Overweight and Obesity Among Children and Adolescents in Al-Muqdadiyah City

Hameed M Majeed (PhD) [1] **and Raya Zaid Ali** (BSc) [2]

Abstract

Background: The obesity of the children, teens, or adults is one of the most serious risks to the health in the twenty first century. It appears widely during the last three decades and this growing distribution of the children obesity has a relationship with the occurrence of the diseases in earlier ages because the obesity has negative effects nearly on the whole body organs and usually causes serious diseases.

Objective: To know the distribution of this epidemic among our children and to have a real picture about the children of the primary schools in Al-Muqdadiyah region.

Patients and Methods: A cross-section study, involved the pupils of the fifth and the sixth stages, the information and the measurements were taken from 633 children (373 males, 260 females) their ages were between 123-144 months, in one month duration (December of 2016), during this period the visits were to 10 primary schools for both genders (four of them in the center of the region and six in the surrounding villages those belong to the region), included the age, weight, height, counting the body mass index, waist circumference, waist to height ratio, systolic blood pressure and diastolic blood pressure in addition to the questionnaire form and the information of the school card.

Results: The percentages of the overweight and the obesity for the males reached 13.6% , 4.07% for the fifth and the sixth stages respectively while for the females they were 10.31% , 6.06% for the fifth and the sixth stages respectively. The percentages of the overweight and the central obesity of the waist circumference for the males were 4.2% , 0.81% for the fifth and the sixth stages respectively while for the females they were 5% , 2.32% for the fifth and the sixth stages respectively. There was an increasing in the percentages of the systolic blood pressure for the males and the females in the fifth and the sixth stages with a decreasing in the percentages of the normal blood pressure for the both genders as they reached for the males to 36.4% , 34.15% in the fifth and the sixth stages respectively, for females 36.98% , 22.73% in the fifth and the sixth stages respectively while the percentages of the normal diastolic blood pressure were 56% , 54.47% for the males in the fifth and the sixth stages, for the females were 49.48% , 42.42% in the fifth and the sixth stages respectively.

Conclusion: The rate of the elevated systolic and diastolic blood pressure are high among the children that warns the occurrence of the health casualties in the future.

Key words: Overweight, Obesity, Children of the primary schools, Al-Muqdadiyah.

Corresponding Author: drhameed 326 @ gmail.com

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[1,2] Department of Education for Pure Science-University of Diyala- Diyala -Iraq.

Introduction

Obesity is defined as the increase in the body fat and the adipose tissues, usually defined by body mass index (BMI) which is a mathematical equation as it is the result of dividing the weight (kilogram) on the body height (squared meter), it (kg/m2) [1]. The centers for diseases control define the overweight of the children and teens as it is the increase in the percentages of the body mass index which is between 85th - below 95th and the obesity as it is the measurements of the body mass index of more than 95th for the same age and gender [2].

The obesity of the children, teens and adults is considered as one of the most risky implications to the public health in the twenty first century as the wide distribution of the obesity among the children is increased largely during the last three decades [3]. The overweight and the obesity in childhood are distributed worldwide from 4.2% in 1996 to 6.7% in 2010, the overweight percentage of the Africa reached 8.5% and of Asia 4.9% [4], and there is an expectance that in the 2035 year there will be an increase in the average of the distribution of the coronary heart diseases among the obese persons in an average between 5-16 cases from each 100000 cases of obesity among the adults[5]. The obesity is a phenomena described by several pathological conditions due to the plurality of its developmental factors [6], it is considered as an inflammatory condition of low grade in the body because it leads to production of adipokines from the adipose tissue include the Plasminogen Activator Inhibitor (PAI _ 1) and Leptin which lead to decrease the level of the Adiponection which is an anti-inflammatory and that leads to several pathological conditions [7].

The studies showed that there was a relationship between the central obesity of the children and the occurrence of metabolic cardiovascular diseases in the future; therefor several countries did examinations for the school children especially for the fourth, fifth and sixth stages for the ages (9-11 years) that to prevent the obesity and the central obesity [8].

The waist height to ratio (WHtR) is considered as an indicator about the existence of the central obesity among the children and teens and has an ability to define the risks of the coronary heart diseases [9].

