

CORRELATION BETWEEN DURATION OF PLAYING VIDEO GAMES AND UPPER TRAPEZIUS MYOFASCIAL PAIN SYNDROME IN ADOLESCENTS

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ABSTRACT

Some activities can cause a person to have a dependence on using a computer just like office work or in terms of getting entertainment such as playing video games among adolescents. Recent studies showed that the duration of playing video games is one of the risk factors for MPS. The prevalence of MPS in the general population varies by up to 85%. The method used in this study is an analytical observational method with a cross sectional approach. This study used simple random sampling techniques and the study subjects were observed with a one-time measurement of dependent variables. This research design was used to find out whether there was a relationship between the duration of playing video games and myofascial pain syndrome of the upper trapezius muscle in adolescents in Denpasar City. The results showed from the total of 59 study samples, there were 46 samples (78.0%) who had upper trapezius MPS and as many as 13 samples (22.0%) who did not experience upper trapezius MPS. The distribution of research samples that experienced MPS was more in adolescents who had excessive duration of playing video games (>2 hours / day) which was 45 samples (76.3%) than samples who had MPS with a normal duration of playing video games (<2 hours / day). The conclusion of this study is that there is a significant correlation ($p = 0.000$) between the duration of playing video games and MPS of the upper trapezius muscle in adolescents in Denpasar City.

Keywords: *Musculoskeletal Disorder; Computer Use; Adolescent; Observational*

INTRODUCTION

The use of electronic devices becomes an important part of carrying out activities, especially adolescents, one of the most commonly used electronic devices is a computer. Several activities like working at the office or getting entertainment like playing video games can cause a person to have a dependency in using a computer. Adolescents certainly have a dependence on the use of computers to play video games¹. A survey reported the average duration of computer use in 1 week in the student population was 10.5 hours in 2000 and continued to increase to 22.7 hours in 2009, this increase can be attributed to technological advances².

A person who has an age range of 10-19 years is classified as an adolescent³. Based on age group, playing video games is most in demand by adolescents. There is a study conducted among students that shows the average duration of playing video games is about more than 4 hours per day⁴. Some of the adolescents subscribe to internet cafes to be able to play more of the video games with many benefits, from this, it can be known that adolescents who subscribe to internet cafes to play video games have a habit of playing. It is said in a study that prolonged static loading in computer use refers to musculoskeletal disorders of the neck, shoulders, and back areas, this is associated with the occurrence of musculoskeletal disorders due to muscle fatigue along with increasing the duration of computer use in playing video games⁵.

Computer use in playing video games is said to be related to the appearance of musculoskeletal pain such as myofascial pain syndrome, an injury caused by muscles that contract continuously. Poor and prolonged postural control can affect fatigue-related upper trapezius muscle conditions and one of the disorders is myofascial pain syndrome (MPS). MPS is a phenomenon of pain that a person feels due to problems in muscle tissue and fascia⁶. The occurrence of upper trapezius myofascial pain syndrome is caused by the formation of myofascial trigger points (MTrP) in the upper trapezius muscle. MTrP is a prominent point in the skin and is formed due to the accumulation of contractures that occur in muscle fibers. The pain felt from people who experience MPS is local and can be provoked when MTrP is pressed or the muscles in question are stretched while moving⁷.

The pain felt from people who experience MPS is local and can be provoked when MTrP is pressed or the muscles in question are stretched while moving⁸. Based on the things mentioned earlier, it is known that the duration of a person who often plays video games is one of the risk factors for MPS disorder. MPS measurements can be done using pain scales such as visual analogue scales when pain is provoked by palpation in MTrP. Palpation in MTrP which is continued with pain quality assessment is a way used by medical personnel to date to make a diagnosis of MPS, it's mentioned in that there are 7 criteria to diagnose MPS by palpating MTrP that is (1) presence of taut band, (2) tenderness on the taut band, (3) pain, (4) local twitch, (5) restricted range of motion, (6) autonomic symptoms, (7) referred pain. All criteria of diagnosing MPS aren't always present at one time and aren't necessary to complete all of the 7 criteria, to diagnose MPS by palpating MTrP it's already sufficient if the target area are having tender taut band that are reproducing pain if palpated⁹.

