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Research Article

Comparison of Muscle Strength and Range of Motion of the Neck between Opium Smokers and Non-Drug Users in the Most Prevalent Opium Smoking Persian Gulf Country: A Cross-Sectional Study from Iran

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ABSTRACT

Background: Many studies have shown that non-ergonomic positioning of the spine is one of the main causes of postural deformity and opium smoking requires sitting in non-ergonomic positions that are repeated several hours a day and over many years which increases the possibility of posture disorders. Since opium smoking is a health concern in Iran, comparing muscle strength and Range of Motion (ROM) of the neck between opium smokers and non-drug users was the aim of this study.

Methods: In this comparative and cross-sectional study eighty opium smokers were compared with 74 non-drug users in terms of muscle strength and range of motion of the neck. Data were analyzed by Kolmogorov-Smirnov, Pearson correlation coefficient and Independent T tests through SPSS software version 23.

Findings: There were significant differences between the two groups in most variables. Range of motion of forward flexion (P=0.011), extension (P<0.001), right lateral flexion (P=0.009) and left lateral flexion (P=0.001) were significantly different between two groups. Also, muscle strength of opium smokers was significantly lower than non-drug users in all four directions (P<0.001).

Conclusion: It seems that opium smokers are more prone to decrease muscle strength and range of motion of the neck than non-drug users and this could be due to the long hours of the non-ergonomic position while smoking opium after years.

Keywords: Addiction; Drug use disorder; Opiate; Opium smoking; Neck; Muscle strength; Range of motion; Musculoskeletal disorders; Opiates smoking

INTRODUCTION

Iran is facing the worst consequences of opium cultivation in Afghanistan and opiates use disorder is a serious health concern in Iran. According to the world drug report 2022, the most seized of heroin, morphine and opium in 2022 belonged to Iran. 98% of the world's opium seized is in Iran; because not only Iran is the main choice route for smuggling opium from Afghanistan to Europe, but also opium smoking in Iran historically has been common since long ago [1,2].

Smoking raw opium, known as 'Taryak' in Iran, is believed by Iranian people to be a powerful medicine that can cure many illnesses. However, this belief is not based on science and is just a myth. Despite this, many Iranians still choose to use opium through smoking [2].

Iran is one of the countries with the most amounts of opium use and indeed second in the world in terms of opium use. In terms of opium smoking, Iran is the most used country in the world. 74% of all the smoked opium in the world is used in Iran. With the start of the COVID-19 pandemic, some people thought that smoking opium could stop the virus growing in the lungs. This

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idea was not true, but many people started smoking opium or continued opium smoking in Iran more and more [3-5]. Opium smoking in Iran is done with special tools called 'Vafour' (a Clay pipe), 'Gholgholi' (a small water-pipe), and 'Sikh-o-sang' (a spoke and a pin), all of which cause the head, neck and upper body to be placed in an uncomfortable and harmful position. In such a way that usually the head and neck come forward than usual and the thoracic spine is completely kyphotic and mostly deviated to one side [6,7]. It can be expected that the continuation of this position for a few hours a day, after a few years, like many work-related musculoskeletal disorders, will cause changes in the strength of the neck muscles or the range of motion of the neck [8,9].

Postural assessment and correction of its deformities are important indicators for musculoskeletal health [10]. The natural curvature of the spine, which is associated with the correct functioning of the body structure and musculoskeletal balance, is created and maintained with minimal muscle effort and minimal pressure on the body. This is the optimal posture [11]. The non-ergonomic positions that are repeated several hours a day can cause long-lasting changes in the musculoskeletal system after years, which have been demonstrated in a wide variety of occupations and sports. Notable examples include the kyphosis in professional cyclists due to hours of training in a kyphotic position, and forward head, kyphosis and lordosis in table tennis players and Wushu athletes [12-14]. Also in many jobs that require sitting or standing in non-ergonomic positions for long hours, musculoskeletal disorder due to posture deformities is prevalent [15,16].

