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Gender impact on children's knowledge and perceptions regarding cardiovascular disease risk factors: A school-based survey in Greece

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Abstract:

BACKGROUND: Cardiovascular disease (CVD) risk factors are adopted during childhood and adolescence. Health literacy at these ages remains the cornerstone of a healthy adult life. The aim of the study was to examine the role of gender regarding CVD risk factors' awareness and to develop an evaluation tool for the assessment of CVD risk factors' knowledge and perception among children.

METHODS: During the school years 2014–2015 and 2015–2016, 1728 students aged 10–12 years (5th and 6th grade), from 5 Greek cities (including Athens metropolitan area), were enrolled; nearly 45% were boys (participation rate varied from 95% to 100% from school to school). Students and their parents completed an anonymous questionnaire; students' somatometric characteristics were also recorded. Schools were randomly selected. Linear regression models were applied to evaluate the impact of children's gender on knowledge and perceptions about CVD risk factors.

RESULTS: Significant higher percentage of correct answers, among girls compared to boys, was revealed regarding the weekly consumption of legumes, the breakfast weekly consumption, and the effects of soft drinks on health (all $P < 0.05$). As far as CVD risk factors' knowledge, significantly higher percentage of girls than boys also answered that high blood pressure and television viewing are bad for health and particularly for heart-related problems (all $P < 0.05$). Girls had a significantly higher mean score of 0.304 than boys, after adjusting for several confounders ($P = 0.029$).

CONCLUSION: Health education programs should take into account gender differences in children's perception and attitudes toward CVD risk factors, in order to increase awareness of children and eventually reduce CVD risk during adulthood.

Keywords:

Beliefs, cardiovascular disease, gender, knowledge, risk factors

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Introduction

According to the World Health Organization, cardiovascular diseases (CVDs) remain the primary cause of mortality and premature disability, in the western world, and with increasing rates, worldwide. It is estimated that 17.5 million people lost their lives due to CVD during 2012, representing 31% of all deaths, globally.[1,2] One of the main reasons for the CVD epidemic is the increased prevalence of CVD risk factors.[3] More than 75% of all CVDs are attributed to 5 modifiable risk factors such as smoking, alcohol consumption, high blood pressure, high cholesterol levels, and obesity.[4]

Although atherosclerosis makes its appearance in adulthood, it is well

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documented that it has a long asymptomatic phase of development, which starts early in life and more specifically during childhood.[5] The initial pathophysiological changes of atherosclerosis start during childhood and adolescence due to the early exposure of risk factors such as tobacco use, physical inactivity, unhealthy diet, harmful alcohol consumption, and hypertension. These risk factors which are adopted during childhood and adolescence are mainly determined by behavioral patterns, and they often follow every individual up to its adult life.[6,7] Thus, timely interventions toward CVD preventions are of great importance as it is easier to establish desirable behaviors during their onset rather than changing the existent adopted ones.[8] Parents, school communities, health professionals, and public health officials should all promote healthier lifestyles in children and young people, in order to prevent the occurrence of CVD.[9]

Gender has been identified as an important determinant of health behaviors. Although typical CVD risk factors are similar in both women and men, their prevalence differs in both genders.[10] Globally, it is estimated that men smoke five times as much as women do but tobacco use is more hazardous in women. In addition, high blood triglycerides are a serious cause of atherosclerosis in young women but not in young men.[11]

Since the adoption of CVD risk factors originates in childhood, the knowledge and perceptions of children about them emerge as an important issue for the prevention of CVD morbidity and mortality. Moreover, gender, as a key determinant in the prevalence and distribution of CDV risk factors, could play a significant role in the development of a favorable or nonfavorable pattern of CVD risk factors' perceptions during childhood. However, evidence regarding the evaluation of the CVD risk factors' awareness and the role of gender in its development are lacking in the literature. Thus, the present study aimed at (a) the development of an evaluation tool for estimating the level of CVD risk factors' knowledge and perception in children aged 10–12 years old and (b) the assessment of the effect of gender on them.

