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OFICJALNE PISMO POLSKIEGO TOWARZYSTWA FIZJOTERAPII

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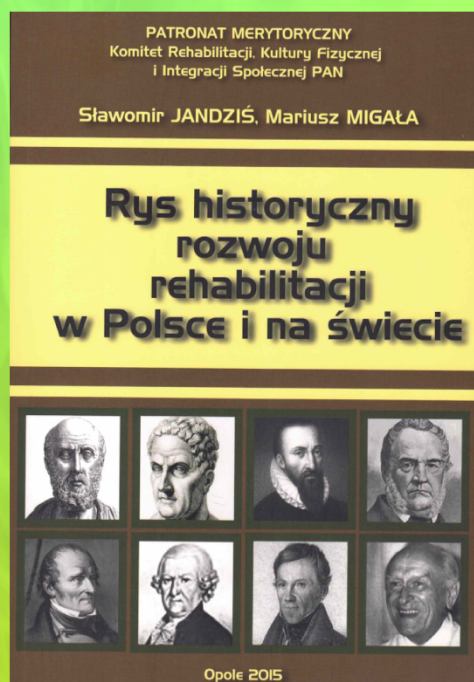


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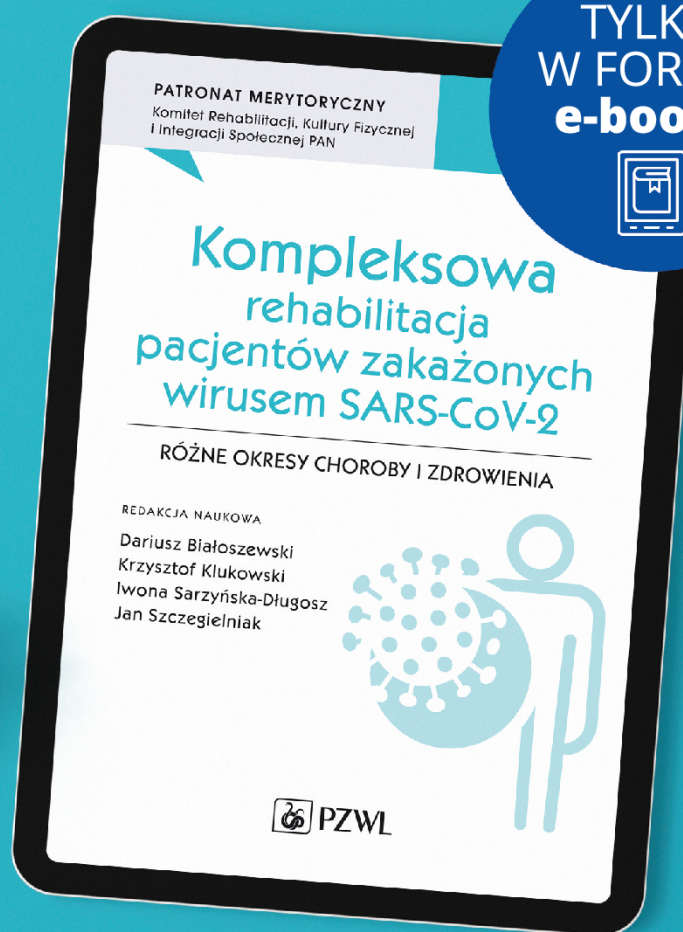
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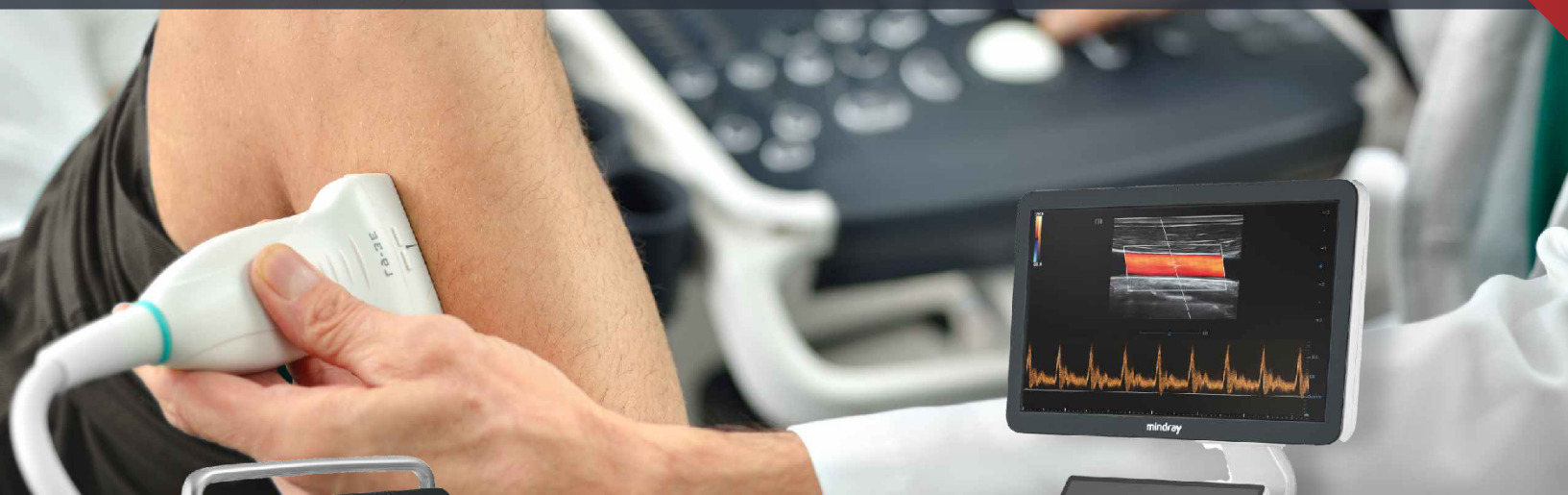


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18 March 2023 - 30 May 2023	1 June 2023 - 20 July 2023	1 - 20 July 2023	20 July 2023 - 2 August 2023	27 July 2023 - 2 August 2023	5 August 2023	September - December 2023
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26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego

11-13 maja 2023, Wisła, Hotel STOK

www.rehabilitacja2023ptk.pl



Rehabilitacja kardiologiczna i fizjologia wysiłku – zapraszamy do rejestracji na wyjątkową konferencję w Wiśle

W dniach 11–13 maja w Hotelu Stok Wiśle odbędzie się wyjątkowe i interdyscyplinarne spotkanie specjalistów z całej Polski – 26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego. Serdecznie zapraszamy do rejestracji.

