

Abstract

Body posture and physical fitness of students from selected music schools over a two-year observation period.

Introduction and study aim

The interest in the issue arises from the increasing frequency of various disorders among professional musicians, which are consequences of specific static and dynamic loads on the musculoskeletal system. The aim of the study is to determine the impact of intensive music instrument practice on the posture of male and female students and to evaluate physical fitness, as well as to demonstrate the relationships between postural disorders and the type of musical performance.

Materials and Research Methods:

Three hundred and ninety-three students were selected from randomly chosen music schools in Poland. Those who obtained consent from a legal guardian or parent (for minors), direct teacher, and school director, and had been students at the music school for at least a year, were included in the study. Each legal guardian and student received brief information about the purpose of the measurements. All participants were divided into classes based on their main instrument, as well as by gender, age, and length of musical practice. For statistical analysis, 190 girls and 203 boys were finally included from the first edition of the study, and 172 girls and 180 boys from the second edition. The research was conducted on the same group. In each edition of the measurements, all students included in the study underwent a diagnostic assessment of their posture using photogrammetric method by an experienced team of diagnosticians, and on subsequent days, Eurofit test trials were conducted. This allowed minimizing the error in diagnosing posture, dependent on the examiner's experience, screen resolution, size of the light spot, and contrast of marked points. The results obtained from the first and second editions of the study will undergo identical analysis. Subsequently, a comparison of the research results from both editions will be made to formulate final conclusions, which will then be used to create an original project of corrective exercise atlas.

Results

Comparative analysis of posture in the first and second editions of the study revealed a significant increase in the significance of changes in postural characteristics, both in terms of their quantity and the number of features in which changes occurred. This was observed in both girls and boys. In Class I, there was an increase in the number of features with significant changes in all planes among girls, while in boys, changes were significant only in the sagittal plane. In Class II, significance was observed only in the sagittal plane among girls, while in boys, the number of significant changes in this plane increased in both editions. In Class III, a significant increase in the number of significant changes in the sagittal plane was observed among girls, while a similar phenomenon was visible only in this plane in both editions among boys. In Class IV, there was an increase in significant changes in all planes among girls, while among boys, only changes in the sagittal plane were significant. In Class V, changes mainly affected the sagittal plane among girls, while boys experienced an increase in the number of significant changes in all planes. Observations for girls in Class VI overlapped with Class V, while boys experienced an increase in the number of significant changes in all planes.

After two years of musical practice, the body build type of girls did not undergo significant changes in Classes I, II, IV, and VI. In Class III, there was an increase in the number of slim girls at the expense of medium build, but a reverse migration (increase in medium build at the expense of slim) was noted in the other age groups. In Class V, there was a shift towards greater obesity in all age groups. Significant changes occurred in boys in all classes and almost all age groups. Two main trends of changes involved averaging the body build type and increased obesity, varying depending on the class. Among girls, the slim build type predominated, while among boys, in most classes, the slim build type prevailed in the first edition, and the medium build type in the second.

Assessment of physical fitness using the Eurofit test in both editions of the study showed significant similarity in results. High statistical significance was obtained in fitness tests in specific age ranges in both editions, although significance was weaker for 13-year-olds. Significant changes were observed in the group of 13-year-old girls, especially in the second stage of the study. In boys, there were reductions or losses of significance in tests of functional endurance. Differences between the first and second editions included balance, flexibility, explosive strength, strength endurance of trunk muscles, and functional endurance. Test values for girls in the second stage approached the norm in flexibility tests. For boys, aged 13, 15, 16, 17, and 20 years, reductions or losses of significance were observed in tests of functional endurance.

Conclusions

1. Specific and significant postural disorders occur as a result of intense practice on the leading musical instrument, worsening with age and years of playing.
2. The occurrence rate of abnormal posture characteristics among players of asymmetrical instruments significantly differs from those playing symmetrical ones, predominantly affecting the frontal and sagittal planes, less frequently the transverse plane. Moreover, the discrepancies in the occurrence of characteristics among boys are slightly different from those among girls.
3. The level of physical fitness measured by the Eurofit test varies significantly from the required minimum determined by accepted reference values. In selected tests, the level is significantly higher (upper limb speed) while in others lower (cardiorespiratory endurance).
4. Boys' fitness level surpasses that of girls, with girls showing higher levels of lower limb speed compared to boys.
5. There is a significant correlation between the characteristics of selected postural features and the type of musical performance. These disorders worsen with age and years of playing.
6. It is advisable to develop a systematic program of activities promoting a healthy lifestyle, aiming particularly at: fostering the need for physiotherapeutic prevention of typical musculoskeletal disorders resulting from professional musical instrument playing, popularizing comprehensive physical fitness among students with elements of motor skill refinement to the level and specificity of musical performance, correcting posture errors, flexibility, and consequences of isometric work.
7. As indicated by the research, anticipated therapeutic benefits or other benefits for the subjects under study may involve the development of a year-round corrective and compensatory gymnastics program in the music school, aiming to:
 - Correct incorrect posture and resulting postural defects, minimizing pain syndromes of the C, Th, L spine segments;

- Enhance motor skills to the required level for playing musical instruments, especially asymmetrical ones;
- Promote comprehensive physical fitness among students, particularly addressing flexibility deficits;
- Reduce postural disorders during static work of selected muscle groups emerging with years of playing an instrument;
- Provide physiotherapeutic prevention of typical musculoskeletal disorders resulting from professional musical instrument playing.