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Association of Musculoskeletal Pain with Poor Quality of Sleep Among E-Gamers in a Private University in Malaysia

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Abstract

Electronic sports (e-sports) require prolonged sitting and repetitive movements, which makes e-gamers susceptible to developing musculoskeletal pain in different body parts. Moreover, their quality of sleep may also be affected. It is very important for physiotherapists to identify the relationship between musculoskeletal pain and poor quality of sleep among e-gamers, so as to develop more precise treatment plans and provide higher-quality patient education. Objective: The purpose of this study was to analyse the association between musculoskeletal pain and poor quality of sleep among e-gamers in a private university in Malaysia. The sample consisted of 42 e-gamers from a private university in Malaysia. A cross-sectional study was conducted by using the Nordic Musculoskeletal Questionnaire and the Sleep Quality Scale. The association between musculoskeletal pain and poor sleep quality was evaluated using a chi-square test. The results showed that more than half of the study population reported a higher prevalence of neck pain in the past year and in the previous week, followed by shoulders, wrists, and hands. Besides, half of the participants also reported that they had very poor sleep quality (50%), followed by the category of poor quality of sleep (23.8%). E-gamers with poor sleep quality showed a significant association with musculoskeletal pain in the neck (p= 0.004), shoulder (p= 0.052), upper back (p=0.043), wrist and hands (p= 0.004). Our findings revealed that musculoskeletal pain in the neck, shoulder, upper back, wrist, and hands was significantly associated with poor sleep quality among e-gamers. Health promotion actions that contribute towards improvement in the quality of sleep and prevention of musculoskeletal pain should be considered, so the performance and quality of life among e-gamers could be improved.

Keywords

Musculoskeletal pain, Sleep quality, E-gamers, E-sports

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Introduction

Electronic sports (e-sports) are a professional or competitive video gaming that has become a trend and a fundamental element in today's digital youth culture (Wagner, 2006). As DiFrancisco et al. (2019) have shown in their study, in the US, over the past three years, varsity e-gaming teams have been established by more than 50 colleges. In order to improve their skills to a competitive level, e-gamers are required to train for many hours per day (DiFrancisco et al., 2019). According to a study done by Kari and Karhulahti (2016), for professional e-gamers, an average of 3.4 to 5.2 hours per day is needed for practising, corresponding to 25 to 35 hours of e-gaming per week. Before a competition, the average time spent on practising may increase up to 10 hours per day. Moreover, for most of the tournaments, up to three hours non-stop, intensive gaming is considered normal (DiFrancisco et al., 2019). Several health-related problems, such as musculoskeletal pain, headache, sleep disorder, anxiety, stress, and decreased physical activity level, have been associated with the prolonged usage of electronic devices (Dumith et al., 2010; Milde et al., 2010; Hakala et al., 2012).

DiFrancisco et al. (2019) have shown in their study that the majority of e-gamers have a lack of awareness regarding good posture during practice. In regards to the physical demands of e-gaming, it has been shown that the nature of this activity is similar to that of office-based work, which is prolonged sitting (Jensen et al., 2002). E-gamers tend to sit in front of a computer, laptop, or phone screen, with the same position for hours at a time (Chung et al., 2019; DiFrancisco et al., 2019). Moreover, e-sports is also an activity that requires repetitive small-muscle movements, especially of the upper limb. According to a survey that was undertaken by Lindberg et al. (2020), 42% of Danish eSports players, taking part in structured eSports, suffered from musculoskeletal pain. A study by DiFrancisco et al. (2019) showed that approximately 2 out of 5 eSports players, corresponding to 40% of them, suffered from either neck or back pain.

Furthermore, in a study done by Bonnar et al. (2019), game genre and gaming culture have been proven to affect the quality of sleep among e-gamers via cognitive and behavioural pathways. In order to achieve competitive success and reach the elite levels, e-gamers may be exposed to unhealthy wake behaviours that compromise sleep. Moreover, poor sleep behaviour will be perpetuated if an e-gamer stays in a gaming team with everyone holding similar beliefs. Light sleep and poor sleep continuity are shown to be common among e-gamers due to their low-intensity physical movement (Suppiah et al., 2015). According to a study conducted by Weaver et al. (2010), an increase of 3 to 5 minutes of sleep onset latency can be observed in the subjects who had been exposed to violent video games for 50 minutes before going to bed.