26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego to coroczne spotkanie specjalistów, zajmujących się rehabilitacją kardiologiczną, prewencją chorób układu krążenia i innymi formami aktywności fizycznej, która ma prowadzić do poprawy stanu naszego zdrowia.

Ta trzydniowa konferencja przeznaczona jest dla lekarzy kardiologów, specjalistów rehabilitacji medycznej oraz innych specjalności, którzy w swojej codziennej praktyce zajmują się rehabilitacją i fizjologią wysiłku, ale także dla fizjoterapeutów, pielęgniarek, techników i przedstawicieli innych zawodów medycznych, zainteresowanych tematyką spotkania, oraz studentów.

Jakie tematy zostaną poruszone podczas konferencji?

26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku to konferencja, na którą zaproszeni zostali wybitni specjaliści z dziedziny kardiologii i nie tylko. Podczas wydarzenia wygłoszonych zostanie prawie 100 wykładów merytorycznych w ciągu aż 20 sesji. Uczestnicy będą mieli również szansę na udział w sesjach przypadków klinicznych, intensywnych warsztatach, a także panelach dyskusyjnych. To wydarzenie cechujące się dużą interdyscyplinarnością, dlatego z pewnością każdy znajdzie coś dla siebie.

Podczas wydarzenia kompleksowo pochylimy się nad dziedziną rehabilitacji kardiologicznej i fizjologii wysiłku. Wśród tematów wiodących znajdują się:

- rehabilitacja w dobie pandemii i po pandemii COVID-19;
- telerehabilitacja i rehabilitacja hybrydowa;
- rehabilitacja kardiologiczna w specyficznych grupach pacjentów;
- programy KOS-zawał i KONS;
- nowe standardy ESC, PTK i SRKiFW;
- Testy wysiłkowe i testy spiroergometryczne
- monitorowanie wysiłku fizycznego;
- prewencja pierwotna i wtórna chorób sercowo-naczyniowych;
- farmakoterapia pacjentów rehabilitowanych kardiologicznie i nie tylko;
- sport i aktywność sportowa w kardiologii;
- czynniki ryzyka chorób układu krążenia.

Program merytoryczny wydarzenia jest niezwykle bogaty i angażujący. Warto podkreślić także, iż na konferencji pojawią się specjalne sesje wykładów prowadzone przez zaproszone sekcje i ассоjacje Polskiego Towarzystwa Kardiologicznego, m.in. Sekcję Kardiologii Sportowej, Asocjacje Niewydolności Serca, Asocjacje Elektrokardiologii Nieinwazyjnej i Telemedycyny, Sekcję Pielęgniarstwa Kardiologicznego i Pokrewnych Zawodów Medycznych, „Klub 30”, Sekcję Farmakoterapii Sercowo-Naczyniowej, Sekcję Prewencji i Epidemiologii, a także Polskie Towarzystwo Medycyny Sportowej.

„Pandemia wymusiła na nas zmianę paradygmatu rehabilitacji kardiologicznej”

Organizatorami wydarzenia są wydawnictwo naukowe Evereth Publishing oraz Sekcja Rehabilitacji Kardiologicznej i Fizjologii Wysiłku Polskiego Towarzystwa Kardiologicznego (SRKiFW). Przewodniczącą Komitetu Naukowego jest prof. dr hab. n. med. Małgorzata Kurpesa, Wiceprzewodniczącymi – prof. dr hab. n. med. Anna Jagier, dr hab. n. med. Dominika Szalewska, a Komitetu Organizacyjnego – dr n. med. Bartosz Szafran.

Dr n. med. Agnieszka Mawlichanów, Przewodnicząca SRKiFW, podkreśla, iż ostatnie Sympozjum miało miejsce w 2019 r. w Wiśle. W tym czasie udało się zorganizować wydarzenie w formule online, jednak zdaniem Przewodniczącej obecnie „wszyscy spragnieni jesteśmy spotkania osobistego, wymiany doświadczeń i bezpośrednich rozmów, nie tylko na sali wykładowej, ale i w kulisach”.

– Cztery lata w sporcie to pełna olimpiada, a w naszej dziedzinie kardiologii można powiedzieć – cała wieczność. Pandemia wymusiła na nas zmianę paradygmatu rehabilitacji kardiologicznej, między innymi stworzyła pole dla rozwoju modelu hybrydowego i monitorowanego telemedycznie. W tym czasie ukazało się wiele ważnych dokumentów, stworzonych przez polskie i europejskie towarzystwa kardiologiczne, dotyczące rehabilitacji, prewencji i aktywności fizycznej. Dynamicznie w naszym kraju rozwija się też program KOS-zawał, przynoszący liczne korzyści, ale też budzący kontrowersje. O tym wszystkim i jeszcze wielu innych sprawach pragniemy podyskutować w czasie naszego majowego spotkania – zapowiedziała dr Mawlichanów.

Rejestracja na 26. Sympozjum Sekcji Rehabilitacji Kardiologicznej i Fizjologii Wysiłku możliwa jest na stronie internetowej konferencji rehabilitacja2023ptk.pl/rejestracja/. Informacje na temat opłatyjazdowej i wydarzeń towarzyszących znajdują się tutaj: rehabilitacja2023ptk.pl/oplata-konferencyjna/.

Informujemy jednocześnie, iż liczba miejsc na konferencji jest ograniczona, dlatego warto zarejestrować się już dzisiaj.

