

## The somatic type of male and female pupils who play selected musical instruments

Mateusz Apanowicz

FizjoMedica, Poniatowskiego 1/4, 86-300 Grudziądz

### Abstract

**Introduction.** The changes in the physique and posture are affected not only by genome, but also by the epigenetic factor.

**Material and methods.** 393 students from randomly selected music schools were qualified for the study. The measurement of body weight and height was conducted using a medical electronic scale.

### Conclusions

1. The slender type was most common among male and female pupils involved in the study. The medium and stout types were less popular but more common among boys.
2. The slender type was usually characteristic for female players of the grand piano, accordion and Western concert flute, the medium type for male guitar and violin players, whereas the stout one for male players of the grand piano.

**Key words:** somatic type, Rohrer's index, musical instruments

### 1. Introduction

The changes in the physique and posture are affected, inter alia, by the epigenetic factor. It is a chemical compound formed under the influence of the environment, where the cell is living. A specific DNA fragment has to be read to make sure that the compound fulfils its function well. It is epigenetic factors that decide which genes will be activated and which remain dormant. An inherited genome enables the organism to rapidly adapt to environmental changes. The epigenetic factor includes, among other things, physical activity, environment and profession. In qualification sport, championship is achieved by individuals with characteristics as similar as possible to the type of a given discipline, and correlation is not significant among players. According to Ćwirko-Godycki, the **type** is a collection of many spots of a multidimensional space. It is a team of people characterized by a similar level of developed morphological, motor, structural and psychical features [1]. Individual differences within the same type are smaller than between the types. Determining the type sets a model to which one aspires and indicates the direction of selected skills. Based on the author's own research, the type playing musical instruments should be characterized by a high level of speed and coordination, less endurance and even less strength. As opposed to sport, where championship is achieved by a competitor with the peak level of motor skills and the somatic type adequate to a discipline, in artistic performance the somatic type is not so important. The review of relevant literature has not demonstrated any studies concerning the somatic type appropriate for the player of a musical instrument.

The study was intended to determine the somatic type of the players of selected instruments.

## 2. Material, methods and research tools

393 individuals were recruited from randomly selected music schools. All the students who had been students of a music school for at least one year were allocated for the study. All subjects were divided into classes depending on the leading instrument and within a class depending on gender, age and the period of playing an instrument. Accordion students accounted for class I, Western concert flute students – class II, grand piano students – class III, guitar students – class IV, violin students – class V, and cello students – class VI. Eventually, 190 girls (K) and 203 boys (M) were qualified for the statistical analysis. The average age of girls was 14.25 years and the experience of playing an instrument was 7.25 years. In the group of boys, the figures were 14.44 and 7.40 respectively. The most girls practiced playing the grand piano (44 subjects) and the least girls played the Western concert flute (21 subjects). As for boys, the largest number of them practiced playing the guitar (42 people) whereas the Western concert flute was the least played instrument (23 subjects). Violin female students had the longest experience of playing the instrument (10.2 years) while those who played the flute demonstrated the shortest period (4.6 years). Among boys, these were respectively: the violin (10.2 years) and the Western concert flute (11.94 years).

The studies were conducted in the period from 10 September 2016 to 20 December 2016 by a team of six under the guidance of the author. The measurement of body mass and height was carried out using an electronic medical scale.

## 3. Test results

The obtained results of mass and height measurements allowed to determine the characteristics of the values by means of the Rohrer's index by sex and age of music school pupils, Table 1. The Wank's prescriptive ranges were used in order to determine the somatic type for the male sex and Kolasa's ranges for the female sex, Table 2.

