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POLISH JOURNAL OF PHYSIOTHERAPY

OFICJALNE PISMO POLSKIEGO TOWARZYSTWA FIZJOTERAPII

THE OFFICIAL JOURNAL OF THE POLISH SOCIETY OF PHYSIOTHERAPY

NR 2/2021 (21) KWARTALNIK ISSN 1642-0136

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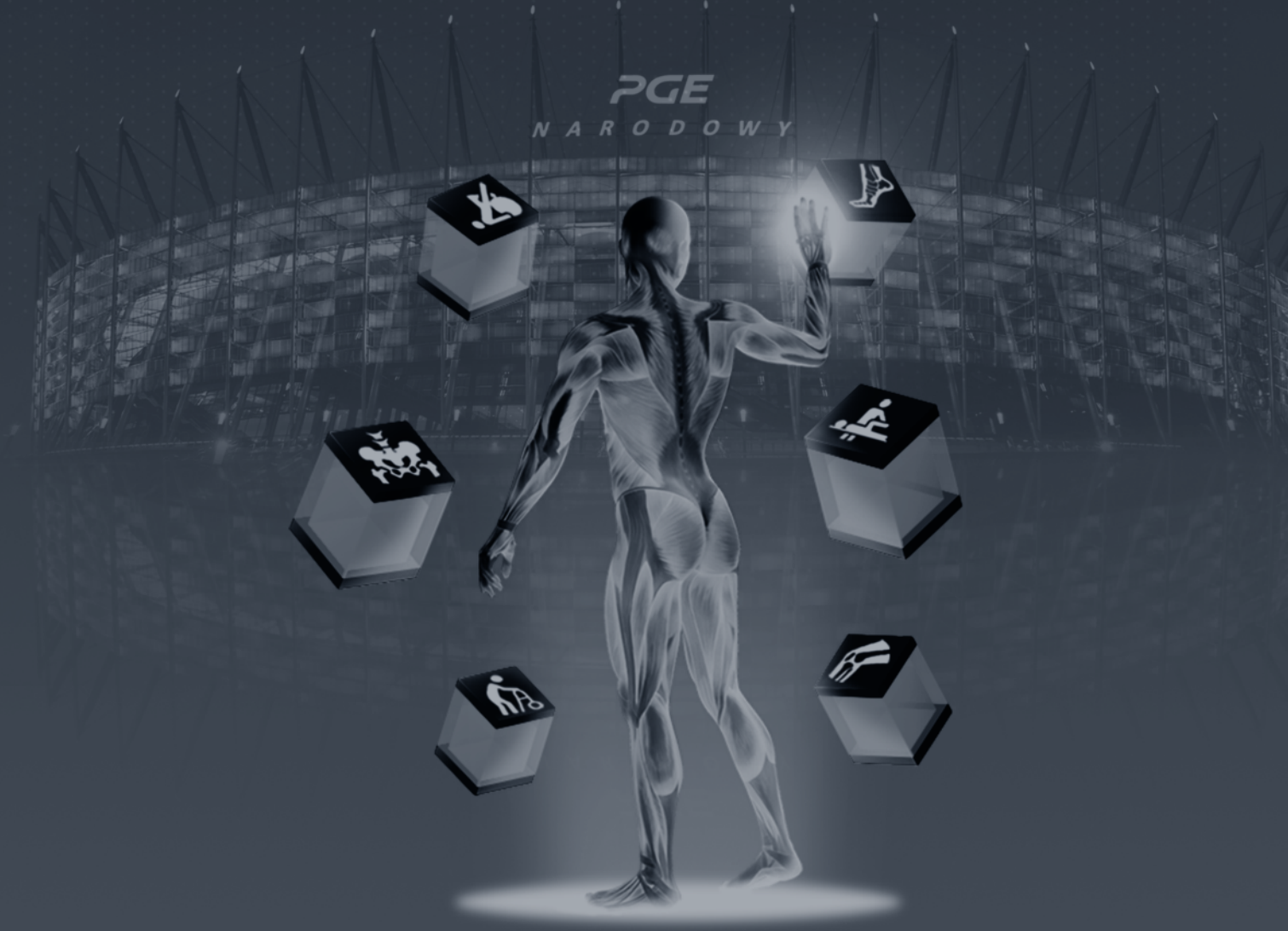