Methods

Participants and procedure

The survey was conducted in the greater metropolitan Athens area, in Heraklion, the capital city of the island of Crete, and in three main counties of the Peloponnese peninsula (Sparta, Kalamata, and Pyrgos), during the school years 2014–2015 and 2015–2016, so as to achieve the requested sample. A total of 1728 students aged 10–12 years, attending the fifth and sixth school grade, were enrolled in the study. Schools were selected using random sampling from a list provided by the Greek Ministry of Education. In total, 47 schools were selected (32 from Athens, 5 from Heraklion, Crete, 3 from Pyrgos, 2 from Kalamata, and 5 from Sparta, Peloponnese). All children, whose parental consent was obtained, completed an anonymous questionnaire with the assistance of trained field investigators at the school setting. Another questionnaire, assessing parental characteristics, was given to the children, in order to be completed by any of their parents at home. Participation rate varied between 95% and 100% from school to school.

Children and parent questionnaire

Children's questionnaire consisted of a total 53 questions assessing daily activities such as dietary habits, physical activity, knowledge and perceptions of risk factors for chronic diseases, and questions about self-perceptions and stress management. Parental questionnaire consisted of 36 general questions. A team of experts in the field of CVD epidemiology, public health, and children's psychology and school performance was involved in the development of the questionnaires. In particular, children's questionnaire included questions about (a) demographic characteristics (age, gender, place of residence, nationality, number of siblings, and birth order), (b) anthropometric characteristics (height, weight (for body mass index calculation) and waist circumference (using scale and tape measure over the skin-tight clothes), and (c) knowledge and perception of the CVD risk factors (diet, physical activity, lifestyle habits, hypertension, hypercholesterolemia, and hypertriglyceridemia).

Parent's questionnaire included questions about (a) family demographic characteristics (place of residence and nationality) and (b) family socioeconomic status (parental marital status, annual income, educational level, and employment status). Specifically, annual family income was classified into four categories: (a) <12.000€, (b) 12.000–18.000€, (c) 18.000–24.000€, and (d) >24.000€. Occupational status was divided into the following categories: civil servant, private employee, pensioner, unemployed, and housekeeping (only for mothers). Finally, marital status was recorded into two categories: (a) single (widowed, divorced, and unmarried) and (b) married/cohabitants. For the present analysis, educational level was classified as primary-secondary (up to 12 years of school) and tertiary (>12 years of school and academic level). The certain classification is regulated by the Greek Ministry of Education, Research and Religious Affairs.

Children's knowledge and perception evaluation on daily lifestyle habits and cardiovascular disease risk factors

For evaluating "considered" knowledge, children were asked, in closed questions, to report according

to their knowledge and beliefs: the optimal frequency of involvement in physical activities, the optimal consumption of certain foods, and beverage intake per week (i.e., meat, fish, fruits/vegetables and legumes, bottle juice, and sport drinks compared to fresh juice), their beliefs about eating habits and behaviors (i.e., number of meals per day, the duration of a meal should have, the importance of breakfast, and the role of hydration), as well as the risk factors that may originated even in childhood (i.e., obesity, smoking, unhealthy diet, alcohol consumption, and inactivity), in a 5-point Likert-type scale from very bad to very good.

Development of a scale for the assessment of children's knowledge and perceptions on cardiovascular disease risk factors

For the assessment of children's knowledge and perceptions on CVD risk factors, which was the main goal of the survey, a specific instrument was developed. Study investigators performed content analysis on the original 53 items of the children's questionnaire and resulted in 20 items with the most discriminating value for the evaluation of their attitude toward CVD risk factors. In addition, the final 20 items reflect the most updated recommendations and guidelines of the European Society of Cardiology, regarding primary CVD prevention.[12] These items were assessing various children's aspects of knowledge and perceptions about CVD risk factors in the domains of nutrition, physical activity, and other lifestyle factors. The range of answers for these items was further evaluated, according to the extent of agreement with the most updated reported associations with CVD. Each item's answer was recorded as 1 if the participant's answer was correct about the positive or negative association of the item with the development of CVD and 0 if it was wrong. Thus, the scale was constructed and consisted of 20 questions (range: 0–20) with higher scores indicating well-informed students on healthy lifestyle habits (0 = none and 20 = excellent).