Table 1. The statistical characteristics of Rohrer's index values (RI) (n) 393

K (female), M (male)

Rohrer Index											
Sex	Age	N	Min	Q <sub>1</sub>	Me	Q <sub>3</sub>	Max	$\bar{x}$	s	V	K
K	11	15	0.99	1.06	1.15	1.18	1.67	1.16	0.17	0.14	3.32
	12	40	0.92	1.10	1.19	1.34	1.51	1.22	0.14	0.12	-0.91
	13	9	0.78	1.05	1.15	1.37	1.50	1.18	0.22	0.19	-1.23
	14	11	1.16	1.23	1.30	1.48	1.87	1.38	0.23	0.17	-0.74
	15	30	1.06	1.20	1.27	1.58	1.86	1.36	0.23	0.17	-0.82
	16	50	1.08	1.18	1.27	1.40	1.79	1.32	0.18	0.14	0.02
	17	22	1.08	1.16	1.23	1.42	1.76	1.32	0.22	0.17	-0.64
	18	12	1.15	1.25	1.30	1.42	1.73	1.36	0.19	0.14	-1.01
M	11	20	0.91	1.13	1.27	1.41	1.57	1.26	0.19	0.15	-1.21
	12	40	0.71	1.08	1.15	1.37	2.10	1.24	0.26	0.21	3.17
	13	8	0.88	0.95	1.25	1.40	1.56	1.21	0.26	0.22	-1.84
	14	9	1.05	1.34	1.39	1.43	1.47	1.34	0.14	0.10	-0.48
	15	27	0.91	1.21	1.30	1.40	1.57	1.29	0.17	0.13	-0.34
	16	57	1.03	1.18	1.29	1.35	1.42	1.26	0.11	0.08	-1.10
	17	29	1.12	1.22	1.29	1.34	1.39	1.27	0.08	0.06	-1.25
	18	13	1.16	1.22	1.31	1.38	1.39	1.30	0.08	0.06	-1.41

Source: author's own research

Table 2. Interpretation of RI according to Wank and Kolasa

Physique type	Boys, men according to Wank	Girls, women according to Kolasa
Slender	up to 1.24	up to 1.37
Medium	1.25-1.36	1.38-1.58
Stout	above 1.37	above 1.59

Source: Ryszewski, Książczyk 2009

Table 3. The percentage of three physique types according to age, gender and musical instrument (n) 393

Rohrer's index													
Sex		K						M					
Instrument/Age		Slender		Medium		Stout		Slender		Medium		Stout	
Instrument	Age	No. of subjects	%	No. of subjects	%	No. of subjects	%	No. of subjects	%	No. of subjects	%	No. of subjects	%
Accordion	11	6	85.71	0	0.00	1	14.29	4	40.00	3	30.00	3	30.00
	12	13	86.67	2	13.33	0	0.00	10	58.82	1	5.88	6	35.29
	13	3	100.0	0	0.00	0	0.00	4	50.00	1	12.50	3	37.50
Western concert flute	11	8	100.00	0	0.00	0	0.00	5	50.00	1	10.00	4	40.00
	12	11	91.67	1	8.33	0	0.00	10	76.92	3	23.08	0	0.00
Grand piano	12	10	76.92	3	23.08	0	0.00	4	40.00	2	20.00	4	40.00
	13	4	66.67	2	33.33	0	0.00						
	14	8	72.73	0	0.00	3	27.27	2	22.22	1	11.11	6	66.67
	15	6	100.00	0	0.00	0	0.00	7	50.00	1	7.14	6	42.86
	16	3	60.00	2	40.00	0	0.00	1	20.00	1	20.00	3	60.00
Guitar	15	9	75.00	0	0.00	3	25.00	1	20.00	4	80.00	0	0.00
	16	25	78.12	5	15.62	2	6.25	16	50.00	14	43.75	2	6.25
	17							3	60.00	2	40.00	0	0.00
Violin	16	2	50.00	1	25.00	1	25.00	1	25.00	1	25.00	2	50.00
	17	14	70.00	2	10.00	4	20.00	7	31.82	12	54.55	3	13.64
	18	9	75.00	0	0.00	3	25.00	4	30.77	5	38.46	4	30.77
Cello	15	6	50.00	2	16.67	4	33.33	1	12.50	2	25.00	5	62.50
	16	6	66.67	0	0.00	3	33.33	7	43.75	4	25.00	5	31.25
	17	2	100.00	0	0.00	0	0.00	2	100.00	0	0.00	0	0.00

