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ORIGINAL ARTICLE

The Range of Thoracic-Lumbar Segment of Spine Mobility in Saggital and Transverse Plane among Young Men Divided into Three Groups Differing in the Current Commitment to Physical Activity

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Key words: *spin mobility, thoracic-lumbar segment, physical activity, men*

Abstract

Background: *The aim of the study was to compare the mobility of the thoracic-lumbar segment of the spine and the mobility of its separate segments – the thoracic and lumbar ones in the saggital and transverse plane among young men divided into three groups that differ in the current commitment to physical activity.*

Material/Methods: *135 young men – students of Physical Education Faculty and of Tourism and Recreation Faculty at the Academy of Physical Education and Sport in Gdansk as well as students from the University of Gdansk aged 21-22 who did not participate actively in any sports discipline were involved in the study. In the saggital plane in the range of bending the torso forwards the flexibility of the thoracic-lumbar segment of the spine was tested according to Wolański's assumptions, the flexibility of the thoracic segment of the spine with Otto and Wurm's test and the lumbar segment of the spine with Schober's test. In the transverse plane in the range of torso twist to the right and to the left the mobility of the thoracic-lumbar segment of the spine and the lumbar segment were examined with the usage of Pavelek's tests.*

Results: *In the saggital plane of the body among men from individual groups, the mobility of the thoracic-lumbar and lumbar segments of the spine during bend forwards was in the norm and above it, whereas the mobility of the thoracic segment of the spine was above the norm. In the transverse plane the range of the spine movement in the thoracic-lumbar and the lumbar spine to the right and left was similar among all the tested men, whereas the range of the thoracic-lumbar segment movement was above and of the lumbar segment below the norm. The students from Physical Education Faculty were characterised as having the highest flexibility of the thoracic-lumbar segment of the spine in the saggital plane in comparison with other students' flexibility . Against the background of the other groups the students of Tourism and Recreation Faculty demonstrated the highest mobility of the lumbar spine in the saggital plane. The stated differences were statistically significant.*

Conclusions: *Higher frequency of participation in physical exercises and their longer duration among the students of Physical Education (PE) in comparison with the other groups did not influence significantly the range of their spine mobility apart from the range of bend forwards of the whole thoracic-lumbar segment of the spine in the saggital plane.*

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Introduction

Mobility of body segments in individual joints, that means flexibility, in the light of contemporary anthropomotorics is included into a potential side of human motorics. This part reflects the inner potentials of an organism, namely motor predispositions, skills and competences, unlike the effective part that determines the result of a chosen motor action. Flexibility can be placed in the group of predispositions situated on the border of structural and functional features of an organism. It is defined as a physical feature that is a structural predisposition of different skills [1, 2, 3]. Predispositions are very strongly genetically conditioned and their measurement is possible only thanks to specific methods applied in the fundamental sciences [4].

The level of mobility range is determined by many diverse factors, among others sex, age, body build, condition of the movement apparatus and these anatomic features that influence the movement effectiveness of an individual – muscles and ligaments elasticity, the condition of joint surfaces and many other external factors [1, 5, 6].

The spine is a movement apparatus with many degrees of freedom thus allowing a human to realise complex movement actions. Thanks to its segmental structure and connection with a strong muscular system, the spine is adapted to fulfilling various functions – it is an axial-supportive apparatus and protects the structures of the spinal cord and spinal roots [7, 8]. In the pre-sacral segment of the spine (*vertebra presacrales*) mobility of individual vertebrae in relation to one another is considerably limited by the ligamentous apparatus, particularly by intervertebral discs that link vertebrae. Nevertheless, minor movements of individual vertebrae sum and allow this spine segment to have a high level of mobility in three planes in comparison with the immovable sacral bone [7, 8]. Movements of the spine can be realised by the whole presacral segment of the spine and separately by its individual segments, whose functional autonomy is not equal in its every part. An importance of the spine flexibility, which is necessary for everyday physical activity, can be observed among people who suffer from the spine pains or with the inflexible spine [7, 8, 9].

