

Spinal pain syndromes among video game players

Zespoły bólowe kręgosłupa u graczy komputerowych

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B – zestawienie danych

C – przeprowadzenie analizy statystycznej

D – interpretacja wyników

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Abstract

Aim of the study: The purpose of this study was to assess the occurrence of spinal pain syndromes among video game players.

Material and methods: 550 persons took part in the survey, including 494 (89.8%) men and 56 (10.2%) women playing video games. The study was conducted using an online questionnaire created using Google Forms. The questionnaire contained 27 questions, including questions about time spent in sitting position, occurrence of spinal pain, ways of dealing with pain and knowledge of the principles of spinal pain prophylaxis.

Results: 70% of respondents play on the computer seven days a week, about 3–4 hours a day. Half of the surveyed players devoted one to two hours a day to physical exercise, one third of the study subjects less than an hour, while every third video game player performed physical activity 3–4 times a week. When pain comes, almost 70% of respondents wait for it to subside, every fourth person treats themselves and the rest seeks help of a doctor or physiotherapist.

Conclusions: There was no correlation between the number of years spent on playing video games and the occurrence of spinal pain as well as between the daily number of hours spent on playing video games and the occurrence of spinal pain.

Keywords: video game players, e-sport, pain, spine

Introduction

The 21st century is the age of the growing popularity of video games. Nowadays, when almost everyone has access to the Internet, part of human activity has been reflected in the virtual world. The intensification of digitisation has led to a change in the way of spending free time, as well as to the development and increase of financing of the video games market. Thanks to this, e-sport, that is, electronic sport was born, consisting in competition between players or teams in a video game. The game can be played recreationally or take a form of a tournament (so-called pro-gaming) [1].

Currently, e-sport is growing at a rapid pace without showing a slowdown. Thanks to this, it has become the subject of many scientific studies, including those that try to present the common

features of sport and e-sport. The most significant difference between the two categories is physical activity, which is missing when playing video games. Electronic sports can be compared to playing chess or darts both in terms of physical activity and the characteristics of professional players. Each of them should be distinguished by a unique coordination of upper limb movements, especially the hand, speed of action and strategic thinking, but they do not have to show any characteristics associated with the overall motor activity of the body. In the future, e-sport has a chance to be considered as sport, and e-players' contests may appear at the Olympic Games, which shows the scale of development of this discipline [2].

The growing interest in the progress of technology and the addictive aspect of video games mean that many young people lead a sedentary lifestyle, forgetting about the need for physical activity. Long-lasting and regular staying in sitting position, as well as not knowing and non-compliance with the principles of ergonomics of work at a computer station are the cause of over-

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loads and pathologies within the musculoskeletal system. Spinal pain syndromes, considered until recently as a problem of the elderly, have become a civilisation disease and are increasingly affecting young people [3, 4].

Spinal pain is currently the most frequently reported problem in the musculoskeletal system and has become a civilisation disease. Modern lifestyle, work, spending a lot of time in sitting position, sports injuries, civilisation conveniences, reduced need for movement, overweight and an insufficient muscular system are extrinsic overloading factors. They cause loads that negatively affect the musculoskeletal system, but they do not always lead to permanent damage. Usually, the spine efficiency is exceeded when on the top of that, intrinsic factors are present, e.g. bad posture, uneven lower limbs, hypermobility, subclinical neurological damage, birth defects (feet, vertebrae and peripheral joints) or the body's aging process. The accumulation of overloads first leads to dysfunction of the spinal structures, and then to degenerative lesions [5].

Material and methods

Participants

550 persons took part in the survey, including 494 (89.8%) men and 56 (10.2%) women playing video games. The group under study consisted of 383 pupils (69.6%), 86 students (15.6%), 72 professionals (13.1%) and 9 unemployed persons (1.6%).

The group under study consisted of players between 11 and 35 years old. The average age of the respondents was 18.5 years. Most people were between 16 and 20 years old (373 persons, 67.8%). The group between 21 and 25 years old included 91 respondents (16.5%), and the group between 11 and 15 years old 73 respondents (13.3%). The least number of people was in the age group between 26 and 30 (10 respondents, 1.8%) and between 31 and 35 (3 respondents, 0.5%).

