Risk factors for cardiovascular diseases in adolescents

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Article linked to research: Risk factors for cardiovascular diseases in children and adolescentes from Picos – PI.

Conflicts of interest: none to declare.

Funding: Institutional Program for Scientific Initiation Grants/UFPI/CNPq.

Received date: April 7, 2014.

Approval date: April 15, 2015.

DOI: 10.17533/udea.iee.v33n2a14

How to cite this article: Rodrigues NLA, Lima LHO, Carvalho ES, Vera PVS, Frota KMG, Lopes MVO, et al. Risk factors for cardiovascular diseases in adolescents. Invest Educ Enferm. 2015; 33(2): 315-324.

Risk factors for cardiovascular disease in adolescents

Objective. Identify risk factors for cardiovascular disease in adolescents. **Methodology.** Descriptive cross-sectional study, conducted from May to September 2012, in the public schools of the city of Picos (Piaui State, Brazil). The sample consisted of 320 adolescents 10-19 years. **Results.** As to gender, 60% were female. With regard to blood pressure values, 15.3% of participants had altered blood pressure values (6.9% with hypertension) and, in relation to nutritional status, 15.6% were overweight and 5.3% obese. None of the variables showed statistically significant differences according to sex. Correlation were found between the variables: family history of hypertension with arm circumference and triceps skinfold; maternal education with triceps skinfold thickness and diastolic blood pressure; uptime with body mass index, arm circumference, waist-hip ratio and heart rate; birth weight with body mass index and arm circumference. **Conclusion.** A significant proportion of adolescent respondents had risk factors for cardiovascular disease. Nursing should lead the adoption of interventions that promote the improvement of healthy lifestyle in adolescence, thus avoiding not only cardiovascular disease, but also other chronic diseases that can develop.

Key words: Risk factors; cardiovascular diseases; nursing; adolescent.

Factores de riesgo para la enfermedad cardiovascular en adolescentes

Objetivo. Identificar los factores de riesgo de enfermedad cardiovascular en adolescentes. **Metodología.** Estudio descriptivo de tipo transversal, llevado a cabo entre mayo y septiembre de 2012, en las escuelas públicas del municipio de Picos (Estado de Piauí, Brasil). La muestra estuvo constituida por 320 adolescentes de 10 a 19 años. **Resultados.** El 60% de los participantes era de sexo femenino. El 15.3% de los participantes presentó valores de presión arterial alterados (6.9% con hipertensión arterial). Con relación al estado nutricional, el 15.6 tuvo sobrepeso y el 5.3%

obesidad. En ninguna de las dos variables se observaron diferencias estadísticamente significativas por sexo. Existe correlación entre las variables: historia familiar de hipertensión con la circunferencia del brazo y pliegue tricipital; educación de la madre con el espesor del pliegue cutáneo tricipital y con la presión arterial diastólica; el tiempo de actividad con el índice de masa corporal, la circunferencia del brazo tasa, la relación y el corazón cintura-cadera; el peso al nacer con el índice de masa corporal y la circunferencia del brazo. **Conclusión.** Una proporción importante de los adolescentes encuestados tienen factores de riesgo para enfermedad cardiovascular. Enfermería debe liderar la adopción de intervenciones que propendan por el mejoramiento de los estilos de vida saludables en la adolescencia, previniendo de esa forma, no solo las enfermedades cardiovasculares, sino también otras enfermedades crónicas que pueden ser desarrolladas.

Palabras claves: factores de riesgo; enfermedades cardiovasculares; enfermería; adolescente.

