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CHARACTERISTICS OF THE NEWBORN BABIES IN KROSNO (THE PODKARPACKIE VOIVODESHIP) BORN IN 2011-2012

Introduction

Birth characteristics of babies is an important element in the description of the condition of populations. Sizes of the body structure of newborns described by birth weight and body length predominantly depend on gender and hereditary traits. The birth order, as well as the length of pregnancy and the age of the mother are often mentioned among the factors determining birth body weight and birth body length. Changes of birth weight and body length are usually heterogeneous. They depend partly on the life environment and changeable socio-economic conditions (Kaliszewska-Drozdowska 1992; Kornafel 1995).

The aim of this work is to present numerical characteristics of the birth weight and body length of children in Krosno (the Podkarpackie Voivodeship) and to assess the effects of the gestational age (between 38 and 42 weeks) and mother's age on the size of the examined birth traits.

Material and methods

The material used in the paper includes the body measurements of 1468 live born newborns from natural births and single pregnancies between weeks 38 and 42 of pregnancy (including 755 boys and 713 girls) born in 2011-2012 at John Paul II Podkarpackie Voivodeship Hospital in Krosno (the Podkarpackie Voivodeship). The data on their birth weight and body length, the gestational age, and mother's age were collected from the obstetric books.

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The age of mothers was categorized in accordance with the Piasecki scale (1982, 1988) into 6 groups (I – 19 years and younger, II – 20-24 years, III – 25-29 years, IV – 30-34 years, V – 35-39 years, VI – 40 years and older). The obtained measurement results were developed using the basic statistical methods. The differences between the average were assessed using the analysis of variance (ANOVA), Student's T-Test, and the correlation coefficient using the Pearson linear correlation.

Results

Tables 1-4 present the numerical characteristics of the birth weight and body length in relation to the gestational age (38-42 weeks) and mother's age.

Table 1

Birth weight and birth body length

Gestational age (weeks)	Boys			Girls			d	Mollison index
	N	M	Sd	N	M	Sd		
Birth weight [g]								
38	140	3379.1	407.4	144	3182.9	391.1	196.2**	-0.48
39	277	3522.7	413.5	240	3330.3	372.3	192.4**	-0.47
40	232	3548.1	388.3	218	3457.9	393.8	90.2*	-0.23
41	78	3654.7	427.5	95	3577.8	405.4	77.0	-0.18
42	28	3869.6	404.6	16	3851.3	464.5	18.4	-0.05
Total	755	3530.4	417.3	713	3384.2	414.1	146.2**	-0.35
Birth body length [cm]								
38	140	54.1	2.4	144	53.4	2.3	0.7*	-0.28
39	277	55.0	2.4	240	54.2	2.3	0.8**	-0.32
40	232	55.5	2.4	218	54.7	2.3	0.7**	-0.31
41	78	56.0	2.7	95	55.3	2.5	0.8	-0.29
42	28	57.5	2.4	16	55.8	2.3	1.8*	-0.76
Total	755	55.2	2.5	713	54.4	2.4	0.8**	-0.31

* – significance at the 0.05 probability level; ** – significance at the 0.01 probability level

Source: own work.

In the case of body weight as well as birth body length, the higher average values were recorded in the groups of boys for the whole population,

as well as in individual weeks of the gestational age (Table 1). Gender differences are statistically significant in all the cases except for the children born at week 41 (not relevant for weight and body length) and those born at week 42 – not relevant for body weight (Table 1).

The average body weights and lengths in individual weeks of the gestational age increase with each week of pregnancy, from 38 to 42 weeks. The estimated linear correlation coefficients between the pregnancy duration (38 to 42 weeks) and the mass and length of the body are respectively: 0.23 ($p<0.001$) and 0.28 ($p<0.001$) in the group of boys, and 0.34 ($p<0.001$) and 0.33 ($p<0.001$) in the group of girls.

Table 2

Differences in birth weight and birth length depending on gestational age

Gestational age	**Boys**		**Girls**	
	d	**p**	**d**	**p**
Birth weight [g]				
38-39	-143.60	0.001	-147.33	0.000
39-40	-25.43	0.478	-127.64	0.000
40-41	-106.64	0.042	-119.90	0.015
41-42	-214.90	0.023	-273.46	0.016
Birth body length [cm]				
38-39	-0.94	0.000	-0.85	0.001
39-40	-0.44	0.040	-0.47	0.028
40-41	-0.58	0.069	-0.56	0.057
41-42	-1.50	0.010	-0.48	0.481

Source: own work.

