American Journal of Bioscience and Clinical Integrity
https://biojournals.us/index.php/AJBCI
ISSN: 2997-7347

The Prevalence of Different Blood Pressure Levels among Adolescents and Young Adults Depending on their Body Weight

Xashimova Zamira Maxmudjanovna
Assistant, Department of Pediatrics, Faculty of Advanced Medical Education, Andijan State Medical Institute

Mamasoliyev Nematjon Soliyevich
Doctor of Medical Sciences, professor, Head of the Department of Internal Medicine, Faculty of Advanced Medical Education, Andijan State Medical Institute

Tursunov Xatam Xasanboyevich
Doctor of Medical Sciences, Professor, Department of Internal Medicine, Faculty of Advanced Medical Education, Andijan State Medical Institute

Kurbanova Rano Rustambekovna
Candidate of Medical Sciences, Associate Professor, Department of Internal Medicine, Faculty of Advanced Medical Education, Andijan State Medical Institute

Received: 2024, 15, Sep
Accepted: 2024, 21, Sep
Published: 2024, 04, Oct

Annotation: Objective: To study the prevalence of various blood pressure (BP) levels among adolescents and young adults depending on their body weight.

Materials and methods: The study involved 2502 participants, including 1371 adolescents and 1131 young adults. Participants were divided into groups based on their body weight: normal weight, overweight, and obesity. Blood pressure was measured using standard methods, and the results were classified according to international guidelines. Statistical analysis was conducted to identify the relationship between body weight and BP levels.

Results: The results showed that elevated blood pressure is more common among adolescents and young adults with overweight and obesity compared to those with normal weight. The frequency of hypertension was significantly

higher in the overweight and obesity groups.

Conclusion: Body weight is a significant risk factor for the development of arterial hypertension among adolescents and young adults. Measures to control body weight are necessary to reduce the risk of hypertension in this age group.

Keywords: normal blood pressure, adolescents, young adults, overweight, obesity.

Introduction. Arterial hypertension, also known as hypertension, is characterized by a persistent increase in blood pressure above the age norm. According to numerous studies, it is one of the most common diseases among adults, often leading to impaired heart function, myocardial infarction, and strokes. The leading risk factors for the development of hypertension are physical inactivity (44%), overweight (36.5%), and harmful habits such as early alcohol consumption and smoking (5.5%). In children and adolescents, elevated blood pressure is usually functional and reversible, associated with impaired neurovegetative self-regulation. According to statistical data, the prevalence of hypertension among children and adolescents ranges from 1% to 14%. This issue remains one of the most pressing in the field of pediatric cardiology.

According to the literature, the most studied risk factor for arterial hypertension in children and adolescents is obesity, which remains a global problem for science and healthcare [1]. The study by Kochetova O.V. and co-authors (2022) showed that the leptin receptor gene variant rs 1137100 is associated with obesity in adolescents, while the rs 2167270 variant of the neuropeptide Y gene is linked to their eating behavior [2]. According to WHO and foreign researchers, the prevalence of BMI and obesity among children has significantly increased worldwide over the past deSBPes [3]. In some developed countries, the obesity rate among children aged 6-11 has reached 13%, and according to studies by Chubarova T.V. et al. (2021) and Bocharova O.V. et al. (2020), this condition often persists into adulthood [4, 5].

Moreover, according to the research of foreign scientists Mirza N.M. et al. (2014), Kelsey M.M. et al. (2014), and Gungor N. (2014), childhood obesity can lead to the development of components of metabolic syndrome, such as abdominal obesity, dyslipidemia, insulin resistance, type 2 diabetes, and arterial hypertension [6, 7, 8]. According to Goodarzi M.O. (2018), more than 250 loci associated with body mass index (BMI) have been identified [10]; polygenic obesity is common, while monogenic forms account for less than 5% of all cases [11, 12]. W. Saeed and co-authors (2020) studied the prevalence of metabolic syndrome among schoolchildren in Yemen and noted that children are at risk of obesity, metabolic syndrome, and prediabetes, despite their low detectability. The authors emphasize the importance of early detection of metabolic syndrome and its components, as well as the need for screening and epidemiological monitoring of at-risk children. This is a key step in developing a primary healthcare strategy, which significantly enhances the effectiveness of primary and secondary prevention of metabolic syndrome among children and adolescents [9].

Literature also shows that the prevalence of BMI and obesity among student youth is steadily increasing [14]. WHO repeatedly warns that BMI and obesity continue to be a global health problem: in 2014. 39% of young men (adults over 18 years of age) BMI, 13% obesity. If the existing rates of morbidity growth are maintained, the prevalence of these health disorders among the population is increasing by an average of 8% per year. According to the forecasts of A.V. Vitebskaya et al. (2016) such growth of BMI occurs in childhood and continues in adolescence [14]. Another researcher in Russia, A.V. Starodubova et al. (2012), reported that in this country more than 2.7 million adolescents have BMI, of which 0.5 million are obese. O.M. Drapkina et al.

