Original Article

The Effects of Physical Activity Digital Product Use and Psychological Health on Low Back Pain in Adolescents: School Based Study in Eastern Turkey

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Abstract

Objectives: Low back pain is an important public health problem because of it's high prevalence. The aim of this study was to determine of prevalence low back pain and to evaluate the effect of physical activity, digital product use and mental health on low back pain.
Patients and Methods: Total 1285 high school students in Bingöl province were included in this cross sectional study. The data were collected from the students by the questionnaire method.
Results: The mean age of the students were 15.9±1.0 and their 52.1 % were women. The rate of students who evaluate the family atmosphere as warm was 57.0%. Of the participants, 26.7% were exercising regularly. The proportion of students experiencing physical stress in any period of their life was 30.9%. It was determined that half of the students used computers and half of the users had low back pain due to the use of computers. The frequency of low back pain was found to be 24.1%. One-fourth of the students did not attend school due to pain. It was observed that there was a positive correlation between the presence of parental back pain, exposure to physical stress, have a oppressive authoritarian family, poor economic situation, daily sitting and increased tablet usage time and back pain. L. Adolescents BP in the adolescents was often accompanied by poor psychological health.
Conclusion: It should be educated about postur, use time of tablet, sitting time, their smoking habits and students should be changed their life style with low back pain should be evaluated psychologically.

Keywords: low back pain, digital product, exercise, psychology

Introduction

Low back pain(LBP) is an important public health problem because of the negative factors such as pain, loss of work and performance, psychological stress, difficulty in realizing daily life activities and deleterious impact on quality of life (Baser et al., 2020; Polat, 2017). Many studies have shown that the prevalence of LBP in adolescent is high. According to the different research, the lifetime LBP frequency in adolescent was 12% in Finland, 57.8 % in Kuveyt.and 28.4% in Tunus (Bejia et al., 2005; Hakala et al., 2006; Shehab et al., 2004). In addition, the frequency of LBP appears to increase with age in childhood and adolescence. The prevalence of LBP in older children and adolescents is 24–36 % higher than in young children (De Luigi, 2014). There are many important factors that can affect lower back pain in childhood and adolescence. These factors can be physiologically related such as trauma, infection, malignancy, neurological and

rheumatological diseases. There are also changeable risk factors that adolescents have often for low back pain. Changeable risk factors include increased frequency of obesity during childhood, adopting sedentary life (such as watching TV for a long time, using a tablet, sitting at a computer) or on the contrary increasing sports activities (such as trauma or excessive muscle use), smoking, sitting position and non-ergonomic school furniture (Bejia et al., 2005; Hakala et al., 2006; Shehab et al., 2004;Taspınar et al., 2013). In addition, psychological risk factors play an important role in LBP. Depression and psychological problems have an important role in the development of LBP (Ki et al., 2017).

Although prognosis is considered to be good in LBP, problems caused by LPB is difficult to treat. While 80 % of patients with acute LBP recover within 6 weeks, 7-10% take longer than 3 months to become chronic and cause labor and economic losses (Burton et al., 1996). LBP that occurs in the adolescent period affects the advanced life of the individual and causes chronic degenerative disorders (Kutsal et al., 2008). Watson et al (2002) found that adolescents with LBP had a high rate of various disabilities. Low back pain during adolescence can restrict daily living activities and cause school absenteeism, learning difficulties, psychological problems (Zapata et al. 2006). A study in Germany found that 19.4% of students with LBP were absentfrom school due to pain (Roth-Isigkeit, 2005).

In this context, it is very important to understand the occurrence and nature of LBP, especially to determine modifiable risk factors. Researched adolescents on this issue in Turkey is limited. This study was conducted to determine the possible causes and prevalence of LBP, which can cause important health problems in adolescents and decrease their quality of life. The results will play an important role in guiding attempts to prevent LBP in the early onset period.