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Assessment of the body posture of junior high school students in the context of their physical activity

Ocena postawy ciała gimnazjalistów w kontekście ich aktywności fizycznej

**Marta Gołdyn-Pastuszka^{1(A,B,C,D)}, Marzena Dorosz^{1(B,F)}, Anna Szczegielniak^{3(C,E)},
Katarzyna Bogacz^{1,2(B,D,E)}, Jacek Łuniewski^{2(C,F)}, Jan Szczegielniak^{1,2(A,D,E)}**

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Abstract

Introduction. Posture defects constitute a social problem and can cause negative changes in many aspects of our lives – in both physical and mental health. Prophylaxis and an appropriate degree of physical activity, which affects harmonious development, are very important here. **Objective.** The objective of the study was to assess the body posture of junior high school students and to determine the degree of their physical activity, and then to check whether there is a correlation between them. **The study group** consisted of 53 people from a junior high school in Wrocław, aged 14 to 17. **Material and methods.** To assess physical activity, the International Physical Activity Questionnaire (IPAQ) was used, which contains 7 questions regarding activity in the last 7 days. Body posture in the sagittal plane was examined using photogrammetry, and typology classification was based on Wolański's method modified according to Zeyland-Malawka. **Results.** The results of the study were subjected to a statistical analysis, which shows that the studied group of adolescents is mostly characterized by a kyphotic type of body posture, while the least common is the balanced type. The level of physical activity of the study group can be described as sufficient, but it is worth noting that only 6% of the respondents are characterized by an insufficient level of physical activity, and only 7.5% are characterized by a high level of physical activity. **Conclusions.** In further analyses, it was examined whether there is a correlation between body posture and physical activity. It was found that there are no statistically significant differences between these two features in the study group.

Key words:

posture defects, body posture, physical activity, junior high school students

Streszczenie

Wstęp. Wady postawy są problemem społecznym i mogą powodować negatywne zmiany w wielu aspektach naszego życia – zarówno zdrowia fizycznego, jak i psychicznego. Bardzo istotna jest tutaj profilaktyka i odpowiedni stopień aktywności ruchowej, która wpływa na harmonijny rozwój człowieka. **Cel pracy.** Celem pracy była ocena postawy ciała gimnazjalistów oraz poznanie stopnia ich aktywności fizycznej, a następnie sprawdzenie, czy występuje korelacja pomiędzy nimi. **Grupę badawczą** stanowiły 53 osoby z wrocławskiego gimnazjum w wieku od 14 do 17 lat. **Materiał i metody.** Do oceny aktywności ruchowej użyty został Międzynarodowy Kwestionariusz Aktywności Fizycznej (IPAQ), który zawiera 7 pytań dotyczących czynności w ciągu ostatnich 7 dni. Postawę ciała w płaszczyźnie strzałkowej zbadano za pomocą metody fotogrametrii, a klasyfikację typologii dokonano na podstawie zmodyfikowanej metody Wolańskiego według Zayland-Malawki. **Wyniki.** Wyniki badań zostały poddane analizie statystycznej, z której wynika, że badana grupa młodzieży charakteryzuje się kifotycznym typem postawy ciała, natomiast najrzadziej spotykanym jest typ równoważny. Poziom aktywności fizycznej badanej grupy można określić jako wystarczający, jednak warto zauważyć, że tylko 6% mniej badanych charakteryzuje się niewystarczającym poziomem aktywności fizycznej, a jedynie u 7,5% stwierdzono wysoki poziom aktywności. **Wnioski.** Dokonując dalszej analizy zbadano, czy występuje korelacja pomiędzy postawą ciała a aktywnością fizyczną. Stwierdzono, że nie istnieją istotnie statystycznie różnice pomiędzy tymi dwoma cechami w badanej grupie.

Słowa kluczowe:

wady postawy, postawa ciała, aktywność fizyczna, młodzież

Introduction

The term “body posture” means the free shaping of our figure in a standing, upright position, i.e. position we assume every day. When we talk about correct posture, we mean symmetry in both the frontal and sagittal planes, and the naturally shaped curves of the spine. The position of the head is important here, i.e. it should be above the chest, hips and feet. Body posture is the most unstable human feature. It can be said that there is no balance here, but rather a “constant struggle” to maintain balance [1].

Among young people, interests and forms of spending free time are shaped primarily by school through physical education classes. They develop personality and teach them to take care of their health. Physical activity increases fitness, stamina, strength and resistance of a young body. It also has a positive effect on mental development. It increases composure, improves well-being, sleep quality and short-term memory. The acquisition and consolidation of positive behaviours is reflected in the later stages of life [2, 3].

Objective

The objective of the study was to assess body posture in the sagittal plane of junior high school students using a non-invasive diagnostic technique and to determine the degree of pro-health behaviours in the study group. In addition, the objective of the study was to examine the correlation between body posture and the level of intensity of physical activity of students from a junior high school in Wrocław. The research was designed to answer the following research questions:

1. What is the body posture of the junior high school students participating in the study?
2. What is the level of physical activity of the junior high school students participating in the study?
3. Is there a correlation between body posture and physical activity in the study groups?

Material and methods

The study covered a total of 53 people (33 girls, 20 boys) aged 14 to 17 – average age: 14.9 ± 0.7 (Fig. 1). They were students at Junior High School No. 39 in Wrocław. All respondents provided written consent from their legal guardian to participate in the study - both before the body posture examination and before completing the questionnaire.

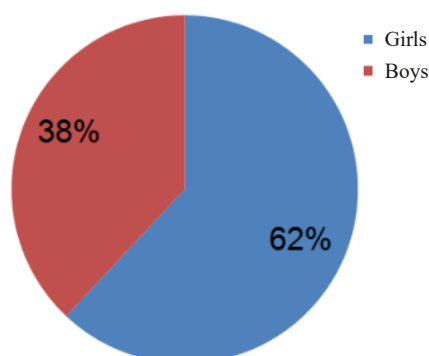


Fig. 1. Percentage characteristics of the study group

The short version of the International Physical Activity Questionnaire (IPAQ) was used to measure physical activity. Information was collected on the time spent sitting, walking and the time spent on physical activity – both moderate and intense – in the last 7 days. The questionnaire contained 7 questions concerning activities performed at school, at home, in free time, and while moving from place to place. Only physical activity that lasted at least 10 minutes (without a break) was taken into account. Intensity coefficients corresponding to multiples of the metabolic equivalent of task (MET) ratio were used to assess individual types of physical activity (Table 1).

