



The Bone Pelvis and the Study of its Maturity in Female University Students

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Abstract

The article presents the materials of the research and their analysis concerning the study of the process of completion of the maturation of the pelvic bones in female students of different courses of the University, who are engaged in physical culture. To conduct the study, a method was used to determine such morphofunctional value as the pelvic bone index (PBI), proposed by NI Kovtyuk.

Keywords: Female Students; Bone Pelvis; The Degree of Maturity of the Pelvic Bones; Morphofunctional Index

Abbreviations

PBI: Pelvic Bones Index; GUNP: General Uniformly Narrowed Pelvis; SPP: Simple Flat Pelvis; SI: Soloviev Index

Introduction

Study of issues related to individual medical and biological characteristics of young people, incl. student youth, is very relevant and constantly in demand, in the study of morphological changes in them, in the process of ontogenesis. In our opinion, the problem of the age gradation of the completion of the process of maturation of the bone structures of the female pelvis has not been fully studied in adolescents, incl. among female students of different courses of the university, during their active physical education.

Aim of the work

To establish the degree of maturity and age criteria for the maturation of the bone structures of the female pelvis, among the students of the I-IV courses of the university, who are actively involved in physical culture.

Research problem

Students are representatives of the urban and rural population, with varying degrees of preparedness for physical work, with varying degrees of physical activity and admitted to physical education, as part of the main group.

Research hypothesis

In junior students, at the age of 18-19.5 years, in most cases, the process of maturation and formation of the bone structures of their pelvis is active, but not yet fully completed.

Research objectives

To achieve the set research goal, we set the following tasks:

- To select, on a voluntary basis, a group of female students of the I-IV courses of the university, who, according to the results of the medical examination, are included in the main group, to participate in physical education classes at the university.
- Carry out anthropometric and pelvimetric measurements necessary for this study.
- Based on the results of the measurements obtained, carry out individual and then group calculations of the pelvic bone index (PBI).
- Analyze the results obtained, identify the correspondence/confirmation or refutation/denial of the hypothesis of the research and the implementation of the goal of the research.

Material and Methods

To conduct the study, we used a method for determining such a new morphofunctional index value as the pelvic bone index (PBI), proposed in 2004 by NI Kovtyuk [2-4]. This method was proposed and repeatedly tested by the author in her research, which formed

the basis for her Ph.D. thesis “Comprehensive assessment of the development of school-age girls in the Chernovetsk region” [4]. The advantage of this technique is its non-invasiveness and ease of determination. PBI is determined by the following formula: $PBI = a \times b / IS$, where, “a” is the transverse size of the bone pelvis (distantia trochanterica), cm; “b” - external conjugate (conjugata externa), cm [4]; SI – Soloviev index, cm. Determination of the size of the bone pelvis (pelvimetry) was carried out in the standard way, using Martin’s pelvic meter. Determination of indicators of the Solovyov index, using a centimeter tape, in the area of the wrist joint, normally – from 14 to 16 cm [1-3,5-7].

Also, in addition, the external dimensions of the bone pelvis of the female students who took part in the study were studied. For the normative variants of the measured indicators of the external dimensions of the bone pelvis, their standard values for these age groups, used in anatomy, morphology, obstetrics and gynecology, were taken: distantia trochanterica - transverse outer dimension, defined as the distance between two large trochanters of the femur, normally 30-32 cm [1-3,5-7]; conjugata externa is the external, straight size of the bony pelvis, which is determined from the middle of the upper edge of the pubic symphysis to the supra-sacral fossa and, normally, is 20-21 cm [1-3,5-7]. After obtaining the necessary re-

sults of pelvimetry and anthropometry, a mathematical calculation of the PBI values was carried out, according to the author’s formula of N.I. Kovtyuk [4]. According to the author’s criteria, the values of 30.0-40.0 were considered normative. Indicators less than 30.0 indicate the incompleteness of the process of formation (maturation) of the bone structures of the pelvis of the studied, or a decrease in the process of bone maturity. The cause of this process may be disturbances from the endocrine and reproductive systems of the studied, of different genesis [2-4]. Values above 40.0 indicate the completion of the process of maturation of the pelvic bones in the surveyed women [2-4].

Result and Discussion

For this study, by the method of random sampling, 239 female students of the I-IV courses of the university were selected, who are engaged in physical culture at the university, and according to the results of the medical research, they belonged to the main medical group. Of these, the first year students - 65 people, the second - 61 people, the third – 59 people, and the fourth year - 54 people. All female students involved in this study gave their voluntary consent to participate in it. The average age of the 1st year students was 18.36 ± 1.23 years; II course – 20.98 ± 2.14 years; III course – 21.67 ± 1.93 years; IV course – 22.57 ± 1.68 years.

Table 1: Pelvimetric values among female students of the studied groups.