(2016) and Y.V. Eliseeva in the pathogenesis of BMI and obesity in students highlight the violation of energy balance in nutrition, widespread urbanization, hypokinesia and genetic determinism [15].

Material and methods of research. The object of the study was 1371 adolescents and 1131 students (adolescent age) medics examined in 2021-2023 in Andijan city. The subject of the study was venous and capillary blood, SBP, DBP and pulse pressure, lipid and non-lipid risk factors (hypercholesterolemia, overweight, obesity). We performed general blood analysis and general urinalysis according to generally accepted methods used in general clinical practice. Physical (examination, palpation, percussion and auscultation) and subjective (questioning of passport part, complaints of adolescents on CVD/CVD risk factors) methods of research were used. The content of total cholesterol (mmol/L) and glucose (mmol/L) in venous blood was determined on an autoanalyzer according to generally accepted methods.

Anthropometric measurements were performed, in which the body mass index - "Kettle index" was determined using the formula: body weight (kg)/height (m^2). CVD/AH risk factors were determined and evaluated according to WHO criteria and in accordance with European and American criteria.

The mean values of 2 measurements taken at least 2 minutes apart were taken into account when assessing BP. When assessing office BP (mmHg), American ("new") criteria of AH diagnosis were applied: 1) SBP <120 and DBP <80 mmHg - normal BP;

2) SBP 130-139 and/or DBP 80-89 - AH stage I;

3) BP ≥140/90 mmHg. - Stage II AH.

European ("old") criteria for the diagnosis of AH were also used:

1) AH was diagnosed when SBP ≥140 and/or DBP≥90;

2) High normal BP (pre-hypertension) was diagnosed when SBP 130-139 or DA 85-89 mmHg;

3) Normal BP-diagnosed at SBP 120-129 and DBP 85-89 mmHg;

4) Optimal BP - diagnosed at SBP <120 and DBP <80 mm.Hg;

5) Isolated systolic AH-diagnosed when SBP≥140 mm.Hg and DBP <90 mm.Hg;

6) Pulse pressure was taken as elevated when the difference between SBP and DBP ≥ 60 mm.hg.

The diagnosis of arterial hypertension in adolescents (under 18 years of age) was based on BP measurements against 90th-95th percentile values for age, sex, and height:

1) Normal BP: mean SBP and/or DBP ≥ 90th percentile for specific age, sex, and height;

2) High normal BP: mean SBP and/or MAP ≥90th percentile but <95th percentile;

3) Arterial hypertension: mean SBP and/or MAP ≥95th percentile for a given age, sex, and height.

Overweight (BMI) was recorded when Kettle's index values calculated by the formula: weight(kg)/height(m2), ≥ 25, and IR levels ≥30 were taken as obesity. Arterial obesity was detected when waist circumference was ≥94 cm in men and ≥80 cm in women (when indicated).

Table 1 summarizes the prevalence of NBP and AH according to European criteria in the adolescent population as a function of body weight .

Table 1. Prevalence of normal blood pressure and arterial hypertension according to european criteria in a population of adolescents according to body weight.

№	Blood pressure readings		Weight of adolescent students								Total (n=1371)		RR	95% CI	χ^2	P
			Low (n=458)		normal (n=827)		Excess (n=63)		Obesity (n=23)							
			n	%	n	%	n	%	n	%	n	%				
1	Normal blood pressure	SBP<140	454	99,1	814	98,4	33	52,4	10	43,5	1311	95,6	1,973	1,597 - 2,438	6,302	<0,001
		DBP <90	454	99,1	814	98,4	40	63,5	11	47,8	1319	96,2	1,664	1,396 - 1,982	5,697	<0,001
2	Arterial hypertension I	SBP≥140	4	0,9	5	0,6	22	34,9	8	34,8	39	2,8	0,020	0,009 - 0,040	10,755	<0,001
		DBP ≥90	4	0,9	10	1,2	14	22,2	7	30,4	35	2,6	0,044	0,023 - 0,084	9,522	<0,001
3	Arterial hypertension II	SBP≥160	0	0,0	8	1,0	8	12,7	5	21,7	21	1,5	0,041	0,017 - 0,096	7,327	<0,001
		DBP≥100	0	0,0	3	0,4	9	14,3	5	21,7	17	1,2	0,014	0,004 - 0,049	6,776	<0,001

As can be seen from the data in Table 1, the prevalence of SBP (<140 mmHg) and DBP (<90 mmHg) at different levels of body weight was: at low body weight (LMT) - 99.1% and 99.1% each, at normal body weight (NormT) - 98.4% and 98.4% each.) at different levels of body weight were: at low body weight (LBW), 99.1% and 99.1% each, at normal body weight (NBW), 98.4% and 98.4% each, at overweight (OBW), 52.4% and 63.5% each, and at obesity, 43.5% and 47.8% each, respectively [RR=1.573; 95% Cl=1.597-2.438; $\chi 2$=6.302; P<0.001 for SBP<140 mmHg. Hg; RR=1.654; 95% Cl=1.396-1.982; $\chi 2$=5.697; P<0.001 at SBP<90 mmHg].

