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*The variability of diameter of the human external iliac artery  
in different periods of pre- and postnatal life*

The external iliac artery is one of two final branches of the common iliac artery. It supplies mostly the lower limb, however topographically belongs to the pelvis. The previous study showed a great variety of the artery length, topography, course and branches (1–3, 6, 7, 9–12), but its proximal (initial) and distal (final) diameters were not studied in details.

The knowledge of its size is important for various clinical purposes, especially in interventional vascular techniques. In spite of modern radiological procedures, such as computer tomography and magnetic resonance, *in situ* dissection is still preferable for morphological studies (5, 7).

The aim of the study was to evaluate diameters of the human external iliac arteries in various periods of life.

MATERIAL AND METHODS

The study was conducted on 220 unfixed human bodies of both sexes, including 110 males and 110 females, aged 7 months of fetal life till 82 years (Table 1, 2). The number of individuals in all the examined groups depended on the material accessibility. The children groups were divided based on the psychosomatic development.

The proximal diameter of the external iliac arteries was measured in the place where the artery arose from the common iliac artery. The distal diameter was measured on the level of the inguinal ligament. All the measurement were done using the linear dimensions calliper with exactitude to 0.1 mm.

The Mann–Whitney U test was employed in statistical analysis. An  $\alpha = 0.05$  ( $p < 0.05$ ) was considered significant

RESULTS

The absolute proximal and distal diameters of the external iliac arteries depended on age (Table 1, 2). The statistical differences were noted between all the examined age groups. The highest changes in both absolute and relative values were found in fetuses, in children in early postnatal period (<9 months of age) and in adults aged 50–59 years. Such results were unrelated to sex and body side.

No statistically significant differences in distal/proximal ratio were also found between the left and the right side, both in males and females (Fig. 1).

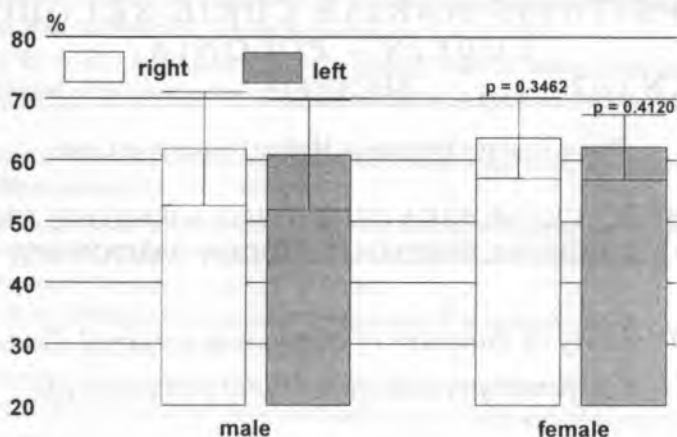


Fig. 1. Distal/proximal ratio of the diameter of external iliac artery in males and females

Table 1. The proximal and distal diameter (mm) of the external iliac artery in males