Shaping a person's morphological and functional features, among others spine mobility, is conditioned *inter alia* by physically active lifestyle. The level of physical activity is influenced mainly by exogenous factors, whereas its standard changes in correlation with the form of its realisation [1, 3, 9, 10]. There are a few different units of measurement that do not have standards and are commonly accepted to be used in the evaluation of physical activity [1]. Physical activity generally can be divided into one that is conducted during work and during one's leisure time. An evaluation of physical activity proposed by Bouchard and Shepard [11] considers: physical activity during leisure time, physical exercise, sport, occupational activities, domestic duties and other elements that influence energy balance of an organism. In turn, Anshel et al. [12] in a description of the importance of the influence of chosen physical exercises took into consideration the following elements: the kind of physical activity, the intensity of exercises, their frequency and duration. These constituents were partly used to study the value of the physical activity index (from moderate to vigorous one – MVPA) that was completed by professor B. Woynarowska with the question about physical education lessons in research on teenagers [13].

Physical exercises included in the curriculum of the first-year studies at Physical Education Faculty demonstrated essentially different importance and influence on a young person's organism from those physical exercises that are realised by the students at Tourism and Recreation Faculty and the students at the University of Gdansk, which seems to result from the peculiarity of the educational process. Hence, it was assumed that physical exercises of Physical Education students, whose characteristic feature is their higher frequency and longer duration in comparison with the exercises of the students from other faculties, can significantly increase the elasticity of the ligamentous-muscular apparatus and thus the spine mobility.

The aim of the study was to compare the mobility of the thoracic-lumbar segment of the spine and the mobility of its separate segments – the thoracic and lumbar ones in the saggital and the transverse planes among young men divided into three groups differing in the current commitment to physical activity.

Material and Methods

The study on the spine mobility was conducted in the 2009/2010 academic year among 135 students aged 21–22, who studied at the Academy of Physical Education and Sport in Gdansk, at Physical Education Faculty (PE) and Tourism and Recreation Faculty (TR) and at the University of Gdansk (UG). They formed three groups, each consisting of 45 students from each faculty. When the experiment started, men from PE and TR Faculties studied in their third year (the fifth semester), while the students from UG were in the second year of their studies (the third semester), which is the last year of their obligatory physical education classes.

In a conducted survey the examined people declared that currently and in the past they did not practice sport professionally, which means that they did not practice in any sports club under the supervision of a trainer; they only participated in obligatory sports classes according to the study curriculum and their term's schedule of classes. After excluding from the research the students who had had a relatively long period of sports training and after excluding people for random reasons, the homogenous research material consisting of students who did not practice sport actively was obtained. The division of the students into the three research groups was accomplished in consistence with suggestions regarding the influence of chosen physical exercises on a young person, as proposed by Anshel et al. [12] and Cabak and Woynarowska [13]. Hence, the division criterion was based on obligatory physical exercises realised in a weekly cycle, that is on the frequency and duration of a didactic unit, which for each group of students was 45 minutes (Table 1). The studied men were characterised by good health and did not complain about any pain ailments.

Tab. 1. The number of obligatory 45-minute physical exercises classes in a weekly cycle realised in particular semesters

Group	1st semester	2nd semester	3rd semester	4th semester	5th semester
	number of hours/week	number of hours/week	number of hours/week	number of hours/week	**number of hours/week**
PE	7	8	9	8	**7*** (1hr – swimming; 2hrs each: skating , team games, specialisation sports classes)
TR	1	2	2	4	**2*** (1hr – nordic walking, 1hr – sports games)
UG	2	2	**2*** (physical education)	-	-

** In the brackets there are types of physical exercises realised in the 5th semester of PE and TR and in the 3rd semester at UG*

The measurements of the thoracic-lumbar segment of the spine and of its separate segments – the thoracic and lumbar ones – included the range of bend forwards in the saggital plane and the range of turn to the right and left side in the transverse plane. The methodological guidelines and physiological norms that are used in clinical tests of adults were taken into consideration during the study [5, 14, 15, 16, 17, 18, 19]. The range of the spine mobility was evaluated (despite the factor of the spine flexibility [18]) indirectly, i.e. by the difference of distances between a point marked on the tested person's skin in the upright position and then after a movement in a specific direction [20]. A measuring tape was used during the test, which allows achieving the measurement with precision of 1.0 mm. The studied men wore loose sports shorts and took the examination without previous warm-up exercises of the ligamentous-muscualr apparatus.

