

ANTHROPOMETRIC CHARACTERISTICS OF FEMALES IN DIFFERENT AGE GROUPS IN LATVIA FROM CHILDHOOD TO ADULTHOOD

LIANA PĻAVIŅA¹, HELENA KĀRKLĪŅA², SILVIJA UMBRAŠKO¹,
JEKATERINA STANKEVIČA¹, DAVID KACHLIK³

¹ *Department of Morphology, Institute of Anatomy and Anthropology,
Riga Stradiņš University, Riga, Latvia*

² *Faculty of Nursing, Riga Stradiņš University, Riga, Latvia*

³ *Department of Anatomy, Second Faculty of Medicine, Charles University, Prague,
Czech Republic*

ABSTRACT

The purpose of the present study was to evaluate changes in main anthropometric parameters such as height, body mass, and body circumferences (chest, upper arm) in different age groups from childhood to adulthood in healthy females in Latvia and to determine the active growing age periods and the impact of tobacco use on anthropometric parameters. We provided a health well-being questionnaire concerning lifestyle and tobacco use. In the present study, we assessed the body mass index (BMI) values to identify body mass index-defined overweight and obesity. The levels of the body mass index exceeded the standard data only in a small number of the examined persons. Body composition data and the body mass index are used as an index of obesity as a standard practice by many clinicians according the recommendations of health authorities as a basis for health behaviour and physical activities to preserve physical and mental health. A significant correlation has been previously reported between anthropometric characteristics, physical activity and health capacity. The study data were collected with the participants' informed consent. Statistical analysis was performed using a statistics program. The body mass index is the respondents' major characteristic which describes the physical condition and nutrition level in any age group. Tobacco use by the mother during the pregnancy period has an influence on the child's body mass and body mass index values that were fixed for girls in the 1st and 2nd

childhood periods. Intensive increase in anthropometric parameters was observed during the transition from the adolescence to the youth period.

Keywords: *anthropometric indicators for women; body mass dynamics in post-natal ontogenesis; changes in body mass index at different ages*

INTRODUCTION

Anthropometric parameters as body height, body mass and body mass index have been used for epidemiologic health studies of population as a convenient and inexpensive measurement of overweight and obesity [1, 2, 11, 13]. Anthropometric indicators show the physical development of humans from childhood to adulthood [3, 24, 25]. Evaluation of the main anthropometric parameters is important for health specialists in dynamics and provides the main information on the individual's potential health problems, such as overweight and obesity that are often considered a pre-pathological condition that precedes the onset of cardiovascular diseases and diabetes [4, 14, 21]. Anthropometric parameters and physical development in various age groups characterise the healthiness of lifestyle and motivate to meet qualitative and quantitative physical activity standards [5, 6, 10, 26] in order to maintain health capacity and working ability [7, 19]. Adolescence has been called a critical age group for various risk factors like tobacco use, drinking of alcohol and dietary habits that induce imbalance in human health. Early start of tobacco use increases the risk for the development of tobacco dependence, and the difficulties in getting rid of it can cause development of inflammatory diseases and have an influence on body composition, which can lead to overweight and obesity [5–8]. The anthropometric parameters of the individual also affect qualitative and quantitative physical activity [8, 18], which is closely related to physical fitness [9, 20], and also forms an integral part of each person's daily life [10, 12, 16]. Physical fitness also has morphological and functional properties which allow an individual to be able to be engaged in physical activities [11–13]. The anthropometric parameters depend on environmental and household conditions, internal and external risk factors that are able to induce imbalance in human health status [14, 15, 16, 23, 24, 27]. Physical fitness is characterised by the individual's cardio-respiratory status, muscular strength and physical endurance as well as velocity and coordination [15–17]. The goal of the study was to evaluate the dynamics of the main anthropometric indicators in healthy women aged 4–35 years during the postnatal ontogenesis age periods – childhood, adolescence, youth, and adulthood.