Normal SBP and DBP were observed in adolescents with prevalence rates of 95.6% and 96.2%, respectively.

n the population of adolescents AH of I degree was determined with the frequency of detection at the levels of -2.8% (SAH) and 2.6% (DAH) In adolescents with low, normal and overweight body mass, as well as with obesity, the frequency of detection of SAH of I degree (SBP≥140 mm. Hg) of first-degree DAH (DBP ≥90 mmHg) was 0.9% and 5%, 0.6% and 22%, 34.9% and 8%, 34.8% and 39%, respectively [RR=0.020; 95% Cl=0.009-0.040; $\chi 2$=10.755; P<0.001 for first-degree SAH; RR=0.044; 95% Cl=0.023-0.084; $\chi 2$=9.522; P<0.001 for first-degree DAH].

Grade II AH in the studied population of adolescents was detected with prevalence rates of -1.5% (SBP≥160 mmHg and 1.2% (DBP≥100 mmHg). In NMT, NorMT, IsMT, and obesity, grade II SAH and grade II DAH were defined with the following prevalence levels, respectively: 0.0% and 0.0%, 1.0% and 0.4%, 12.7% and 14.3%, 21.7% and 21.7%, and 21.7% [RR=0.011; 95% Cl=0.017-0.096; $\chi 2$=7.327; P<0.001 for grade II SAG; RR=0.014; 95% Cl=0.004-0.049; $\chi 2$=6.776; P<0.001 for grade II DAG].

Table 2 presents the results of statistical analysis to estimate the prevalence of NAD and AH in the adolescent population as a function of body weight according to European (“old”) criteria.

Table 2. Prevalence of normal blood pressure and AH according to European criteria as a function of body weight in young men.

№	Blood pressure readings		Weight of adolescent students								Total (n=1131)		RR	95% CI	χ^2	P
			Low (n=208)		normal (n=829)		Excess (n=87)		Obesity (n=7)							
			n	%	n	%	n	%	n	%	n	%				
1	Normal blood pressure	SBP<140	189	90,87	725	87,45	68	78,16	4	57,14	986	87,18	1,150	1,026 - 1,289	2,414	<0,05
		DBP <90	182	87,50	721	86,97	68	78,16	4	57,14	975	86,21	1,136	1,014 - 1,274	2,202	<0,05
2	Arterial hypertension I	SBP≥140	15	7,21	68	8,20	13	14,94	1	14,29	97	8,58	0,537	0,317 - 0,908	2,316	<0,05
		DBP ≥90	20	9,62	66	7,96	13	14,94	1	14,29	100	8,84	0,569	0,337 - 0,961	2,108	<0,05
3	Arterial hypertension II	SBP≥160	4	1,92	36	4,34	6	6,90	2	28,57	48	4,24	0,453	0,218 - 0,939	2,127	<0,05
		DBP≥100	6	2,88	42	5,07	6	6,90	2	28,57	56	4,95	0,543	0,265 - 1,115	1,662	>0,05

In young men, the prevalence of NAD-normal SBP (<140 mmHg) and DA (<90 mmHg) was 87.18% and 86.21%, respectively.

Depending on the body weight of young men, the detection rate of normal systolic and diastolic BP was respectively: at NMT-90.87% and 87.50%, at NorMT-87.45% and 86.97%, at IzMT-78.16% and 78.16%, at obesity-57.14% and 57.14% [RR=0.150; 95% Cl=1.026-1.289; $\chi 2$=2.414; P<0.05 for SBP <140 mm.Hg. Hg; RR=0.136; 95% Cl=1.014-1.274; $\chi 2$=2.202; P<0.05 when SBP <90 mmHg].

According to the European criteria in the surveyed population of male students AH I degree - SAH (SBP ≥140 mmHg) and DAH I degree (DA ≥90 mmHg) were detected with the following frequency of prevalence: at NMT - 7% and 9.62%, at NorMT - 8.20% and 7.96% each.) were detected with the following prevalence rates: 7.21% and 9.62% in NMT, 8.20% and 7.96% in NormT, 14.94% and 14.97% in IsMT, and 14.21% and 14.29% in obesity, respectively [RR=0.537; 95% Cl=0.317-0.908; $\chi 2$=2.316; P<0.05 for SBP ≥140 mmHg; RR=0.537; 95% Cl=0.317-0.908; $\chi 2$=2.316; P<0.05 for SBP ≥140 mmHg. Hg; RR=0.569; 95% Cl=0.337-0.916; $\chi 2$=2.108; P<0.05 for SBP ≥90 mmHg].