The flexibility of the thoracic-lumbar spine during bend forwards in the saggital plane was tested in consistence with methodological guidelines and norms (centile rank) proposed by Wolański [18]. On the basis of measurements of the distance between the seventh cervical vertebra and the fifth lumbar vertebra (C7–L5) in the upright position (measurement a) and during bend forwards with straight knee joints (measurement b), the factor of the spine flexibility (FSF) was calculated according to the following formula, irrespective of the spine length [18]:

$$FSF = [(b - a) : a] \cdot 100\%$$

The range of bend forwards of the thoracic segment of the spine was determined with Otto and Wurm's test [5, 16, 19]. On the body of each participant a point was marked that corresponded to the seventh cervical vertebra (C7) and the second point was placed on the thoracic spine, 30 cm beneath C7 (C7 – 30.0 cm↓). Then the distance between the above mentioned points in the upright position of the body and during the maximal bend of torso forwards was determined. Gaining the result of 33 cm or above (norm 3.0 cm) is considered as complete, i.e. normal mobility of the thoracic segment of the spine in the saggital plane, whereas the result above this value can indicate limited mobility.

Schober's test was used to investigate the range of bend forwards of the lumbar segment of the spine [1, 5, 15, 16, 17]. The distance between the point corresponding to the fifth lumbar vertebra (L5) and the point that is placed 10.0 cm above L5 (L5 – 10.0 cm↑) was measured in the upright body position and during the maximal bend of torso forwards. When the mobility is complete, the correct distance ought to increase to 14.5 cm (norm 4.5 cm).

To determine the mobility of the thoracic-lumbar spine and separately its lumbar segment in the transverse plane, Pavelek's first and second tests were used [16]. The tests investigating the range of the spine turn to the right and to the left side were conducted in a sitting position (sitting astride on a stool). Mobility of the thoracic-lumbar segment was evaluated on the basis of the measurement of the distance between sternal incisure (*Suprasternale – sst*) and L5 in an upright torso position and during the maximal turn of the torso to the right and to the left side (Pavelek's first test). When the full range of turn is observed (norm 7.0 cm), the distance between the above mentioned points measured on the side of the turn ought to lower by 7.0 cm (or above 7.0 cm) [16].

The range of turn in the lumbar segment of the spine in the transverse plane was evaluated on the basis of the measurement of the distance from the place of linkage between the body of sternum and xiphisternum *(Xyphoidale – xi)* to L5 also in a sitting position (sitting astride on a stool) and after turn to the right and to the left side (Pavelek's second test). If the distance between the above mentioned points lowers by 6.0 cm or above 6.0 cm (norm 6.0 cm), it can be treated as an evidence of a complete range of mobility [16].

The collected material was statistically analysed with the usage of computer software STATISTICA 9. On the basis of data collected during the measurements the following were calculated: arithmetic mean ($\bar{X}$), standard deviation (±S) and the range of variability (Min – Max). The statistically significant differences were investigated by the U-Mann-Whitney test .

Results

The factor of the thoracic-lumbar spine flexibility (FSF) and the range of the lumbar spine mobility (Schober's test) in the saggital plane during a bend forwards were in the physiological norm and above it in all the analysed groups of students, i.e. the students at PE, TR and UG, while the mobility of the thoracic segment of the spine (Otto and Wurm's test) was beneath the norm (Tables 2 and 3).