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nr 2/2021 (21)

Social Media Effects on Postural Muscles Related to Upper Cross Syndrome and Physical Wellness

Wpływ mediów społecznościowych na mięśnie posturalne związane z zespołem skrzyżowania górnego i dobrym samopoczuciem fizycznym

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Abstract

Aim. Upper Cross Syndrome (UCS) is a major postural disorder. As time spent on social media (TSSM) is increasing yearly. Limited literature was found on the effect of TSSM on body posture. The purpose of this study was to examine the relationship between TSSM with muscular changes related to UCS and physical well-being among university students in Jordan.
Material and Methods. Two hundred participants were recruited for this study. After signing the informed consents, Participants filled a survey and underwent standardized measures including head position measures, Manual Muscles Testing (MMT) and Muscles Length Test. Survey included multiple factors that can be related to postural changes.
Results. Forty-seven percent of participants scored fair, 37.2% scored good, and only, 15.1% scored normal in MMT of deep neck flexor muscles. Also, 40.5% of participants scored fair, 44.95% scored good, and 14.6% scored normal in MMT of shoulder retractor muscles. Results revealed a significant relationship between TSSM with decreased strength of deep neck flexor muscles ($p < 0.05$), left scapula retractor muscles ($p < 0.01$), and right scapula retractor muscles ($p < 0.01$). Additionally, a significant relationship between TSSM with headache ($p < 0.05$) and low back pain ($P < 0.05$) was found.
Conclusion. Social media should be used wisely to avoid postural impairments. Limiting time spent on social media to one hour daily can be helpful in maintaining healthy postural muscles and physical well-being.

Key words:
Body Posture, Social Media, Upper Cross Syndrome, Upper Quarter, Time

Streszczenie

Cel. Zespół skrzyżowania górnego (*upper crossed syndrome* – UCS) jest głównym zaburzeniem postawy. Długość czasu spędzanego w mediach społecznościowych (TSSM) rośnie z roku na rok. Literatura dotyczącą wpływu TSSM na postawę ciała jest ograniczona. Celem niniejszego badania było zbadanie związku między TSSM a zmianami mięśniowymi związanymi z UCS i samopoczuciem fizycznym wśród studentów uniwersytetu w Jordanii.
Materiał i metody. Do niniejszego badania zrekrutowano dwustu uczestników. Po podpisaniu świadomych zgód, uczestnicy wypełnili ankietę i przeszli standardowe pomiary, w tym pomiary pozycji głowy, ręczne badanie mięśni (MMT) i badanie długości mięśni. Badanie obejmowało wiele czynników, które mogą być związane ze zmianami postawy.
Wyniki. 47% uczestników uzyskało ocenę dostateczną, 37,2% – dobrą, a tylko 15,1% - prawidłową w MMT głębokich mięśni zginaczy szyi. Ponadto 40,5% uczestników miało ocenę zadowalającą, 44,95% dobrą, a 14,6% - normalną w MMT mięśni odpowiedzialnych za retrakcję barku. Wyniki ujawniły istotny związek między TSSM a zmniejszoną siłą głębokich mięśni zginaczy szyi ($p < 0,05$), mięśni odpowiedzialnych za retrakcję lewej łopatki ($p < 0,01$) i mięśni odpowiedzialnych za retrakcję prawej łopatki ($p < 0,01$). Ponadto stwierdzono istotny związek między TSSM a bólem głowy ($p < 0,05$) i bólem krzyża ($p < 0,05$).
Wniosek. Media społecznościowe powinny być używane mądrze, aby uniknąć zaburzeń postawy. Ograniczenie czasu spędzanego w mediach społecznościowych do jednej godziny dziennie może być pomocne w utrzymaniu zdrowych mięśni posturalnych i dobrego samopoczucia fizycznego.