To further examine the construct validity of the knowledge and perception instrument, exploratory factor analysis (EFA) was performed in the randomly selected sample of 500 observations from the existing study database. This sample size was selected upon literature findings, suggesting that a sample of at least 500 observations is necessary for EFA to result in reliable factors, without estimation problems.[13] The principal components extraction method was used, and the varimax orthogonal rotation method was applied in the extracted factors to facilitate their interpretation. In order to determine the optimal number of factors to retain, the scree-plot "elbow" criterion was used. Scree plot is a graph representing the eigenvalues of the extracted factors, and the "elbow" criterion suggests retaining the number of factors above the inflection point (the point where the graph curve is starting to level off). The analysis revealed good construct properties of the aforementioned proposed score (data not shown here).

Bioethics

The study was approved by the Institute of Educational Policy of the Ministry of Education and Religious Affairs and was carried out in accordance with the Declaration of Helsinki (1989). The research protocol was also approved of by the Harokopio University Bioethics Committee. The school principals, teachers, parents, and students were informed about the aims and procedures of the study. A signed parental consent was obtained before the completion of the questionnaires.

Data analysis

Quantitative variables are presented as mean ± standard deviation for normally distributed variables and as median, otherwise. Categorical variables are presented as absolute and relative frequencies. The association among gender and categorical variables was investigated using Chi-square Pearson's statistical test of independence or Student's *t*-test, for normally distributed continuous variables. In order to assess the effect of gender on the knowledge and the perceptions about CVD risk factors, multiple linear regression was applied using knowledge and perception score as dependent, gender as the main independent factor, and child's age and paternal and maternal educational level as confounding factors. The assumptions of linear regression were checked with residual analysis, and absence of multicollinearity was documented with the calculation of a value of variance inflation factor <4 for all the independent variables inserted in the multiple linear model. All tests are two-sided with significance level set to 0.05. The STATA software version 14 (MP & Associates, Sparta, Greece) was used for all statistical analyses.

Results

The study sample consisted of 1728 children, with a mean age of 11.2 (±0.8) years, while 45% were boys (children participation rate varied from 95% to 100% from school to school). Basic characteristics of children are presented in Table 1. It was observed that boys are heavier and have larger waist circumference than girls ($P = 0.035$ and $P < 0.001$, respectively); no differences were observed between other characteristics (all $P > 0.50$) [Table 1].

Moreover, 1190 parents completed the parental questionnaire; of them, 74.8% were mothers and 25.2% were fathers (parental participation rate was 69.4%). The mean father's age was 45.9 (5.4) years and the mean mother's age was 41.5 (4.4) years. Regarding the parental obesity status, 48.4% and 24.7% of the participating fathers and mothers were overweight and 21.6% and 10.6% were

obese, accordingly. Almost the same percentages of parents (83.6% of the fathers and 89.6% of the mothers) had completed secondary- or university-level studies. The vast majority of children (87.5%) were living in two-member families and almost 75% of them residing in their own house. More than half of the families (50.7%) of the study reported annual income >18.000€, while the unemployment rates were lower for men (8.1%) than for women (16.0%).

Table 2 presents the distribution of correct answers in each item of the knowledge and perception instrument among boys and girls. Overall, the mean score was 10.4 (±2.2) for boys and 10.6 (±2.1) for girls (P = 0.105) and the median score was 11 for both boys and girls. Significant differences were observed in 6 out of the 20 items of the research tools. Specifically, girls demonstrated significantly higher percentages of correct responses in the suggested legume (71.4% vs. 66.6% of the boys, P = 0.03). Moreover, more girls than boys reported that children should eat breakfast daily (90.0% vs. 85.2%, P < 0.001) and that soft drinks are unhealthy type of food (88.6% vs. 80.6%, P < 0.001). As far as CVD risk factors' knowledge is concerned, significantly higher percentage of girls than boys also answered that high blood pressure is bad for health (71.5% vs. 66.3%, P = 0.020) and that television viewing is also bad for health and particularly for heart-related problems (97.7% vs. 95.6%, P = 0.015) [Table 2].