In comparison with the students at TR Faculty and UG, the students at PE Faculty gained the best results of the factor of the thoracic-lumbar segment of the spine flexibility during a bend forwards ($\bar{X}$ = 23.93). Among the students of PE only one person indicated a limited range of mobility. The average values of the FSF factor indicated the correct mobility of the spine; however, there is a statistically significant difference among the groups (Table 2). The highest range of mobility of the lumbar segment of the spine during a bend forwards was demonstrated by the students at TR Faculty ($\bar{X}$ = 5.63), among whom no case of limited mobility was noted. An analysis of average values of the range of the lumbar spine movement showed that there existed some differences between students at TR and UG. The limitation of mobility of the above mentioned segment occurred similarly often among students at PE (8.8%) and students at UG (8.8%). The range of the thoracic segment of the spine mobility during a bend forwards was lower than complete in particular groups ($\overline{X}$ < 3.0), and it was the lowest among students of TR ($\overline{X}$ = 2.27). Among the three analysed groups the highest range of mobility of the above mentioned segment of the spine, however limited, was presented by students of PE ($\overline{X}$ = 2.78), amidst whom only half had its complete range (Tables 2 and 3).

Tab. 2. Characteristic values of the spine mobility in the saggital plane

GROUP	TEST	UNIT	AVERAGE	±S	MIN/MAX	U-Mann-Whitney		
						PE	TR	UG
PE (n = 45)	OTTO and WURM	cm	2.78	1.07	0.5÷5		#	
	SCHOBER	cm	5.37	0.68	3.5÷7			
	FSF	%	23.93	3.3	17.14÷30.76		*	
TR (n =45)	OTTO and WURM	cm	2.27	0.99	0.5÷5			
	SCHOBER	cm	5.63	0.82	4.5÷7.5			*
	FSF	%	22.55	4.11	11.57÷31.81			*
UG (n = 45)	OTTO and WURM	cm	2.76	1.23	0÷5.5			
	SCHOBER	cm	5.21	0.74	3.5÷7.5			
	FSF	%	23.35	3.67	14.47÷32			

*p ≤ 0.05: * for average values above the physiological norm, # for average values beneath the physiological norm*

Tab. 3. Mobility of the spine in the saggital plane

GROUP	TEST	Norm		Beneath the norm	
		n	%	n	%
PE	OTTO and WURM	25	55.50	20	44.50
	SCHOBER	41	91.11	4	8.88
	FSF	44	97.77	1	2.22
TR	OTTO and WURM	14	31.11	31	68.88
	SCHOBER	45	100.0	0	0.00
	FSF	37	82.22	8	17.77
UG	OTTO and WURM	22	48.88	23	51.11
	SCHOBER	41	91.11	4	8.88
	FSF	40	88.88	5	11.11

The comparison of the study results of the thoracic-lumbar spine mobility in the transverse plane (Pavelek's first test) and the lumbar spine (Pavelek's second test) among young men is presented in Tables 4 and 5. The range of mobility in the case of the spine turn in both directions did not differ in a statistically significant way between the range of mobility to the right and to the left side.

In the case of the transverse plane, students of all groups demonstrated a complete or even higher range of mobility of the thoracic-lumbar spine than it was expected according to the physiological norms ($\overline{X}$ > 7.0). Nonetheless, students from TR Faculty presented the highest range of mobility. About 1/3 of the students from PE Faculty and UG demonstrated mobility beneath the norm, which means that it was limited.

The range of the turning movement of the lumbar segment of the spine in the transverse plane for individual groups of students was lower than normal ($\overline{X}$ < 6.0) and the lowest amidst the students of TR. The analysis of average values that characterise limited mobility of the above mentioned segments of the spine indicated that there exist statistically significant differences between students of TR and students of PE and also between students of TR and UG (Table 4).