Fatores de risco para doenças cardiovasculares em adolescentes

Objetivo. Identificar os fatores de risco para doenças cardiovasculares em adolescentes. **Metodologia.** Estudo descritivo do tipo transversal, realizado de maio a setembro de 2012, nas escolas públicas do município de Picos (Estado de Piauí, Brasil). A amostra foi composta por 320 adolescentes, de 10 a 19 anos**. Resultados.** Com relação ao sexo, 60% eram feminino. No que diz respeito aos valores pressóricos, 15.3% dos participantes apresentaram valores de pressão arterial alterados (6.9% com hipertensão arterial) e com relação ao estado nutricional, 15.6% apresentaram sobrepeso e 5.3% obesidade, em nenhuma das variáveis se observou diferenças estatisticamente significativas por sexo. Encontrou-se correlação entre as variáveis: antecedentes familiares de hipertensão arterial com circunferência do braço e prega cutânea tricipital; escolaridade materna com prega cutânea tricipital e pressão arterial diastólica; tempo de atividade com índice de massa corporal, circunferência do braço, relação cintura-quadril e frequência cardíaca; peso ao nascer com índice de massa corporal e circunferência do braço. **Conclusão.** Uma proporção importante dos adolescente pesquisados apresentou fatores de risco para doenças cardiovasculares. A enfermagem deve conduzir a adoção de intervenções que promovam a melhoria do estilo de vida saudável na adolescência, evitando assim, não só a doença cardiovascular, mas também outras doenças crônicas que podem ser desenvolvidas.

Palavras chave: fatores de risco; doenças cardiovasculares; enfermagem; adolescente.

Introduction

The circulatory system diseases have represented the first cause of death in Brazil for more than three decades. Although some of its risk factors are known, reducing the cardiovascular morbidity and mortality has not been an easy task, in view of its complexity and the need to start the control of arterial hypertension, smoking, hypercholesterolemia and obesity early. Besides these factors, the World Health Organization proposes the reduction and control of others, such as high alcohol consumption, physical inactivity and inappropriate diet, as part of an integrated approach and in all age ranges.[1]

The cardiovascular diseases (CVD) are an important cause of death in developed and developing countries. In general, the clinical manifestations of CVD start from the middle age onwards. A recent study, however, indicates that the atherosclerotic process starts to develop in childhood. Fatty streaks, the precursors of atherosclerotic plaques, appear in the inner layer of the aorta at the age of three and in the coronary arteries during adolescence.[2] The probability of some CVD increases when multiple established risk factors for atherosclerosis are present. The CVD originate in the presence and/or grouping

of risk factors inherent in the individual (general, behavioral and biological) or in the community (s)he is part of (socioeconomic, environmental, cultural and urbanization conditions). In that sense, childhood and adolescence are characterized as a favorable period for the development of interventionist strategies aimed at fighting the cardiovascular diseases, in view of evidence that these diseases can originate in this period of life. In addition, different biological risk factors acquired in childhood and adolescence tend to persist until adult age, enhancing the risk of morbidity and mortality in adult life.[3]

The demonstration that the cardiovascular diseases can originate in childhood and adolescence entails the need for comprehensive research on these risk factors during that period, with a view to planning increasingly early and possibly more effective interventions in these factors, reducing the morbidity and mortality in the future. In a study undertaken in Santiago de Cuba, involving adolescents between 15 and 17 years of age, prevalence rates of high blood pressure were found corresponding to 7.5% among boys and 2.4% among girls.[4] In another study, the prevalence of hypertension corresponded to 4.3% and of pre-hypertension 1.9% in children and 1.7% in adolescents.[5] In a research developed in Chile, involving adolescents between 15 and 17 years of age, 18.8% suffered from pre-hypertension, 17.3% from stage-1 high blood pressure and 3.1% from stage 2 high blood pressure.[6]

The nurses are the ideal health professionals to coordinate the team to reduce the risk of cardiovascular diseases and be part of multifactorial campaigns in hospitals, outpatient services and community health services. Therefore, they should take interest in and commit to the differences and singularities in patient populations based on age, race, ethnic origin, culture, sociodemographic characteristics and alphabetization. Using health education and their proximity to the community, the nurses play a fundamental role in the prevention and early identification and control of cardiovascular risk factors in the population. In this perspective, the objective in this study was to investigate the risk factors for cardiovascular diseases in adolescents.

Methodology

Descriptive and cross-sectional study in which the risk factors for cardiovascular diseases were investigated in adolescents from the city of Picos (state of Piauí, Brazil). The study was undertaken in 41 public primary and secondary schools in the city. To calculate the sample size, the formula for cross-sectional studies with finite populations was used,[7] resulting in a sample of 320 adolescents. The participants were proportionately selected according to the number of students enrolled in each school, and randomly selected among all adolescents who complied with the eligibility criteria, using the software R.