A study in Iran that investigated forward head posture in heroin users showed that more than half of them have their heads tilted forward [17]. Another study on posture deformities in prisoners with drug abuse histories in Iran found that 98% of them had at least one postural deformity [18]. Postural deformities and the musculoskeletal disorders they cause have been studied worldwide across many occupational, age and gender groups, in line with national cultures and traditions, but surprisingly, the this topic have not yet been studied or ignored in large statistical populations such as drug abusers and specially opium smokers. Perhaps, in European and American countries, the main substances people smoke are marijuana (weed), methamphetamine (meth), cocaine (coke) and heroin (smack), and these are only smoked for short periods of time, so people don't smoke drugs for hours a day and this is the reason why it is not their research priority in the field of health. But in Iran this problem is a health concern and the priority of harm reduction and needs research. So, this study was performed to compare neck muscles strength and range of motion between opium smokers and non-drug users.

METHODOLOGY

Participants

This comparative cross-sectional study was carried out in 2022 in Tehran. With snowball sampling, 80 people with drug use disorders that their main drug/method use was opium smoking were selected from 4 outpatient treatment center for drug use disorder (which were 4 clusters of sampling) and compared with 74 non-drug users which were selected by the same sampling from friends and relatives of the first group based on matching. Since there was no similar comparative study, two groups were carefully and obsessively selected to be the same and the results of the comparison between the two groups would be a more realistic representation of the dependent variables. To achieve this goal, we randomly selected the main branches of sampling, and then we asked each person to introduce a drug addict and a non-drug user from their friends, relatives or colleagues. So that the samples of the two groups are as similar as possible in terms of age, occupation, socio-economic level and psycho-cultural status. These criteria were taken into account to select the people of the two groups: They should be between 25 and 50 years old, can stand, be able to speak Persian and at least be literate in reading and writing, and have body mass index below 27.5 (Because higher BMI is associated with more musculoskeletal disorders) [19].

Tools and data gathering

Drug use disorder and dependence which has been diagnosed based on ICD-11 criteria was the main condition for first group selection [20]. Also, opium smoking at least five years history was the other criteria (because based on the literature, it usually takes 3-5 years for musculoskeletal disorders to occur in certain occupational groups and non-ergonomic positions) [21]. For non-drug users the most important criteria was to be relatively similar to the first group in terms of age, sex, occupation and BMI. A history of known and chronic neuromuscular or musculoskeletal disease, past spine surgery or history of shoulder girdle surgery, regular and professional sport exercises, any imbalance due to a specific disease, any known postural imbalance or deformity were all exclusion criteria.

Data gathering was done by using demographic questionnaire, Maudsley addiction profile and practical measuring of muscle strength and ROM [22].

Practical measurement

To perform the practical measurements of the study, using a handheld dynamometer, the maximum isometric strength of flexor, extensor and lateral flexor muscles of the neck was measured. Using standard weights, the device was calibrated before starting the measurements. The duration of the dynamometer was set for 7 seconds, of which 2 seconds was the time for the person to increase the muscle contraction force until reaching the maximum contraction force and 5 seconds to maintain the same state.

In order to prevent the confounding effect of fatigue, the tests were performed only once and the data obtained from the strength measurement tests were normalized with the BMI of the study subjects. Neck range of motion was measured using a cervical inclinometer, while the person was sitting on the chair and the chest was tied to the chair support with a strong tape.

To measure the range of motion of the neck, it was done as follows: The person sat on the chair and the chest was tied to the back of the chair with a tight band. Then, the range of motion of the neck was measured in 6 main directions with a cervical inclinometer (Model: Baseline CROM-3 goniometer).

Reliability of the measurement method was confirmed by test-

retest. Ten participants were rated in an extra four testing sessions of neck muscle strength and Range of Motion (ROM) test in two weeks (Figure 1).