Tab. 4. Characteristic values of the spine mobility in the transverse plane

GROUP	PAVELEK'S TESTS	AVERAGE (cm)	±S	MIN/MAX	U-Mann-Whitney		
					PE	TR	UG
PE (n=45)	sst – L5 to the right	7.89	2.17	4 ÷ 12.5			
	sst – L5 to the left	7.68	1.69	4.5 ÷ 10.5			
	xi – L5 to the right	5.53	1.38	3 ÷ 9.5		#	
	xi – L5 to the left	5.41	1.37	3.5 ÷ 8		#	
TR (n=45)	sst – L5 to the right	8.1	2.14	3 ÷ 13.5			
	sst – L5 to the left	8.21	2.07	2 ÷ 12.5			
	xi – L5 to the right	4.53	1.28	2 ÷ 7			#
	xi – L5 to the left	4.77	1.31	2.5 ÷ 8			#
UG (n=45)	sst – L5 to the right	7.5	1.88	4 ÷ 12			
	sst – L5 to the left	7.54	2.35	3 ÷ 13.5			
	xi – L5 to the right	5.42	1.42	2 ÷ 8			
	xi – L5 to the left	5.53	1.52	3 ÷ 10			

$p \leq 0.05$: # for average values beneath the physiological norm

Tab. 5. Mobility of the spine in the transverse plane

GROUP	PAVELEK'S TESTS	Norm		Beneath the norm	
		n	%	n	%
PE	sst – L5 to the right	33	73.3	12	26.7
	sst – L5 to the left	31	68.8	14	31.2
	xi – L5 to the right	18	40.0	27	60.0
	xi – L5 to the left	12	26.6	33	73.4
TR	sst – L5 to the right	35	87.5	10	22.5
	sst – L5 to the left	36	80.0	9	20.0
	xi – L5 to the right	10	22.5	35	87.5
	xi – L5 to the left	14	31.2	31	68.8
UG	sst – L5 to the right	28	62.2	17	37.8
	sst – L5 to the left	30	66.6	15	33.4
	xi – L5 to the right	22	48.8	23	51.2
	xi – L5 to the left	22	48.8	23	51.2

Discussion

In the research on the thoracic-lumbar segment of the spine mobility among young men, the tests that examine the range of joints movement in two planes, i.e. the saggital and the transverse ones, were used. This allows avoiding overgeneralization that would appear if it was based on the results of only one test, a situation that can be observed *inter alia* in the tests that evaluate the level of physical fitness [21]. Moreover, the applied tests allow determining unambiguously the range of mobility of joints in the thoracic-lumbar segment of the spine and separately in its individual segments – the thoracic and the lumbar ones. The above mentioned tests allow eliminating simultaneous participation of other joints (e.g. the hip joint) and eliminating associated movements of some body elements during the turn of torso to the right and to the left side thanks to the applied stabilization of the pelvis (sitting astride on a stool) [14, 16, 18]. The conducted measurements of mobility have multi-direction clinical applications and they are especially useful during the process of control of the results of improvement of the spine's motor skills and the correction of its defects [5, 8, 14, 16, 18, 19]; they are also used as a tool during physical education and sports classes [1, 3].

Such obtained results indicated that young men, divided into three groups differing in the current commitment to physical activity, were characterised with a partial, i.e. limited, range of mobility of the thoracic segment of the spine in the saggital plane during bend forwards (Otto and

Wurm's test) and of the lumbar segment of the spine in the transverse plane during a turning movement of the torso (Pavelek's second test). The range of mobility was evaluated with the usage of other tests (FSF, Schober's test, Pavelek's first test) and it proved to be complete, i.e. not limited. Moreover, the obtained values were in accordance with the physiological norms for adult people. The above mentioned results confirm the fact that the thoracic-lumbar segment of the spine comprises a chain of joints in which individual elements participate unequally in the spine movements and they have different movement potential in the saggital and the transverse plane. Different functions of individual spine segments in the above mentioned planes of movement are mainly caused by the structure of vertebrae and in relation to the thoracic spine additionally by its participation in the structure of the rib cage [7, 8].