Tab. 1. The value of the MET ratio for each type of physical activity

Type of physical activity	MET ratio value
Walking	3.3
Moderate activity (including work at home)	4.0
Intense activity (including work around the house)	8.0

Body posture in the sagittal plane was assessed using non-invasive photogrammetry with the projection moiré phenomenon. The measuring station consisted of: a computer with software, a monitor, a printer and a projection-receiving device with a camera. The examination took place in a school room that was specially prepared for this purpose. Before starting the measurements, selected bone points were marked on the respondent's body: spinous processes of the vertebrae from C7 to S1, acromion processes of the shoulder blades, inferior angles of the shoulder blades, peak of thoracic kyphosis, peak of lumbar lordosis, and posterior superior iliac spines.

The following parameters were further analysed (Fig.2):

- ALFA angle (α),
- BETA angle (β),
- GAMMA angle (γ),
- compensation index (μ)
- thoracic kyphosis angle (TKA),
- thoracic kyphosis depth (TKD),
- lumbar lordosis angle (LLA).
- lumbar lordosis depth (LLD).

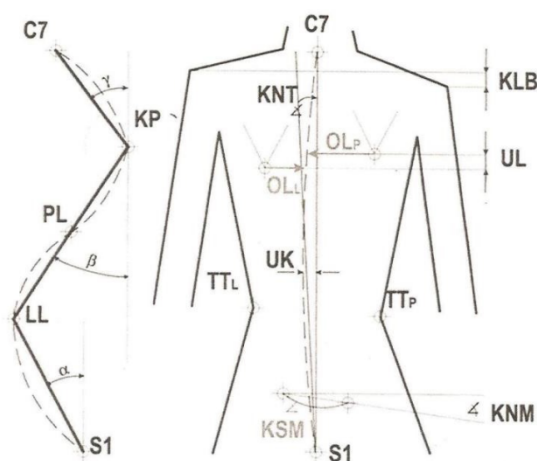


Fig. 2. Parameters necessary to analyse the results

Body posture was classified and assessed on the basis of Wolański's method modified according to Zeyland-Malawka [26]. The angular value of thoracic kyphosis was calculated according to the formula:

$$\chi = \alpha + \beta,$$

and the angular value of the lumbar lordosis:

$$\lambda = \beta + \gamma.$$

Compensation index (μ) was determined on the basis of the difference between lumbar lordosis (λ) and thoracic kyphosis (χ):

$$\mu = \chi - \lambda.$$

On the basis of the compensation index (μ), the respondents were assigned to particular posture types:

- kyphotic (K),
- balanced (R),
- lordotic (L).

Particular posture subtypes (I, II, III) were determined taking into account the size of thoracic kyphosis (χ) for kyphotic postures, the sum of the angles of inclination of the spine (σ) in the upper thoracic (α), thoracolumbar (β) and lumbosacral sections (γ) for balanced postures and the value of lumbar lordosis (λ) for lordotic postures.

The classification is as follows:

1. Kyphotic postures, if $\mu > 3^\circ$:

- type K I, if $\chi < 29^\circ$;
- K II, if $29^\circ \leq \chi \leq 31^\circ$ or $\alpha > 15^\circ$;
- K III, if $\chi > 31^\circ$.

2. Balanced postures, if $(-3^\circ) \leq \mu \leq 3^\circ$:

- type R I, if $\sigma < 33^\circ$;
- R II, if $33^\circ \leq \sigma \leq 41^\circ$;
- R III, if $\sigma > 41^\circ$.

3. Lordotic postures, if $\mu < (-3^\circ)$:

- type L I, if $\lambda < 25^\circ$;
- L II, if $25^\circ \leq \lambda \leq 29^\circ$ or $\gamma > 16^\circ$;
- L III, if $\gamma > 29^\circ$.

Taking into account Wolański's criteria, in the Zeyland-Malawka modification, body posture was classified into four groups:

- very good posture – subtype: RI,
- good posture – subtypes: KI, RII, LI,
- defective posture – subtypes: KII, LII,
- bad posture – subtype KIII, RIII, LIII [26].

Results

The anteroposterior curvatures of the spine were analysed, and the frequency of occurrence of particular types and subtypes of body posture was assessed. The degree of physical activity of the study group was also checked. All data was collected in an Excel spreadsheet and then subjected to a statistical analysis using the STATISTICA program. A statistically significant level is considered to be $p \leq 0.05$.

Tab. 2. Statistical characteristics of the angular parameters of the size of the anterior-posterior curvatures of the spine taking gender into account

Feature [°]	Mean G	Mean B	t	df	p	N G	N B	SD G	SD B
ALFA	13.49	16.49	-1.67	51	0.100	33	20	6.7	5.63
BETA	10.52	10.29	0.21	51	0.831	33	20	4.06	3.17
GAMMA	14.59	14.76	-0.16	51	0.871	33	20	3.56	3.51
TKA	155.62	154.95	0.39	51	0.697	33	20	7.07	3.87
LLA	156	153.23	1.2	51	0.235	33	20	8.48	7.51

Legend:

G – girls, B – boys, t – t-Student test result, df – degrees of freedom, p – level of significance, N – number of respondents, SD – standard deviation, TKA – thoracic kyphosis angle, LLA – lumbar lordosis angle.

Tab. 3. Statistical characteristics of the linear parameters of the size of the anterior-posterior curvatures of the spine taking gender into account

Feature [mm]	Mean G	Mean B	t	df	p	N G	N B	SD G	SD B
LLD	18.42	19.36	-0.33	51	0.739	33	20	10.86	7.99
TDK	14.40	13.92	0.25	51	0.804	33	20	7.50	5.41

Legend:

LLD – lumbar lordosis depth, TKD – thoracic kyphosis depth, G – girls, B – boys, t – t-Student test result, df – degrees of freedom, p – level of significance, N – number of respondents, SD – standard deviation

The conducted statistical analysis of both linear and angular parameters (Table 2 and Table 3) allowed us to observe how the individual values developed in both girls and boys. It was noticed that the angle ALPHA is slightly larger in boys, while KKL has a higher value in girls. The other angular parameters are similar. Among the linear parameters, boys had a higher LLD value, while girls had a higher TKD value. No statistically significant differences were observed among the given parameters.