Freedman and others, study which was on the American children (5-12 years) found that there was a positive relationship between the levels of the systolic and diastolic blood pressure and the body mass index [10]. According to The Fourth Report on the Diagnosis, the prehypertension is defined as the levels of the systolic blood pressure (SBP) or diastolic blood pressure (DBP) between 90th and 95th for the gender, age and height or if the systolic blood pressure was more than 120 mmHg and the diastolic blood pressure was more than 80 mmHg [11].

The children obesity has a relationship with several diseases and deaths in adulthood such as the diabetes type 2,

hypertension, hypercholesteremia, cardiovascular diseases, stroke, arthritis [12], and the cancers of the colon, breast, gallbladder and the endometrium [1], that the children obesity must be treated and subside the fears those threaten the public health [13].

Patients and Methods

The study involved the pupils of the fifth and the sixth stages within Al-Muqdadiyah region-Diyala, the information and the measurements were taken from 633 children (373 males, 260 females) their ages were between 123-144 months, in one month duration (December of 2016), during this period the visits were to 10 primary schools for both genders (four of them in the center of the region and six in the surrounding villages those belong to the region), all pupils of the one class were selected for recording the age, weight, height, counting the body mass index, waist Circumference (WC), waist height to ratio, systolic blood pressure and diastolic blood pressure in addition to the questionnaire form and the information of the school card.

Anthropometric measurements

The anthropometric measurements of the pupils were measured by tape measure tool for the height (the pupils stood on the ground and the height from head to toe was measured) and waist circumference measurements (below the last rib level or at the umbilicus level), balance apparatus for the body weight (kg) measurement by putting it on the ground and the pupil stood straightly on it and the body mass index of the pupils was counted for both genders (males and females) by using the following equation: [14]

Body mass index = weight (kg) /height (m2)

Also the waist to height ratio of the pupils was counted for both genders (males and females) according to the following equation: [15]

Waist height to ratio = waist circumference (cm) /height (cm).

Blood pressure measurement

The sphygmomanometer was used for the systolic and diastolic blood pressure (mmHg) measurement by fitting the left arm to a solid stent and rolling the cuff around the arm and inflated it to cover 70% of the arm, near the elbow.

Statistical Analysis

The results were statistically analyzed using (Independent - Samples T Test) analysis and application of SPSS program version 20. A P value < 0.05 was considered statistically significant.

Results

The present study measures the body mass index, waist circumference, waist to height ratio, classified according to Centers for Disease Control (CDC) and Prevention to underweight, natural, overweight and obesity and systolic and diastolic blood pressure classified according to The Fourth Report on the Diagnosis.

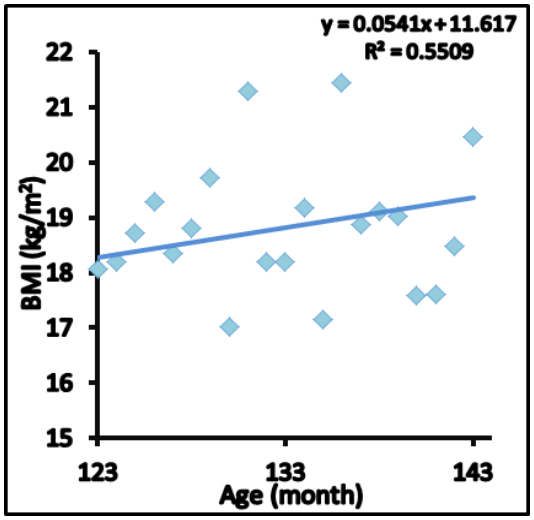
The table (1) shows mean anthropometric measurement values and systolic and diastolic blood pressure in both males and females.

The mean BMI, WC, WHtR, SBP, SDP were [(18.79 ± 5.13) , (18.38 ± 4.07)] kg/m2, [(67.02 ± 9.28) , (66.10 ± 8.10)] cm, [(0.47 ± 0.06) , 0.46 ± 0.05)] , [(117.86 ± 17.02) , (124.32 ± 18.48)] mmHg, [(70.95 ± 13.07) , (74.02 ± 13.62)] mmHg respectively in fifth stages males and females. The mean BMI, WC, WHtR, SBP, SDP were [(18.60 ± 3.91) , (19.04 ± 4.68)] kg/m2, [(66.67 ± 8.89) , (69.20 ± 10.05)] cm, [(0.46 ± 0.05) , (0.47 ± 0.07)] , [(120.39 ± 19.25) , (124.80 ± 19.73)] mmHg, [(72.95 ± 13.08) , (76.89 ± 15.84)] mmHg respectively in sixth stages males and females. There were not significant differences between males and females in the measurements, values but there were only in the systolic blood pressure values at significant level (P value < 0.05).