Słowa kluczowe:
postawa ciała, media społecznościowe, zespół skrzyżowania górnego, górna ćwiartka, czas

Introduction

Body posture is the alignment of body segments in the hierarchical chain. It can be observed via the relationship among bone segments within and between the axial and appendicular skeleton. Healthy body posture involves proper alignment of segments starting with the head and ending by the foot. Proper body posture minimizes the strain on the back muscles and joints and can be achieved by keeping the joint and bones aligned properly [1].

Poor body posture usually results from a combination of physical and environmental factors, such as having a poor ergonomics while working on a computer or studying [2]. Major physical factors that relate to poor body posture are the weakness or shortening of postural muscles including abdominal, back, hamstring, hip flexor, scapula retractor and pectoralis muscles. Often, shortening and weakness of the postural muscles happen due to underuse and lack of physical activities, and working in prolonged poor posture [2].

Upper Cross Syndrome (UCS) is considered to be one of the major postural deviations. UCS is a disorder characterized by having a forward posture of the head and shoulders and increased thoracic spine kyphosis. It is a common postural dysfunctional pattern of the upper quarter in the human body due to muscle imbalances. Muscles imbalance includes tightness and overactivation of the levator scapulae, pectoralis major and upper trapezius associated with weakness and inhibition of serratus anterior, deep neck flexors especially scalene, middle trapezius, lower trapezius and rhomboids muscles [3, 4].

UCS affects the body posture and mechanics of the cervical spine and shoulder girdle resulting in upper quarter and neck pain [5, 6]. The literature has reported many long-term consequences for UCS including balance disorders, lung problems, migraine, cardiovascular problems, digestion problems, and the psychosocial effects [7-9]

Limited number of epidemiological studies were conducted to determine the prevalence of UCS among young adults and its association with social media use time in developing countries and particularly in the Middle East region. In a study that was conducted among Lahore University medical students 17-25 years old in Pakistan by Mubeen and colleagues in the year of 2016, the prevalence of UCS was found to be high and about half of the students (48.7%) suffered from neck pain. In the same study, the researchers found that a 66.8% of participants were found to have poor studying posture. The results revealed that poor studying posture could be a leading factor to UCS which affects head and upper trunk posture significantly [10].

Apparently, dealing with head and trunk pain is costly. The annual cost due to head and trunk pain (headache, back pain, chest pain, and abdominal pain) ranged between $560 to $635 billion in the United States in the year 2010. It was greater than the annual costs of heart disease ($309 billion), cancer ($243 billion), and diabetes ($188 billion) and nearly 30% higher than the combined cost of cancer and diabetes [11].

Use of social media is increasing on daily basis. Social media includes Facebook, YouTube, WhatsApp, Facebook Messenger, Instagram, Twitter, TikTok, and Snapchat. It was reported that 3.8 billion people are using social media actively in the year 2020. This number increased by 9% compared to 2019 [12]. People spend more than 40% of waking hours using internet [12]. The number of people who used social media in 2019 was 2.6 billion which increased tremendously compared to the year 2010 where the number of users was 482 million [12].

Many researchers focused on the effect of social medial on psychological aspects more than physical aspects. The positive effects of limiting social media use time on health such as on improving sleep disturbances, positive mental health, depression and social wellbeing has been reported in the literature [13, 14].

Aim

Limited literature was found on the effect of the social media on upper quarter postural muscles that are related to UCS due to the novelty of the topic. According to our best knowledge, there are no published studies or reports on the prevalence of muscular changes associated with UCS and related risk factors in Jordan or even in the Middle East and North Africa (MENA) region. Therefore, The purpose of this study was to examine the relationship between TSSM with muscular changes related to UCS and physical well-being among university students in Jordan.