Questionnaire

The study was conducted in the form of an online questionnaire. In addition to the basic questions about age, sex, weight and height, the survey contained 27 single and multiple choice closed-ended questions. The questions concerned physical activity undertaken by video game players, number of years in playing games, number of hours spent in sitting position in front of the computer and away from it as well as spinal pain. Respondents experiencing spinal pain answered questions about the frequency, place, intensity and type of pain experienced as well as time spent in sitting position after which the pain occurred. In addition, questions about ways helping in dealing with pain and activities bringing relief were asked. The last part of the questionnaire, addressed to all respondents, concerned questions about the ergonomics of the sitting position – do the respondents know the principles of ergonomics, do they apply them and what armchair are they sitting on. They were also asked about other ailments related to spending time in front of the computer. The questionnaire was created using Google Forms and was completely anonymous. It was made available on the Facebook platform.

Statistical methods

The results were drawn up using the Microsoft Excel 2013 package in order to create percentage charts. Additionally, statistical analysis was performed in Statistica 10.0 program using the chi-square test of independence. A significance level of 0.05 was assumed in all tests performed.

Results

Descriptive statistics

Among the respondents, more than half (373 respondents, 67.8%) played video games every day. Every tenth respondent (53 respondents, 9.6%) said that they played video games 5 times

Table 1. Characteristics of the persons under study

Indicators in the study		n	%
Body height	153–163 cm	22	4.0
	164–174 cm	119	21.6
	175–185 cm	306	55.6
	186–196 cm	97	17.6
	197–207 cm	6	1.1
Body weight	40–60 kg	113	20.5
	61–81 kg	279	50.7
	82–102 kg	135	24.5
	103–123 kg	22	4.0
	124–144 kg	1	0.2

a week, 48 respondents (8.7%) 6 times a week, and 37 respondents (6.7%) 4 times a week. The answer “3 times a week” was chosen by 21 respondents (3.7%), “twice a week” by 14 respondents (2.7%), and “once a week” only by 4 respondents (0.7%). Respondents were also asked how much time they spent in sitting position during the day. The results are presented in Table 2.

The respondents were asked about the knowledge of the principles of spinal pain prophylaxis and about the frequency of taking an ergonomic sitting position while playing on a computer. The results are presented in Table 3.

Out of the 550 video game players who took part in the questionnaire, the highest number of persons (163 players) did physical activity once or twice a week. Slightly more than half of the respondents (279 people) replied that during the day they were active for one to two hours (Table 4).

Among 550 computer players surveyed there were 251 people suffering from back pain, including 35 women (13.9%) and 216 men (86.1%). Respondents were asked to mark the intensity of pain on the Visual Analogue Scale (VAS). None of the surveyed chose the intensity of pain to be “9” and “10”. The largest proportion of the respondents (63 persons, 25.1%) indicated the intensity of pain to be “3”, and the smallest (3 persons, 1.2%) both “1” and “8”. Every tenth person (50 people, 19.9%) chose “4” on the scale, 41 people (16.3%) chose the value “5”, 37 people (14.7%) chose “6”, 28 people (11.2%) considered the pain to be “2” and 26 people (10.4%) described it as “7”.

Respondents experiencing back pain were asked about its frequency of occurrence and the time they played on their computers after which the pain appeared (Table 5).

Table 2. Time spent in sitting position during the day

Time during the day	While playing on a computer		Apart from playing on a computer	
	n	%	n	%
1–2 hours	61	11.1	109	19.8
3–4 hours	234	42.5	122	22.2
5–6 hours	161	29.3	168	30.4
7–8 hours	56	10.2	20	21.8
More than 8 hours	38	6.9	32	5.8

Table 3. Knowledge and application of the principles of spinal pain prophylaxis by the persons under study

Indicators in the study		n	%
Knowledge of the principles of spinal pain prophylaxis	Yes, I know	71	12.9
	I have a little knowledge	270	49.1
	I do not know	209	38.0
Taking an ergonomic sitting position while playing on a computer	Yes, always	78	13.3
	Yes, but only sometimes	329	59.8
	No	148	26.9

Table 4. Physical activity characteristics of the persons under study

Indicators in the study		n	%
Frequency of engaging in physical activity	Less than once a week	83	20.5
	once – twice a week	163	34.7
	3–4 times a week	191	29.6
	More often than 4 times a week	113	15.1
Time of daily physical activity	Less than an hour	177	32.2
	1–2 hours	279	50.7
	3–4 hours	57	10.4
	More than 4 hours	37	6.7