In the course of further analyses, the respondents were classified into individual types of body posture. For this purpose, the compensation index (μ) was taken into account, while the classification into individual subtypes was carried out taking into account Wolański's criteria in the Zeyland-Malawka modification.

The above studies showed that the largest group consisted of young people with kyphotic posture (38%). Second in terms of percentage was lordotic posture (34%), while the smallest group had balanced posture – 28% (Fig. 3).

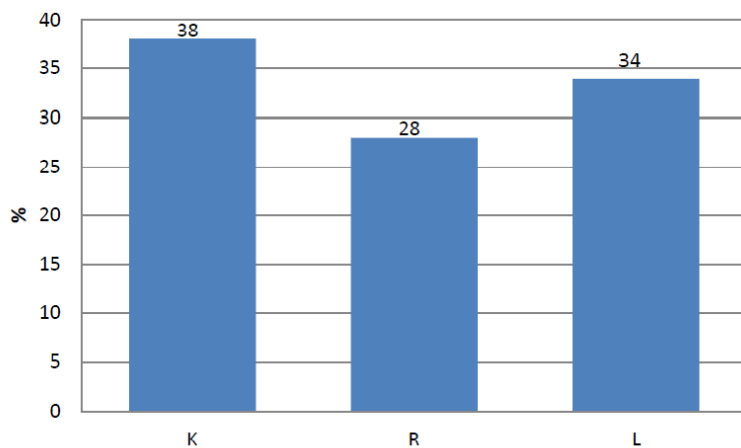


Fig. 3. Percentage characteristics of the respondents taking body posture type into account (K – kyphotic type, R – balanced type, L – lordotic type)

In the next stage, the percentage characterization of individual body posture types was carried out taking gender into account (Fig. 4). It was found that the majority of boys had a lordotic posture. The other two types (kyphotic and balanced) were represented by the same percentage (30%). In the group of girls, the majority had a kyphotic posture (42.2%), followed by a lordotic posture (30.3%), and the smallest group had a balanced posture (27.3%).

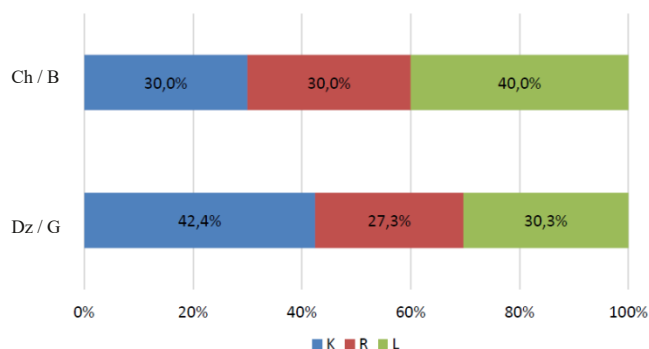


Fig. 4. Percentage characteristics of the occurrence of body posture types taking gender into account (B – boys, G – girls, K – kyphotic type, R – balanced type, L – lordotic type)

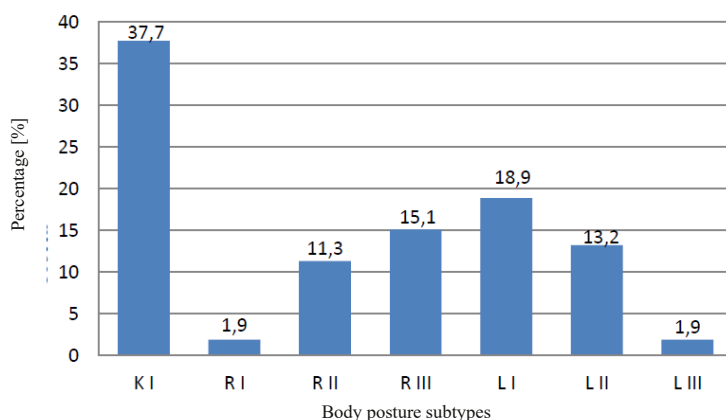


Fig. 5. The structure of the respondents according to the body posture subtypes after primary categorization

Based on the modification of Wolański's typology by Zeyland-Malawka, the respondents were assigned to individual body posture subtypes (Fig. 5). It was found that the largest group consisted of respondents with the kyphotic subtype (KI 37.7%), the second largest group consisted of respondents with the lordotic subtype (LI 18.9%), and the third – the balanced subtype (RIII 15.1%), while the lowest percentage included RI and LIII subtypes (1.9%), where 1.9% is one person. It was also noted that not all body posture subtypes were present in the study group – subtypes KII and KIII were not observed.

Qualification of body postures to specific types and subtypes made it possible to assign and divide the study group into four categories of body posture: very good, good, defective and bad. This division was made on the basis of the previously mentioned classification.

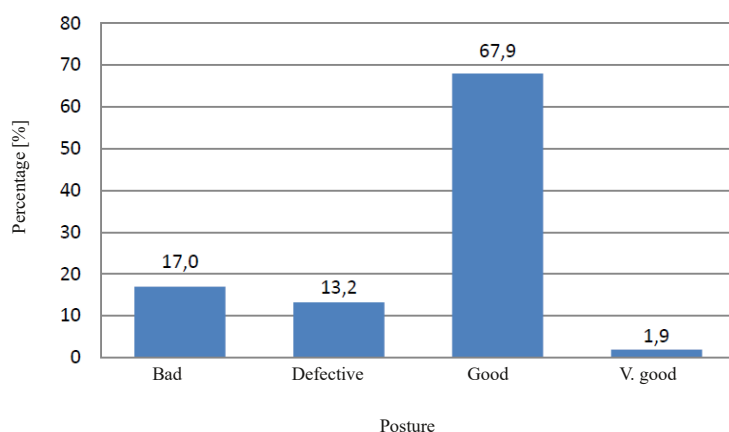


Fig. 6. The structure of the respondents in terms of body posture after secondary categorization

The chart above (Fig. 6) shows the percentage characteristics of the occurrence of individual body postures. It was noted that only one person (1.9%) had very good posture, while the most common body posture was good body posture (67.9%).