Table (1): Comparison of anthropometric measurements, systolic and diastolic blood pressure between male and female.

Measures	Stages \ Age (month)	Male		Female	
		Number	Mean ± SD	Number	Mean ± SD
Age (month)	Fifth (123-136)	250	130.13 ± 3.87	194	129.48 ± 3.97
	Sixth (136-144)	123	139.58 ± 1.82	66	139.76 ± 2.51
BMI (kg/m^2)	Fifth (123-136)	250	18.79 ± 5.13	194	18.38 ± 4.07
	Sixth (136-144)	123	18.60 ± 3.91	66	19.04 ± 4.68
WC (cm)	Fifth (123-136)	250	67.02 ± 9.28	194	66.10 ± 8.10
	Sixth (136-144)	123	66.67 ± 8.89	66	69.20 ± 10.05
WHtR	Fifth (123-136)	250	0.47 ± 0.06	194	0.46 ± 0.05
	Sixth (136-144)	123	0.46 ± 0.05	66	0.47 ± 0.07
SBP (mmHg)	Fifth (123-136)	250	117.86 ± 17.02	194	124.32 ± 18.48
	Sixth (136-144)	123	120.39 ± 19.25	66	124.80 ± 19.73
DBP (mmHg)	Fifth (123-136)	250	70.95 ± 13.07	194	74.02 ± 13.62
	Sixth (136-144)	123	72.95 ± 13.08	66	76.89 ± 15.84

*SD: Standard deviation. BMI: Body mass index, WC: Waist circumference, WHtR: Waist height to ratio, SBP: Systolic blood pressure, DBP: Diastolic blood pressure.



Figure(1): BMI for Age(month) in males

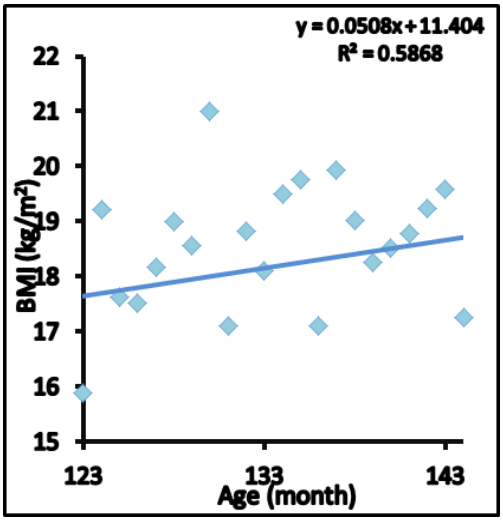


Figure (2): BMI for Age(month) in females.

The table (2) refers to the percentages of the overweight and obesity according to the body mass index for the males of the fifth and the sixth stages which reached (9.6% , 4%) , (2.44% , 1.63%) respectively while the percentages of the overweight and obesity for the females of the fifth and the sixth stages reached (6.7% , 3.61%) , (3.03% , 3.03%) respectively.

Table (2): The percentages of overweight and obesity distribution among the primary schools' pupils according to the body mass index measurement.

Male									
Stages/Age(month)	No.	Mean	% U.w.	Mean	% Natural	Mean	% O.w.	Mean	% Ob.
Fifth (123-136)	250	13.81	9.60	17.77	76.80	25.34	9.60	34.73	4.00
Sixth (136-144)	123	14.45	14.63	18.76	81.30	27.99	2.44	34.10	1.63
Female									
Fifth (123-136)	194	12.89	8.25	17.86	81.44	25.33	6.70	29.64	3.61
Sixth (136-144)	66	13.55	10.61	18.78	83.33	29.39	3.03	34.91	3.03

*(%): Percentage, (No.): Number, (U.w.): Underweight, (O.w.): Overweight, (Ob.): Obesity

The table (3) refers to the percentages of the overweight and the central obesity according to the waist circumference for the males of the fifth and sixth stages which reached (6.4% , 2%) , (0.81% , 0.81%) respectively while the percentages of the overweight and the central obesity for the females of the fifth and sixth stages reached (3.61% , 1.03%) , (4.55% , 1.52 %) respectively.

Table (3): The percentages of overweight and obesity distribution among the primary schools' pupils according to the waist circumference measurement.