Table 5. Characteristics of pain among the examined persons

Indicators in the study		n	%
Frequency of occurrence of pain	Every day	47	18.7
	2–3 times a week	85	33.9
	Several times a month	91	36.3
	Several times a year	28	11.2
Time spent on the computer playing games after which pain occurs	0.5 hours	19	7.6
	1–2 hours	45	17.9
	3–4 hours	78	31.1
	5–6 hours	58	23.1
	More than 6 hours	51	20.3

The questionnaire included a question to the computer players regarding the severity of back pain. Only 33 respondents (13.1%) replied that pain interferes with their duties or work. Slightly more than half of the respondents (129 people, 51.4%) experiencing back pain noted that it bothers them, but only sometimes. Pain did not disturb the daily activities of 89 subjects (35.5%).

Respondents answered questions about how they cope when they experience pain. Most often (171 people, 68.1%) the answer was “waiting for the pain to subside”. Every ninth respondent (61 people, 24.3%) replied that he/she was treating himself/herself, 11 people (4.4%) received help from a doctor, and only 8 people (3.02%) received help from a physiotherapist.

The respondents were also asked about possible own actions to alleviate pain. More than one answer could be chosen. According to the largest number of respondents, physical exercises (160 people, 63.7%) and passive rest (117 people, 46.6%) were helpful. Respondents also used painkillers, anti-inflammatory drugs, ointments, etc. (89 people, 35.5%), massage (13 people, 5.2%) and warm compresses (4 people, 1.6%).

Statistical analysis

Two dependencies of selected features describing the surveyed persons were examined. The first dependency was the impact of game experience on the occurrence of back pain, and the second relationship was the impact of daily game time on the occurrence of back pain. No statistical significance was obtained in any of the analysed dependencies (Table 6).

Table 6. Statistical analysis of selected dependencies

Dependencies studied	p
Player's experience and occurrence of back pain	0.3543
The daily amount of hours spent on playing on the computer and the occurrence of back pain	0.8677

Discussion

Back pain and posture defects are now more and more common among young people. It is mainly associated with the development of computer technology, which contributes to many hours spent in a sitting position and reduction of physical activity [6]. There are many studies and reports on the harmful effects of sitting position and professional groups particularly vulnerable to back pain, however, no research on computer players was found in the literature that was available.

Kaczor-Szkodny et al. [7] assessed physical activity and preferences regarding spending free time among pupils aged 12–15 years old. Studies have shown that 1/3 of pupils are physically active 1 or 2–3 hours a day, but 20% of the respondents only 15–30 minutes a day. In addition, the fact that almost 1/5 of pupils spend more than 3 hours each day in front of the computer turned out to be alarming. Kozińska et al. [8] studied the level of physical activity of pupils of secondary schools in Łódź. Most respondents admitted to being active less often than the minimum recommended dose. The analysis indicates an insufficient level of physical activity of the respondents. In addition, it was noted that the frequency of practicing activity correlates with the age of respondents. Greater activity was observed among the younger group of young people. Sochocka et al. [9] examined a group of 553 students of different faculties. Over half of the respondents did not make any effort regularly. Only 12% of respondents did it every day, and 25% twice a week. As many as 18% of respondents were active only a few times a month. The surveyed students most often devoted only an hour a week to physical activity. On the other hand, Smolis-Bąk et al. [10] surveyed a group of 136 office workers aged 20–64 years old using a questionnaire. Every second person declared that they spend their free time actively. Only 25.7% did physical activity every day. In addition, a beneficial effect of physical activity on the reduction of various ailments arising as a result of working with a computer has been demonstrated. The author's research showed that every third computer player engaged in physical activity 3–4 times a week. Half of the surveyed players devoted

one to two hours a day to physical effort, and as much as 32.2% less than an hour. The alarming fact is that almost 70% of respondents play on their computers seven days a week, devoting 3–4 hours each day to it.

Bukłaho et al. [11], by examining 150 students from the Medical University of Białystok, they noticed that over 50% of the respondents heal themselves when there are symptoms of pain, every third person does not take any action, and the rest receive help from a doctor or physiotherapist. The most effective in relieving pain among 77.58% of respondents appears to be rest, followed by relaxing exercises and massage. In the research that Sieradzki et al. [12] conducted on students of physiotherapy it was noted that the most common pain relief activities were correct positioning, massages, and relaxation exercises. Only 10.9% of respondents chose passive rest. During the author's research, it was noted that in the event of pain, almost 70% of respondents wait until the pain subsides, every fourth person heals himself/herself and the rest receives help from a doctor or physiotherapist. Movement exercises are the most effective actions in the fight against pain, followed by passive rest. It is worrying that as many as 1/3 of people reach for painkillers, anti-inflammatory drugs, ointments, etc.