In the case of body weight, the largest differences (statistically significant) were recorded between 41 and 42 weeks of pregnancy in both sexes, whereas slightly larger differences were revealed among girls (Table 2).

The results of the analysis of variance (ANOVA) allow concluding that the gestational age (between 38 and 42 weeks) significantly affects the birth weight and body length among the newborn boys (respectively $F=11.72$. $df=4$. $p<0.001$ and $F=17.4$. $df=4$. $p<0.001$) and girls (respectively $F=24.35$. $df=4$. $p<0.001$ and $F=12.7$. $df=4$. $p<0.001$).

Table 3

Birth weight and birth length depending on maternal age

Gestational age (weeks)	Boys			Girls			d	Mollison index
	N	M	Sd	N	M	Sd		
Birth weight [g]								
I	15	3263.3	334.5	22	3548.2	396.4	-284.8*	0.85
II	131	3474.7	375.9	124	3419.0	410.6	55.8	-0.15
III	294	3509.9	392.6	238	3371.1	395.6	138.8**	-0.35
IV	202	3589.5	456.3	211	3376.3	411.4	213.2**	-0.47
V	94	3570.6	448.7	94	3375.4	439.6	195.2**	-0.44
VI	19	3613.7	412.1	24	3287.9	529.2	325.8*	-0.79
Birth body length [cm]								
I	15	54.3	3.0	22	54.9	2.6	-0.6	0.22
II	131	55.0	2.3	124	54.3	2.4	0.7*	-0.31
III	294	55.1	2.5	238	54.5	2.4	0.6**	-0.25
IV	202	55.3	2.5	211	54.4	2.3	0.9**	-0.36
V	94	55.4	2.7	94	54.4	2.6	1.0**	-0.37
VI	19	56.3	2.4	24	54.0	2.7	2.3**	-0.96

* – significance at the 0.05 probability level; ** – significance at the 0.01 probability level

Source: own work.

Table 3 presents the values of the average birth weight and body length of the newborn babies in relation to mother's age. The weight and length of the body of the newborn babies increase with the age of the mother, following the Piasecki scale. The estimated linear correlation coefficients between the pregnancy duration (38 to 42 weeks) and the mass and length of the body are respectively: 0.12 (p=0.001) and 0.09 (p=0.016) in the case of boys. Moreover, in the group of girls, the relationship between mother's age and the weight and length of the body are statistically insignificant – respectively: -0.07 (p=0.077) and -0.02 (p=0.545).

Table 4

Differences in birth weight and birth length depending on maternal age

Gestational age	Boys		Girls	
	d	p	d	p
Birth weight [g]				
I-II	-211.40	0.039	129.23	0.174
II-III	-35.20	0.388	47.86	0.282
III-IV	-79.52	0.039	-5.21	0.891
IV-V	18.82	0.740	0.88	0.987
V-VI	-43.05	0.700	87.51	0.406
Birth body length [cm]				
I-II	-0.73	0.263	0.63	0.262
II-III	-0.09	0.731	-0.18	0.507
III-IV	-0.18	0.425	0.11	0.630
IV-V	-0.15	0.636	-0.06	0.828
V-VI	-0.84	0.214	0.46	0.442

Source: own work.

In the case of boys, statistically significant differences between the average body weights only between the first and the second as well as the third and fourth age groups of the mother were recorded, and the differences between the average lengths of the body in the subsequent mother age groups are statistically insignificant (Table 4). In the case of girls, both for weight and body length, the differences between the successive age groups of mothers are statistically insignificant (Table 4).

The results of the analysis of variance (ANOVA) allow concluding that mothers' age (between 38 and 42 weeks) significantly affects only the birth weight of boys ($F=3.01$, $df=5$, $p=0.011$).

Discussion

The results presented in this paper elaborate on partial results obtained for the published monograph entitled *The Child of the Podkarpackie Voivodeship* (Wandycz 2014). In the monograph mentioned above, higher body weight and body length were noted among the children of mothers living in rural areas, however, the differences obtained were not statistically significant. The fact that the character and size of the environment have no influence on newborns' weight and length of the body was also recorded by Asienkiewicz et al. (2006), who described the population of newborn babies

in Sulechów (the Lubuskie Voivodeship). The size of the life environment did not affect the size of birth weight or body length, therefore, when presenting the data concerning the newborn babies in Krosno, the influence of the size of the mother's life environment on the average birth characteristics of children was omitted.