Male									
Stages/Age(month)	No.	Mean	% U.w.	Mean	% Natural	Mean	% O.w.	Mean	% Ob.
Fifth (123-136)	250	53.49	4.40	65.62	87.20	85.19	6.40	99.56	2.00
Sixth (136-144)	123	53.27	8.13	67.30	90.24	95.30	0.81	120.00	0.81
Female									
Fifth (123-136)	194	52.66	2.58	65.39	92.78	86.04	3.61	94.25	1.03
Sixth (136-144)	66	55.33	4.55	68.05	89.39	94.67	4.55	102.00	1.52

* Percentage, (No.): Number, (U.w.): Underweight, (O.w.): Overweight, (Ob.): Obesity :(%)

The table (4) refers to the percentages of the overweight and central obesity according to the waist to height ratio for the males of the fifth and the sixth stages which reached (18% , 3.2%) , (16.26% , 0.81%) respectively while the percentages of the overweight and central obesity for the females of the fifth and sixth stages reached (10.31% , 0.52%) , (12.12% , 4.55%) respectively.

Table (4): The percentages of overweight and obesity distribution among the primary schools' pupils according to the waist to height ratio measurement.

Male									
Stages/Age(month)	No.	Mean	% U.w.	Mean	% Natural	Mean	% O.w.	Mean	% Ob.
Fifth (123-136)	250	0.35	0.80	0.44	78.00	0.54	18.00	0.66	3.20
Sixth (136-144)	123	0.22	0.81	0.44	82.11	0.54	16.26	0.69	0.81
Female									
Fifth (123-136)	194	0.38	1.20	0.45	87.63	0.55	10.31	0.61	0.52
Sixth (136-144)	66	0.35	1.52	0.45	81.82	0.56	12.12	0.65	4.55

*(%):Percentage,(No.):Number,(U.w.):Underweight,(O.w.):Overweight,(Ob.):Obesity)

The table (5) refers to the percentages of the prehypertension and hypertension according to the systolic blood pressure for the males of the fifth and sixth stages which reached (31.6% , 32%) , (29.27% , 36.59%) respectively while the percentages of the prehypertension and hypertension for the females of the fifth and sixth stages reached (20.62% , 55.67%) , (60.61% , 16.67%) respectively.

Table (5): The percentages of prehypertension and hypertension distribution among the primary schools' pupils according to the systolic blood pressure measurement.

Male							
Stages/Age(month)	No.	Mean	% Natural	Mean	% Prehypertension	Mean	% Hypertension
Fifth (123-136)	250	102.18	36.40	117.23	31.60	135.06	32.00
Sixth (136-144)	123	110.79	34.15	116.75	29.27	132.27	36.59
Female							
Fifth (123-136)	194	100.34	23.71	117.53	20.62	137.05	55.67
Sixth (136-144)	66	98.27	22.73	126.58	60.61	154.55	16.67

*(%): Percentage, (No.): Number.

The table (6) refers to the percentages of the prehypertension and hypertension according to the diastolic blood pressure for the males of the fifth and sixth stages which reached (26% , 18%) , (24.39% , 21.14%) respectively while the percentages of the prehypertension and hypertension for the females of the fifth and sixth stages reached (21.13% , 29.38%) , (28.79% , 28.79%) respectively.

Table (6): The percentages of prehypertension and hypertension distribution among the primary schools' pupils according to the diastolic blood pressure measurement.

Male							
Stages/Age(month)	No.	Mean	% Natural	Mean	% Prehypertension	Mean	% Hypertension
Fifth (123-136)	250	61.79	56.00	76.89	26.00	90.87	18.00
Sixth (136-144)	123	63.19	54.47	78.60	24.39	91.58	21.14
Female							
Fifth (123-136)	194	63.57	49.48	76.63	21.13	89.71	29.38
Sixth (136-144)	66	64.57	42.42	77.00	28.79	94.95	28.79

*(%): Percentage, (No.): Number.

Discussion

The obesity is the main determine to increase the blood pressure in the childhood, the high spread of the fat in the body is an indicator for the some complications those belong to the obesity such as hypertension.