Smolis-Bąk et al. [10] examined in their study the knowledge and application of ergonomic principles among office workers. It became apparent that there are more respondents who know and apply computer work rules than people who know the rules but do not apply them. It has also been shown that the use of principles of ergonomics reduces the occurrence of discomfort caused by working in front of the computer. In the author's study, it was noted that almost half of the respondents partly know the principles of back pain prevention. Among the respondents there were the most people who only occasionally use an ergonomic sitting position while playing. Almost 1/3 of respondents did not care about correct posture during the game.

According to the research by Cieplowska et al. [13] conducted on one hundred office workers aged 25–40 years old, people with office work experience that is longer than or equal to 10 years more often experience back pain than those working less than 10 years. Zejda et al. [14] reached similar conclusions when studying the relationship between the time and conditions of work performed at a computer station and the occurrence of backache and upper limbs. The researchers noted that seniority has an impact on the occurrence of back pain. During the author's research, no relationship was found between the duration of playing computer games and the occurrence of back pain. The above difference in results is most likely caused by the young age of the computer players surveyed.

Drozda et al. [15] analysed the occurrence of back pain among 1475 students aged 13–20 years old. During the study, it was found that people without back pain spend more time watching TV each day than people with back pain. It was noted that both groups spend a similar number of hours a day in front

of their computers. Diepenmaat et al. [16] reached surprising conclusions. They noticed that people declaring the musculoskeletal discomfort spend less hours in front of their computers. In their opinion, stress and depression are the main causes of reported disorders. The results of the author's research did not show any correlation between the daily number of hours devoted to playing computer games and the occurrence of back pain, which could have resulted from the relatively young age of the respondents.

The rapidly growing video game market attracts millions, mostly young people, in front of computer monitors. Creating organisations gathering professional players who earn huge money and enjoy great popularity means that many people give up learning, physical activity, contacts with peers and spend almost all their day playing computer games to reach the highest level and to stand in front of an audience reaching tens of thousands of people. However, it is worth considering what the future health consequences may be from adopting a sitting position for several or several hours a day, which is known to be the most aggravating position for the lumbar spine.

Conclusions

1. In the event of pain, the majority of respondents waited for the pain to subside, and the most effective methods of pain relief were exercise and passive rest.
2. The surveyed computer players had partial knowledge about the prevention of back pain, and only sometimes adopted an ergonomic sitting position.
3. Among the computer players surveyed, no relationship was found between game experience and the occurrence of back pain.
4. No relationship was observed among the respondents between the daily number of hours devoted to computer games and the occurrence of back pain.

References

- [1] Witkowska M. Funkcjonowanie wykonawcze profesjonalnych graczy komputerowych. *Homo Ludens*. 2016;1(9):35–40.
- [2] Hallmann K, Giel T. eSports – Competitive sports or recreational activity? *Sport Management Review*, Elsevier. 2018;21(1):14–20.
- [3] Pasiut S, Osińska A. Zespoły bólowe kręgosłupa – analiza czynników ryzyka i częstości występowania dolegliwości. *Rehabilitacja Medyczna*. 2016;20(1):12–22.
- [4] Drężewska M, Sieroń A, Śliwiński Z. Ocena efektów analgetycznych terapii wibroakustycznych w leczeniu dolegliwości bólowych części lędźwiowo-krzyżowej kręgosłupa u pracowników biurowych. *Fizjoterapia Polska*. 2013;3(13):8–13.
- [5] Stodolny J, Stodolna-Tukendorf J. *Jak chronić swój kręgosłup?* Busko-Zdrój: ZL Natura. 2017