The range of mobility of the thoracic-lumbar segment of the spine among young men from the analysed groups was comparable in the saggital and the transverse plane. Physical exercises realised by students in weekly cycles did not contribute to a higher variety of the range of the spine mobility among the students of PE and TR Faculty and from UG. The higher number of obligatory physical exercises that were realised in 45-minutes didactic units by the students of PE included also the exercises stimulating the spine's flexibility; however, they did not show any evident influence on the mobility of the analysed spine segment. The obtained results do not completely confirm the assumption of this work that physical exercises of the students from PE Faculty, whose characteristic feature is a higher frequency and longer duration in particular semesters in comparison to the exercises of the students from the other two faculties, can considerably increase flexibility of the ligamentous-muscular apparatus and thus the mobility of the spine. It should be emphasised that the highest, complete, i.e. normal range of mobility of the thoracic-lumbar segment of the spine in the saggital plane during bend forwards (FSF) among the students of PE Faculty was a partial confirmation of the authenticity of the above mentioned assumption. Nonetheless, it differs in a statistically significant way only in comparison with the students of TR ($p \leq 0.05$).

This can be a confirmation of the observations by Ślężyński [6], Ślężyński and Żedzicki [22], Chodemicka et al. [23] and previous research by Gilewicz [24] that strength exercises can partly limit joints mobility. In individuals with a better shaped muscular apparatus, and the students of PE Faculty should undoubtedly be classified to this group by reason of the symphysis of joints articular, which can be a factor that indicates lower spine flexibility, similarly as in the case of weight-lifters in the research by Ślężyński [6], massive musculature limited their mobility. To practice weight lifting, the spine must have suitable strength and solid back muscles. Massive abdomen muscles with comparable attachments, as Chodemicka et al. suggest, will limit the movement during the bend of the torso forwards. It is a confirmation of earlier research by Wright [25], Hayward [4] and the emphasis that mobility of the spine is not only dependent on the geometry and structure of its individual joints but also on potential tension as well as on elasticity of ligaments, tendons and muscles engaged in the chosen movement.

The area of focus should also be stated among the students of TR Faculty in comparison to the students of the two other groups (PE and UG), among whom the highest range of the lumbar spine mobility (Schober's test) and the lowest one of the thoracic segment (Otto and Wurm's test) was observed, which as a result presents complete flexibility of the whole thoracic-lumbar spine (FSF) in the saggital plane, whereas in the transverse plane the highest range of mobility during turning movements of the thoracic-lumbar segment, and the lowest one in the lumbar segment. The observed differences were statistically significant. A comparative analysis conducted among other groups of students disclosed a similar situation to the case of men from TR Faculty, even though the differences were statistically insignificant. It was stated that the complete, i.e. not limited, range of mobility of the thoracic-lumbar segment of the spine in the saggital plane during bend forwards consists of an increased range of mobility of the lumbar segment and an incomplete, i.e. limited, range of the thoracic segment's movements. On the other hand, in the transverse plane when the range of the thoracic-lumbar segment of the spine during a turn is complete (to the right and to the left), a limitation in the range of mobility during turning movements of the lumbar segment co-occur. The obtained results confirm the information of other authors [7, 8, 9, 16, 19, 21, 27] about the property of the spine as a movement apparatus that is the chain of functions of its separate segments. Hence, the ability of spine joints to move fluently in the whole range of mobility, as Borms and VanRoy suggest [21], reflects the kinematic potential of a joint and presents the properties of muscles and the connective tissue protecting joints that can be stretched in the frames of their structural limitations. High spine mobility is observed among competitors in various sports disciplines, particularly among gymnasts, dancers and circus acrobats [7, 26], who not only have proper morpho-structural predispositions of their organisms, but also undergo specialised training from a very young age. Its main assumption is to achieve active and passive lengthening and increasing elasticity of joint capsules, ligaments and muscles.

The results of measurements of the spine mobility conducted during own research confirm that higher flexibility is not necessarily a characteristic feature of people with a higher level of physical fitness, because as, among others, Szopa et al. [3] and Osiński [1] suggest, it can be treated as a specific property not directly connected with motoric features. Its testing, besides the evaluation of physical fitness connected with the circulatory-respiratory system, as Drabik [10] emphasises, informs about the general and preliminary level of organism's functioning in its dynamic state. That is why during the last few years flexibility has been recognised as an essential element of physical fitness and represents a important component among fitness meters that condition an individual's health and autonomy [11, 28].