The duration of playing video games is the time span that a person uses electronic devices to play video games. In Pande's study, the duration of playing video games was classified as "normal" for the duration of playing video games every day which is less than 2 hours and "excessive" if more than 2 hours¹⁰. Reported in 30 minutes of video games there is a more advanced cervical bone transfer to the spine below, this change in neck posture is called forward neck posture¹¹. The duration of playing video games in adolescents varies from 3-6 hours each day^{4,12}. Playing video games using a computer that makes a person sit sedentary for more than 2 hours a day becomes a factor in the correction of musculoskeletal disorders in the neck and shoulder area.

Physiotherapists and other medical personnel are expected to understand and to prevent the impact of excessive duration of playing video games with using a computer that is closely related to myofascial pain syndrome upper trapezius muscle disorder. Because there are still very few similar studies,¹³ this study was made to examine the relationship between the duration of playing video games with myofascial pain syndrome upper trapezius muscle disorder in adolescents in Denpasar City.

METHODS

a. Methodology

Study design

This study used a cross-sectional approach as the main research method.

Subjects recruitment

The research study was approved by Medical Faculty of Udayana University with ethical clearance number 1722/UN14.2.2.VII.14/LT/2021. An explanation of the benefits from the research study was conducted through informed consent to all of the respondents. Participants in this study were

adolescents aged 15-19 years who played in one of the internet cafe in the city of Denpasar and are willing to participate in the research study.

Sampling technique

59 subjects were selected with simple random sampling techniques that met the criteria for inclusion and exclusion. The inclusion criteria in this study were adolescents boys aged 15-19 years, subscribed to internet cafes, played video games for at least 30 minutes every day, and were willing to be research subjects. The exclusion criteria in this study were subjects with a history of traumatic injury of shoulders and neck as well as subjects who took pain medication on the day of the examination. The study subjects were observed and the variable was measured once after the study subjects filled out the form. Subjects drop out when the study subject is not present at the time of the study or does not fill in the time use diary.

a. Material and procedure

Material

Researchers made a table of personal data for respondents to fill in at DeThrone internet cafe. The personal data table contains questions such as name, contact number, age, internet cafe member or not, playing video games for at least 30 minutes per day or not, and approval of the following research. The researcher then randomly selected the number 59 subjects according to the formula of the subjects that was used to get the research subjects.

Procedures

Duration of playing video games were measured with Time Use Diary (TUD), it can also measure the duration of other activities from the subjects¹⁴. This instrument has a good validity (75%) and also well known to be used on many research that needs to record activities duration¹⁵. TUD were filled by the research subjects every day for one week, this instrument contains open questions such as what main activities are performed, how long the duration is, where to perform the activity, and what side activities if any. Myofascial Pain Syndrome (MPS) in this research study were diagnosed by professional physiotherapist with flat palpation technique to find the trigger point of upper trapezius MPS, if the research sample is diagnosed with MPS, it will be followed by measuring the quality of pain with Visual Analogue Scale (VAS)⁶. All data were analyzed using Statistical Package for the Social Sciences (SPSS) version 16.0, correlation between the independent variable and the dependent variable were analyzed using Chi-square Test.

RESULTS

This study was done semi-online, through the personal data table that formed by the researcher, there were total 96 people had responded. After the criteria had been applied and randomized sampling, TUD were distributed via google form to the 59 research subjects that had been chosen randomly. Researcher with the help of professional physiotherapist then performed an MPS examination after the research sample finished filling in the TUD and none of the samples were dropped out. The distribution of the sample can be observed in the table below.

Table 1. Sample distribution based on group of age, gender, duration of playing video games, myofascial pain syndrome, and quality of pain.