Table 1: Children's sociodemographic and other characteristic

Children's characteristics	Boys (*n*=785)	Girls (*n*=943)	*P*
Age (years)*	11.2 (0.74)	11.2 (0.75)	0.743
Weight (kg)*	44.8 (10.3)	43.8 (9.8)	0.035
Height (cm)*	150.9 (11.5)	151.2 (10.7)	0.58
Waist circumference (cm)*	70.9 (11.9)	67.9 (13.2)	<0.001
Number of brothers/sisters*	1.29 (0.75)	1.31 (0.87)	0.677
Birth order (%)			
1st	49.6	51.9	0.816
2nd	39.6	37.0	
3rd or higher	10.8	11.0	
Greek nationality	80.9	81.6	0.698

*Mean (SD). SD=Standard deviation

The results from simple and multiple linear regressions, assessing the effect of gender on the knowledge assessment instrument, adjusted for the effect of several potential confounders are presented in Table 3. Simple linear regression analysis showed that gender did not significantly affect the score. However, when adjusted for children's obesity, parental educational and employment status, as well as the family annual income status, gender revealed its significant effect. Thus, girls had a

Table 2: Percentage of boys and girls who responded correctly in the knowledge and perception instrument

Children's perceptions and knowledge	Boys (*n*=785) (%)	Girls (*n*=943) (%)	*P*
Perception			
Item 1: More than 3 times or 2-3 times per week you think that everyone should eat legumes	66.6	71.4	0.03
Item 2: More than 3 times or 2-3 times per week you think that everyone should eat fish	45.2	40.2	0.035
Item 3: More than 3 times per week you think that we should take exercise	65.9	61.6	0.066
Item 4: Do you think that children should eat breakfast daily	85.2	90.0	<0.001
Knowledge			
Item 5: Sedentary life affects bad or very bad our health	86.5	88.9	0.119
Item 6: Obesity affects bad or very bad our health	93.2	95.0	0.105
Item 7: Consumption of fruit/vegetables affects bad or very bad our health	93.3	94.0	0.517
Item 8: High blood pressure is dangerous for developing health problems	66.3	71.5	0.020
Item 9: Stress is dangerous for developing health problems	69.7	68.3	0.529
Item 10: Soft drinks are unhealthy foods	80.6	88.6	<0.001
Item 11: Young children will develop many or quite a lot of serious health problems as adults when they don't eat healthily or take exercise	80.4	80.1	0.849
Item 12: Children could have high blood pressure	33.6	33.5	0.948
Item 13: Children could have high cholesterol/triglyceride levels in their blood	45.2	45.5	0.927
Item 14: Television viewing is bad for health and especially for heart-related problems	95.6	97.7	0.015
Item 15: Smoking harms the heart	82.9	85.4	0.155
Item 16: Smoking harms blood vessels	30.7	30.6	0.977
Item 17: Eating fast food is bad or very bad for your health	84.6	87.9	0.047
Item 18: Drinking cartooned juices is bad or very bad for your health	51.3	54.5	0.253
Item 19: Snacks containing too much sugar and fats (e.g., chocolate, sweets, crisps) are bad or very bad type of food	91.4	93.4	0.109
Item 20: Adding enough salt to foods is bad or very bad habit	85.5	89.1	0.024

Table 3: Results from linear regression models assessing the association of gender on children's knowledge and perception scale (range 0-20) regarding cardiovascular disease risk factors

Children and family characteristics	Crude model (standardized B)	*P*	Adjusted model (standardized B)	*P*
Gender				
Girl versus boy	0.039	0.105	0.068	0.048
BMI (per 1 kg/m^2)	-	-	0.037	0.276
Paternal educational level (university vs. primary-secondary)	-	-	0.097	0.012
Maternal educational level (university vs. primary-secondary)	-	-	0.027	0.484
Paternal employment status (employed vs. unemployed)	-	-	0.023	0.533
Maternal employment status (employed vs. unemployed)	-	-	0.024	0.505
Family status	-	-	0.009	0.785
Family income status (>18,000€ vs. ≤18,000 €)	-	-	0.043	0.785

All variables were tested for collinearity through VIF criterion and none of them exceeded VIF value of 4 (that denotes presence of collinearity that affects the robustness of the linear regression model). VIF=Variance inflation factor

significant higher mean score (standardized beta = 0.068, $P = 0.048$) than boys, after adjusting for the effect of the aforementioned confounders [Table 3].