In the obtained results of mobility of the thoracic-lumbar spine in the saggital and the transverse planes among young men in three groups that differ in the current commitment to physical activity, it is not possible to omit the health aspect. Physical activity is a fundamental element of healthy lifestyle. Physical activity systematically applied during the developmental stage, as Mleczko suggests [3] in relation to the research of effort physiologists, in the middle age can contribute to the improvement of organism's adaptive skills that condition its occupational activities and environment.

Accurate spine mobility is particularly important in maintenance of proper body posture, for everyday activity and independence until old age [8, 21, 25]. The anomalies of flexibility are an essential element of various dysfunctions and disorders of the spine. It can be quoted after Świderski [9] that "the limitation of flexibility is the first symptom of illness occurring before distinct discomfort or static failure of the spine". On the basis of own research among young men, it was stated that the absence of a fluent range of movement of individual spine's segments, namely of the thoracic spine in the range of bend forwards (Otto and Wurm's test) and its lumbar segment in the range of turning to the right and to the left direction (Pavelek's second test), should not be treated marginally as it represents, as doctors, physiotherapists and physical education teachers emphasise [4, 8, 5 , 6, 9, 14, 19, 26], the first symptom of the absence of complete functional efficiency of the spine that results in its pain and also in disorders of body posture. This can justify an opinion citied by Heyward [8] that physical exercises increase the level of joints mobility.

Conslusions

To sum up, it should be emphasised that young men – students of PE, TR and UG – showed accurate mobility of the thoracic-lumbar segment of the spine in the saggital and the transverse plane of the body, and proper mobility of the lumbar segment in the saggital plane.

Flexibility of the thoracic-lumbar segment of the spine in the saggital plane was the highest among students of PE Faculty, and its average value differs in a statistically significant way only in comparison with students of TR Faculty. In the above mentioned plane of movement the authors also found statistically significant differences in the range of mobility of the thoracic-lumbar and the lumbar segment of the spine among students of PE and TR Faculties.

The students of PE and TR Faculties and from UG demonstrated limited mobility of the thoracic segment of the spine in the saggital plane and of the lumbar segment in the transverse plane.

The students of TR Faculty in comparison to the students from other groups obtained the highest average value of the lumbar segment and the lowest one of the thoracic segment in the saggital plane, and the highest average value of turning movements of the thoracic-lumbar segment and the lowest one of the lumbar segment in the transverse plane. The observed differences were statistically significant.

The results of the study revealed that increased frequency of physical exercises and their longer duration among students of PE Faculty in comparison to the exercises of students from TR Faculty and UG did not have a significantly essential influence on the range of their spines mobility, despite the range of bend forwards of the thoracic-lumbar segment of the spine in the saggital plane.

The results of the study allow drawing the following conclusions:

1. Mobility of the thoracic-lumbar segment of the spine observed among young men divided into 3 groups differing in the current commitment to physical activity presented features of peculiar and non-homogenous mobility, as fluent bend of the torso forwards in the saggital plane in the whole range of mobility resulted from an increased range of the lumbar segment mobility with a simultaneously limited range of the thoracic spine move. However, in the transverse plane the fluent movement in the whole range of the torso turning to the right and to the left was possible thanks to the participation of the thoracic-lumbar spine with simultaneously limited mobility of turning in the lumbar segment.
2. The tests applied in the present study investigating the range of mobility of the thoracic-lumbar segment of the spine are diagnostic, even though they are included in the set of indirect methods. They allow describing the range of mobility of the thoracic-lumbar segment of the spine and the participation of its individual segments – the thoracic segment and the lumbar one in two planes of movement. The above mentioned tests, broadened among others with an evaluation of the range of the spine mobility during bend to the side, i.e. in the coronal plane, can be useful during the study of issues concerning the ontogenetic changeability of the range of the spine mobility that as of yet has been weekly understood.
3. Such investigated mobility of the thoracic-lumbar segment of the spine allows evaluating the mobility of its individual segments, which are anatomical and functional units, in two planes, which has a high practical application in diagnostic-therapeutic activities, among others in the prophylaxis and correction of posture defects.

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