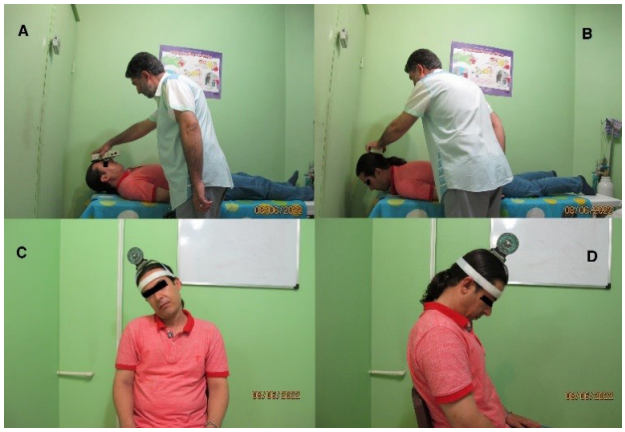

Figure 1: Measurement of neck muscle strength and range of motion. **Note:** A) Flexor muscles strength; B) Extensor muscles strength; C) Right lateral flexion ROM; D) Flexion ROM.

Statistical analysis

The gathered data were analyzed by Kolmogorov-Smirnov, Pearson correlation coefficient and Independent T tests through SPSS software version 23.

RESULTS

Basic variables

As mentioned, in order to maximize the similarity of the two groups, the greatest accuracy was used. The age and anthropometric characteristics of the two groups were not significantly different ($p \geq 0.05$). The mean age in the group of opium smokers was 38.20 and standard deviation was 6.55 and in the group of non-drug users was 37.80 ± 5.88. Also, the average BMI in the group of opium smokers was 24.05 and its standard deviation was 2.05 and in healthy subjects was 23.67 ± 1.98.

Main variables

The range of motion in all directions and the muscles strength of the neck are compared between two groups in Table 1 as shown there were significant differences between them in most of the variables.

Table 1: Between group's comparison of the neck muscles strength and range of motion.

Variable	Group	Mean	SD	P-value
Forward flexion ROM	Drug use disorder	44.5	8.75	0.011
	Non-drug users	56.55	7.22	
Extension ROM	Drug use disorder	36.35	6.8	<0.001
	Non-drug users	58.55	11.35	
Right lateral flexion ROM	Drug use disorder	39.72	8.15	0.009
	Non-drug users	51.21	10.42	
Left lateral flexion ROM	Drug use disorder	35.86	5.36	0.001
	Non-drug users	50.43	8.75	
Right lateral rotation ROM	Drug use disorder	78.65	6.16	≥ 0.05
	Non-drug users	77.08	7.67	
Left lateral rotation ROM	Drug use disorder	81.26	5.85	≥ 0.05
	Non-drug users	82.8	6.38	
Flexor muscles strength	Drug use disorder	4.35	2.11	<0.001
	Non-drug users	6.11	2.34	
Extensor muscles strength	Drug use disorder	4.75	1.88	<0.001
	Non-drug users	7.08	2.02	
Right lateral flexor muscles strength	Drug use disorder	5.05	2.01	<0.001
	Non-drug users	6.35	2.41	
Left lateral flexor muscles strength	Drug use disorder	4.85	2	<0.001
	Non-drug users	6.72	2.12	