Material and Methods

Participants

Two hundred participants were recruited from different universities and students' clubs in Jordan. One participant withdrew from the study due to their busy schedule. Participants were included in this study if they were healthy, had no reported musculoskeletal pathologies or systemic diseases, and between the ages of 18 to 24 years. Participants were excluded if they had congenital musculoskeletal deformities, history of spine injury, musculoskeletal surgeries, or were diagnosed with disorders that may affect normal growth. Demographic data of participants is shown in table 1. All protocols and procedures were approved by the Institutional Review Board at the Hashemite University.

Table 1. Demographic data of participants

Sample size (N)	Age (Mean ± SD) [Years]	Weight (Mean ± SD) [kg]	Height (Mean ± SD) [cm]
199 participants	21.2 ± 1.3	64.6 ± 15.7	166.2 ± 9.3

Study Design
A prospective cross-sectional observational study.

Data Collection
Assessment of Upper Cross Syndrome
Measurement of anterior displacement of the head using Cervical Range of Motion (CROM) (Performance Attainment Associates, 12805 Lake Blvd, Lindstrom, MN 55045, USA)
It is a device that measures the distance between the occiput and spinous process of C_7 vertebra in order to determine the anterior displacement of the head in centimeters. This tool is valid and reliable [15].

Measurement of deep neck flexor muscles strength
Manual Muscles Testing (MMT) was performed in supine position where the participants were asked to tuck their chin and lift the head off the table simultaneously. Verbal cues included " Make a double chin. Lift your head up to get your chin as close as possible to your chest and do not let me push you down." Manual resistance was applied by the assessor, according to Hislop and Montgomery manual muscles testing, to determine the strength of the deep neck flexor muscles [16].

Measurement of pectoralis major muscle flexibility
Muscle length test was performed in supine with Glenohumeral joint line at the edge of the table. Examined shoulder was placed in 90 degree of scaption and external rotation. Following that, the examined shoulder was taken into horizontal shoulder abduction until the resistance (R1) noted or discomfort reported by the participant. Horizontal shoulder abduction ROM was measured using a universal goniometer (UG) (Baseline, Albany, NY, USA). Based on that, pectoralis muscle flexibility was determined where limited ROM means limited flexibility.

Measurement of scapula retractor muscles strength
MMT was performed in prone position with shoulder at 90 degree of abduction with neutral rotation and elbow at 90 degree of flexion. Instructions to participant were as" lift your elbow toward the ceiling. Hold it (for 3 seconds). Do not let me push it down". Manual resistance was applied by the assessor, according to Hislop and Montgomery manual muscles testing, to determine the level of strength [16].

Visual Analog Scale
Visual Analog Scale was used to determine the presence of musculoskeletal pain.

Survey Questionnaire
A Survey was developed based on the available literature reviews and consulting with physical therapy and epidemiology experts from the academic and professional fields. Pilot survey was tested on 10 students to assess time required to complete it and the ease of completion. Survey is consisted of 21- item questionnaire that required less than 10 minutes for completion. It was divided into 4 sections. Section I addressed the demographic data of the subjects. Section II addressed environmental factors that can affect body posture. Section III addressed biomechanical factors that can affect body posture. Section IV addressed the usage and time spent on social media. The time spent on social media and factors that can affect body posture were assessed using a 5-point Likert scale.