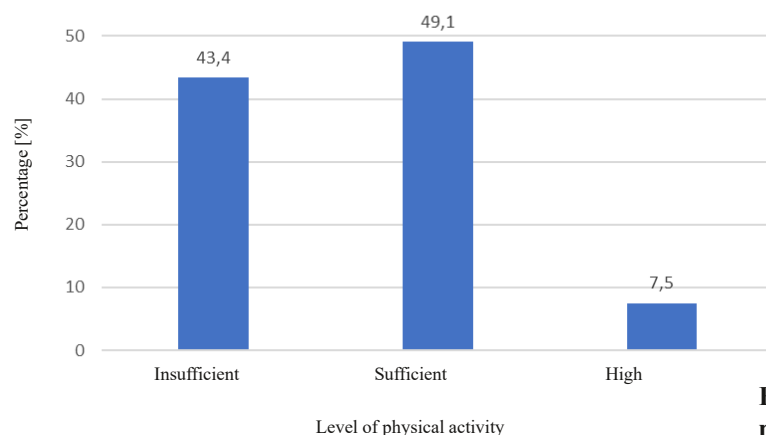


Fig. 7. Percentage characteristics of the occurrence of particular levels of physical activity

As a result of further analysis, based on the IPAQ questionnaire, the percentage characteristics of the study group in terms of the level of physical activity were made. It was found that 49% of young people were characterized by a sufficient level of activity, 43% by an insufficient level, and only 7.5% of the respondents were characterized by a high level of physical activity (Fig. 7).

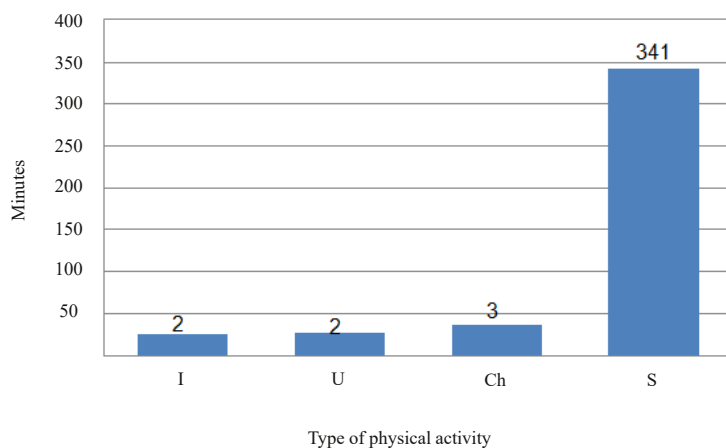


Fig. 8. Average occurrence of particular types of physical activity (I – intense physical activity, U – moderate physical activity, Ch – walking, S – sitting)

Analysing the average time spent on individual types of physical activity, it was noticed that the respondents spend more or less the same amount of time a day on intense and moderate physical activity. They spend significantly more time sitting, as much as 341 minutes a day (about 6 hours) (Fig. 8).

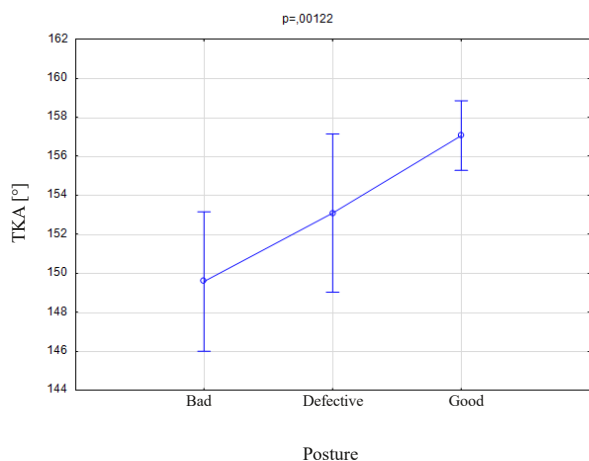


Fig. 9. Comparison of the parameter significantly differentiating TKA in individual types of posture

A greater angular value of thoracic kyphosis indicates a smaller thoracic curvature (180° TKA). The chart shows that the higher the value of this parameter, the better the posture type (Fig. 9).

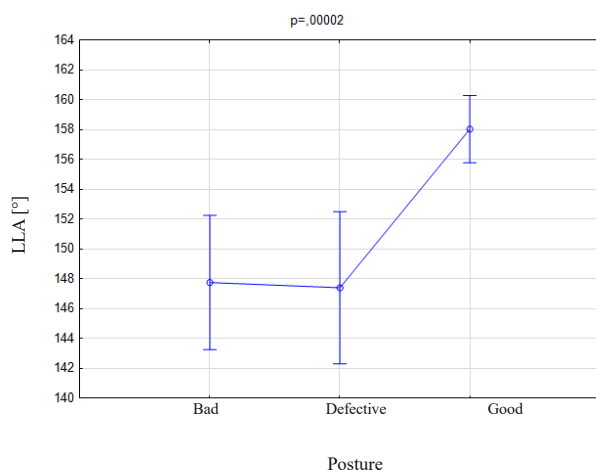


Fig. 10. Comparison of the parameter significantly differentiating LLA in individual types of body posture

A greater angular value of thoracic kyphosis indicates a smaller lumbar curvature (180° LLA). The chart shows that the higher the value of this parameter, the better the posture (Fig. 10).

Figures 9 and 10 show the mean values of the thoracic kyphosis angle (TKA) and the lumbar lordosis angle (LLA), and then they were compared to individual types of body posture. These parameters were found to be statistically significant, i.e. in 99% the model is statistically significant ($p < 0.005$). No statistically significant differences were observed among other parameters. After dividing the groups according to the level of physical activity, the presence of good, defective and bad body posture was re-analysed in the newly created groups.