From previous studies, it has been shown that musculoskeletal pain is associated with poor quality of sleep. Kundermann et al. (2004) stated that neurophysiological changes which alter pain thresholds will be affected by sleep disturbance. Paananen et al. (2010) have shown in their study that the development of musculoskeletal pain is associated with sleep-related problems among adolescents. Moreover, compared to healthy adolescents who have no musculoskeletal pain, the adolescents who suffered from chronic musculoskeletal pain in any part of their body would have higher chances of getting poor quality of sleep (Palermo et al., 2012).

E-gamers are more susceptible to developing musculoskeletal pain in different body parts such as the neck, shoulder, wrist, back, and lower limbs. Their quality of sleep may also be affected. It is of utmost importance to identify the relationship between musculoskeletal pain and poor quality of sleep among e-gamers, so that preventive measures and precise treatment plans can be undertaken. Furthermore, the results of this study can act as a stepping stone to raise awareness regarding the harmful effects brought about by prolonged e-gaming. Therefore, this study is conducted to identify the association of musculoskeletal pain with poor quality of sleep among e-gamers in a private university in Nilai.

Methodology

This cross-sectional study was conducted among e-gamers from a private university, Nilai, using a purposive sampling method. E-gamers between the age group of 18-25 years old, who spent more than 7 hours per week playing video games and have any musculoskeletal pain, were recruited for this study. However, those who were unable to read English, had any sleep disorders, any mental disorders that may affect quality of sleep, any medical condition that may affect quality of sleep, or had tremendous stress were excluded from this study. The sample size was calculated using the G*Power Version 3.1.9.7. Sample size was estimated to be 37 by taking α error as 0.05, power as 0.90, and effect size as 0.5 (Cohen, 1988; 1992). The participation in the study was voluntary, and withdrawal at any time was allowed. Informed consent was obtained from each participant before data collection. Ethical approval to conduct this study was obtained from the Research and Ethics Committee of INTI International University (reference no: INTI-IU/FHLSRC/BPHTI/7NY12020/013).

Nordic Musculoskeletal Questionnaire (NMQ)

Reliability study of NMQ using test–retest methodology showed that the number of different answers ranged from 0 to 23%. A range of 0 to 20% disagreement was found during the test of validity (test against clinical history and NMQ). It was acceptable in a screening tool, as concluded by the authors. (Crawford, 2007).

Sleep Quality Scale (SQS)

This questionnaire has an internal consistency of 0.92 and a test-retest reliability of 0.81. The SQS is also strongly correlated with the results collected from the Pittsburgh Sleep Quality Index (Shahid et al., 2011). Using a four-point Likert-type scale, to elicit how frequently the respondents are having certain sleep behaviors (0 = “few,” 1 = “sometimes,” 2 = “often,” and 3 = “almost always”). Scores on items belong to factors 2 and 5 (restoration after sleep and satisfaction with sleep) and are reversed before being tallied. Total scores range from 0 to 84, with the higher scores indicating more acute sleep problems. (Shahid et al., 2011)

Statistical Analysis

The data was analyzed using the Statistical Package for the Social Sciences (SPSS) software Version 26. Chi-squared tests were used to identify the association between musculoskeletal pain and poor quality of sleep. The level of significance was taken as $p < 0.05$.

Results

The prevalence of neck pain was the highest in the past 12 months and in the previous week (85.7% and 66.7%, respectively), followed by shoulders pain (78.6% and 59.5%, respectively), wrists/hands pain (61.9% and 50.0%, respectively), upper back pain (45.2% and 26.2%, respectively), lower back pain (42.9% and 23.8%, respectively), knees pain (16.7% and 4.8%, respectively), elbows pain (14.3% and 9.5%, respectively), hips/thighs pain (14.3% and 4.8%, respectively) and ankles/feet pain (9.5% and 4.8%, respectively).

Based on the categorization of SQS scores shown in Table 1 (Ningrum and Kusumaningrum, 2021), out of 42 subjects, 4 (9.5%) subjects were included in the "very good" category, 2 (4.8%) subjects were included in the "good" category, 5 (11.9%) subjects were included in the "average" category, 10 (23.8%) subjects were included in the "poor" category and 21 (50%) subjects were included in the "very poor" category.

Table 1. Categorization of SQS Scores

SQS Score Range	Category
> 71.5	Excellent
58.5 – 71.5	Very Good
45.5 – 58.5	Good
32.5 – 45.5	Fair
19.5 – 32.5	Poor
< 19.5	Very Poor

As shown in Table 2, there was a significant association found between musculoskeletal pain in the neck (p= 0.004), shoulders (p= 0.052), upper back (p= 0.043), wrists/hands (p= 0.004), and poor quality of sleep. There was no significant association found between musculoskeletal pain in the elbow (p= 0.657), lower back (p= 0.125), hips/thighs (p= 0.885), knees (p= 0.885), ankles (p= 0.885), and poor quality of sleep among the e-gamers.