Patıent and Methods

This cross-sectional study included high school student between September and November 2017 in central district of Bingol. Population of the research consists of 10259 students studying in 31 high schools. The sample population was calculated using the known sample finding formula. When the incidence was 30% and the error rate was 0,05. It was found that a minimum of 313 students. As a result, total of 1285 high school students were included in the study. According to the random number table, high school students selected for this study. The study was approved by the Ethics Committee. (approval no 23). A written informed consent was obtained from each participant. The questionnaires were anonymous, and participation was not mandatory.

In this study, the data were collected via a questionnaire using the face-to-face technique. The questionnaire including with 34 items as, prepared by researchers following a literature survey. The questionnaire consist of socio-demographic features back pain and pain related features, physical activity status, digital product use and General Health Questionnaire.

Demographic features include information such as age, gender, class, physical trauma experienced (such as traffic accident, fall, injury), employment status, parent education status, family environment, sleep habits and smoking. To evaluate low back pain; questions such as whether there is low back pain in lifetime, the effect of school performance, the state, going to the doctor due to pain and taking medication behavior were asked. “Face Pain Scale” was used to evaluate the severity of pain. Face Pain Scala was developed by Wong and Baker . There are 6 facial expressions on this scale. Pain score is determined according to the numerical values given to the faces. There are zero to ten scoring systems and the scoring progresses by 2 increments. Starting from a low score, there are degrees of pain under each facial expression "I have no pain, I have mild pain, I have moderate pain, I have a lot of pain, I have severe pain and I have very severe pain". The score range is 0-10 and scoring is done by asking the person to choose the facial expression that best describes the pain situation he / she feels (Çöçelli et al., 2008).

For the evaluated the physical activities of the students, daily sitting hours outside the school, regular exercise status, avarage exercise time and how to go to school were asked. Regular exercise was evaluated according to World Health Organization (at least 60 minutes of moderate- to vigorous intensity physical activity daily) (Who 2010). In order to evaluate the use of digital products, the type of computer used, daily computer usage time, and immobile sitting time were asked. In addition, students were asked to experience low back pain when using a computer, and were asked to indicate the distance between the screen and the eye. Finally, questions about

playing video games were asked.In order to evaluate the clarity of the questionnaire, pre-application was made and the places that were not understood were corrected.The questionnaire form was applied to the students face to face and an average of thirty minutes was given to fill in the questionnaire.

The psychological health of the respondents was measured using the 12-item General Health Questionnaire (GHQ-12). GHQ-12 was developed by Goldberg and Blackwell in order to screen nonpsychotic psychiatric disorders in general settings. Each item on the scale has four responses from "better than usual" to "much less than usual." Regarding the scoring system we applied to GHQ-12 scoring, each item response category was coded 0-0-1-1, with total score ranging from 0 to 12 points. These students who scored ≥2 points in GHQ-12 were considered to be at risk for mental problems. The test's validity and reliability studies for Turkey were performed by Kilic (Cronbach alpha = 0.78). In this study, Cronbach alpha is 0.87 (Kilic et al.1997).

Data were analyzed using SPSS 22.0 (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp) package program. A p value of <0.05 was considered statistically signifigance. Frequency distributions of the data are expressed as percentage, average and standard deviation; in analysis, chi-square test and binary logistic regression analysis was used to evaluate the independent association existing between the potential risk factors and LBP. The results were presented in odds ratio and 95% confidence intervals.

Results

In our study, 1285 adolescents were evaluated in high school in 2017. The mean age of high school student was 15.97 ± 1,09. The rate of female participants was 52.1% and 33.6% were first grade. Education level of 42.3% of the mothers of students was primary school. The ratio of students physical stress, such as falling, hitting, and trauma at a certain period of their lives, was 30.9% (397 students). 4.9 % of the students had an job. The rate of students who state that they have a warm family atmosphere was 57.0 %. The results showed that the average general health score of 60.1 % of young people in Bingol province was higher than the cut off point 2, general health of the youth is at risk.

When the students' physical activity status is examined; 27.6% of them were found to exercise regularly. 42.8% of students exercise less than thirty minutes at a time. The features related to physical activity are given in Table 1.