To participate, the adolescents had to be regularly enrolled and be 10 to 19 years of age. WHO defines this age interval as adolescence.[8] Living in the rural region of Picos, as this hampered the access to the adolescents' parents: and being an adoptive child were considered as exclusion criteria, as some information involved data from the adolescents' biological parents. To collect the data, one form and a questionnaire adapted from another study were used.[1] The form contained information on the adolescent's identification, anthropometrics, dietary habits and physical exercise. The questionnaire contained information on the biological parents' health data and the adolescent's birth history.

What the anthropometric assessment is concerned, the following were identified: weight, length, triceps skin fold (TSF), waist and hip circumference (WC and HC). To measure the height, a metric tape fixed to a smooth wall was used. It was verified with the adolescents standing barefoot, backwards, with their feet joint and parallel, upright and looking ahead, with the support of a rule placed on the participants' head, so as to guarantee the exactness of the measure using the metric tape.[8] The weight was measured

with the individual barefoot and wearing light clothing. Digital portable scales were used with a capacity of 120 kg, a precision level of 0.1 kg and an automatic display switched on through a touch of the foot. The Body Mass Index (BMI) was calculated based on the weight and height levels, defined by calculating the body weight, in kilograms, divided by the squared height in square meters. To classify the nutritional status, the criteria proposed by WHO[9] were adopted, using the indicators BMI/age, height/age, weight/age, according to the Z score. It was classified according to age and gender as extremely thin (< -3 z score), thin (≥ -3 z score and < -2 z score), eutrophic (≥ -2 z score and +1 ≤ z score), overweight (> +1 score z ≤ +2 z score) and obese (> +2 z score).

The arm circumference (AC) was measured was measured using a flexible tape with 0.1cm precision. The place to measure the AC was determined by the midpoint of the distance between the acromion of the scapula and the olecranon. For this measure, the participant remained standing, with the arms relaxed aside the body. For the classification, the parameters described in the literature were used.[10] The triceps skin fold (TSF) was measured on the backside of the arm, at the midpoint between the acromion and the olecranon. A Cescorf scientific adipometer was used with an 0.1 mm precision level. Two verifications were needed to calculate the mean measure. For the sake of classification, the percentiles established by the National Council Health Statistics[11] were used, in which the normality is located between P15 and P85.

To measure the WC and HC, an inelastic and flexible metric tape was used and the measures were verified with the individual standing upright, with a relaxed abdomen, arms aside the body and feet together. To obtain the WC, the tape was firmly placed around the narrowest part of the trunk, between the lower rib and the iliac crest, without excessive pressing or stretching. The HC was measured at the highest point of the buttocks.[12] The waist-hip (WHR) was calculated by dividing WC by HC.

Concerning the hemodynamic data, blood pressure (BP) and heart rate (HR) were verified. The BP was verified using the classical auscultation method, at a quiet room inside the school. The BP measurement followed the procedures recommended in the VI Brazilian Hypertension Guidelines.[13] Cuff sizes appropriate to the adolescents' arm circumference were used. To classify the pressure, the curves to determine the percentile of the adolescent's height according to age and sex were used, as well as the blood pressure percentile table referenced by the V Arterial Hypertension Guidelines.[14] Two measures were taken at a one-minute interval. The arterial hypertension classification was used according to the tables for blood pressure measurement in children and adolescents (male and female). - Normotensive: Blood pressure below the 90 percentile; - Normal/high: Blood pressure between the 90 and 95 percentile; - Arterial hypertension: Blood pressure superior to 95 percentile.[4] The HR was verified through cardiac auscultation for one minute, using a stethoscope located on the mitral focus, in the left fifth intercostal space on the mid clavicle line.

The data were organized in tables and analyzed using descriptive and inferential statistics, based on absolute and percentage frequencies, in central trend and dispersion measures and association tests, Spearman's Rho and Mann-Whitney. In the development of the study, all ethical principles of Resolution 466/12[15] on research involving human beings were followed. The project received due approval from the Institutional Review Board at Universidade Federal do Piauí (CAAE: 0094.0.045.000-11).

