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MUSCULOSKELETAL DISORDERS AMONG STUDENTS AT UNIVERSITY IN ZIELONA GÓRA AND THEIR INFLUENCE ON MOTION EFFICIENCY

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Abstract

Musculoskeletal disorders affect a growing number of young people. This is a very worrying phenomenon, since it often affects people who have not started their professional careers yet. Pain from the musculoskeletal system may result from static and dynamic overloading of the system. Regardless of the cause, it reduces the ability to work. In the analysed case – it reduces the ability to achieve the best results in physical fitness tests.

This paper presents the results of research on the frequency of reporting musculoskeletal disorders among students at the University in Zielona Gora and the influence of these disorders on the results of fitness tests.

The frequency of the analysed disorders, as well as the level of physical fitness do not differ from the figures reported in earlier similar studies conducted at the University in Zielona Gora.

Relationships between pain intensity and a decrease in physical fitness were observed in relation to arm and leg power as well as agility. Flexibility, endurance and speed showed no correlation with the intensity of musculoskeletal disorders of any region of the body.

Key words*: musculoskeletal disorders, physical efficiency, male students*

Introduction

Musculoskeletal disorders, or so-called. CTDs (Cumulative Trauma Disorders) affect people of all ages but it is commonly thought that their commonness increases with age. Generally, lumbar pain is the most commonly reported type, both by adults and the elderly as well as young people. Apart from the most common low back pain (up to 50% of the population) neck and shoulder pain is also often reported (Wandycz, Grzywiński, 2008; Wandycz, 2009a). It is particularly worrying that 20–30% of children at primary and lower secondary schools suffer from lumbar pain (Wandycz, 2006a, 2006b, 2008a), and over 40% of high school students report this type of disorders (Wandycz, Tofil, 2009). This percentage is similar to that found in a population of adults who work hard physically (Grzywiński et al., 2009).

The literature gives a number of factors that contribute to the development of low back pain in young people, such as the incidence of these disorders in the family, anthropometric factors, mobility of the spine joints, body posture, muscle strength, sports activities and even smoking cigarettes and watching television (Salminen et al. 1992). In various studies, physical labour and excessive muscular efforts, particularly carrying heavy loads, are considered to be the most common causes of back pain (Wandycz, 2007).

When discussing factors that may significantly contribute to the formation of symptoms, the issue of too little physical activity and spending a long time in a sitting position is raised

far too rarely. Most of faulty postures in children suffering from back pain are caused by their sedentary lifestyle – teenagers spend up to 80% of school day at their desks (Mandal, 1985).

Musculoskeletal pain is relatively common concern among people doing sports. Over 20% of recreational runners report the presence of musculoskeletal pain before a race (Lopes et al. 2011). Among adolescents musculoskeletal pains were found more often in subjects with high physical activity than in subjects with average physical activity (Kujala et al. 1999).

It is assumed that physical fitness is primarily determined by the condition of the musculoskeletal system. Pain from the musculoskeletal system should therefore reduce the results obtained in physical fitness tests (Caldwell, Smith 1966; Dorpat, Holmes 1955).

Aim

The aim of this study is to examine physical fitness, asses prevalence of musculoskeletal disorders among students at University in Zielona Gora and answer to the question: Does the intensity of pain significantly affect the physical fitness tests?

Methodology

One hundred and thirty nine year one male students at the University in Zielona Gora were participated in the research. Table 1 presents the detailed data on their body height, weight, age and selected somatic indices, including BMI, the Rohrer's index and body surface.

The study was conducted in spring 2010. A questionnaire was used to collect details on the respondents' basic social features, lifestyles and subjective assessment of their health. The questionnaire contained a map of the human body with marked parts and regions to write in the frequency and intensity of symptoms, developed and used by Wandycz in studies of musculoskeletal disorders (Wandycz, 2006b, 2008b).