Generally, the literature states that boys are characterized by higher average birth weight (Piasecki 1983; Bożiłow 1992; Kornafel 1995; Gawlikowska-Sroka et al. 2007; Pawlus et al. 2017) and the results obtained confirm this relationship (in total for those born at 38-42 weeks of pregnancy) and for those born at 38, 39, and 40 weeks.

The gestational age affects the weight and length of a newborn's body (Asienkiewicz et al. 2006, Pawlus et al. 2017) and the subsequent weeks of pregnancy (up to 42) are related to the increase of body weight and length. A similar dependence was noted by Kaliszewska-Drozdowska (1992) in both sexes in relation to the differences in body weight and parietal-sedentary length (si). The results obtained confirm that the gestational age (for 38-42 weeks) statistically significantly affects both birth weight and body length.

On the one hand, some research results presented in the literature (studies of fetuses of different ages) indicate that mother's age has no influence on the weight and body length (the total length or the parietal-sedentary length) of newborn babies (Bożiłow et al. 1992; Miller 1989; Cieślik and Waszak 1992); on the other hand, other results confirm the relationship between mother's age and children's birth parameters (Mayer 1968; Cieślik and Waszak 1988; Piasecki 1983, 1988; Orkwiszewska and Gładykowska-Rzeczycka 1994; Wandycz 2007; Janiszewska 2011). Gworys et al. (2008) indicate that mother's age has a significant impact on the weight and length of a child's body – the smallest average birth weight of children was recorded in mothers under 20 years of age, however, mothers aged 20-27 give birth to children with the biggest body length (for both sexes). The results of the tests presented in this paper confirm the increase in the average body weight of newborn babies with mother's age, but only among boys. In the case of girls, one can observe a reduction in the weight and body length depending on subsequent age groups of mothers (statistically insignificant).

Based on the results obtained and the conducted analysis, the following statements can be made regarding the body weight and body length of the newborns born in 2011-2012:

1. Boys are on average heavier and longer than girls.

2. The duration of pregnancy between 38 and 42 weeks is associated with an increase in the weight and length of the body of the newborn

babies in the subsequent weeks of the gestational age.

3. The birth weight and body length of boys increase with mother's age.

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CHARACTERISTICS OF THE BABIES BORN IN KROSNO (THE PODKARPACKIE VOIVODESHIP) IN 2011-2012

Keywords: newborns, birth weight, birth body length, gestational age, maternal age.

This article aims to show how the weight and length of newborn babies depend on gestational age and mother's age. The study focused on the babies born in 2011-2012 in a hospital in Krosno (the Podkarpackie Voivodeship). Only live born children, born between the 38th and 42nd weeks of pregnancy, and with birth weight over 2500 g were taken into account.

The results obtained allow stating that boys are on average heavier and longer than girls. The duration of pregnancy between the 38th and 42nd weeks is associated with an increase of birth weight and length of the body in the subsequent weeks of gestational age. In the case of boys, birth body weight and body length increase with mother's age.

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CHARAKTERYSTYKA URODZENIOWA NOWORODKÓW KROŚNIEŃSKICH (WOJEWÓDZTWO PODKARPACKIE) URODZONYCH W LATACH 2011-2012

Słowa kluczowe: noworodki, urodzeniowa długość ciała, urodzeniowa masa ciała, wiek płodowy, wiek matki.

Celem niniejszej pracy jest przedstawienie charakterystyk liczbowych urodzeniowej masy i długości ciała dzieci urodzonych w latach 2011-2012 w szpitalu w Krośnie (województwo podkarpackie) oraz ocena wpływu wieku płodowego (między 38. a 42. tygodniem) i wieku matki na wielkość badanych cech urodzeniowych.

W pracy przedstawiono dane dotyczące noworodków (żywych, z ciąż pojedynczych) urodzonych między 38. i 42. tygodniem ciąży i masie ciała przekraczającej 2500 g.

Otrzymane wyniki pozwalają na stwierdzenie, że noworodki płci męskiej są przeciętnie cięższe i dłuższe od noworodków płci żeńskiej. Czas trwania ciąży między 38. a 42. tygodniem wiąże się ze zwiększaniem masy i długości ciała noworodków w kolejnych tygodniach wieku płodowego. Masa i długość ciała noworodków męskich zwiększa się wraz ze zwiększaniem wieku matki.