Discussion

The certain study is one of the very few observational ones which investigated the knowledge and perceptions of children aged 10–12 years regarding CVD risk factors and the effect of gender on them, using a unique research tool, a score, developed originally for the study. In addition, the certain assessment score enables the examination of possible associations between various children or parental characteristics and children's total perceptions about CVD risk factors. Thus, we provided evidence for differences in the level of CVD risk factors' awareness among boys and girls, which should be considered when public health interventions about the prevention of CVD and the CVD risk factors are developed for children.

Our results showed that the majority of children have a good level of knowledge about many CVD risk factors regarding dietary and lifestyle habits and their consequences in heart's and vessels' health. However, almost half of all the boys and girls of the study reported that children could not have hypercholesterolemia or hypertriglyceridemia. This percentage rose up to 70% for the perception that children could not have hypertension. This evidence demonstrates the lack of knowledge about the risk of two major chronic diseases in childhood, among Greek children. The prevalence of hypertension has been estimated from 2.2% among children aged 8–17 years old up to 3.4% for children between 3 and 18 years of age, and its prevalence is similar to other more noted diseases as "childhood diseases" such as asthma, autism, or congenital CVDs.[14,15] The most common form of hyperlipidemia in children is heterozygous familial hypercholesterolemia, with a reported incidence of 1 out of 300–500 births.[16] Moreover, children who have hypertension or hypercholesterolemia are prone to become hypertensive or hypercholesterolemic adults, which are well-known risk factors for developing CVD.[17]

A major strength of our evidence is the development and use of a unique research tool – the assessment scale – which provided a comprehensive and complete assessment of the level of awareness about CVD risk factors in children aged 10–12 years. Up to date, a lot of research has evaluated the knowledge and attitudes toward CVD risk factors in several population groups among adults using validated instruments.[18-20] However, children have not been previously examined. There are many reports which are focusing mainly on children's and adolescents' weight perception and nutrition knowledge, while very few are assessing more aspects of the CVD risk factors, such as smoking, hypercholesterolemia, or hypertension.[21-23] No golden standard exists for the external validation of the scale with the level of knowledge and attitudes toward CVD risk factor. However, although the choice of the items of the scale was not based on discriminant analysis, the content validation process which was performed by an expert committee and the large original items' repository which was used reassure for the appropriate choice of the scale items. Moreover, the examination of the construct validity of the scale revealed two different latent traits, thus confirming the internal validity of the developed research tool. Summarizing the assessment scale can assess reliably the knowledge and attitudes toward CVD risk factors in children aged 10–12 years and can provide useful insights into children's perspectives about the relation between CVDs and various anthropometric and lifestyle characteristics.

Moreover, it was revealed that adolescent girls had a higher mean score than boys, reflecting a higher level of knowledge and attitudes toward several factors that affect CVD occurrence. This could be attributed to the higher concerns that female adolescents have about their body image as well as the parental information about the role of healthy eating and physical activity in

the body weight management.[24-28] On the other hand, boys seem to respond differently to the sociocultural pressure for the ideal body. Whereas adolescent girls want to be thinner, adolescent boys want to be "bigger," as masculinity is associated with big muscles. This might explain why half of young boys want to gain weight.[29,30] This could misguide boys to unhealthy eating habits, unaware that this leads to a fatter and not to a muscular frame.