When students' digital product use was examined, it was seen that 33.8% of them used computers. A quarter of the students use computers for 30-60 minutes daily. Approximately half of the students were found to have low back pain while using a computer. The rate of using tablets was very high in students (62.8%). The rate of students playing video games was 40% and77.8% of them play under two hours a day. The digital product usage properties of the students are given in Table 2.

The prevalence of LBP in students was 24,1% and pain level is 3,01 ± 0,9. Total 25 students (%8) of the students used drugs due to back pain, one fourth of them failed to go to school due to pain. Some properties of LBP in students are shown in Table 3.

There was no significant relationship between students' classes and genders and their low back pain. The binary logistic regression analysis showed prevelance of LBP was increased in older adolescent but with a statistically significant difference between 14 year compared to 18 year. The rate of low back pain was significantly higher in those who have experienced physical stress in their life and who evaluated their family as suppressive-authoritarian. LBP was higher significantly in students with bad economic conditions and smoke cigarette. We found that LBP in the adolescents was often accompanied by mental risk, and the differences were statistically significant. Prevelance of LBP in adolescent according to age, gender, experiencing pysical stres, family atmosphere and LBP in parents shown in Table 4. When the frequency of LBP was examined according to the physical activity levels of the students, it was seen that regular exercise, average exercise time, and way of going to school did not affect LBP. However, it has been observed that as daily sitting time increases, LBP also increases (Table 5). There was no significant relationship between students experiencing low back pain according to their computer use status and daily usage time. While there was no significant relationship between tablet use and LBP, it was found that as the duration of tablet use increases, the frequency of back pain increases. Tablet use position was not effective in low back pain. There was no significant relationship

between playing video games and playing time and LBP. The relationship between students' digital product use and LBP is given in Table 6.

Table 1. Properties of students related to their physical activities

Physical activity properties	n (%)
Regular exercise	
Yes	355 (27.6)
No	930 (72.4)
Average exercise time	
Less than 30 minutes	439 (42.8)
31-60 minutes	332 (32.4)
61-120 minutes	196 (19.1)
More than 120 minutes	58 (5.7)
How to go to school	
On foot	617 (48.0)
By bus	651 (50.7)
By bike	17 (1.3)
Daily sitting time	
Less than 60 minutes	224 (17.4)
61-180 minutes	583 (45.4)
181 minutes and over	478 (37.2)

Table 2. Students' digital product usage properties

Digital product use properties	**n (%)**
Computer type used	
Using desktop	206 (16.0)
Using laptop	434 (33.8)
Daily computer usage time *	
Under 30 minutes	251 (39.2)
30-60 minutes	161 (25.2)
61-120 minutes	127 (19.8)
121 minutes and over	101 (15.8)
Distance between eye and screen	
20 cm less	110 (17.2)
21-25 cm	211 (33.0)
26-30 cm	197 (30.8)
31cm and over	122 (19.1)
Having low back pain while using a computer	
Yes	293 (45.8)
No	347 (54.2)
Tablet use status	
Yes	807 (62.8)
No	478 (37.2)
Tablet usage time *	
Under 30 minutes	263 (32.6)
30-60 minutes	240 (29.7)
61-120 minutes	173 (21.4)
121 minutes and over	131 (16.2)

Playing a video game	
Yes	504 (39.2)
No	781 (60.8)

* Students who do not use computers and tablets were not analyzed.

Table 3. Some properties of LBP in students

LBP properties	n	(%)
Having LBP		
Yes	310	(24.1)
No	975	(75.9)
Consult a doctor		
Yes	124	(20.3)
No	487	(79.7)
Effect on school performance		
Not affect	157	(25.7)
Partially affecting	385	(63.0)
Seriously affects	69	(11.3)
Having back pain in the mother or father		
Only in mother	322	(25.1)
Only in father	231	(18.0)
In both	392	(30.5)
No back pain	340	(26.5)