Results

In terms of sex, female adolescents were predominant (60%). In the anthropometric characteristics of the male adolescents, as shown in Table 1, the mean age was 13.41 years, the weight 50.75 kg and height 1.59 m. In addition, the median body mass index was 18.84 kg/m^2, systolic blood pressure 100 mm/Hg, diastolic blood pressure 67.5 mm/Hg and mean heart rate 79.66 bpm.

According to Table 2, the female adolescents showed a median age of 13.46 years, the mean weight was 46.16 kg and the median height 1.55 m, different from the male adolescents. The mean BMI was 19.58 kg/m^2, the median SBP 100 mm/Hg, DBP 64.75 mm/Hg and mean HR 80.00 bpm.

As regards the blood pressure, 15.3% of the participants (18.7% of boys and 13.1% of girls) showed altered pressure levels and 6.9% suffered from arterial hypertension (7.0% of boys and 6.8% of girls) (Table 3). The BMI showed that 21% of the adolescents suffered from overweight and obesity (20.3% of boys and 21.4% of girls), with 5.3% obesity (7.0% of boys and 4.2% of girls). No statistically significant difference per sex was found in terms of the blood pressure classification (χ^2=3.02, p=0.220), nor with regard to the BMI (χ^2=2.36, p=0.669).

Table 1. Sample characteristics according to age, anthropometric and hemodynamic indicators of 128 male adolescents. Picos, 2012

Variables	Mean	Standard error	Median	KS (p-value)
Age	13.41	2.33	13.50	0.057
Weight	50.75	14.95	51.00	0.443
Height	1.59	0.13	1.61	0.279
Body mass index	19.69	4.19	18.84	0.035
Systolic blood pressure	101.94	18.77	100.00	<0.001
Diastolic blood pressure	64.32	14.62	67.50	<0.001
Heart rate	79.66	10.29	79.50	0.933

Table 2. Sample characteristics according to age, anthropometric and hemodynamic indicators of 192 female adolescents. Picos, 2012

Variables	Mean	Standard error	Median	KS (p-value)
Age	13.46	2.45	13.00	0.002
Weight	46.16	10.01	46.50	0.664
Height	1.88	4.91	1.55	0.000
Body mass index	19.58	3.75	19.31	0.693
Systolic blood pressure	101.42	14.76	100.00	<0.001
Diastolic blood pressure	64.75	12.23	64.50	<0.001
Heart rate	80.60	8.66	80.00	0.009

Table 3. Sample distribution per blood pressure classification and BMI per sex and total. Picos, 2012

	Male (n=128)	Female (n=192)	Total (n=320)
Blood pressure			
Normotensive	81.3%	87.0%	84.7%
Normal / high	11.7%	6.3%	8.4%
Arterial hypertension	7.0%	6.8%	6.9%
BMI			
Extreme thinness	0.8%	0.5%	0.6%
Thinness	18.8%	16.1%	17.2%
Eutrophia	60.2%	62.0%	61.2%
Overweight	13.3%	17.2%	15.6%
Obesity	7.0%	4.2%	5.4%

The data from Table 4 showed a negative and statistically significant correlation between the length of activity and the BMI. In addition, a positive and significant correlation was found between the BMI and weight at birth. The WHR also showed a positive correlation with the adolescent's length of daily sleep. The arm circumference showed an inverse significant correlation with the active time and a direct correlation with the weight at birth. The TSF was correlated with the mother's education level, indicating that, the shorter the education, the higher the TSF. The DBP showed a significant and inverse correlation with the maternal education and length of breastfeeding. In the male adolescents, having a hypertensive mother was a risk factor for higher arm circumference levels.

Table 4. Correlation between anthropometric variables and maternal education, length of breastfeeding, length of exclusive breastfeeding, active time, inactive time, sleep and weight at birth in the male adolescents. Picos, 2012

Variables	Education	Length of breastfeeding	Length of exclusive breastfeeding	Active time	Inactive time	Sleep	Weight at birth
BMI	-0.102	-0.056	-0.060	-0.228*	0.012	-0.069	0.286†
Waist-hip ratio	-0.011	-0.050	0.105	-0.093	-0.087	0.361‡	0.066
Arm circumference	-0.124	-0.004	-0.010	-0.201*	0.084	-0.090	0.288†
Triceps skin fold	-0.229†	-0.082	0.056	0.008	0.105	0.139	0.059
Systolic blood pressure	-0.065	-0.114	-0.081	-0.148	0.024	-0.055	0.036
Diastolic blood pressure	-0.209*	-0.212*	-0.064	0.025	0.027	0.111	-0.056
Heart rate	-0.050	0.009	-0.091	0.008	0.115	-0.006	-0.053