Table 2. Association between Musculoskeletal Pain and Poor Sleep Quality

Body Region	N	df	χ^2	p-value
Neck	42	4	15.664	.004
Shoulders	42	4	9.408	.052
Upper back	42	4	9.878	.043
Elbows	42	4	2.432	.657
Wrists/hands	42	4	15.257	.004
Lower back	42	4	7.219	.125
Hips/thighs	42	4	1.155	.885
Knees	42	4	1.155	.885

Ankles/feet	42	4	1.155	.885

Note. χ^2 = chi-square statistic; df = degrees of freedom. $p < .05$ indicates a statistically significant association.

Discussions

The present study examined the association between musculoskeletal pain and poor quality of sleep among e-gamers through a self-reported survey. This study showed the highest prevalence of musculoskeletal pain in the neck in the past year and in the previous week, followed by shoulders, wrists, and hands. Out of the 42 participants, 45.2% of the e-gamers reported that they had upper back pain in the past year, but only 26.2% of them had musculoskeletal pain in this region during the previous week. While 42.9% of the participants experienced low back pain in the past year, only 23.8% of them reported pain in this region during the previous week. The prevalence of musculoskeletal pain in this study was similar to a study undertaken by DiFrancisco et al. (2019), which showed that the highest number of complaints among e-gamers was of neck pain (41%). However, DiFrancisco et al. (2019) also reported a higher prevalence of back pain (41%) in the previous week, compared with the current study (upper back pain, 26.2%; low back pain, 23.8%). The difference could be explained by the large difference in training time between the two studies. For the current study, the participants who were recruited were spending a minimum of seven hours per week of e-gaming. However, the study carried out by DiFrancisco et al. (2019) recruited professional e-gamers who spent an average of 25-35 hours of e-gaming per week, with 50% of the participants spending more than three hours per day of sitting and playing without taking a break.

The results of the current study showed that out of 42 participants, 50% reported having very poor sleep quality, followed by 23.8% who reported a poor quality of sleep, while 11.9% of the gamers reported having an average sleeping quality. A study using the same questionnaire, conducted by Ningrum and Kusumaningrum (2021), reported 24.3% of participants suffering from poor sleep quality, which was similar to the results of the current study. A study with objective measures using the self-reported sleep duration by Twenge et al. (2017) showed a positive correlation between the usage of electronic devices, in terms of hours, and the failure of getting 7 or more hours of sleep at night. Another study by Exelmans and Van (2015) reported that the higher the volume of video games played, the higher the level of fatigue and insomnia. For the respondents who had e-gamed for more than 1 hour per day, their risk of having poor quality of sleep was 31% higher than normal people (Exelmans and Van, 2015). All these studies show that excessive e-gaming could affect the quality of sleep, which was similar to the results of the current study.

The results of the current study show that there was an association between musculoskeletal pain (neck, shoulders, upper back, wrists/hands) and poor quality of sleep among the gamers. This finding was in line with the previous studies done by de Souza et al. (2020), which showed that poor quality of sleep was associated with musculoskeletal pain among the public-school teachers in Brazil. Another study done by Harrison et al. (2014) also reported poor quality of sleep being associated with the presence of regional musculoskeletal

pain among the adolescents in the U.K. It could be explained by the finding that poor sleep quality could trigger a series of physical and emotional alterations which could further increase muscle tension and lead to musculoskeletal pain in different parts of the body (Linder et al., 2014).

Future studies should be conducted that include a larger sample size, improving the external validity so that the results can be generalisable to the entire Malaysian population. The current study has potential limitations. The questionnaires used in this study are self-reported, which may lead to the possibility of recall bias among the respondents. Besides, the target population of this study is limited to the e-gamers from private universities in Nilai and cannot be generalised to the entire Malaysian e-gamers fraternity.

Conclusion

This study found an association between musculoskeletal pain (neck, shoulders, upper back, wrists/hands) and poor quality of sleep among the e-gamers in a private university, Nilai. Intervention studies should be carried out to test whether the treatment protocols targeting prevention or reduction of musculoskeletal pain are also effective in improving the quality of sleep, and vice versa. In addition, health promotion actions that contribute towards improvement in the quality of sleep and prevention of musculoskeletal pain should be considered, so the performance and quality of life among the e-gamers could be enhanced.

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