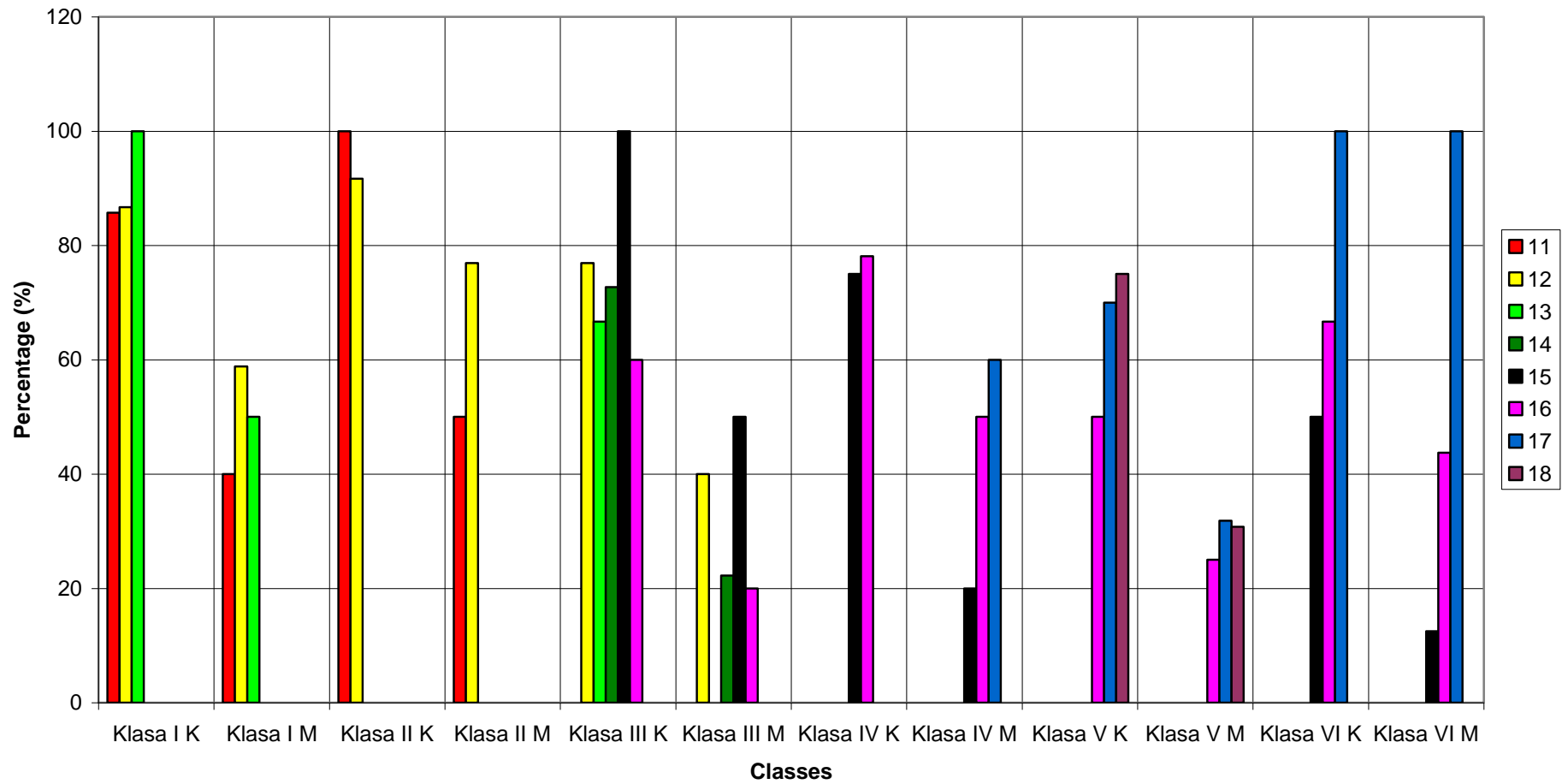
Source: author's own research

As displayed in the statistical analysis, the slender type percentage among the subjects of all classes was very high, Table 3, Fig. 1. In class I, among 13-year-old girls, in class II at the age of 11, class III at the age of 15 and VI at the age of 17, all the subjects had a slender physique. As regards boys, the slender type prevailed only in class VI at the age of 17. The conducted analysis showed that female players of the accordion (class I), the Western concert flute (class II), and the grand piano (class III) were the most slender. In the remaining classes, this percentage was almost always higher than 60%. Among boys, the biggest percentage was observed among the male players of the Western