Age	n	Proximal diameter						Distal diameter					
		right			left			right			left		
		min.	max.	mean	min.	max.	mean	min.	max.	mean	min.	max.	mean
7 m. pr. l.	4	0.6	1.2	0.93	0.5	1.3	0.93	0.4	1.3	0.83	0.5	0.8	0.68
8 m. pr. l.	3	1.3	1.9	1.70	1.0	1.7	1.33	1.0	1.5	1.30	1.1	2.1	1.67
9 m. pr. l.	3	1.4	1.7	1.60	1.8	2.4	2.03	1.2	2.0	1.57	0.8	2.2	1.53
Newborn	10	1.2	2.6	1.71	1.2	2.5	1.82	0.6	2.3	1.54	0.9	2.0	1.39
1-3 m. p. l.	2	2.1	2.1	2.10	2.3	2.9	2.60	1.7	1.9	1.80	1.5	2.1	1.80
4-6 m. p. l.	5	2.0	3.2	2.66	1.7	2.9	2.36	2.0	3.0	2.26	1.8	3.3	2.48
7-11 m. p. l.	3	2.6	3.7	3.13	2.8	3.5	3.17	2.5	2.9	2.70	2.2	2.8	2.40
1-3 years	4	2.4	3.6	3.03	2.8	3.5	3.13	2.5	3.2	2.88	2.1	3.6	2.95
4-6 years	3	4.3	5.1	4.57	3.8	4.7	4.20	3.6	4.4	4.00	3.8	4.3	4.10
7-9 years	3	4.2	5.6	4.87	4.4	5.2	4.77	4.0	4.9	4.43	4.3	5.9	4.77
10-12 years	2	5.1	6.2	5.65	5.2	5.8	5.50	4.7	5.8	5.25	5.5	5.7	5.60
13-16 years	3	6.0	7.1	6.67	6.5	7.0	6.83	5.5	7.0	6.27	5.2	7.2	6.27
17-19 years	5	6.7	8.1	7.18	6.3	9.2	7.66	6.4	7.8	7.08	6.1	8.3	7.32
20-29 years	10	6.4	9.2	7.86	6.5	8.5	7.41	5.9	8.4	6.72	6.2	7.9	6.86
30-39 years	10	7.8	10.2	9.37	8.0	9.6	8.79	7.0	9.4	8.74	6.9	10.0	8.37
40-49 years	10	7.4	10.4	8.69	7.8	9.8	9.01	6.8	9.5	8.01	7.1	9.5	8.53
50-59 years	10	8.6	12.1	10.6	9.3	11.9	11.0	7.7	11.3	9.63	8.7	10.9	10.2
60-69 years	10	8.5	11.6	10.1	8.9	11.2	10.3	7.9	10.9	9.86	8.2	10.6	9.47
≥70 years	10	8.9	12.7	11.1	8.6	13.5	11.3	7.5	12.0	10.4	8.2	11.8	10.1

m. pr. l. – months of prenatal life; m. p. l. – months of postnatal life

Table 2. The proximal and distal diameter (mm) of the external iliac artery in females

Age	n	Proximal diameter						Distal diameter					
		right			left			right			left		
		min.	max.	mean	min.	max.	mean	min.	max.	mean	min.	max.	mean
7 m. pr. l.	2	0.8	0.9	0.85	0.4	1.3	0.85	0.5	1.1	0.80	0.5	0.9	0.70
8 m. pr. l.	6	0.7	1.6	1.30	0.4	2.0	1.25	0.6	1.4	1.03	0.7	1.7	1.18
9 m. pr. l.	2	1.4	2.0	1.70	0.9	1.5	1.20	1.2	2.2	1.70	0.6	1.8	1.20
Newborn	10	1.2	2.9	1.90	0.8	2.7	1.69	0.8	2.5	1.53	1.2	2.2	1.67
1-3 m. p. l.	4	2.1	2.7	2.33	1.8	2.3	2.05	1.5	2.3	1.80	1.0	2.6	1.85
4-6 m. p. l.	3	1.7	2.4	2.17	1.6	3.0	2.47	1.5	3.4	2.43	2.1	2.5	2.37
7-11 m. p. l.	3	2.5	3.8	3.33	2.4	4.0	3.23	2.7	3.1	2.93	2.7	3.3	3.03
1-3 years	6	2.8	3.7	3.07	2.5	3.8	3.02	2.4	3.5	2.82	2.5	3.7	2.90
4-6 years	2	3.7	4.5	4.10	3.8	4.7	4.25	3.5	4.0	3.75	3.3	5.0	4.15
7-9 years	2	4.3	5.6	4.95	4.7	5.6	5.15	4.4	5.1	4.75	4.3	4.8	4.55
10-12 years	3	4.0	6.4	5.33	4.8	5.2	5.03	5.0	5.9	5.30	4.6	5.5	5.03
13-16 years	1	6.1			7.0			5.1			6.7		
17-19 years	6	5.8	8.0	6.92	6.0	7.8	7.07	4.7	6.8	5.88	5.3	7.1	6.50
20-29 years	10	5.2	8.3	6.73	5.8	8.1	6.99	5.4	7.6	6.53	4.9	7.8	6.42
30-39 years	10	6.5	8.6	8.34	6.7	9.8	7.82	5.8	9.0	7.71	5.9	9.3	7.37
40-49 years	10	6.7	9.0	7.79	5.3	8.3	6.74	4.9	8.6	7.20	5.2	7.5	6.34
50-59 years	10	7.9	10.1	8.98	7.6	9.5	8.51	6.7	9.5	8.28	7.0	9.7	7.93
60-69 years	10	7.6	10.5	9.22	8.2	11.4	9.83	6.5	9.7	8.53	6.7	10.6	9.02
≥70 years	10	8.0	11.4	10.1	8.3	10.8	9.55	7.4	10.4	9.14	8.0	9.9	8.82