MATERIAL AND METHODS

The study population included healthy women aged 4–35 years ($n = 861$) in Latvia. The participating women were categorized in age-related subgroups according to the age classification proposed in 1965 by Arshavskij and Bunak [28]. The classification by age stages was used taking into account the physical and psychosocial development stages – the 1st childhood (4–7 years), the 2nd childhood (8–11 years), adolescence (12–15 years), youth (16–20 years), the 1st maturity adulthood (21–35 years). The randomised selection data on individuals – females – were collected from 2007–2018 from different regions of Latvia and different social and economic groups. Body mass and height were measured with standardised techniques. Anthropometric measurements of barefoot individuals wearing light clothes were taken by the researchers' trained assistants. The current height was fixed by anthropometry with an accuracy of 0.001 m. The current body mass was fixed by a scale with an accuracy of 0.01 kg. We determined the main anthropometric parameters and calculated the anthropometric coefficients and indices. Body mass index was calculated as the value of body mass in kilograms divided by the square of body height in meters. The results were analysed using mathematical statistical methods by using SPSS 20. Anthropometric results are presented as mean \pm SEM (standard error of mean)

RESULTS AND DISCUSSION

Assessment of the main anthropometric parameters reflects the basic physical health status and could be used as motivation to follow a healthy lifestyle for keeping working capacities and welfare. The analysis of the collected data showed the wide variability of anthropometric characteristics of healthy women (Table 1). The most variable anthropometric indicator is the body mass; the changes in the average value of body mass in different age groups are reflected in Figure 1. The body mass values in girls of the 1st childhood group (4–7 years) fluctuated from 13.1 kg to 37.5 kg (Table 1). The increasing dynamics of the body mass by 36.3% or +14.0 kg was the most intensive in the 2nd childhood group (8–11 years) compared to the average body mass data of the girls in the 1st childhood group (4–7 years). The mean body mass value in the 2nd childhood was 35.9 ± 0.6 kg. The average body mass value of girls in the adolescence group (12–15 years) also increased by 18.1% or +6.5 kg compared to the 2nd childhood group. The body mass values varied on a wide scale from 29.7 kg to 75.5 kg. The average value of the body mass in the youth

group (16–20 years) was 62.6 ± 1.1 kg, which reflects an increase of 47.6%, or +20.2 kg in comparison with the adolescence age group. There were wide variation intervals of individual anthropometric parameters inside the youth group of women aged 16–20 years.

Table 1. Anthropometric parameters for women of different age groups

	N	Body mass	Body mass	Height	Height	Bmi	Bmi
		(kg)	(kg)	(cm)	(cm)	(kg/m ²)	(kg/m ²)
		Mean \pm sem	Min-max	Mean \pm sem	Min-max	Mean \pm sem	Min-max
1st childhood 4–7 years	275	21.9 \pm 0.3	13.1–37.5	118.3 \pm 0.4	94.0–139.0	15.6 \pm 1.0	11.2–23.3
2nd Childhood 8–11 years	312	35.9 \pm 0.6	32.2–84.0	142.6 \pm 0.6	125.3–166.5	17.6 \pm 0.2	10.9–35.0
Adolescence 12–15 years	87	42.4 \pm 1.0	29.7–75.5	151.0 \pm 0.7	139.5–165.0	18.3 \pm 0.4	13.6–29.3
Youth 16–20 years	79	62.6 \pm 1.1	56–81	169.2 \pm 0.7	164–183	21.7 \pm 0.4	19.5–24.7
1st maturity Adulthood 21–35 years	108	63.1 \pm 1.0	48–90	169.2 \pm 0.7	154–184	21.9 \pm 0.2	17–28

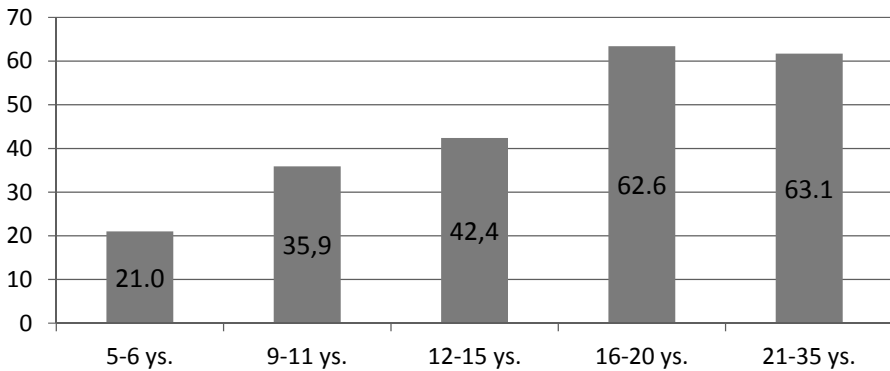


Figure 1. The mean values of body mass indicators for women in different age groups

The body mass values varied from the minimum of 56 kg to the maximum of 81 kg. Biological growth and development of girls in the phase of puberty comes to an end approximately at twenty years of age. Differences in the average body mass value of women in the youth group (aged 16–20 years) and women of the 1st maturity adulthood group (21–35 years) were insignificant ($p > 0.05$).