Procedures
Participants were selected randomly from universities and students' clubs. Study objective and procedures were explained to the participants by the researcher. After signing the consent form, the participants were asked to fill a questionnaire in order to determine the possible risk factors of UCS. Questionnaire were provided by the principal investigator that was not involved in measurements. All examiners were not aware of the time that the participants spent on social media to minimize the risk of bias.
To measure the anterior displacement of the head, participants were asked to sit on a standard chair with back support. Adjustable lumbar lordosis support was used to support the lower back in sitting. Cervical Range of Motion device (CROM) was used to measure the anterior displacement of the head (Forward head).
Following that, participants were asked to assume supine position in order to examine the strength of cervical neck flexor muscles and flexibility of pectoralis major muscle. Participants were instructed to retract their neck while lifting the head off the table and hold it against resistance that was applied by the assessor. Muscles strength was determined based on the resistance intensity.
To measure the pectoralis muscle flexibility, participants were asked to stay in supine position with both shoulders in scaption and externally rotated to 90-degree and externally rotated. Then, the assessor provided horizontal shoulder abduction until the resistance (R1) noted or discomfort reported by the patient. Horizontal abduction ROM was measured using a Universal Goniometer (Baseline, Albany, NY, USA). Pectoralis muscle flexibility was determined based on the ROM. Limited ROM means limited pectoralis flexibility.
Finally, participants were asked to assume prone position in order to measure the strength of scapula retractor muscles. Participants shoulders were placed in 90-degree of abduction with neutral rotation and elbow in 90-degrees of flexion. The verbal cues to the participants included " Lift your elbow toward the ceiling. Hold it. Do not let me push it down". Manual resistance was applied by the examiner in order to determine the level of scapula retractor muscles strength. The examiner palpated the medial angle of scapula for test accuracy.

Data Analysis
Data analysis was conducted using Statistical Package for Social Sciences (SPSS 26). Sample size analysis was conducted to determine the appropriate sample size. A default prevalence of upper quarter muscular changes at 50% was taken with precision absolute at 5% and type 1 error of 5%. The general characteristics of the participants were summarized using means and SDs for quantitative variables. Calculation of percentage was used to summarize the main findings of this study. Chi Square analysis was utilized to examine the relationship between the time spent on using social media and other factors. Alpha was set at 0.05.

Results of the Research

Percentage was used to find the prevalence of muscles weakness among participants. Participants scoring fair or good strength are considered to have muscles weakness to some extent. 47% of participants had fair strength and 37.2% of them had good strength of deep neck flexor muscles. Only, 15.1% of participants had normal deep neck flexor muscles strength (Fig.1). 40.5% of participants had fair strength and 44.95% of participants had good strength of scapula retractor muscles. The percentage of participants who had normal muscles strength of scapula retractor was 14.6% (Fig.1).

Results revealed the presence of a significant relationship between time spent on social media and deep neck flexor muscles strength ($p < 0.05$). 63.2% of participants who spent more than 3 hours on social media had fair strength, 19.1% had good strength, and 17.6% had normal strength of deep neck flexor muscles. On the other hand, 41.2% of participants who spent less than one hour on social media had fair strength, 47.1% had good strength, and 11.8% had normal strength of deep neck flexor muscles (Fig.2).