m. pr. l. – months of prenatal life; m. p. l. – months of postnatal life

## DISCUSSION

According to Adachi (1) the mean diameter of the external iliac artery is between 5 to 8 mm in adult. However, Bochenek (3) indicated that the artery dimension is about 10 mm, while Luzsa (7) pointed only to 6.8 mm with deviation of 4 to 10 mm. In Poirier's study (8) and Schroeter's one (10) the diameter was 12-13 mm and 9.6 mm, respectively. Testut (11) was the only author who evaluated the sex differences. The diameter in man was 7 mm, whereas in woman – 6.5 mm. Unlike all the above cited authors, Buxton et al. (4) studied the proximal (7.1 mm) and distal (6.8 mm) diameter of the artery. Similar to our studies, none of the authors revealed differences between the right and the left side. Adachi (1) and Bochenek (3) suggest that side-differences are not clinically important in adults. Unlike, in the common and internal iliac arteries, such differences are also not visible in fetuses and newborns.

Some authors affirm that in adults the external iliac artery has a wider diameter than the internal one. The higher dimension of the internal iliac artery was noted in early fetal life in which the artery was the main continuation of the common iliac artery (1, 3, 7, 9, 12). Anson (2), as well as Johnston in *Gray's Anatomy* (6) reported that in prenatal period the external iliac artery has a twice smaller diameter than that of the internal iliac artery.

In conclusion, it could be stressed that the proximal and distal diameters of the external iliac artery depend exclusively on age but not on sex or body side.

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#### SUMMARY

The aim of the study was to evaluate diameters of the human external iliac arteries in various periods of life. The study was conducted on 220 unfixed human bodies of both sexes, aged 7 months of fetal life till 82 years. The proximal diameter of the external iliac arteries was measured in the place where the artery arose from the common iliac artery. The distal diameter was measured on the level of the inguinal ligament. The absolute proximal and distal diameters of the external iliac arteries depended on age. The statistical differences were noted between all the examined age groups. The highest changes in both absolute and relative values were found in fetuses, in children in early postnatal period (<9 months of age) and in adults aged 50–59 years. Such results were unrelated to sex and body side.

#### Zmienności średnicy początkowej i końcowej tętnicy biodrowej zewnętrznej u ludzi w okresie pre- i postnatalnym

Celem pracy była ocena średnicy początkowej i końcowej tętnicy biodrowej zewnętrznej u ludzi w różnych okresach życia. Badania przeprowadzono na 220 nieformalizowanych zwłokach ludzkich w wieku od 7 miesiąca życia płodowego do 82 roku życia. Średnicę początkową i końcową mierzono odpowiednio w miejscu odejścia naczynia od tętnicy biodrowej wspólnej oraz na wysokości więzadła pachwinowego. W badaniach wykazano, że wymiary bezpośrednie naczynia

zależały od wieku osobniczego. Statystycznie istotne różnice obserwowano między poszczególnymi grupami wiekowymi. Największe różnice zarówno w wymiarach bezpośrednich, jak i pośrednich obserwowano u płodów oraz u dzieci do dziewiątego roku życia, a także u osobników starszych w wieku 50–59 lat. Obserwowane różnice nie zależały od płci i strony ciała.