Physical fitness tests were carried out only in the morning and before noon. The respondents' fitness was assessed in six categories (Matynia, 1960; Pilicz, 1997):

- arm strength – upper extremities' dynamic power – tested by means of medicine-ball throw,
- explosive power of lower limbs – tested by means of standing long jump,

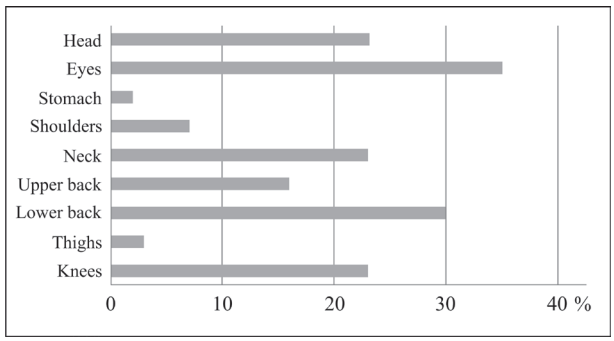
Table 1. *Description of the study group*

	M	SD	MIN	MAX	Variability (%)
Body height (cm)	180.6	7.1	165.0	201.8	4.0
Body mass (kg)	77.8	12.4	53.4	120.5	15.9
Age (years)	20.2	0.8	19.0	21.0	4.0
BMI (kg/m^2)	23.8	3.2	17.5	35.9	13.5
Rohrer's index	1.3	0.2	0.9	2.0	13.9
Body surface (m^2)	2.0	0.2	1.6	2.5	8.7

- flexibility – tested by means of the depth of standing forward bend,
- agility – tested by means of 'envelope run' 3x5 m three times,
- speed endurance – measured by means of Burpee's test,
- speed abilities – measured by means of 20 squat test time result.

The participants were not paid for taking part in the research.

Figure 1. *Frequency of reporting pain at the time of tests [%]*



Results

The collected results were used to prepare tables and figures showing the frequency of reporting musculoskeletal disorders, head, eye and abdomen pain and the figures on the respondents' fitness.

As seen in Figure 1, the respondents most often reported pain in lumbar spine (30%) and in neck and knees (23%).

The tables 2 and 3 below show the results of motor fitness tests and the correlations between these results and the intensity of pain in the analysed regions of the body.

Statistically significant relationships between pain intensity and the results of fitness tests were found only in the case of three out of the six studied types of physical fitness. The slighter pain in the neck, shoulders, upper back, thighs and knees was reported the further the medicine ball throw distance was recorded. The long jump distance correlates negatively with neck and knee pain – more severe pain means a shorter jump. Agility correlates positively with shoulder, neck and knee pain – more severe pain prolongs the time needed to complete the envelope run test. In other cases, the correlations observed are not statistically significant (Table 3).

Discussion

Musculoskeletal disorders, or so-called. CTDs (Cumulative Trauma Disorders) affect people of all ages. Generally, the majority suffer from spine disorders, particularly lumbar pain, regardless their age as this pain is reported by the elderly, adults as well as adolescents and children. In primary schools this problem affects almost 20% of children, in lower secondary schools the problem is reported by 30% of girls and 38% of boys, and in secondary schools by 42% of surveyed males and 56% of surveyed females (Wandycz, 2006a, 2006b, 2008a, 2009a; Wandycz, Tofil, 2009). These results are similar to those reported in the literature by other researchers, including Pascoe et al. (1987): that is 28–50%. There is a widespread belief that lumbar pain is typical for adults who do physical labour. However, it appears that back pain affects people working in sitting positions, mainly in offices, such as professionals working with computers (Wandycz, 2008b, 2009b), as often as forest workers (Grzywiński et al. 2009). The frequency of musculoskeletal disorders presented in this paper is similar to the one reported in the literature (Wandycz, Asienkiewicz, 2011). Moreover, the results of physical fitness tests reported

Table 2. *Value of motor features*

	M	SD	MIN	MAX	Variability (%)
Arm strength – 3 kg medicine-ball throw (m)	9.02	1.87	5.1	14.1	20.7
Explosive power of lower limbs – standing long jump (cm)	210.83	24.52	125.0	261.0	11.6
Flexibility – depth of forward bend (cm)	6.87	7.77	–18.0	24.0	113.1
Agility – „envelope" run (sec)	25.86	2.16	22.4	33.6	8.35
Endurance – 60-second squat-backward-leg-throw (cycles)	23.71	4.14	10.0	34.0	17.46
Speed – twenty squat time result (sec)	19.97	1.86	15.2	25.8	9.32