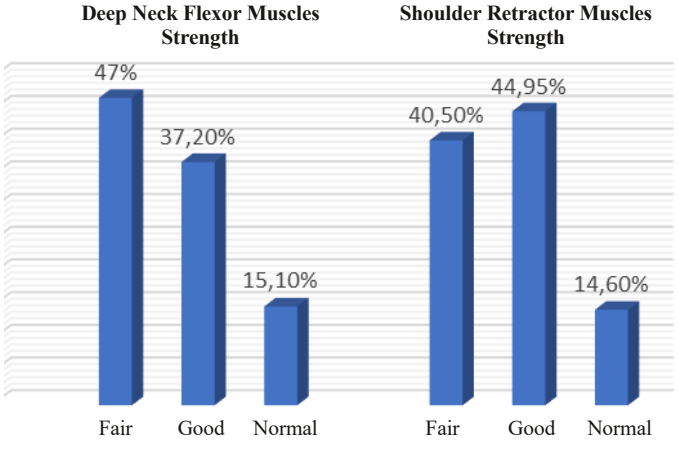

Figure 1. The prevalence of muscles weakness among university students

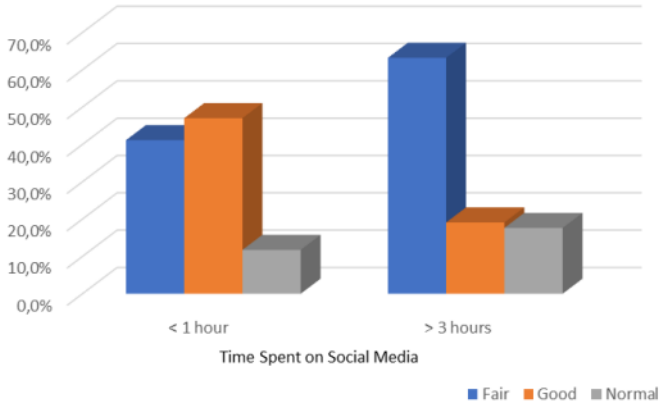

Figure 2. Deep neck flexor muscles strength and time spent on social media

A significant relationship was found to be existed between the time spent on social media and left scapula retractor muscles strength ($p < 0.01$). 55.9% of participants who spent more than 3 hours on social media had fair strength and 14.7% of them had had normal strength of left scapula retractor muscles. In contrast, 29.4% of participants who spent less than one hour on social media had fair strength and 23.5% of them had normal strength of left scapula retractor muscles (Fig.3).

Also, there was a significant relationship between the time spent on social media and right scapula retractor muscles strength ($p < 0.01$). 51.5% of participants who spent more than three hours on the social media had fair strength and 13.2% of them had normal strength of right scapula retractor muscles. However, 35.3% of participants who spent less than one hour on social media had fair strength and 32.4% of them had good strength of right scapula retractor muscles (Fig.4).

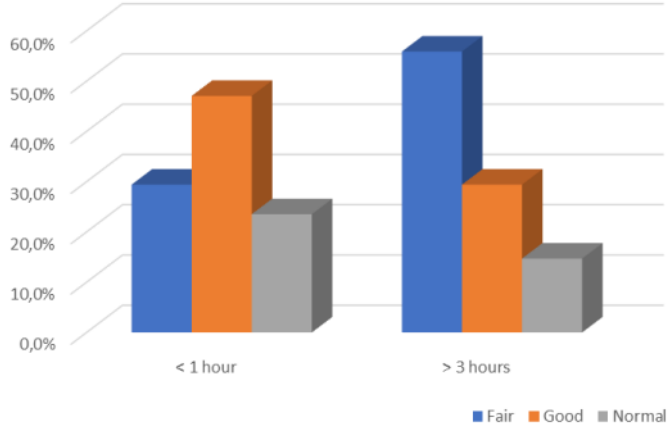

Figure 3. Left Shoulder Retractor muscles strength and time spent on social media

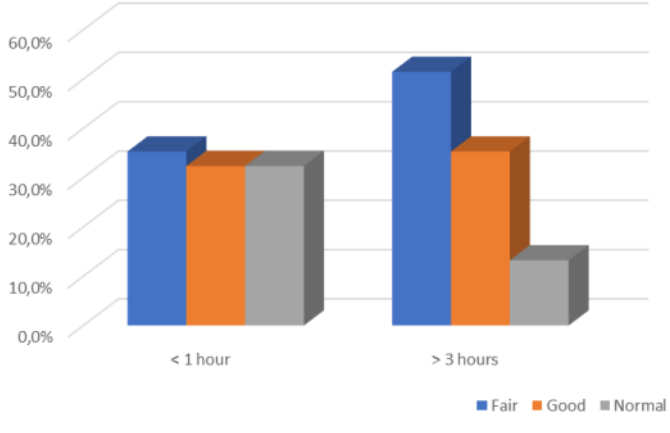

Figure 4. Right Shoulder Retractor muscles strength and time spent on social media

