editorial

Prevention of cardiovascular diseases starts in childhood

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Atherosclerotic cardiovascular disease is still the major cause of death worldwide. The understanding of the development of atherosclerosis is essential to define prevention strategies. Autopsy and epidemiological studies have shown that this process starts early in childhood. Also the Bogalusa Heart Study and the Pathobiological Determinants of Atherosclerosis in Youth (PDAY) confirmed the presence of atherosclerotic plaques in adolescents and an association with risk factors namely increased body mass index(BMI), blood pressure, LDL-Cholesterol(C), low level of HDL-Cholesterol, diabetes mellitus and cigarette smoking. Non-invasive measures of atherosclerosis in pediatric population (carotid-intima-medial thickness and arterial distensibility) reached similar conclusions. These results appoint to the need of prevention strategies starting in childhood. There is growing evidence that health status and well-being are influenced by several aspects, namely genetics factors (30%), health care (10%), social and environmental factors (20%), and individual behaviours (40%). This means that the development of cardiovascular disease has its origins in families, and that approaches to prevention should address the developing child and adolescent and their family environment, namely health life styles.

Interventions in paediatric age, especially in children with identifiable risk factors (e.g., obesity, hypertension, diabetes mellitus, Kawasaki disease) are important in promoting cardiovascular health. Paediatric cardiologists, paediatricians and family physicians should be aware of their responsibility in cardiovascular prevention and play an active role in interventions to reduce risk factors fostering behaviour changes in an integrated perspective. Risk factors for atherosclerotic disease include dietary habits, physical activity, blood pressure, smoking/tobacco exposure, lipid and lipoprotein levels. Recently, other factors like sleep habits, stress management or depression have emerged as conditions associated with accelerated atherosclerosis. We also know that adult behaviour is conditioned by habits acquired during childhood and that use of medication will not fully eliminate cardiovascular risk, thus interventions in paediatric age are an important issue in the promotion of health and well-being.

Strategies for a better health status in adulthood include general measures to achieve health life styles, and identification and management of the child at risk for early atherosclerosis.

Screening for cardiovascular risk is recommended during routine health supervision, concerning: 1. family history, 2. diet, 3. physical activity, 4. leisure time TV/video/computer use, 5. tobacco exposure. Blood pressure (BP) should be measured in every visit in children older than 3 years; younger children need a regular BP assessment if there is a positive history of neonatal complications, congenital heart disease, urinary/renal abnormality, solid-organ transplant, malignancy, medications, or condition known to raise BP or increase intracranial pressure. Promotion of breast feeding and a diet low in saturated fat starting at age 1 year is recommended. Advocate a diet rich in fruits, vegetables, whole grains, low-fat/fat-free milk and milk products; lower in sugar and salt; with a total fat 30% of daily kcal/EER[1], saturated fat 8-10% of daily kcal/EER,

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1   EER- Estimated Energy Requirements/d for age/gender

monounsaturated and polyunsaturated fat up to 20% of daily kcal/EER; avoid *trans* fat as much as possible. Encourage moderate-to-vigorous physical activity every day and limit daily leisure screen time (TV/video/computer): no TV in child's bedroom, limit total media time to no more than 1-2 hours of quality programming per day. Advocate for a smoke-free home environment, counsel parents/ adolescents strongly about not smoking, providing explicit information about the addictive and adverse health effects of smoking or specific smoking cessation guidance.

The National Heart, Lung and Blood Institute (NHLBI), part of the National Institutes of Health, and the American Academy of Pediatrics (AAP) recommend lipid screening in all children at least once between the ages of 9 and 11 years, and again between ages 17 and 21 years. This represents a significant change from the previous guidelines (The NCEP Expert Panel on Blood Cholesterol Levels in Children and Adolescents, 1992), that advised for screening only children with a family history of heart disease (parent, grandparent, aunt, uncle, or sibling with heart attack, treated angina, CABG/stent/angioplasty, stroke, or sudden cardiac death at < 55 y in males, < 65 y in females) or high cholesterol.

The statement of the American Heart Association (AHA): Cardiovascular Health Promotion in Children-Challenges and Opportunities for 2020 and Beyond, discusses two important factors: the promotion of ideal cardiovascular health in all children and the improvement of cardiovascular health metric scores in children currently classified as having poor or intermediate cardiovascular health. The ideal cardiovascular health status is based in health behaviors: (1) never smoked; (2) body mass index below the 85th percentile; (3) at least 60 minutes per day of moderate or vigorous physical activity; and (4) a healthy diet score, and also (1) total cholesterol less than 170mg/dL; (2) blood pressure below the 90th percentile; and (3) fasting blood glucose less than 100 mg/dL (table 1).

Table 1 - Poor, Intermediate, and Ideal Definitions: Health Metrics in Children and Adolescents according to the American Heart Association 2020 Strategic Goals

Metric	Poor	Intermediate	Ideal
Smoking status	Tried >30 d ago	...	Never tried never smoked whole cigarette
BMI* (Body mass index)	>95th percentile	85th-95th percentile	<85th percentile
Physical activity	None	>0 and <60 min/day moderate or vigorous activity every day	≥60 min/day moderate or vigorous activity every day
Healthy Diet Score[†] scaled to a 2000-kcal/d diet.	0–1 components	2–3 components	4–5 components
Total Cholesterol	≥200 mg/dL 170–	170–199 mg/dL	<170 mg/dL
Blood Pressure[¥]	>95th percentile	90-95th percentile	<90th percentile
Fasting Glucose	≥126 mg/dL	100–125 mg/dL	<100 mg/dL

* Calculated as (Weight in Kilograms / (Height in Meters x Height in Meters)) and classified according to 2000 Centers for Disease Control and Prevention Body Mass Index-for-age growth charts

† Defined based on expert consensus to approximate a healthy dietary pattern consistent with a Dietary Approaches to Stop Hypertension [DASH]–type eating pattern: ≥4.5 cups/d of fruits and vegetables, ≥2 servings/wk of fish, ≥3 servings/d of whole grains, and no more than 36 oz/wk of sugar-sweetened beverages and 1500 mg/d of sodium.

¥ Measured as mmHg and classified according to 2004 NHLBI Fourth Report on the Diagnosis, Evaluation, and Treatment of High Blood Pressure in Children and Adolescent

Most of the used strategies for cardiovascular prevention are based on education and behaviour change methodology through educational materials and self-monitoring questionnaires, teaching in clinics, schools or other community environments. The possibility of using computerized technology or web – based interventions has also been introduced with favourable outcomes. More research is needed in this area, as well the evaluation of cost effectiveness of this type of interventions. Nevertheless, it seems an appealing strategy to implement in this population particularly comfortable with the new technologies.

Cardiovascular health in the adult starts early in infancy, and population and individual-level approaches to promote health behaviours are essential. A comprehensive strategy is necessary involving patients, healthcare providers, professional organizations, community, schools, media outlets, and government agencies to protect individual people's health and quality of life

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