Conclusion. The results of our observations show that in young men with grade II arterial hypertension (AH) the incidence of the disease increases with increasing body weight. At low body weight, cases of AH are less frequent than at normal body weight. Overweight increases the incidence of AH, and obesity has the highest prevalence. In general, in the population of young men, the prevalence of AH degree II increases with increasing body weight.

REFERENCES

1. Bocharova O.V., Teplyakova E.D. Obesity in children and adolescents is a public health problem of the XXI century//Kazan Medical Journal.-2020.-T.101.-#3.- pp.381-388.DOI: https://doi.org/10.17816/KMJ2090-381.
2. Diagnosis, treatment and prevention of arterial hypertension in children and adolescents. Methodical recommendations. - Moscow. - 2009.-c.6.
3. Kochetova O.V., Shangareeva Z.A., Viktorova T.V. et al. Association of gene variants LEP rs2167270, LEPR rs11371100, GHRL rs696217, rs27647 and NPY rs 16147- obesity and eating behavior of adolescents: a case-control study //Voprosy sovremennoi pediatria.-2022.-Volume 21.-#3.-p.242-252. https://doi.org/10.15690/vsp.v21i3.2428.

4. Chubarov T.V., Bessonova A.V., Zhdanova O.A. et al. Risk factors of obesity development in different periods of childhood// Obesity and Metabolism.- 2021. - T. 18. - №2. - P. 163-168 doi: https://doi.org/10.14341/omet 12756.Mirza N.M., Yanovski J.A. Prevalence and Consequences of Pediatric Obesity //Handbook of obesity: Epidemiology etiology, and physiopathology. Boca Raton.FL:Taylors Francis Lid.:2021.-PP.56-73.
5. Di Cesare M., Soric M., Bovet P. et al. The epidemiological burden of obesity in Childhood: a worldwide epidemic requiring urgent action//BMC Med.-2019;17(1):212. DOI: https://doi.org/10.1186/s12916-019-1449-8.
6. Gungor N.K. Overweight and obesity in children and adolescents// J Clin Res Pediatr Endocrinology - 2014; 6 (3): 129-143. DOI: https//doi.org/10.4274/jcrpe.1471.
7. Kelsey M.M., Zaeptel A., Bjornstad P. et al. Age related consequences of Childhood obesity//Gerontology. - 2014; 60 (3); 223-227. DOI: https//doi.org/10.1059/000356023.
8. Saeed W., Al – Habori M., Saif – Ali R., Al – Arejani E. Metabolic Syndrome and Prediabetes Among Yemeni School-Aged Chilaren // Diabetes Metab Syndr Obes. – 2020: 13: 2563-2572. DOI: https://doi:org/10.2147/DMSO. S 260-131.
9. Goodarzi M.O. Genetics of obesity: what genetics association studies have taught us about the biology of obesity and its complication//the Lancet Diabetes Endocrinal. - 2018; 6(3):223-236. DOI: https//doi.org/10.1016/S2213-8587(17)30200-0.
10. Locke A.E., Kahali B., Berndt S.I. et al. Genetic studies of body mass index yield new insights for obesity biology//Nature. - 2015; 518 (7538): 197-206. DOI: https//doi.org/10.1038/nature14177.
11. Peterkova V.A., Bezlepkina O.B., Bolotova N.V. et al. Obesity in children: Clinical recommendations//Problems of endocrinology.-2021.-T.67.-No.5.- pp.67-83. doi: https://doi.org/0.14341/probl12802
12. Vitebskaya A.V., Pisareva E.A., Topovich A.V. Lifestyle of children and adolescents with obesity. Results of questionnaire survey of patients and their parents// Obesity and Metabolism.2016;13(2):33-40. DOI:10.14341/OMET2016233-40.
13. Shulaev A.V., Shikaleva A.A. To the issue of identifying clinical and social predictors of metabolic syndrome in children (literature review)//Public Health and Public Health. - 2021.- № 1(69). -c.14-24.
14. Das R.R., Mangaraj M., Panigrahi S.K. et al. Metabolic Syndrome and insulin Resistance in Schoolchildren From a developing Country. Front. Nutr.-2020; 7: 31. DOI: https://doi.org/10.3389/fnut.2020.00031.
15. Drapkina O.M., Eliashevich S.O., Shepel R.N. Obesity as a risk factor for chronic non-infectious diseases//Russian Cardiology Journal.-2016;6(134):73-79. http://dx.doi.org/10.15829/1560-4071-2016-6-73-79.