Table 3. *Correlations between pain intensity and physical fitness tests*

Part of the body	Arm strength	Power of lower limbs	Flexibility	Agility	Endurance	Speed
Head	–0.12	–0.02	0.05	0.08	–0.13	–0.03
Eyes	–0.10	–0.08	–0.03	–0.04	–0.04	–0.04
Stomach	–0.13	–0.13	–0.03	0.14	–0.03	–0.01
Shoulders	–0.22*	–0.18	–0.14	0.23*	–0.14	0.02
Neck	–0.30*	–0.21*	–0.16	0.22*	–0.15	0.08
Upper back	–0.19*	–0.09	–0.12	0.13	–0.12	0.06
Lower back	–0.28*	–0.17	–0.15	0.16	–0.16	0.10
Thighs	–0.26*	–0.08	–0.16	0.07	–0.06	0.00
Knees	–0.34*	–0.29*	–0.01	0.23*	–0.12	0.08

in the paper generally do not differ from the results of tests conducted in previous years on the population of Zielona Gora University students (Asienkiewicz et al., 2006; Tatarczuk et al., 2007a, 2007b, 2009a, 2009b). Thus, the results are probably representative and the use of subjective methods to assess the prevalence and intensity of symptoms, especially in continuous studies, may significantly enhance knowledge about the impact of pain on performance in sports. And in the case of arm strength, leg power and agility, the assessment of pain can be a relatively good predictor of individual performance.

Conclusions

On the basis of the test results the following conclusions can be drawn on musculoskeletal disorders and their relationships with the results of physical fitness tests:

1. The participants frequently complained of musculoskeletal pain of the lumbar spine (30%), and neck and knees pain (over 20%).
2. The distance of the medicine ball throw negatively correlates with the intensity of pain in the neck, shoulders, thighs and knees. Greater pain means a shorter throw.
3. The length of the jump negatively correlates with pain in a neck and knees – greater pain means a shorter jump.
4. Agility positively correlates with pain in shoulders, neck and knees – greater pain prolongs the time needed to complete the envelope test run.
5. Suppleness, endurance and speed in the studies did not depend on the intensity of pain in the musculoskeletal system.

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ANTROPOLOGICKÁ IDENTIFIKACE JEDINCŮ Z HROMADNÉHO HROBU

Anthropological Identification of Skeletal Remains from Mass Grave

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Abstract

In March 2007 a mass grave containing skeletal remains of five individuals was discovered near the city Vysoké Mýto. The whole location was investigated by the members of Criminal Police Department who found out that according to attendant artefacts the grave came from the 2nd world war period and official investigation was stopped. The skeletal remains where stored at The Department of Forensic Medicine of Charles University in Hradec Králové and then anthropologically analyzed. Because of thoughtless manipulation during excavation the bones of all five individuals were mixed together so the reconstruction of skeleton was the first task of anthropological analysis. Sex, age, race and stature were determinated as well as diseases and trauma. We also try to create the facial reconstructions and we discovered the cause of death; all five individuals were executed by gunshot to the nape.

***Keywords**: Mass Grave, Skeletal Remains, Identification, Gunshot wound, The Second World War*

Úvod

V březnu roku 2007 byl nedaleko Vysokého Mýta na území obce Brteč (okres Ústí nad Orlicí, Pardubicích kraj) objeven hromadný hrob obsahující kosterní ostatky a artefakty nejméně pěti jedinců. Na místo nálezu byli přivoláni policisté Obvodního oddělení Policie České republiky z Vysokého Mýta, kteří provedli prvotní ohledání místa nálezu. V následné prohlídce pokračovali policisté SKPV (Služba kriminální policie a vyšetřování) z Ústí nad Orlicí. V jejich kompetenci bylo zajištění důkazního materiálu, vyzvednutí kosterních ostatků a jejich dopravení na Ústav soudního lékařství Lékařské fakulty Univerzity Karlovy a Fakultní nemocnice v Hradci Králové k provedení soudnělékařských expertíz. Po zhodnocení výsledků těchto expertíz a datací nalezených artefaktů bylo konstatováno, že masový hrob pochází s největší pravděpodobností z období druhé světové války, a kriminalistické vyšetřování tak bylo z důvodu promlčení trestného činu zastaveno. Pro forenzní vědu se tak stal kosterní nález irelevantním, což umožnilo postoupit ostatky následnému antropologickému zpracování pro vědecké účely. Válečná historie nálezového místa, vojenské artefakty a úrazové změny na některých kostech napovídaly, že ohledání kosterního nálezu může přinést řadu dalších zajímavých informací.

Cíl

Cílem studie bylo komplexní antropologické zpracování kosterních ostatků zahrnující především zpětnou kompletaci původních skeletů, metody určující obecnou identifikaci (věk, pohlaví, etnický původ a výšku postavy) i metody stanovující identifikaci individuální.