According to the body mass index, the percentage of the overweight and obesity for the males was higher in the fifth stage 13.6% followed by the sixth stage 4.07% while the percentage of the overweight and obesity for females was higher in the fifth stage 10.31% followed by the sixth stage 6.06%. The percentages of the overweight and obesity distribution among the both genders of children according to Global School _ based Student Health Survey, in Pakistan in 2009 were 6.5% and 1% respectively, in Morocco in 2010 were 14.1% and 2.5% respectively, in Syria in 2010 were 21.7% and 5.8% respectively, in Iraq in 2012 were 25.3% and 7.9% respectively, in Egypt in 2011 were 32.5% and 7.0% respectively and in Al-Kuwait in 2011 were 51.4% and 22.7% respectively [16].

The growth and health of the children are affected by the environments, as the city and some of the villages those involved in the study suffered from the wars. The current study shows high percentages of underweight children that because the effect of the negative factors such as a decrease in the physical activity, malnutrition, low economic status and bad psychological condition of the children.

According to the waist circumference, the percentage of the overweight and central obesity for the males was higher in the fifth stage 4.2% followed by the sixth stage 0.81% while the percentage of the overweight and central obesity for the females was higher in the sixth stage 3.04% followed by the fifth stage 2.32%. When a comparison was done between the percentages of the central obesity of the current study children and the study of [17]. which involves the children of China , they reached in the fifth stage 32.6% , 42.7% and in the sixth stage 29.7% , 21.7% for the males and females respectively. The percentages of the obesity in the both stages were very higher than the percentages of the current study. Waist circumference is considered better than the body mass index in the estimation of the visceral adipose tissues and a good indicator for the insulin resistance, hypertension and hyperlipidemia [18].

According to the waist to height ratio, the percentage of the overweight and central obesity for the males was higher in the fifth stage 10.60% followed by the sixth stage 8.54% while the percentage of the overweight and central obesity for the females was higher in the fifth stage 10.82% followed by the sixth stage 8.34%. When a comparison was done between the percentages of the central obesity for the current study children and the study of [19], which involves the children of Britain, they were in the fifth stage 4% , 5% and for the

sixth stage 5.5% , 3% for the males and females respectively. The percentages of the both genders of the fifth stage were higher than the percentages of the both genders of the current study, the percentages of the males in the sixth stage were higher than the percentages of the males of the current study while the percentages of the females were lower than the percentages of the females of the current study. The waist to height ratio linked with the body mass index in the epidemiological studies as an indicator about the central obesity according to the age [12], and has an ability to predict about the risk of fat accumulation in the body since the earlier childhood to the adulthood.

According to the systolic blood pressure, the percentage of the prehyperte nsion and hypertension for the males was higher in the sixth stage 32.93% followed by the fifth stage 31.8% while the percentage of the prehypertension and hypertension for the females was higher in the sixth stage 38.64% followed by the fifth stage 38.15%.

According to the diastolic blood pressure, the percentage of the prehyperte nsion and hypertension for the males was higher in the sixth stage 22.77% followed by the fifth stage 22% while the percentage of the prehypertension and hypertension for the females was higher in the sixth stage 28.79% followed by the fifth stage 25.26%. Freedman and others refer to that the levels of the systolic blood pressure for the children were stable and did not change during 20 years (since 1974 to the 1993) but the levels of the diastolic blood pressure decreased 2 mmHg [10]. Also a study found that a relationship was between the increase in the waist circumference and the increase in the levels of the systolic and diastolic blood pressure [20], while the study of Paradis and others on the children of Canada (6-11 years) found that there was a low percentage of children who have stable or elevated levels of blood pressure; therefor many researches are needed to know the determinants of the blood pressure levels in the children [21].

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References

[1]Sangun Ö ; Dündar B ; Köflker M ; Pirgon Ö and Dündar N. Prevalence of Metabolic Syndrome in Obese Children and Adolescents using Three Different Criteria and Evaluation of Risk Factors. J Clin Res Ped Endo. 2011; 3 (2):70-76.

[2]Centers for Disease Control and Prevention. Childhood Obesity Facts. 2015.

[3]Han JC and Kimm SYS. Childhood Obesity - 2010: Progress and Chall- enges. Lancet. 2010; 375: 1737-1748.

[4] Güngör NK. Overweight and Obesity in Children and Adolescents. J Clin Res Pediatr Endocrinol. 2014; 6 (3): 129- 143.

[5] Bereket A and Atay Z. Current Status of Childhood Obesity and its Associated Morbidities in Turkey. J Clin Res Pediatr Endocrinol. 2012; 4 (1): 1-7.

[6] Lustig RH and Weiss R. Disorders of energy balance. In: Sperling MA (ed) Pediatric Endocri- nology (third edition). Saunders Elsevier, Philadelp- hia. 2008; 788-838.