Table 4. Prevelance of LBP in adolescent according to age, gender, experiencing pysical stres, family atmosphere and LBP in parents

	n	LBP prevalence	OR (95% CI)	p-value
Age				
14	14	16.9%	1	
15	85	22.0%	1.39(0.74-2.59)	0.29
16	105	24.5%	1.60(0.86-2.96)	0.13
17	69	25.0%	1.64(0.87-3.10)	0.12
18	37	11,9%	2.43(1.21-4.87)	0.01
Gender				
Female	166	24.8%	1.07(0.83-1.39)	0.569
Male	144	23.4%	1	
Experiencing physical stress				
Yes	121	30.5%	1.62(1.24-2.11)	0,01
No	189	21.3%	1	
Family atmosphere				
Friendly	156	21.3%	1	
Normally	119	26.9%	1.36 (1.03-1.79)	0.02
Domineering	35	31.5%	1.70 (1.09-2.63)	0.01
Economic condition				
Good	23	24.5	1	
Middle	257	23.2	0.93(0.57-1.52)	0.78
Bad	30	35.7	0.71(0.89-3.28)	0.10
LBP in parents				

Only mather	70	21.7%	1.61(1.08-2.40)	0.02
Only father	66	28.6%	2.32(1.53-3.51)	0.01
Both mother and father	124	31.6%	2.68(1.85-3.87)	0.01
No pain in parents	50	14.7%	1	
GHQ-12				
0-1	513	19.9	1	
2 and over	772	26.9	1.48 (1.13-1.94)	0.01

OR: Odds ratio; CI: confidence interval

Table 5. Prevelance of LBP in adolescent according to regularly exercise, daily sitting time and feeling pain after exercise

	n	LBP prevalence	OR (95% CI)	p-value
Regularly exercise				
Yes	84	23.7%	1.03 (0.77-1.38)	0.81
No	226	24.3%		
Daily sitting time (except school)				
60 dakikadan az	42	18.8%	1	
61-180 dakika	135	23.2%	1.30 (0.88-1.92)	0.17
181 dk ve üzeri	133	27.8%	1.67 (1.13-2.46)	0.01

OR: Odds ratio; CI: confidence interval

Table 6. Prevelance of LBP in adolescent according to use of digital product

Use of digital product	n	LBP prevalence	OR (95% CI)	p-value
Computer type used				
Desktop	42	20.4%	0.96 (0.72-1.27)	0.79
Laptop	106	24.4%	0.76 (0.52-1.12)	0.16
Can not use	162	25.1	1	
Tablet use				
Yes	189	23.4%	0.90 (0.69-1.17)	0.44
No	121	25.3%	1	
Time of tablet use				
Less than 30 minute	133	27.8%	1	
31-60 minute	49	20.4%	0.94 (0.61-1.45)	0.80
61-120 minute	39	22.5%	1.07 (0.67-1.70)	0.75
More than121 minute	45	34.4%	1.93 (1.21-3.08)	0.01
LBP while using computer				
Yes	95	32.4%	2.66 (1.81-3.89)	0.01
No	53	15.3%	1	
LBP while using tablet				
Yes	92	38.2%	2.97 (2.12-4.18)	0.01
No	97	17.2%	1	
Playing video game				
Yes	113	22.4%	0.85 (0.65-1.11)	0.25
No	197	25.2%	1	

OR: Odds ratio; CI: confidence interval

Discussion

This large study of over 1,200 adolescents provides important prevalence data LBP and risk factors. This study found that LBP was highly prevalent in high school students 14 to 18 age in life time. It was determined that one out of every four students had back pain problems. One-fifth of adolescents with pain applied to a doctor and 62% of students stated that pain partially affected school performance. The frequency of LBP was found to be 7.5% in a study conducted in adolescents in Amsterdam (Dipentmaat et al, 2006). Skoffer et al (2008) investigated the frequency of LBP in the last 3 months and found that more than half of adolescents (aged 15-17) experienced pain. Hakala et al.(2012) and Shan et al., (2013) found 36.3% and 33.1% prevalence of LBP in the last six months respectively. The prevalence of LBP is not similar to previous studies can be explained by the duration of the questioning of pain. The medical aid search rate of students is also very high. It is gratifying to seek medical help, especially when they realize that pain affects school success negatively. LBP might effect the social lives of adolescents at school and during leisure.