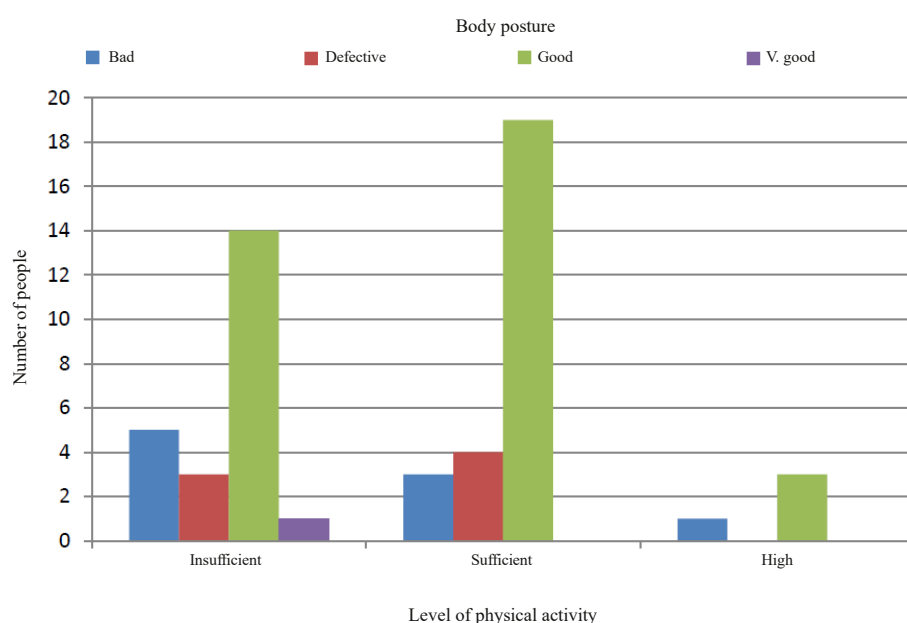


Fig. 11. The correlation between body posture and the degree of physical activity

Based on Fig. 11, it was noticed that the vast majority of people with good body posture have a sufficient level of physical activity. It was also noticed that among people with an insufficient level of physical activity there is the largest number of people with bad body posture. After conducting the Spearman's test, no correlation was observed between body posture and the level of physical activity – Spearman's $\rho = 0.06$ (Table 4).

Tab. 4. The correlation between body posture and physical activity

Spearman rank order correlation				
The determined correlation coefficients are significant from $p < 0.05$				
A pair of variables	N	R Spearman	t	p
Physical activity and body posture	53	0.057078	0.40829	0.684772

Discussion

In the era of computerization and sedentary lifestyle, the body is exposed to many negative factors that contribute to the formation of posture defects.

They are most often noticeable during the period of sudden growth, at a younger school age, when the child's lifestyle changes due to schooling. Studies conducted on young music school students showed that symmetrical and asymmetrical loads on the musculoskeletal system of beginner musicians increase the frequency of posture defects in the sagittal and frontal planes [4]. Body posture defects can cause changes in the functioning of the body, limit its mobility, but also affect mental well-being.

Some authors believe that the problem of body posture defects may affect up to 33% of school-age children. It was showed that they occur both in children living in urban and rural areas (5). Other studies show that the problem of body posture defects may affect 35% of Polish youth. Drzał-Grabiec et al. conducted research aimed at evaluating body posture in the sagittal plane. The study group included 159 children from the first three grades of a rural primary school. Body posture was assessed using photogrammetry with the projection moiré phenomenon. Studies showed that only 7% of children had defective posture and none had bad posture. The most common type of posture was the lordotic type (47%), the second was the kyphotic type (39%), and the least observed was the balanced type (15%). Upon further analysis, it was found that the dominant subtypes were kyphotic I and lordotic I [6]. Research conducted by Wilczyński in a group of 503 children aged 12–15 showed 297 (59.05%) correct postures and 206 (40.95%) defective postures [7]. Similar studies were conducted by Wojna et al., where body posture was assessed in the sagittal plane, and the obtained results were analysed according to Wolański's criteria modified by Zeyland-Malawka. The study group included 348 children aged 6–7 from public kindergartens and primary schools in Wrocław. Here the results were a bit different. A significant percentage of body posture defects in the sagittal plane was noted, mainly among 6-year-olds, where the dominant type of posture was the lordotic type [8]. In the studies conducted by Hagner et al., in which a point assessment of body posture was used, it was showed that among 10- and 13-year-old children there are no very good and bad postures, and almost 65% of children have incorrect posture [9].

With reference to the above results, the body posture of junior high school students was examined in the sagittal plane. It was assessed using photogrammetry based on the projection moiré phenomenon. Based on the conducted research, it was showed that the most common type of body posture among the respondents was the kyphotic type (38%), followed by the lordotic type (34%). Balanced posture was the least common (28%). Despite the use of the same research methods, our results differ from those obtained by Drzał-Grabiec and Wojna et al. They may result from the age differences of the studied groups. However,

looking at the frequency of occurrence of body posture types, in our research, good posture was observed in 68%, while bad posture was observed in 17% of the respondents. In the comparison of our results and those obtained by Hagner et al., discrepancies were noted, which may be caused by different research methods. Some authors tried to show differences between research methods in their works. Such a comparison between photogrammetry method and the inclinometer method was made in the study by Walicka-Cupryś et al. The authors showed that there is a statistically significant difference between the above-mentioned methods when examining individual sections of the spine. It was also found that the results obtained using these methods cannot be compared with each other [10]. In the study conducted by Andrzejewska and Grabarczyk, the assessment of anterior-posterior curvatures of the spine and the classification of body posture types, taking gender into account, was performed. The research covered 786 children from primary schools in Wrocław. A non-invasive, electronic Posturometer-S device was used for the examination, and the classification of anterior-posterior curvatures was made on the basis of Wolański's typology. In these studies, it was showed that the first kyphotic type (K I) was dominant in both genders, and the first lordotic type (L I) was least common. The third kyphotic type (K III) and the third lordotic type (L III) were not observed in the study group [11]. A similar study among 1,194 children aged 3 to 6 was conducted by Mikołajczyk et al., where a visual assessment of selected elements of body posture was carried out, taking into account Kasperczyk's methodology. As a result of the conducted research, it was found that in both genders a rounded back – the kyphotic type was most common [12].