Variable		Frequency (n)	Percentage (%)
Group of Age (years old)	Middle adolescent (15 - 17)	11	18.6
	Late adolescent (18 - 19)	48	81.4
Gender	Male	59	100
Duration of playing video games	Normal (<2 hours)	11	18.6
	Excessive (>2 hours)	48	81.4
Myofascial pain syndrome	Yes	46	78.0
	No	13	22.0
Quality of pain (mm)	No pain (0 - 0,4)	13	22.0
	Mild pain (0,5 - 4,4)	35	59.4
	Moderate pain (4,5 - 7,4)	11	18.6
	Severe pain (7,5 - 10)	0	0

Table 1 shows the distribution of research sample by group of age, duration of playing video games, MPS, and quality of pain. The number of the late adolescents was found to be the most, which was 48 people (81.4%). The entire study subjects were male and samples with excessive duration of playing video games dominated with 48 people (81.4%). In the distribution of samples by upper trapezius MPS event, the most was sample with MPS which amounts to 46 people (78.0%), in addition, samples with mild pain quality are the most with 35 people (59.4%).

Table 2. Distribution data of subjects by time use diary

Activity	Frequency	Mean duration (hour)	Std. deviation
Playing video games	59 (100%)	3.04	0.97
Studying	59 (100%)	3.93	0.69
Watching television	14 (23.7%)	0.63	0.32
Exercising	16 (27.1%)	0.41	0.18

From Table 2, It can be known that the sample has the same activity in addition to playing video games, namely studying. Possible biased result due to physical activity other than playing video games becomes minimalized because in terms of activity it can be said that the sample is homogeneous.

Table 3. Cross tabulation between duration of playing video games and myofascial pain syndrome upper trapezius muscle

Upper trapezius myofascial pain syndrome	Frequency		Total	Asymptotic Significance (2-sided)
	<2 hours	>2 hours		

No	10	16,9%	3	5,1%	13	
Yes	1	1,7%	45	76,3%	46	
Total	11	18,6%	48	81,4%	59	0.000

The chi square test results contained in Table 3. show an asymptotic significance (2-sided) value of 0.000. The value of asymptotic significance (2-sided) determines the statistical significance of a relationship under study. In all significance tests, if the asymptotic significance (2-sided) value <0.05 then it can be said that there is a significant relationship between the 2 variables. An asymptotic significance (2-sided) score of 0.000 in the study showed that there was a significant association between video game duration and upper trapezius myofascial pain syndrome (MPS) disorder.

DISCUSSION

The sample obtained in this study consisted of 2 age groups of adolescents, namely middle adolescents and late adolescents. The middle adolescent age group has an age range of 15 – 17 years, while late adolescents have an age range of 18-19 years¹⁶. It was found that the sample with the youngest age of 16 years was 4 samples and the oldest was 19 years old with 38 samples. Based on age, the most samples were samples with 19 years old followed by 18 years old and it was found that there were fewer in the middle adolescent group this can be attributed to the fact that late adolescents especially those aged 19 years are in the stage before entering young adulthood so that they are more able to self-regulate and be consistent with their interests than the age below, moreover, due to the development of the times related to increasingly sophisticated technology and the popularity of computer video games among adolescents⁴.

All of the study samples were male with a total of 59 people. The inclusion criteria in the male sex subjects were based on physiological differences in female muscles with men which are risk factors for MPS disorders because MPS disorders are related to a person's susceptibility to microscale injury¹⁷. It is known that in this study there were more adolescents who played for at least 2 hours/day or longer every week, with 48 samples (81.4%) than those who played less than 2 hours/day every week, with 11 samples (18.6%). In this study, the duration of playing video games on a computer was divided into 2 categories with the provision that the duration of less than 2 hours/day was categorized as normal and the duration of 2 hours/day or longer was categorized as excessive and had risks supported by research by Pande¹⁰.