The mean value of body height of girls at 4–7 years of age (1st childhood) was 118.3 ± 0.4 cm. The height parameters were distributed in a wide interval from 94.0 cm to 139.0 cm. The height parameters increased from the 1st childhood period to the 2nd childhood by 17.1%, or by 24.5 cm (Figure 2) that reflects the ongoing process of active growth. The body height parameters increased only by 6%, or by 8.4 cm for adolescents (12–15 years) compared to the mean value of height in girls in the 2nd childhood. Behaviour and habits undergo changes during adolescence and youth. The height parameters recorded in the youth group were 169.2 ± 0.7 cm (Figure 2) that showed an increase by 10.3% in comparison with the adolescence group. The recorded body height ranged from the minimum of 154 cm to the maximum of 182 cm. The internal factors (genetic factors, hormonal level, etc.), as well as external factors (level of physical activity, tobacco use, alcohol use, healthy diet with protein, vitamins and minerals [14]) have an influence on the individual growth and development processes of the body. High social activity levels and changes in eating habits determined the body composition of women in the youth age group [15]. No statistically significant differences were found ($p > 0.05$) in the main anthropometric characteristics between the women in the youth period (16–20 years) and the 1st maturity adulthood age group (21–35 years).

A rapid increase in the mean value of the body mass index (by 18.8%) was recorded between the 1st childhood period (4–7 years) and the 2nd childhood period (8–11 years). Assessment of the body mass index values (Figure 3) indicated the influence of tobacco use by children's mothers during pregnancy as an external factor influencing children's body mass index. We fixed a statistically significant correlation ($r = 0.347$, $p < 0.05$) with the smaller intensity of increase in anthropometric indicators (body mass index) in children in the 2nd childhood group whose mothers had used tobacco in the pregnancy period compared to the changes in the body mass index of the children of that age group whose mothers had been free from tobacco use during pregnancy. An increase in the body mass index value up to 3.9% was fixed (Figure 3) between the 2nd childhood group (8–11 years) and the adolescence age group (12–15 years).

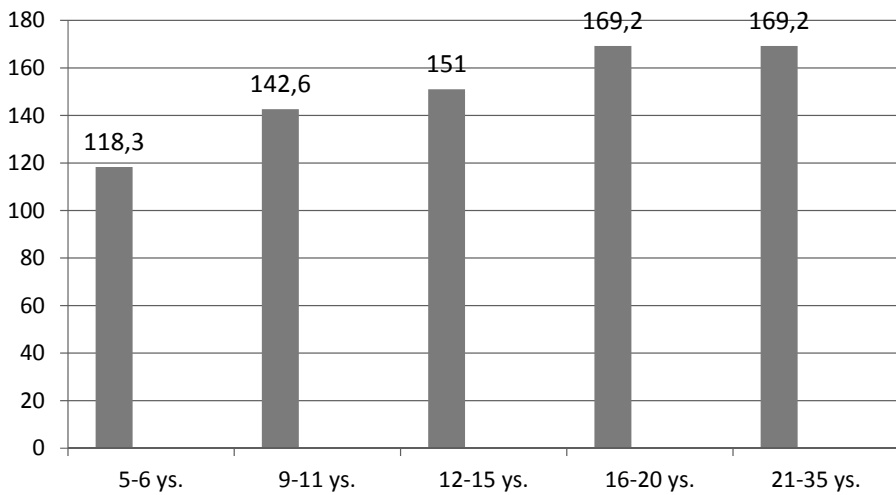


Figure 2. The mean values of body height indicators for women of different age groups