In the study conducted by Barczyk-Pawelec et al., 112 female handball players aged 8 to 17 were examined. Body posture was assessed using photogrammetry, and then the body posture types were classified in the sagittal plane according to Wolański's methodology modified by Zeyland-Malawka. It was found that the study group is characterized by a kyphotic type of body posture, which may be due to the specificity of the training [13]. It was turned out that the most common subtype of body posture is the first kyphotic subtype (K I), similarly to the results obtained in the studies conducted by Andrzejewska and Grabarczyk. When comparing further results, discrepancies were noticed. In the studies conducted by Andrzejewska and Grabarczyk, the least common subtype is the first lordotic subtype (L I), which in our research was classified as the second most common subtype. However, attention was drawn to the fact that the third kyphotic subtype (K III) and the third lordotic subtype (L III) were not observed in both studies, which characterized only one person in our research. Despite the different research methods, it can be concluded that the above-mentioned results are similar. Taking gender into account in our research, it was noticed that among girls the most common type was the kyphotic type – similarly to the results obtained in the studies conducted by Barczyk-Pawelec, while the lordotic type was the most common type among boys. A difference was noticed between our research and research con-

ducted by Mikołajczyk, which may result from different research methods.

Physical activity is one of the basic elements of a healthy lifestyle. It is a source of vital and mental health - it allows us to maintain fitness and endurance and has a positive effect on our psyche. In the study conducted by Grabarczyk et al., a qualitative and quantitative assessment of the physical activity of junior high school students in Subcarpathia was performed. The study group included 199 third-grade students (101 boys and 98 girls). The research method was a questionnaire, which contained 37 questions and consisted of two parts. The prototype of this questionnaire was the International Physical Activity Questionnaire. It showed that 100% of respondents affirmatively answered the question: "Is physical activity beneficial for your health?". However, despite such knowledge, only 18% of the respondents engaged in the recommended level of physical activity [14]. A similar study was conducted by Świdorska-Kopacz [16]. Its aim was, among others, to assess health behaviours in the field of physical activity of junior high school students. The study showed that 43% of the respondents exercise intensively four times a week or more often, while 27% of the respondents did not exercise at all or only once a week. About 50% of the respondents spent their free time passively, sitting in front of the TV or computer. Only 64% of students, in comparison with the research conducted by Grzegorzczak, believed that the lack of physical activity has an adverse effect on health. Other studies showed that almost 20% of 346 respondents spend their free time sitting in front of a computer for more than 4 hours a day, and more than half of the respondents spend at least 2 hours in front of the TV [15]. Research conducted by Mandowska [17] shows that 14% of respondents rest passively and 50% engaged in physical exercise. Among high school students, 46% of the respondents devote to physical activity 1 to 2 hours a week, 26% – 3 to 4 hours, 13% – 5 hours a week, while 14% do not engage in any physical activity. Our research showed that in the study group of junior high school students, the average time spent sitting a day is 341 minutes (i.e. about 6 hours), although there were also people who admitted to sitting for as much as 660 minutes a day. They spent only 26 minutes a day on intense physical activity.

A sufficient degree of physical activity among the respondents was showed in the study by Wojtyła et al. His research was carried out using a questionnaire developed by the authors, but based on a survey recommended by the WHO. Despite a sufficient degree of physical activity, it should be noted that the main and often the only physical activity during the day are physical education classes (88%) and walking to school (61%). It is also worrying that more and more young people (as many as 60%) spend their free time every day or almost every day sitting in front of a computer or TV [18]. This way of spending free time is now most frequently chosen, which can lead to many negative effects, including bad posture and obesity [19]. The research conducted by Sobolewski [20] showed that about 52% of respondents declare their physical activity at an average level, almost one third of students declare a high level, while one eighth describes it as low.

Korpak used the International Physical Activity Questionnaire in his research. He examined students of one of the high schools in Biała Podlaska. The analysis of the research showed that half of the respondents were characterized by a high level of physical activity, 13% by a sufficient level, while as many as 23% of the respondents spend about 8 hours a day sitting. The study group also included people who admitted to being in a sitting position for as long as 780 minutes (13 hours) [21]. Other studies aimed at presenting the level of physical activity were conducted among young people aged 11–15. The research tool was an international, standardized questionnaire, which concerned health behaviours, including various types of physical activity, lasting at least 60 minutes a day. The results showed very low physical activity in 24% of the respondents, and the recommended level was achieved by 35% of the respondents [22]. Other studies showed that physical activity of schoolchildren oscillated mainly at the average level, and was performed by about 45% of the respondents. The second largest group engaged in a high level of physical activity and the third largest group indicated a low level of physical activity [23].

Our research, in which the International Physical Activity Questionnaire was used, showed that the study group of junior high school students is characterized by a sufficient level of physical activity (49%). However, a high percentage of insufficient activity was noted, which was observed in as many as 43% of the respondents. However, in all the above-mentioned results and in our research on physical activity, a tendency to spend free time passively and a tendency to a sedentary lifestyle were observed. Despite the use of the same research methods, there are discrepancies between our research and the research conducted by other authors. Among high school students there was a higher level of physical activity than in the study group. This may be due to the greater awareness of high school students about the healthy impact of physical activity on the human body.

Generally accepted principles speak of the positive impact of physical activity on human development, but some opinions contradict this. Studies conducted among 14- and 15-year-olds showed that several years of swimming training are enough to observe changes in the shape of the spine in the sagittal plane. The authors showed that there are significant differences in body posture between swimming and non-swimming groups – the kyphotic type of posture is dominant in swimmers and this may have a negative impact on the shape of the anterior-posterior curvature of the spine [24]. In the study by Czechowska et al. 72 children from junior high school classes were examined. The angle of lumbar lordosis (LLA) and the angle of thoracic kyphosis (TKA) in the sagittal plane were assessed using the Mora device. The examination was conducted twice - at the beginning of the school year and after 10 months. It showed that statistically significant changes can be observed in children who during the time between examinations engaged in swimming. On the other hand, among children who did not participate in corrective classes or did not engage in swimming, deterioration of body posture parameters in the sagittal plane is observed [25].

In our research, the correlation between body posture and physical activity was studied. It was showed that most people with good body posture have a sufficient level of physical activity, but at the same time in the same group the highest percentage of insufficient level of physical activity was also observed. The conducted statistical analysis showed no correlation between body posture and physical activity.

Conclusions

1. As a result of the conducted research, it can be concluded that the kyphotic type of body posture dominates in the study group.
2. On the basis of the completed questionnaire, the activity of the respondents can be described as sufficient.
3. Among people with a sufficient level of physical activity, good body posture prevails.
4. The conducted research showed that the differences between body posture and the level of physical activity are not statistically significant.

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