The distribution of upper trapezius MPS disorder was found to be more in adolescents with a duration of playing video games >2 hours / day, with 45 samples (76.3%) compared to adolescents with a duration of playing video games <2 hours / day who did not experience MPS upper trapezius interference with 3 samples (5.1%). Meanwhile, in adolescents with the duration of playing video games <2 hours / day who did not experience upper trapezius MPS disorder with 10 people (16.9%) were also found more when compared to teenagers who had a duration of playing video games <2 hours / day and experienced upper trapezius MPS disorder, only with 1 person (1.7%).

The results of the chi-square test showed the value of the asymptotic significance (2-sided)/ p value of 0.000 ($p < 0.05$) which can be interpreted as null hypothesis (H_0) being rejected and the alternative hypothesis (H_a) accepted so there is a relationship between the duration of playing video games and upper trapezius MPS disorder in teenagers in Denpasar City. From Table 3. Most of the research samples that experienced upper trapezius MPS disorders were samples with excessive duration of playing video games (>2 hours / day) which was 45 samples (76.3%), while research samples with upper trapezius MPS disorders with normal duration of playing video games (<2 hours / day) was 1 person (1.7%) with the number of samples experiencing upper trapezius MPS disorder as many as 46 samples (78.0%) from 59 total samples of this study.

Excessive duration of playing video games (>2 hours / day)¹⁰ caused a person to have a static position for 2 hours or more, in addition to computer use, a person is ensured to use a keyboard and a cursor which results in repetitive movements of the hands and adjustments in the height of the arms and shoulders that must be maintained depending on the length of computer use¹⁸. Playing video games will make things like long sitting positions, repetitive movements, shoulder muscle contractions, and static loading also last longer so that the impact on health is also greater. One of the health problems that is often mentioned in computer use is pain in the shoulders and neck¹⁹.

Myofascial pain syndrome of upper trapezius muscles results in a person feeling pain in the shoulder and neck area. The risk factors of upper trapezius MPS are similar to a computer use, example like long sitting position, repetitive movement of the upper extremities, the contraction of the shoulder muscles, and static loading of the neck, these two things (duration & MPS) are related, firstly because it adheres to the pathophysiology of the MPS, with continuous muscle contraction due to mechanical stress can result in the abnormal release of acetylcholine (ACh) that can increase muscle tension leading to form some trigger points. Trigger point will later become MPS complaints²⁰. Secondly, muscles will experience fatigue due to the increased duration of activity which leads to micro-strains/ small-scale muscle tissue tears, injury to muscles is also a risk factor for MPS because it has an impact in terms of physiological changes in muscles⁷.

The results of this study were supported by Devi's research in 2017 which showed that out of a total of 117 respondents in the study who all used computers with an excessive duration (>2 hours / day) had musculoskeletal problems dominated by pain in the back, upper neck, and lower neck areas²¹. In addition, there was a study by Hakala in 2010 that examined health disorders related to the effect of long computer use with a sample of adolescents aged 12-18 years as many as 7,292 people by providing an adolescent health and lifestyle survey that had been tested and showed moderate to good results in measuring the kappa coefficient and came to the conclusion in his research that excessive computer use has a relationship with the occurrence of upper extremity disorders such as pain in the neck and shoulder area²².

From Table 3. it is also known that as many as 3 samples (5.1%) with excessive duration of playing video game did not experience upper trapezius MPS disorder. This can happen considering that the physiological condition of everyone's muscles is different, where physiological differences refer to the level of muscle strength that makes a person have less risk of developing musculoskeletal disorders if they have greater muscle strength than people of their age¹⁷.

CONCLUSION

It is concluded that there is a significant relationship between the duration of playing video games and myofascial pain syndrome disorders of the upper trapezius muscles in adolescents in Denpasar City. Excessive duration of playing video games (>2 hours / day) increases the risk of myofascial pain syndrome disorders of the upper trapezius muscles in the sample. Suggestion for further research to having a more complete assessment for example the postural detail from each subjects, bigger subjects size, and other tool for diagnosing MPS that more objective but still applicable in the field.

CONFLICT OF INTEREST

The authors declare no conflict of interest

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