- [6] Czaprowski D, Leszczewska J, Sitarski D. Czy istnieje „idealna” pozycja siedząca? *Postępy Rehabilitacji*. 2014;(3):47–54.
- [7] Kaczor-Szkodny P, Horoch CA, Kulik TB, Pacian A, Kawiak-Jawor E, Kaczouk M. Aktywność fizyczna i formy spędzania wolnego czasu wśród uczniów w wieku 12–15 lat. *Medycyna Ogólna Nauki o Zdrowiu*. 2016;22(2):113–119.
- [8] Kozińska J, Redo K, Drygas W. Poziom aktywności fizycznej młodzieży łódzkich szkół ponadpodstawowych. *Medycyna Sportowa*. 2014;1(4): 37–48.
- [9] Sochacka L, Wojtyłko A. Aktywność fizyczna studentów studiów stacjonarnych kierunków medycznych i niemedycznych. *Medycyna Środowiskowa*. 2013;16(2):53–58.
- [10] Smolis-Bąk E, Kwakowicz M, Kowalik I, Majda W, Kazimierska B. Wpływ aktywności fizycznej i stosowania zasad ergonomii na występowanie wybranych zespołów bólowych u pracowników biurowych. *Postępy Rehabilitacji*. 2015;(2):5–11.
- [11] Bukłaho K, Cybulski M, Ustymowicz-Farbiszewska J, Krajewska-Kułał E. Styl życia a występowanie dolegliwości bólowych kręgosłupa wśród studentów Wydziału Nauk o Zdrowiu Uniwersytetu Medycznego w Białymstoku. *Pielęgniarstwo i Zdrowie Publiczne*. 2017;26(1):19–25.
- [12] Sieradzki M, Krajewska-Kułał E, Van Damme-Ostapowicz K, Ocena występowania zespołów bólowych dolnego odcinka kręgosłupa w populacji studentów kierunku fizjoterapia. *Problemy Higieny i Epidemiologii*. 2013;94(3):451–458.
- [13] Ciepłowska A, Waszkowiak K, Jędrusek-Golińska A, Szymandera-Buszka K, Kmiecik D, Kobus-Cisowska J. Stan odżywienia i zachowania żywieniowe pracowników biurowych poznańskich korporacji – badania pilotażowe. *Problemy Higieny i Epidemiologii*. 2017;98(4):387–392.
- [14] Zejda JE, Bugajska J, Kowalska M, Krzych L, Mieszkowska M, Brozek. Dolegliwości ze strony kończyn górnych, szyi i pleców u osób wykonujących pracę biurową z użyciem komputera. *Medycyna Pracy*. 2009;60(5):359–367.
- [15] Drozda K, Lewandowski J, Górski P. Bóle kręgosłupa u młodzieży szkół gimnazjalnych i ponadgimnazjalnych zamieszkałej w środowisku miejskim w Polsce na przykładzie Poznania. *Ortopedia, Traumatologia, Rehabilitacja*. 2011;5(6):489–503.
- [16] Diepenmaat ACM, van der Wal MF, de Vet HCW, Hirasling RA. Neck/Shoulder, Low Back, and Arm Pain in Relation to Computer Use, Physical Activity, Stress, and Depression among Dutch Adolescents. *Pediatrics*. 2006;117:412.

Streszczenie

Cel pracy: Celem niniejszej pracy była ocena występowania zespołów bólowych kręgosłupa u graczy komputerowych.

Material i metody: W przeprowadzonym badaniu ankietowym wzięło udział 550 osób w tym 494 (89,8%) mężczyzn i 56 (10,2%) kobiet grających w gry komputerowe. Badania przeprowadzono za pomocą internetowego kwestionariusza ankiety stworzonego z wykorzystaniem Formularzy Google. Ankieta zawierała 27 pytań, wśród których znalazły się m.in. pytania o czas spędzany w pozycji siedzącej, występowanie dolegliwości bólowych kręgosłupa, sposoby radzenia sobie z bólem oraz o znajomość zasad profilaktyki bólów kręgosłupa.

Wyniki: Prawie 70% badanych gra na komputerze siedem dni w tygodniu, około 3–4 godzin dziennie. Połowa badanych graczy poświęcała wysiłkowi fizycznemu od jednej do dwóch godzin dziennie, jedna trzecia badanych mniej niż godzinę natomiast co trzeci gracz komputerowy uprawiał aktywność fizyczną 3–razy w tygodniu. W przypadku wystąpienia bólu prawie 70% ankietowanych czeka aż ból sam ustąpi, co czwarta osoba leczy się sama a pozostałe osoby korzystają z pomocy lekarza lub fizjoterapeuty.

Wnioski: Nie wykazano zależności między stażem grania w gry komputerowe, a występowaniem dolegliwości bólowych kręgosłupa a także między dzienną liczbą godzin poświęcanych na granie w gry komputerowe, a występowaniem dolegliwości bólowych kręgosłupa.

Słowa kluczowe: gracze komputerowi, e-sport, ból, kręgosłup