(*) p<0.05; (†) p<0.01; (‡) p<0.001

The data in Table 5 showed that the length of exclusive breastfeeding may have protected against cardiovascular diseases, as a significant negative correlation was observed between the length of exclusive breastfeeding and BMI. The WHR showed a significant and direct relation with the time spent on physical exercise. Again, the length of exclusive breastfeeding showed a protective effect on cardiovascular diseases, as a significant negative correlation was observed between the length of exclusive breastfeeding and SBP in the female adolescents. Sedentariness is a classical risk factor for cardiovascular diseases. A negative correlation was observed between DBP and inactive time and heart rate and length of activity. Among the female adolescents, having a hypertensive father was a risk factor for higher triceps skin fold levels.

Table 5. Correlation between anthropometric variables and maternal education, length of breastfeeding, length of exclusive breastfeeding, active time, inactive time, sleep and weight at birth in the female adolescents. Picos, 2012

Variables	Education	Length of breastfeeding	Length of exclusive breastfeeding	Active time	Inactive time	Sleep	Weight at birth
BMI	-0.025	0.020	-0.182*	-0.067	0.079	-0.085	0.087
Waist-hip ratio	-0.070	-0.080	-0.099	0.303‡	-0.122	0.065	0.005
Arm circumference	0.017	0.060	-0.120	-0.063	0.022	-0.061	0.098
Triceps skin fold	-0.092	-0.029	-0.104	-0.055	0.086	-0.009	-0.017
Systolic blood pressure	0.032	-0.130	-0.185*	0.043	-0.185†	-0.003	-0.029
Diastolic blood pressure	-0.002	-0.077	-0.089	0.164	-0.166*	0.107	-0.037
Heart rate	0.201*	-0.027	-0.118	-0.207†	-0.054	-0.031	0.090

(*) p<0.05; (†) p<0.01; (‡) p<0.001

In addition, the relations between BMI, WHR, SBP, DBP, HR, AC and TSF and: family antecedents of diabetes and heart disease; skin color; maternal smoking and gestational age at birth were also investigated. Nevertheless, no statistically significant relations were identified between these variables.

Discussion

Detecting cardiovascular risk factors in adolescents is fundamental to prevent CVD and future complications. Systemic arterial hypertension (SAH) is a powerful cardiovascular risk factor that is closely associated with overweight/obesity and has increased among adolescents. In this study, the presence of increase blood pressure (BP) levels was found in male and female adolescents, superior to the 95 percentile. SAH is considered an independent risk factor in any age range.[16] The problem becomes more complex in children and adolescents because of their growth and development, as the increased pressure levels tend to continue in the adult phase.[17] In this study, the blood pressure levels were measured twice, but on a single occasion, which may have contributed to this result. Some studies show that, if repeated on a second occasion, some of these altered measures may move to the normality range.[18]

Another associated risk factor is the family history of SAH, which seems to have a synergic effect on the impact of obesity on pressure levels during adolescence. In this study, an association was verified between having a hypertensive mother and higher AC levels in boys. In girls, the association was found between having a hypertensive father and higher TSF levels. When studying the influence of hereditariness on the origin of SAH, some research indicate that the members of the same family do not only share the genes, but also the same cultural and domestic environment, which significantly contributes to the lifestyle these individuals adopt, as they often dependent on the parents' decisions.[19]

When characterizing the adolescents through the BMI, a prevalence of overweight and obesity corresponding to 13.2% and 7%, respectively, was found for the male sex and 17.2% and 4.2% for the female sex. Despite the higher prevalence of eutrophic individuals, the number of adolescents with overweight is significant, corresponding to about 1/5 of the study population. These data are in accordance with the findings of the Family Budget Survey (POF 2008-2009),[20] in which the incidence of overweight in male adolescents corresponded to 21.5%, against 18.4% for female adolescents. The POF (2008-2009) showed that obesity was more prevalent in in the male (5.8%) when compared to the female gender (4.9%).