concert flute (class II) and the cello (class VI) while the smallest one among the players of the grand piano (class III) and the violin (class V).

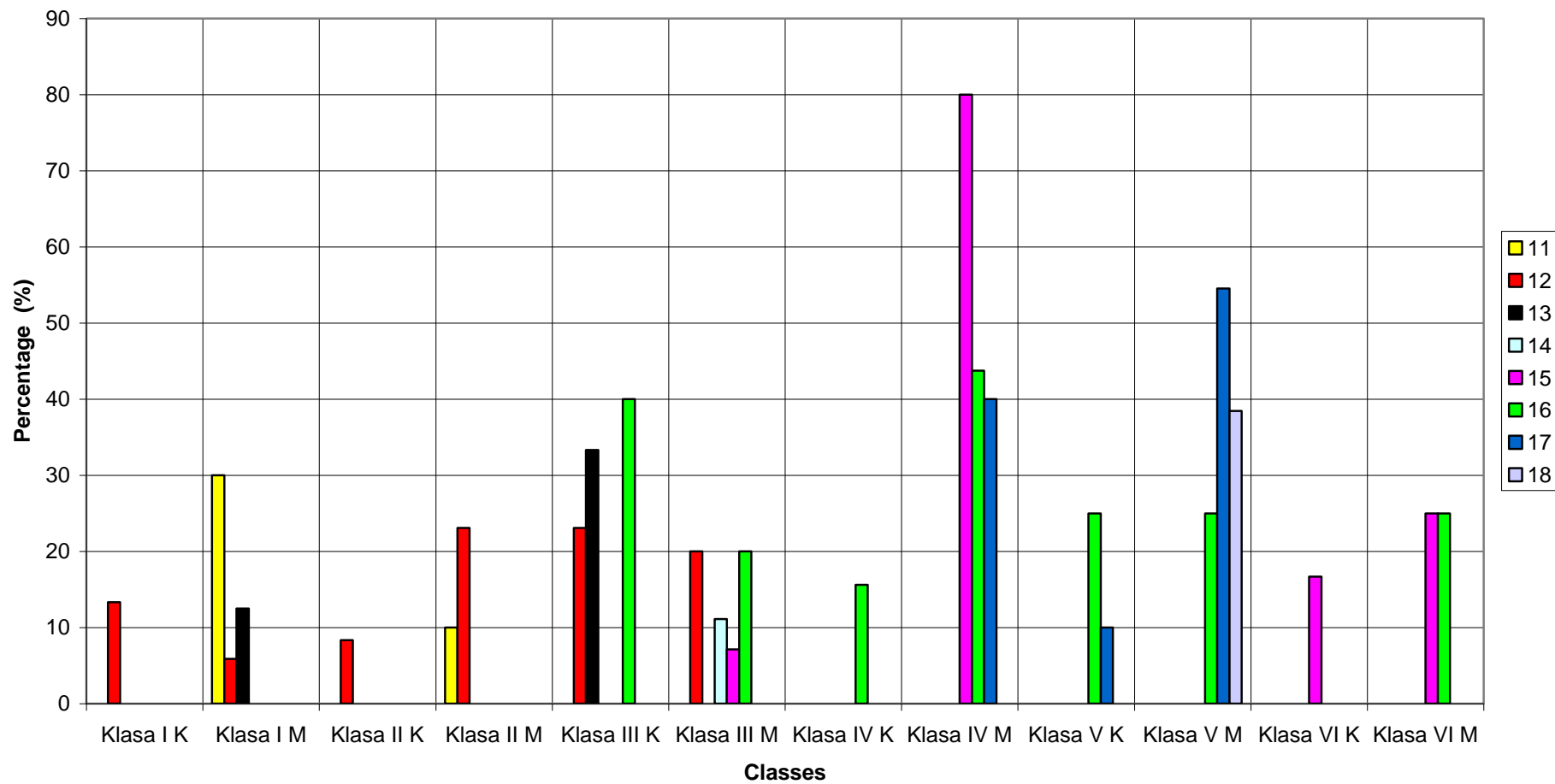
The analysis of the medium type percentage indicated that this physique type was relatively rare among the subjects involved in the study, Table 3, Fig. 2. The medium physique was more common among boys than girls. It was most frequent among the female pupils playing the grand piano (class III) and least popular among girls playing the Western concert flute (class II). As regards boys, guitar players (class IV) and violin players (class V) most often had the medium physique, whereas accordion players (class I) and Western flute players (class II) comprised the smallest group of this type.