In this study, LBP was found to be significantly higher in 14 year old students compared to 18 year olds. There is a direct relationship between age and low back pain. This is a fact that has been supported by most studies(Jones&Macfarlane, 2009; Prista et al., 2004). Wedderkopp et al (2005) found that the level of puberty affects LBP. Indeed, in a follow-up study in Finland, LBP further reduced the risk of hospitalization as pubertywas delayed (Matilla et al, 2008). Nonetheless,the growth spurt initiated during adolescence may be the starting factor in LBP (Wedderkopp et al ,2005).

In this study, no significant relationship was found between gender and LBP. Roth-Isigkeit et al. found significantly relationship between boys and girl. It was reported that girls have more pain than boys. Also Hakala et al. found the frequency of pain higher in female students. However, Silva et al have not found signifigance. The higher prevalence in girls has been related to be hormonal differences and the occurrence of menstruation-related pains in girls.

LBP incidence is high in smoking adolescents and our results are similar to the literatüre (Taşpınar et al.,2013; Kesikburun et al., 2018).The trigger of smoking in low back pain is not clear. However, in general it is known that smoking reduces bone mineral density. As a result, osteoporosis may develop. Another suggestion is that the increase in intra-abdominal and intra-discal pressure caused by cough. This pressure increase may cause disc herniation in some cases(Taşpınar et al.,2013). Using incorrect body mechanics during smoking can trigger low back pain.

In our study has found a positive association between poor psychological health and development of low back pain. A positive association between low back pain in adolescents and poor mental health was reported in a cohort study (Bejia et al. 2005). Our findings support those of previous studies (Osama et al., 2019; Murphy et al 2007). Several hypotheses have been arisen how depression can causes LBP. Poor psychological health can cause to decrease in the pain thresholds in adolescents. In addition increasing pain intensity and restriction of daily living activities can impair psychological health (Qixiang et al., 2019).

Similar to the study of Diepenmaat et al we could not find a relationship between physical activity and LBP. Hovewer, Sundell et al. have suggested that people who exercise regularly have a higher prevalence of LBP. If the regular exercises performed in this period when the growth rate is very intense, it can be a protective factor from low back pain if it is done according to the body mechanics. The duration sitting was another variable explaining in LBP. Among 4,813 Iranian schoolchildren, time spent watching television and doing homework was associated with LBP (Mohseni et al., 2007). Especially, adolescents are face great pressure due to university entrance exams. For this reason, sitting periods are increasing. Ergonomic problems during sitting and not using the back support can cause pain.

In this study we did not find a correlation between desktop computer use time and LBP, which is consistent with the findings Shan et al. and Diepenmaat et al who also did not find a significant correlation between computer use and LBP. In this study, as the time spent on the computer increases, the risk of LBP increases. In a study, the severity and sensitivity of pain was found to be higher in students using computer less than 14 hours a week than those using less than 3.6 hours. In our study, although there was no

significant difference between computer use time and LBP, it was observed that the frequency of low back pain increased significantly as the tablet use time increased. Studies examining the relationship between tablet use and low back pain are limited. However, taking a flexible position and not paying attention to body mechanics in tablet use increases the risk of LBP.

Interestingly, in this study, desktop computer users showed less LBP compared with laptop computer users, but the relation was not significantly. Shan et all found low back pain high in adolescents using laptop. The reasons such as flexible placement of desktop computers, making adjustments screen and keyboard, enabling comfortable and flexible seating may have decreased the LBP rate.

There are some limitations to our study. First, despite the sample of over 1200 participants, data was collected from one only one country. Results may not generalize in Turkey. Also, findings may be affected by bias. Second, a cross-sectional study cannot establish causal relationships.

This study demonstrates that LBP is a common health problem in Turkish adolescent. Many factors cause LBP in adolescents. Smoking situations, sitting time, experiencing physical stres, family atmosphere, LBP in parents, cıgarette use, psychological health and time of tablet use affect LBP. In order to reduce or prevent LBP, student should be educatedabout postur, use time of tablet, sitting time and their smoking habits should be changed.

Acknowledgments: The authors would like to thank all the students who participated in the study.

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