Limitations

This study, as an observational one, has some limitations that should be considered. The sample is originated from few parts of Greece, which limits the generalizability of the findings to the entire Greek children's population aged 10–12 years. However, due to the stratified random sampling scheme that was implemented and the large size of the final sample, its representativeness could be considered high. Furthermore, there is a possibility of reporting bias during the completion of the questionnaire by the children in the school setting. However, the presence of a trained investigator throughout the completion of the questionnaire for addressing any potential misconceptions about it increases the validity of the given responses. The questionnaires covered basic information regarding sociodemographic and lifestyle habits, they were developed for the certain study population, and therefore, no cross-cultural adaptation was needed. The score also was developed specifically for the study's purposes and has not been tested for reliability and validity; nevertheless, there are still results that should not be undervalued. However, the construct validity of the score was examined using EFA in a random sample of 500 observations.

Conclusion

The certain study identified gender as an important factor regarding the perceptions and knowledge related to CVD risk factors in children of 10–12 years of age. Using a novel evaluation instrument, the knowledge, and perception assessment scale, girls exhibited higher levels of CVD risk factors' knowledge than boys. Children's understanding about CVD risk factors is important to promote the adoption of the healthy dietary and lifestyle pattern, thus establishing the grounds for a healthy adult life with lessen CVDs. Well-organized health promotion programs that take into account gender differences in the attitudes toward CVD risk factors should be developed to increase awareness and reduce the risk of developing CVD in adulthood.

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Conflicts of interest

There are no conflicts of interest.

References

1. World Health Organization (WHO). Fact Sheet No. 317 Cardiovascular Diseases (CVDs). Updated; 2015. Available from: http://www.who.int/mediacentre/factsheets/fs317/en/. [Last accessed on 2017 Nov 30].
2. Nichols M, Townsend N, Scarborough P, Luengo-Fernadez R, Leal J, Gray A, *et al*. European Cardiovascular Disease Statistics. 2012 edition. European Heart Network AISBL, Brussels, European Society of Cardiology, Sophia Antipolis. Available from: http://www.escardio.org/static_file/Escardio/Press-media/press-releases/2013/EU-cardiovascular-disease-statistics-012.pdf. [Last accessed on 2017 Nov 30].
3. Mendis S, Puska P, Norrving B. Global Atlas on Cardiovascular Disease Prevention and Control. World Health Organization (in Collaboration with the World Heart Federation and World Stroke Organization), Geneva; 2011. Available from: http://www.file:///C:/Users/user/Downloads/9789241564373_eng%20(3).pdf. [Last accessed on 2017 Nov 30].
4. Thom T, Haase N, Rosamond W, Howard VJ, Rumsfeld J, Manolio T, *et al.* Heart disease and stroke statistics-2006 update: A report from the American Heart Association statistics committee and stroke statistics subcommittee. Circulation 2006;113:e85-151.
5. Hong YM. Atherosclerotic cardiovascular disease beginning in childhood. Korean Circ J 2010;40:1-9.
6. McGill HC Jr., McMahan CA, Herderick EE, Malcom GT, Tracy RE, Strong JP, *et al.* Origin of atherosclerosis in childhood and adolescence. Am J Clin Nutr 2000;72:1307S-15S.
7. Natale RA, Messiah SE, Asfour L, Uhlhorn SB, Delamater A, Arheart KL, *et al.* Role modeling as an early childhood obesity prevention strategy: Effect of parents and teachers on preschool children's healthy lifestyle habits. J Dev Behav Pediatr 2014;35:378-87.
8. Mosca L, Barrett-Connor E, Wenger NK. Sex/gender differences in cardiovascular disease prevention: What a difference a decade makes. Circulation 2011;124:2145-54.
9. Mikkola TS, Gissler M, Merikukka M, Tuomikoski P, Ylikorkala O. Sex differences in age-related cardiovascular mortality. PLoS One 2013;8:e63347.
10. Hitchman SC, Fong GT. Gender empowerment and female-to-male smoking prevalence ratios. Bull World Health Organ 2011;89:195-202.
11. Patsopoulou A, Tsimtsiou Z, Katsioulis A, Rachiotis G, Malissiova E, Hadjichristodoulou C, *et al.* Prevalence and risk factors of overweight and obesity among adolescents and their parents in central Greece (FETA project). Int J Environ Res Public Health 2015;13:83.
12. Perk J, De Backer G, Gohlke H, Graham I, Reiner Z, Verschuren M, *et al.* European guidelines on cardiovascular disease prevention in clinical practice (version 2012). The Fifth Joint Task force