The analysis of the stout type showed that this type of physique was more frequent than the medium type and occurred more often among boys than girls, Table 3, Fig. 3. The stout physique was more characteristic for boys than girls. It was most often observed in the female players of the grand piano (class III) and cello players (class VI), and least often accordion players (class I). The stout type was most often reported among grand piano players (class III) and cello players (class VI), whereas least frequent among guitar players (class IV).

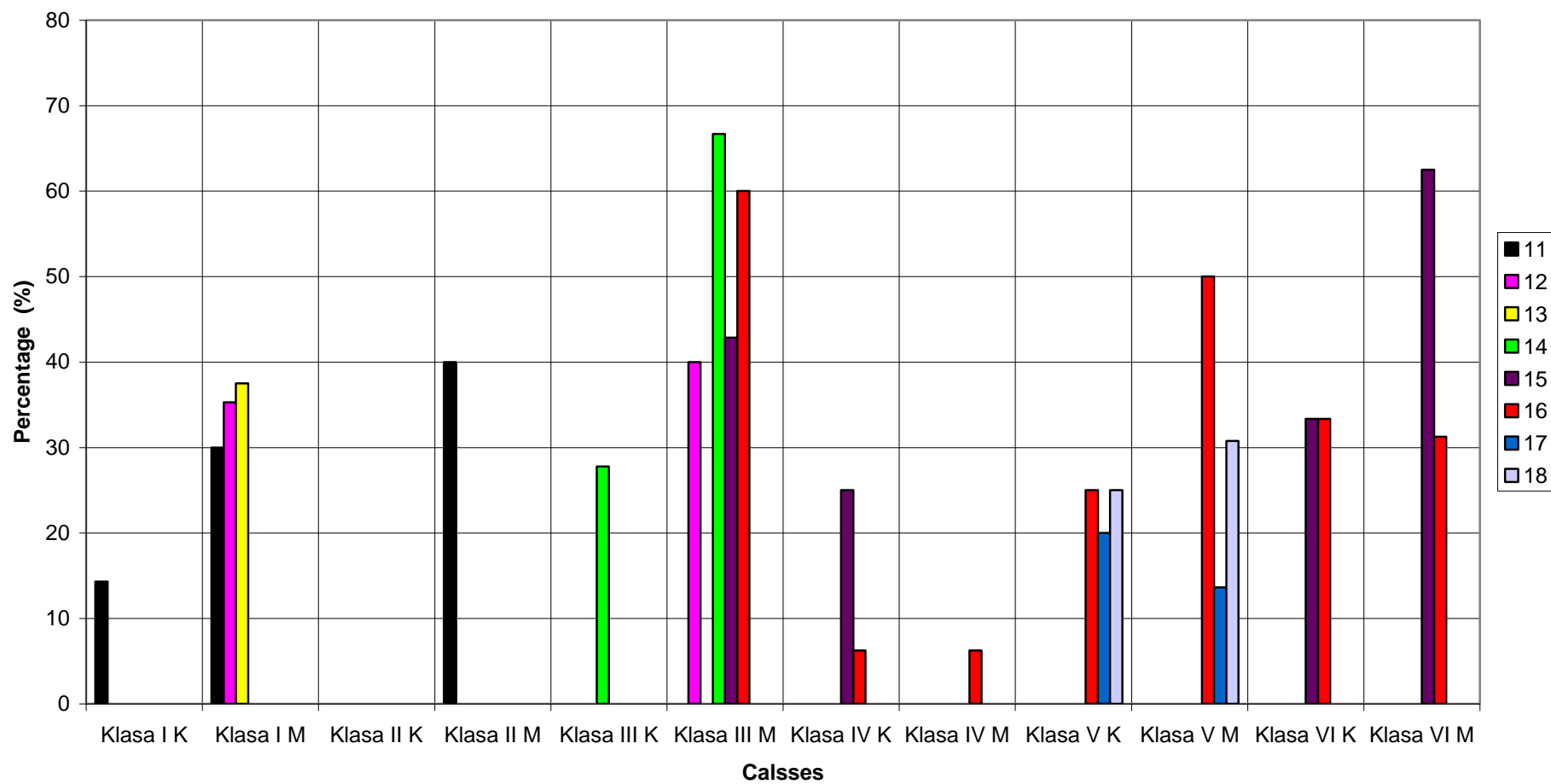
**Fig. 1. The percentage of the slender physique type among female and male pupils of class I-VI (n) 393**