[7] Masquio DCL ; de Piano A ; Sanches PL ; Corgosinho FC ; Campos RMS ; Carnier J ; da Silva PL ; Caranti, DA ; Tock L ; Oyama LM ; Oller do Nascimento CM ; de Mello MT ; Tufik S and Da ˆmaso AR. The effect of weight loss magnitude on pro- anti- inflammatory adipokines and carotid intima-media thickness in obese adolescents engaged in interdisciplinary weight loss therapy. Clinical Endocrinology. 2013, 79: 55-64.

[8] Fujita Y; Kouda K ; Nakamura H and Iki M. Cut-off Values of Body Mass Index, Waist Circumference ,and Waist to- Height Ratio to Identify Excess Abdominal Fat: Population - Based Screening of Japanese Schoolchildren. J Epidemiol. 2011; 21(3): 191-196.

[9] Sharma AK. ; Metzger D L. ; Daymont C ; Hadjiyannakis, S and Rodd C J. LMs tables for waist - circumference and waist – height ratio Z - scores in children aged 5 - 19 y in nhanes iii: association with cardio - metabolic risks. International Pediatric Research Foundation Inc, 2015; 78 (6): 723 - 729.

[10]Freedman DS ; Goodman A and Berenson GS. Secular Trends in BMI and Blood Pressure Among Children and Adolescents: The Bogalusa Heart Study. Pediatrics. 2012; 130 (1): 159-166.

[11]Guo X ; Li Y; Sun G ; Yang Y ; Zheng L ; Zhang X ; Sun Z; Ma H ; Wan N ; Jiang M ; Li J and Sun Y. Prehy-pertension in Children and Adolescents: Association with Body Weight and Neck Circumference. Intern Med. 2012; 51: 23-27.

[12]Yan J ; Liu L ; Zhu Y ; Huang G and Peter Wang P. The association between breastfeeding and childhood obesity: a meta¬analysis. BMC Public Health. 2014; 1-14.

[13]Attar RZ ; Safdar OY; Ghoneim A ; Alnajjar AA ; Azhar AS and Zaher ZF. Left Ventricular Hypertrophy in Obese Children. J Obes Weight Loss Ther. 2016; 6 (309): 1-7. [14]Burns RD ; Brusseau TA ; Fang Y ; Fu Y and Hannon JC. Establishing Waist - to – Height Ratio Standards from Criterion - Referenced BMI Using ROC Curves in Low - Income Children. Journal of Obesity. 2016; 1-7.

[15]Cintra IP ; Passos MAZ ; Santos LC ; Machado HC and Fisberg M. Waist - to - Height Ratio Percentiles and Cutoffs for Obesity: A Cross-sectional Study in Brazilian Adolescents. J HEALTH POPUL NUTR. 2014; 32 (3): 411- 419.

[16]Lobstein T. Prevalence And Trends Across The World. In M.L. Frelut (Ed.), The ECOG's eBook on Child and Adolescent Obesity. Retrieved from ebook . ecog- obesity . eu. 2015.

[17] Xiong F ; Garnett SP ; Cowell CT ; Biesheuvel C ; Zeng Y ; Long C ; Wang Q ;

Wang D ; Luo Y and Luo S. Waist circumference and waist - to - height ratio in Han Chinese children living in Chongqing, south-west China. Public Health Nutrition. 2010; 14 (1):20-26.

[18] Mushtaq MU ; Gull S ; Abdullah HM; Shahid U ; Shad MA and Akram J. Waist circumference, waist - hip ratio and wais theight ratio percentiles and central obesity among Pakistani children aged five to twelve years. BMC Pediatrics. 2011; 11–105: 1–16 .

[19] Mc Carthy HD and Ashwell MA study of central fatness using waist ¬to - height ratios in UK children and adolescents over two decades supports the simple message - 'keep your waist circum-ference to less than half your height'. International Journal of Obesity. 2006; 30: 988-992.

[20] Choy C ; Chan W ; Chen T ; Shih C ; Wu L and Liao C. Waist circumference and risk of elevated blood pressure in children: a cross- sectional study BMC Publi c Health. 2011; 11 (613): 1–6 .

[21]Paradis G ; Tremblay MS ; Janssen I ; Chiolero A and Bushnik T. Blood pressure in Canadian children and adolescents. Health Reports. 2010; 21(2): 3–9.