There was no significant relationship between the time spent on social media and pectoralis muscles tightness. However, the study findings revealed the presence of a trend of pectoralis muscles tightness with time spent on social media where 64.7% of participants who spent more than 3 hours on social media had pectoralis muscles tightness compared to 57.4% of them who spent less than 1 hour on social media.
There was no significant relationship between hours spent on social media and neck pain. On the other hand, there was a significant relationship between hours spent on social media and low back pain where 80.6% of participants who spent more than 3 hours on social media had low back pain compared to 50% of participants who spent less than one hour on the social media ($p < 0.05$).
Finally, there was a significant relationship between time spent on social media headache and ($p = 0.048$). 69.1% of participants who spent more than 3 hours on social media reported headache compared to 50% of people who spent less than 1 hour on social media reported headache.

Discussion

The results of this study revealed significant inverse relationships between the time spent on social media with deep neck flexor and scapula retractor muscles strength. The subjects who spent longer time on social media demonstrated weaker deep neck flexor and scapula retractor muscles. Also, there was significant relationship between the time spent on social media with headaches and low back pain which can affect the human physical well-being.
Hunt and colleagues studied the association between social media time usage and well-being of 143 undergraduates [14]. The findings of this study showed that limiting the usage of social media networks such as Facebook, Instagram, and Snapchat up to 30 minutes a day had a significant reduction of depression and loneliness by comparing control and experimental groups over a three-week period. The researchers of this study proposed that limiting the time usage of social media to 30 minutes a day may result in significant improvement in well-being. In this current study, physical well-being was studied. The results indicated negative impact on muscles strength and flexibility that might affect body posture resulting in UCS. In summary, limiting time usage of social media can improve the psychological and physical well-being.
Social media is accessed using digital devices. By default, there is a direct relationship between the time spent on social media and the time spent on digital devices. The American Optometric Association (2020) has listed the most common symptoms associated with digital eyestrain are eyestrain, headaches, blurred vision, dry eyes and pain in the neck and shoulders. Digital eyestrain is a condition characterized by visual disturbance and/or ocular discomfort related to the usage of digital devices and results from a range of stresses on the ocular environment including: glare, defocus, accommodation, fixation disparity, dryness, fatigue, and discomfort [17]. Many researchers found that headache was one of the most common digital eyestrain symptoms among student populations [18-21]. The current study supports the mentioned findings where the results revealed a significant relationship between the time spent on social media and headaches among participants.
As shown in the results, there was association between the time spent on social media and deep neck flexor muscles or scapula retractor muscles strength. However, there was no significant association between the usage of social media and pectoralis muscles flexibility or forward head position. This can be attributed to the fact that the participants were young and still at early stage of postural changes. Also, the mentioned findings suggest that the weakness of scapula retractor precedes the tightness of pectoralis muscles and the muscular changes in upper quarter precedes the anterior translation of the head.
Previous studies recommended limiting the usage of social media to 30 minutes to help with psychological status and avoid using social media 30 minutes prior to bed time to improve sleep quality [13, 14, 22]. Based on the findings of the current study, people are recommended to limit the usage of social media to one hour or less a day to help maintain healthy postural muscles, body posture, and physical well-being.
In the current study, the researchers evaluated participants at one point of time which limits the ability to predict future changes on body posture that might be related to social media usage. Future Cohort studies are recommended to examine the progression of UCS and muscles changes related to it. Also, future studies are recommended to find the effect of the usage of digital devices on body posture.

Conclusion

Social media should be used wisely to avoid postural impairments. Limiting time spent on social media to one hour daily can be helpful in maintaining healthy postural muscles and physical well-being.

Applications

Physical therapists offer health education to their patients regarding their condition to attain the best outcomes of the provided interventions. The results of this study can be used by physical therapists to provide the proper preventive practices and appropriate treatment with young adults who suffer from upper quarter postural dysfunction. Therapists can educate their patients, who are social media users, about the importance of controlling the time spent on social media to help with maintaining proper body posture and healthy postural muscles.

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