The nutritional status during adolescence is a determining factor of adults' nutritional status and overweight during adolescence is related with higher prevalence rates of dyslipidemias in adult life,[21] that is, greater attention is due to this group's health, with further monitoring for the sake of an early diagnosis, so as to guarantee a healthier life in the present and future. Overweight and obesity originate in an inappropriate diet, associated with sedentariness, which may start in childhood. Today, most adolescents' diet is characterized by low fruit and vegetable consumption and high intake of sweets, fried foods and carbohydrates. The low maternal education can negatively influence the adolescents' eating habits, in view of the mothers' deficient knowledge on the importance of a balanced diet. This can explain the significant and inverse relation found between maternal education and triceps skin fold and DBP in boys.

Sedentariness is an important risk factor for atherosclerosis and consequently CVD, in the same way as regular physical exercise is highly relevant to prevent and control CVD, influencing almost all risk factors, such as obesity, dyslipidemias, diabetes mellitus and SAH.[22] In this study, it was verified that the median length of activity was only 125 minutes, while the length of inactivity was 240 minutes. In addition, the length of activity in male adolescents showed a significant and inverse relationship with the BMI and AC. In girls, the time spent on physical exercise showed a significant and direct relationship with the WHR and an inverse relation with the HR; the DBP

showed a significant and inverse relation with the length of inactivity. This demonstrates the importance of physical exercise to reduce and control the body weight and energy consumption, besides improving the pressure levels and HR.

The main reasons that have made the adolescents less active are the increased time spent in front of the television, the use of internet and videogames, less physical education classes in schools, less active leisure options in function of the violence and the parents' concern with the children's safety.[23] Some studies have demonstrated the emergence of risk factors for CVD, such as premature birth, low birth weight and short length of breastfeeding.

In some studies, the low birth weight (LBW) has been related with an increased risk of developing arterial hypertension, obesity and CVD. The results of another research[24] provide further evidence in this sense, as pre-puberty children with LBW present higher BP than children with normal birth weight. In addition, a change was found in the circadian rhythm of the BP (lesser drop in BP levels during sleep). It should be highlighted that this change is admittedly related to a greater risk of developing cardiovascular disease and mortality in adult life. In this study, among the boys, a significant and direct relation was identified between weight at birth and BMI and AC.

Some authors have related the length of exclusive breastfeeding with the development of overweight and obesity. They found a dependent effect between the length of breastfeeding and the incidence of overweight and obesity in children and adolescents.[24,25] In this study, among the boys, the length of breastfeeding showed a significant and inverse relation with the DBP. Among the girls, the length of exclusive breastfeeding showed a statistically significant and inverse relation with the BMI and SBP. The possible biological mechanisms that influence the protective function of breast milk against obesity include the unique composition of this milk and the metabolic and physiological responses of breast milk. The unique composition of the nutrients in breast milk is qualitative and quantitatively different from any infant formula, as it contains bioactive substances, which affect the differentiation and proliferation of the fat cells, which can influence the tissue growth and development.[25]

In line with these findings, the literature[26] affirms that the increased obesity in infants results from early and incorrect weaning; deriving from dietary errors in the first year of life, mainly in the urban population, which give up breastfeeding early and replace it by a diet with too many carbohydrates, in higher than necessary amounts for the child's growth and development. One element that is frequently present in the ineffective breastfeeding context and is also related to excessive weight gain in infants is the use of artificial formulae. The early interruption of breastfeeding to the detriment of the adoption of artificial feeding increases the childhood energy consumption by 15 to 20% when compared to the energy intake of breastfeeding infants.[26]

Conclusion

Thus, the data presented in this study indicate that the cardiovascular risk factors represent a highly prevalent problem in adolescents from Picos. Knowing the frequency of these adolescents' CRF permits the early adoption of interventions for the development of healthy eating habits and lifestyles during adolescence, thus preventing CVD, besides other chronic illnesses that may be triggered.

