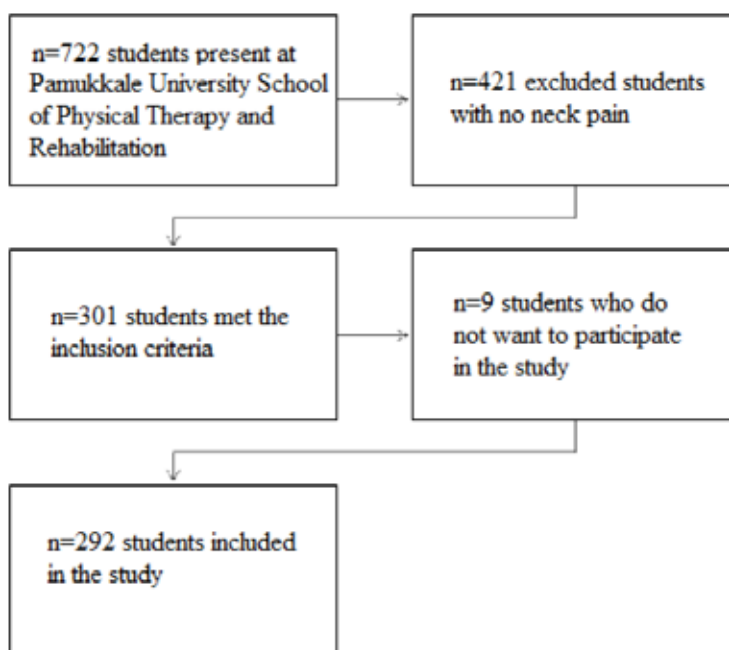


Figure 1. Flow chart showing how participants were included in the study

Discussion

The key results obtained from this study in the young adult population indicated that neck position during phone calls, spine-related quality of life, disability status of the neck and general quality of life were important risk factors for chronic neck pain intensity. The aim of this study was to investigate the effects of factors such as cigarette use, smartphone use, increasing in the young population over the last years, on

chronic neck pain intensity.

According to the results of our study, young individuals with mild neck pain had significantly higher levels of spine-related quality of life, general quality of life and sleep quality, and less neck disability than younger subjects with moderate-severe neck pain.

There is no evidence in the current literature about the relation between BMI and neck pain intensity. We investigated this relation, but found no effect of BMI on neck pain intensity. However, increasing BMI is associated with back pain and its intensity, but not neck pain [18].

Studies have shown that female gender is associated with neck pain, and this association is related to incidence [9]. In the present study, we did not investigate the incidence of neck pain according to gender, we investigated pain intensity distribution. After analysis, we found no significant differences between female and male genders in terms of neck pain intensity distribution in the young adult population.

The association of neck pain with smoking was corroborated in the study by Makela et al [18]. Also, there is a strong association between smoking and a herniated cervical intervertebral disc [19]. Coté et al. reported that in a population of 2184 adults aged 20-69 years, the prevalence of Grade II neck pain was also higher among current smokers. Grade I neck pain was more common in past smokers than in non-smokers, whereas current smokers were more likely to report Grades II and III to IV neck pain [8]. These studies show the effect of smoking on the incidence of neck pain, on the other hand, in the present study, we found that there was no effect of smoking on neck pain intensity in the young adult population. This result may be caused by acute small- to medium-sized analgesic effects of nicotine on pain intensity [20].

Studies on the prevalence of smartphone use have reported that the distribution of musculoskeletal symptoms or pain of any intensity was most common in the neck, followed by the upper back and then the shoulders. These results showed that the total time spent using a smartphone was significantly associated with any pain in the neck and shoulder. Consequently, the excessive use of a smartphone could produce considerable stress on the cervical spine and therefore cause neck pain [20]. However, in our study, there were no significant findings on the effect of SP usage per day on pain. This may be due to the approximation of the SP usage per day parameter between the groups.

According to our results, younger individuals using SP with a screen size of 5 inches and above have more risk of experiencing moderate to severe neck pain than those with a screen size of below 5 inches. Increasing cervical flexion and muscle activity with the increase in the size of the touch screen may cause this situation [21].

In this study, we found that the percentage of SP use in a non-neutral position of the neck was greater in young adults who suffer from moderate-severe neck pain than in group with mild neck pain. Using SP in a non-neutral position increases the risk of experiencing moderate-severe neck pain. In a study conducted on university students, it was reported that an increase in non-neutral neck and shoulder posture percentages may be responsible for the pain in these regions [22]. In a study

conducted on young adults with mild neck pain and no neck pain, it was found that upper and lower cervical flexion angles were significantly higher in the mild neck pain group while using SP [23].

The relation between neck disability and pain is well described in the literature [24]. In our study, findings showed that disability level affects pain intensity. Subjects who suffer from neck pain might experience pain catastrophizing and may create a pain-disability vicious cycle for themselves by avoiding movements that may create pain. One of the limitations of our study is that we have not been able to examine pain catastrophizing.

Sleep quality is another aspect of chronic neck pain that may also affect pain intensity [25]. Pain and sleep relation may be double-sided. Since severe pain can affect sleep, poor sleep quality can affect pain intensity. Sleep disturbance has an increasing effect on pain intensity in women with fibromyalgia [25]. Although it is not a statistically significant difference, in our study, we found that the moderate-severe neck pain group have had poorer sleep quality than the mild neck pain group.

Quality of life is closely related to chronic pain. The presence of neck pain has been reported to reduce the quality of life. There is a negative association between neck pain and quality of life [11]. Our findings showed that decreased quality of life worsened pain intensity. In spite of the gross measurement capacity of the general quality of life, spine-related quality of life is a specific outcome measure for patients with neck pain. In our study, the findings indicated that measured spine-related quality of life status and general quality of life had a negative effect on pain intensity.

The strengths of our study are as follows:

- examining the effects of variables not on the presence of pain, but on pain intensity
- investigating non-neutral neck position during SP calls
- conducting the study in a population most affected by SP usage

The limitations of the study are as follows:

- the measures were self reported, which might have caused some response bias
- the similarity between the groups in terms of some of the variables restricted the comparison

The conclusions obtained from our study are as follows:

- As the intensity of neck pain increases in young adult people, the rate of neck disability increases and the spine-related quality of life, the general quality of life and sleep quality decrease. In other words, decreased neck pain intensity increases the spine-related and general quality of life, and sleep quality.
- Smoking habit has no significant effect on neck pain intensity.
- Young adults more often prefer SP with large screen sizes. The use of a larger screen SP often causes more severe chronic neck pain in younger individuals than a smaller screen.
- Young people who keep their necks in a neutral position during calls with SP suffer less neck pain than those who do not hold in a neutral position.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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