of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of nine societies and by invited experts). Eur Heart J 2012;33:1635-701.
13. Comrey AL, Lee HB. A First Course in Factor Analysis. Hillsdale, NJ: Erlbaum; 1992.
14. US Department of Health and Human Services. Heart Disease and Stroke: Objectives; 2017. Available from: https://www.healthypeople.gov/2020/topics-objectives/topic/heart-disease-and-troke/objectives. [Last accessed on 2017 Dec 15].
15. Hansen ML, Gunn PW, Kaelber DC. Underdiagnosis of hypertension in children and adolescents. JAMA 2007;298:874-9.
16. Humphries SE, Whittall RA, Hubbart CS, Maplebeck S, Cooper JA, Soutar AK, *et al.* Genetic causes of familial hypercholesterolaemia in patients in the UK: Relation to plasma lipid levels and coronary heart disease risk. J Med Genet 2006;43:943-9.
17. Berenson GS, Srinivasan SR, Bao W, Newman WP 3rd, Tracy RE, Wattigney WA, *et al.* Association between multiple cardiovascular risk factors and atherosclerosis in children and young adults. The Bogalusa Heart Study. N Engl J Med 1998;338:1650-6.
18. Shaikh RB, Mathew E, Sreedharan J, Muttappallymyalil J, Sharbatti SA, Basha SA, *et al.* Knowledge regarding risk factors of hypertension among entry year students of a medical university. J Family Community Med 2011;18:124-9.
19. Maksimović MŽ, Marinković JM, Vlajinac HD, Maksimović JM, Tomanić MS, Radak DJ, *et al.* Awareness and knowledge of cardiovascular disease risk factors among medical students. Wien Klin Wochenschr 2017;129:458-63.
20. Piwońska A, Piotrowski W, Piwoński J, Kozela M, Nadrowski P, Bielecki W, *et al.* Cardiovascular health knowledge of the polish population. Comparison of two national multi-centre health surveys: WOBASZ and WOBASZ II. Kardiol Pol 2017;75:711-9.
21. Ha SA, Lee SY, Kim KA, Seo JS, Sohn CM, Park HR, *et al.* Eating habits, physical activity, nutrition knowledge, and self-efficacy by obesity status in upper-grade elementary school students. Nutr Res Pract 2016;10:597-605.
22. Shin A, Nam CM. Weight perception and its association with socio-demographic and health-related factors among Korean adolescents. BMC Public Health 2015;15:1292.
23. Ray M, Guha S, Ray M, Kundu A, Ray B, Kundu K, *et al.* Cardiovascular health awareness and the effect of an educational intervention on school-aged children in a rural district of India. Indian Heart J 2016;68:43-7.
24. Hill A. The development of children's body shape concerns. In: Jaffa T, McDermott B, editors. Eating Disorders in Children and Adolescents. New York: Cambridge University Press; 2007. p. 32-44.
25. Koroni M, Garagouni-Areou F, Roussi-Vergou CJ, Zafiropoulou M, Piperakis SM. The stigmatization of obesity in children. A survey in greek elementary schools. Appetite 2009;52:241-4.
26. McCreary D. Gender and age differences in the relationship between body mass index and perceived weight: Exploring the paradox. Int J Mens Health 2002;1:31-42.
27. Truby H, Paxton SJ. The children's body image scale: Reliability and use with international standards for body mass index. Br J Clin Psychol 2008;47:119-24.
28. Clark LA, Tiggemann M. Appearance culture in nine- to 12-year-old girls: Media and peer influences on body dissatisfaction. Soc Dev 2006;15:628-43.
29. Schur EA, Sanders M, Steiner H. Body dissatisfaction and dieting in young children. Int J Eat Disord 2000;27:74-82.
30. McCabe MP, Ricciardelli LA. Body image dissatisfaction among males across the lifespan: A review of past literature. J Psychosom Res 2004;56:675-85.