The limitations in this study include the assessment of BP at a single moment, as well as the quantification of the length of exclusive breastfeeding based on questions answered from the respondents' memory, which may have caused a memory bias. Through the School Health Program, the nurses can assume leading roles, relevant for evidence-based practice, through cardiovascular health education activities that are comprehensive and appropriate to the age. Also, the National Association of Pediatric Nurse Practitioners in

the United States ratifies the importance of the nurses in the early control of cardiovascular risk factors through the implementation of school curricula sensitive to the changes in the students' diet patterns, calorie intake, physical exercise, smoking and living habits in general; tracking and forwarding of children identified as at risk of CVD and establishment of links with the community resources and infrastructure necessary to support the school environment in the promotion of children and adolescents' cardiovascular health in the neighborhood, at school and in the family.[27]

Through the nursing consultation, the cardiovascular risk factors and their complications can be identified. In addition, health education can be provided, which constitutes one of the main elements to improve the living conditions of people with risk factors for cardiovascular diseases. In this perspective, monitoring the prevalence of CRF can contribute to the planning and orientation of intervention strategies, especially in the adolescent phase, when the individuals are more prone to changes in inappropriate living habits.

References

1. Molina MCB, Faria CP, Montero MP, Cade NV, Mill JG. Fatores de risco cardiovascular em crianças de 7 a 10 anos de área urbana, Vitória, Espírito Santo, Brasil. Cad Saúde Pública. 2010; 26(5):909-17.
2. Rocco ER, Mory DB, Bergamin CS, Valente F, Miranda VL, Calegare BFA, et al. Optimal cutoff points for body mass index, waist circumference and HOMA-IR to identify a cluster of cardiometabolic abnormalities in normal glucose-tolerant Brazilian children and adolescents. Arq Bras Endocrinol Metab. 2011; 55(8):638-45.
3. Romanzini M, Reichert FF, Lopes AS, Petroski EL, Farias Júnior JC. Prevalência de fatores de risco cardiovascular em adolescentes. Cad. Saúde Pública. 2008; 24(11):2573-81.
4. Cobas LS, Constantín AR, Velásquez JLT, Beyrís RPR. Prevalencia de hipertensión arterial en adolescentes de 15 a 17 años [artículo en línea]. MEDISAN [Internet] 2009 [cited Jan 8, 2015]; 13(6). Available from: http://bvs.sld.cu/revistas/san/vol13_6_09/san07609.htm.
5. Díaza A, Tringlera M, Molina JD, Díaz MC, Geronimi V, Aguera D, et al. Control de la presión arterial y prevalencia de hipertensión arterial en niños y adolescentes de una población rural de Argentina. Datos preliminares del Proyecto Vela. Arch Argent Pediatr. 2010; 108(1):68-74.
6. Nehgme J, Carrillo J, Vargas C. Prevalencia y Factores de Riesgo Asociados a Hipertensión Arterial en Adolescentes Chilenos entre 15 y 17 años. Encuesta Nacional de Salud. Chile 2009-2010 [Internet]. Santiago de Chile: Ministerio de Salud, 2011 [cited Jan 8, 2015]. Available from: http://epi.minsal.cl/estudios-y-encuestas-poblacionales/encuestas-poblacionales/encuesta-nacional-de-salud/resultados-ens/. Acesso em: 08 jan 2015.
7. Luiz RR, Magnanini MM. O tamanho da amostra em investigações epidemiológicas. In: Medronho RA. Bloch KV, Luiz RR, Werneck GL. Epidemiologia. 2 ed. São Paulo: Atheneu; 2008. p. 295-307.
8. World Health Organization. Population-based prevention strategies for childhood obesity: report of a WHO forum and technical meeting. Geneva: World Health Organization, 2009.
9. WHO: Programmes and Projects. The WHO Reference 2007: growth reference data for 5 – 19 years [Internet]. Geneva: WHO; 2011 [cited Jun 13, 2011]. Available from: http://www.who.int/growthref/en/
10. Frisancho, A. R. Anthropometric Standards for the assessment of growth and nutritional status. Ann Arbor: University of Michigan Press; 1990. P.189.
11. National Center for Health Statistics. Anthropometric Reference Data and Prevalence of Overweight United States, 1976-80. Washington (DC): Government Printing Office; 1988. Department of Health Education and Welfare publication nº (PHS) 87-1688. Vital and Health Statistics; series 11; n.238. Available from: http://www.cdc.gov/nchs/data/series/sr_11/sr11_238.pdf
12. Mazaro IAR, Zanolli ML, Antonio MARGM, Morcillo AM, Zambon MP. Obesidade e fatores de risco cardiovascular em estudantes de Sorocaba, SP. Rev Assoc Med Bras. 2011; 57(6):674-80.
13. Sociedade Brasileira de Cardiologia / Sociedade Brasileira de Hipertensão /Sociedade Brasileira de

Nefrologia. VI Diretrizes Brasileiras de Hipertensão. Arq Bras Cardiol. 2010; 95(1 supl.1):1-51.