**Fig. 2. The percentage of the medium physique type among female and male pupils of class I-VI (n) 393**



**Fig. 3. The percentage of the stout physique type among female and male pupils of class I-VI (n) 393**





## Discourse

The research conducted by Migasiewicz [2] showed that the boys and girls involved in the study were characterised by a gradual decrease in the values of Rohrer's index in the age range of 7.5 – 13.5 years. The greatest dynamics of this decrease was observed in girls between the age of 7 and 8 years as well as the age of 10 and 11 years. This phenomenon was most noticeable in boys aged 12.5 – 13.5. Analogous results were achieved in the studies conducted at the beginning of the 1980s among primary school pupils [3]. The research by Burdukiewicz [4] revealed that 11-year-old children were characterized by the most slender physique as confirmed by the study carried out by Janusz [5]. Between the age of 15 and 18, a systematic (slight in girls and remarkable in boys) growth of Rohrer's index was observed. This tendency, with regard to girls, is surely connected with the accumulation of subcutaneous adipose tissue and in case of boys, it may be affected both by quantitative and qualitative changes in skeletal muscles [6, 7]. In the period between the age of 11 and 15, physique massiveness is observed in girls while in boys the proportions between body height and weight are not significantly different [4]. Based on the standards proposed by Drozdowski [8], concerning the classification of the subjects into the slender and stout ones using Rohrer's index, only 7.5 and 10.5-year-old girls could be regarded as stout and the rest of the subjects had a slender physique. Among the male groups, 9.5-12.5 and 17.5-18.5-year-old boys were characterized by the stout type, whereas pupils from the remaining age groups were slender.

## Conclusions

1. The slender type was most common among male and female pupils involved in the study. The medium and stout types were less popular but more common among boys.
2. The slender type was usually characteristic for female players of the grand piano, accordion and Western concert flute, the medium type for male guitar and violin players, whereas the stout one for male players of the grand piano.

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