DISCUSSION

The transmission of Human Immunodeficiency Virus (HIV) and Hepatitis viruses due to the use of shared needles and syringes or high-risk sexual behaviours in drug users is the most important complication and the most dangerous consequence of drug abuse. But it should not focus all our attention on itself, because it is certainly not the most common. Especially if we do not consider the issue global, and regional priorities are more important to us (1). For example, in Iran, following the nationwide launch of the national agonist maintenance treatment program for opiate dependence, and after a decade, the transmission of infectious diseases among addicts was greatly reduced and almost controlled [23,24]. On the other hand, the use of opium, especially opium smoking, is very common (2). And increased after the COVID-19 pandemic [25]. In such a country, one should pay attention to the damage caused by several hours of entering a large volume of smoke in the lungs or several hours sitting in a non-neutral position. Therefore, according to regional and national needs, harm reduction programs should be varied and expanded. Probabilities of musculoskeletal complications from opium smoking positioning are very high, because they are in a non-ergonomic position for a long time. So, in a country like Iran, if addiction prevention and harm reduction programs do not pay attention to the reduction of opium smoking, it can face a crisis of lung diseases and musculoskeletal disorders. As people in accordance with the conditions and requirements of their work, many times they have an inappropriate body position (posture), which in the long term leads to musculoskeletal problems and muscle and joint pains. These problems have been shown in various industries, office work jobs and even some sports [26-28]. The decrease in strength and range of motion of the neck, which was obtained in this study in the group of opium smokers, has been shown in disabled people who have to use a computer head controller [29]. It is obvious that increasing the duration of the non-neutral position, increases the possibility of musculoskeletal disorders and postural deformity. As it was shown in Massah study that there is an inverse and significant correlation between ROM and the strength of the neck muscles with the increase in the duration of opium smoking [30], and in the study of Ghamkhar, some non-neutral positions and posture deformities were aligned and correlated with the decrease in endurance and strength of the neck muscles [31].

The results obtained from the examination of dentists are also in line with the results of this study. In fact, dentists also work while their head and neck are in a forward and non-neutral position for several hours a day, which causes a decrease in muscle strength and neck mobility and a decrease in neck function [32-34]. Many postural deformities, which are mainly acquired and caused by not observing health principles and working in harmful positions, are associated with a decrease in the range of motion of the neck [35,36]. For example, in the study of Quek and his colleagues, a significant relationship was seen between hyperkyphosis and forward head posture with a decrease in neck range of motion [37].

Many studies have reported the relationship between the repetition of work positions and the use of the upper body and upper limbs when working with work tools and the occurrence of neck musculoskeletal disorders [21]. Opium smoking equipment also forces the user to be in a fixed and motionless position for several hours a day. In addition to the fact that the position is usually non-standard and wrong, several hours of immobility and sitting in a static position is an effective factor for musculoskeletal disorders [38,39]. As a result, after years of opium smoking, the risk of neck ROM reduction and neck muscle strength reduction is not far off. Similar to this situation, welders and many workers in other industries suffer from reduced neck range of motion [40,41]. A decrease in the strength of the neck muscles has also been reported in industrial workers, similar to the results of this study [42]. On the other hand, previous studies have shown a relationship between psychosocial characteristics and factors that distort mental health with musculoskeletal disorders. These findings are consistent with the present study. Because substance use disorder is one of the main psychosocial health concerns in today's societies [9,43].

There were some limitations in this study that should be considered. First unfortunately, the female samples refused to participate in the study and we had to settle for the results of the men. The second limitation of the study was that in the preliminary study, the opium smokers experienced severe fatigue during the first round of muscle strength measurement. Therefore, we had to skip three measurements and their average and use the results of one measurement for both groups as a criterion.

CONCLUSION

According to the findings of this study, it seems that opium smokers are more prone to reducing the strength of the neck muscles and neck range of motion than non-drug users, and maybe this difference is due to years of long-term sitting in a harmful position while opium smoking. This suggests that the act of opium smoking may contribute to physical implications beyond the commonly recognized health risks associated with substance abuse. These results demonstrate the significance of considering precautions against both the localized impact of drug use on some muscles and joint mobility, as well as the systemic health impacts of substance use.

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AUTHOR CONTRIBUTIONS

Conceptualization: Study concept and design was done by AMA, AF, OM and MN.

Data curation and analysis: Data gathering and data analysis was done by OM

Drafting, writing-review and editing: All the authors contribute to drafting, writing and editing of the article.

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ETHICAL CONSIDERATION

The study design and research method has been approved by the ethics committee of the University of Social Welfare and Rehabilitation Sciences with the code of IR.USWR.

REC.1398.120. We obtained informed consent from all participants. This article is extracted from the doctoral thesis of the first author.

CONFLICTS OF INTEREST

The authors declare no personal, organizational and financial conflict of interest.

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