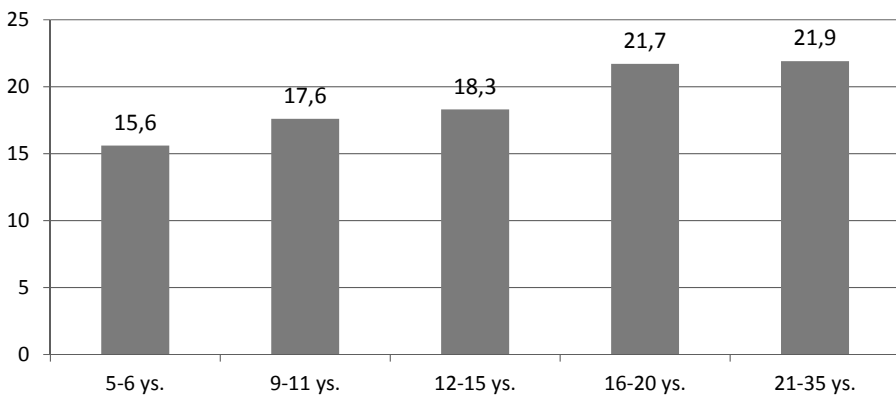


Figure 3. The mean values of body mass index for women of different age groups

Behaviour and habits undergo changes during the adolescence and youth periods. According to the data of the Disease Prevention and Control Centre [5], about 62.2 % of the youth female population smoked, which has an impact on anthropometric parameters. The adolescence and youth age groups are considered critical concerning the start of tobacco use. We fixed the tendency of lowering mean body mass index value in smokers compared to non-smokers in the youth age group. There were various external factors that have an influence on anthropometric parameters. According to our data, there were no statistically significant differences between the body mass index of smokers and non-smokers in the 1st maturity adulthood group. The mean body

mass index values were lower in non-smokers compared to smokers in the 1st maturity adulthood age group. Early start of tobacco use increases the risk for development of abuse and difficulties in getting rid of it. Women older than 21 years (the 1st maturity adulthood age group) become more interested in activities that focus on maintenance of health capacity, high working capacity and preservation of creative energy. The physical working capacity of the individual is based on the physical health, physical development indicators as well as maintenance of the level of physical activity and observance of healthy lifestyle principles. The 1st maturity adulthood period is the end of the growth and development processes of the body. The mean value of body mass and body height in the 1st maturity adulthood group were stable and differences between the adjacent age groups were insignificant ($p > 0.05$). The 1st maturity adulthood period includes the conclusion of education, training period of individuals and start of professional working activities. Representatives of the 1st maturity adulthood age group form a family and become parents. The lifestyle of the individual changes and is characterized by replacement of external activities with family activities. The body mass values tend to grow. The influence of external factors as tobacco use on anthropometric indicators is weak; there was no statistically significant difference ($p > 0.05$) in the value of the body mass index. Changes in the physical activity level and dietary habits generally have an influence on anthropometric characteristics. The average value of the body mass index in the 1st maturity adulthood group was 21.9 ± 0.3 . After the age of 30, the decrease of metabolic activity in tissues progressed. Particularly, a fast decline in muscle mass and increase in the fat tissue amount were found. The change in main anthropometric indicators in the adulthood age group was not statistically significant ($p > 0.05$). Inertia of the metabolic process activity manifests as a decreased level of physical activity and the drop of indicators of physical fitness. In the adulthood age group, changes in metabolism are also accompanied by decreasing health capacity with the prevalence of the obesity process and the associated cardiovascular pathology risks.

CONCLUSIONS

1. The anthropometric parameters of the study participants varied within a wide range in the analysed age groups. The body mass, body height and body mass index values corresponded to the standards in corresponding age groups, but for a small number of participants, the body mass index value exceeded the upper limit of standards in the corresponding age groups.

2. A rapid growth of the body mass and the body height values was observed in girls of the 2nd childhood group (at age of 8–11 years). Tobacco use by mothers during pregnancy had an influence on the child's body mass index (statistically significant in 10-year-old girls). The influence of tobacco use on anthropometric indicators of women in adulthood was weak. There was no statistically significant difference in the value of body mass index between smoking and non-smoking women.
3. A rapid increase in body mass index was observed during the transition period from the adolescence to the youth age group, which is the particular age when greatest attention should be paid to health and avoidance of bad habits.

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Address for correspondence:

Liana Pļaviņa

Department of Morphology Institute of Anatomy and Anthropology

Rīga Stradiņš University

Kronvalda boulv. 9, Rīga, Latvia

e-mail: liana.plavina@rsu.lv