14. V Diretrizes de Hipertensão Arterial. Sociedade Brasileira de Cardiologia, Sociedade Brasileira de Hipertensão e Sociedade Brasileira de Nefrologia. São Paulo; 2006. Available from: http://bvsms.saude.gov.br/bvs/publicacoes/v_diretrizes_brasileira_hipertensao_arterial_2006.pdf
15. Conselho Nacional de Saúde. Resolução n.466, de 12 de Dezembro de 2012. Aprova as diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Diário Oficial da República Federativa do Brasil, Brasília (DF); 2013.
16. Simão M, Hayashida M, Santos CB, Cesarino EJ, Nogueira MS. Hipertensão arterial entre universitários da cidade de Lubango, Angola. Rev Latino Am Enfermagem. 2008; 16(4):672-8.
17. Rodrigues AN, Perez AJ, Pires JGP, Carletti L, Araújo MTM, Moyses MR et al. Fatores de risco cardiovasculares, suas associações e presença de síndrome metabólica em adolescentes. J Pediatr (Rio J.) 2009; 85(1):55-60.
18. Rodrigues AN, Perez AJ, Pires JGP, Carletti L, Araújo MTM, Moyses MR. et al. Cardiovascular risk factors, their associations and presence of metabolic syndrome in adolescents. J Pediatr. 2009; 85(1):55-60.
19. Araújo TL, Lopes MVO, Cavalcante TF, Guedes NG, Moreira RP, Chaves ES et al. Análise de indicadores de risco para hipertensão arterial em crianças e adolescentes. Rev Esc Enferm USP; 2008; 42(1):120-6.
20. Instituto Brasileiro de Geografia e Estatística (IBGE). Pesquisa de orçamentos familiares 2008-2009: antropometria e estado nutricional de crianças, adolescentes e adultos no Brasil; 2010. Available from: http://www.ibge.gov.br/home/estatistica/populacao/condicaodevida/pof/2008_2009_encaa/pof_20082009_encaa.pdf
21. Santos MG, Pegoraro M, Sandrini F, Macuco EC. Fatores de risco no desenvolvimento da aterosclerose na infância e adolescência. Arq Bras Cardiol. 2008; 90(4):301-8.
22. Prat-González I, Juvinyà-Canal D, Sánchez-Pérez I. Estrategia para aumentar el cribado de los factores de riesgo cardiovascular en la población joven. Enferm Clin. 2011; 21(1):3-11.
23. Farias Júnior JC, Mendes JKF, Barbosa DBM, et al. Fatores de risco cardiovascular em adolescentes: prevalência e associação com fatores sociodemográficos. Rev Bras Epidemiol. 2011; 14(1):50-62.
24. Salgado CM, Jardim PCBV, Teles FBG, Nunes MC. Baixo peso ao nascer como marcador de alterações na monitorização ambulatorial da pressão arterial. Arq Bras Cardiol. 2009; 92(2):113-21.
25. Holmes VA, Cardwell C, McKinley MC, Young IS, Murray LJ, Boreham CO, et al. Association between breast-feeding and anthropometry and CVD risk factor status in adolescence and young adulthood: the Young Hearts Project, Northern Ireland. Public Health Nutr. 2009; 13(6): 771–8.
26. Moraes JFVN, Giugliano R. Aleitamento materno exclusivo e adiposidade. Rev Paul Pediatric. 2011; 29(2):152-6.
27. Hayman LL, Meininger JC, Daniels SR, McCrindle BW, Helden L, Ross J et al. Primary prevention of cardiovascular disease in nursing practice: focus on children and youth. Circulation. 2007; 116(3):344-57.