Indicator name	d. spinarum, cm	d. cristarum, cm	d. trochante-rica, cm	c. externa, cm	c. vera, cm
1 st year female students (n = 65)	24,13 ± 0,47	27,06 ± 0,54	30,73 ± 0,63	19,11 ± 0,51	10,37 ± 0,11
2 nd year female students (n = 61)	24,37 ± 0,33	27,19 ± 1,03	31,17 ± 0,88	19,31 ± 0,77	10,23 ± 0,66
3 rd year s female students (n = 59)	24,81 ± 0,27	27,11 ± 0,84	31,22 ± 0,61	19,87 ± 0,21	10,45 ± 0,49
IV year female students (n = 54)	25,01 ± 0,24	27,53 ± 0,53	31,35 ± 0,74	20,03 ± 0,74	10,89 ± 0,67

The analysis of the obtained results of pelvimetry showed that the female students of all 4 surveyed groups have clinical manifestations of an anatomically narrow pelvis. This is convincingly evidenced by the reduced, in comparison with the normative, all the transverse and longitudinal dimensions of the bone pelvis. So, for example, d. spinarum, normally (for this age group), should correspond to 25-26 cm; d. cristarum – 28-29 cm; d. trochanterica – 30-32 cm; c. externa – 20-21 cm; c. vera - 11 cm [2,3,6,7]. When comparing the dynamics of changes in the external dimensions of the bone, in groups of I-IV year students, one can observe the dynamics of a gradual increase in these dimensions, in direct correspondence with the increase in the age of the studied students. If among the 1st and 2nd year girl students the indicators of external dimensions gradually approach the normative ones, then among the 3rd and especially the 4th year students, they are already practically formed, and correspond to the values of the bone pelvis of an

adult, reproductively mature woman [2,3,6,7]. At the same time, if, according to the obtained pelvimetry data, among the students of the 1st and 2nd years, a large number of anatomically narrow pelvis (AUT) was determined, in the variants of the general uniformly narrowed pelvis (GUNP) and the simple flat pelvis (SFP), then among the female students of III and, in particular IV course, with the formation and maturity of their bony pelvis, this number significantly decreased, giving way to normally formed structures of the bony female pelvis.

After carrying out all the necessary anthropometric and pelvic measurements, followed by mathematical recalculation of individual and group measurements, taking into account the course and age of the studied students, we obtained the PBI values presented in Table 2, with $p < 0.05$.

Table 2: The importance of BPI in different age groups of female students.

Indicator name	Pelvic bone index (PIB) value	The value of the Soloviev index (SI)
1 st year female students (n = 65)	26,74 ± 0,73	14,14 ± 0,61
2 nd year female students (n = 61)	29,24 ± 0,57	14,47 ± 0,33
3 rd year s female students (n = 59)	34,68 ± 0,33	15,35 ± 0,52
IV year female students (n = 54)	43,14 ± 0,93	15,58 ± 0,29

The analysis of the obtained PBI indices among female students of different courses and age groups showed that as they grow up and move to an older age group, female students experience an ontogenetically dependent process of ossification/maturity of the pelvic bones. And, if the students of the I and II courses, there were still girls with an incomplete and close to completion process of maturation, ossification of the pelvic bones, then among the older students (III and especially the IV course) - the age group 21-23 years old, PBI values indicates 100% completion in all female students of the process of maturation/ossification of their pelvic bones, with the formation of a bony pelvis, which is characteristic of a reproductively mature woman ready for gestation and childbirth [2-4]. Also, the positive dynamics/increase of the obtained values of the Soloviev index, as a morphofunctional index value, also indicates positive, physiological processes of ossification in female students of different age groups [2-4].

In our opinion, an important moment in the process of physiological formation and maturation of the pelvic bone structures in female students was played by the active participation of these students in the conduct and participation of physical culture classes at the university, as the most important and dominant factor of physical activity among female students.

Conclusion

- It has been reliably established that among younger students and at an earlier age - from 18-18.5 to 20-20.5 years, individually, there is a gradual completion of the formation and maturation of the pelvic bones, which is completely completed at the age of 22- 24.5-25 years old.
- The results of the conducted research confirmed the hypothesis of our research that senior students - III-IV (n = 113), aged 21-23 years, fully completed the process of maturation of the bone structures of their pelvis, with ICT indicators, within from 34.68 ± 0.33 to 43.14 ± 0.93.

- In 11 (16.92%) 1st year students, at the age of 18-18.5 years, the process of maturation of the bone structures of their pelvis is not yet completed, and has values within the range of 26.74 ± 0.73.
- In 6 (9.84%) second-year students, at the age of 18.5-20 years, the process of bone maturation of the bones of their small pelvis is not yet fully completed, but it is already close to the indicators of the lower permissible limit, and is - 29, 24 ± 0.57.
- The positive dynamics of the establishment of the Soloviev index values, noted in all age groups, within the physiological norm, and the correlation with the processes of maturation of the pelvic bones, in them, testifies to the positive processes of the formation and maturation of the skeletal system in all the studied female students.
- We believe that according to the results of the study and their analysis, the aim of the study was achieved and the hypothesis of the study found its full confirmation.
- We believe that all female students of the main medical group, engaged in physical culture at the university, and who took part in the study, have a natural, physiological process of maturation of the bone structures of their bone pelvis, in full accordance with their age period.

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