Early atherogenic signs in atherovulnerable families at a physician´s office of primary health care

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Este artículo también está disponible en español

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ABSTRACT

Introduction: Cardiovascular diseases are a major public health problem in many developing countries, and Cuba is no exception.
Objective: To identify early atherogenic signs in atherovulnerable families at a physician's office of primary health care.
Method: Descriptive cross-sectional observational study, from October 2015 to September 2016, in the office No. 7 belonging to the Policlínico Docente Dr. Mario Muñoz Monroy, of Guanabo, municipality of East Havana, in Havana, Cuba. A total of 200 families were chosen with their children and adolescents, and the early atherogenic signs were explored, such as: overweight, obesity, increased abdominal circumference and high blood pressure. In the relatives, some «major atherosclerotic crisis» was registered and the presence of traditional atherogenic risk factors (overweight, obesity, high blood pressure and smoking).
Results: An amount of 225 children and adolescents were studied, predominantly male (56.4%), where the abdominal obesity (32%) and the general (according BMI) stand out with 18.2%. The major atherosclerosis crises identified in the 485 adult family members were ischemic heart disease (60 [12.4%]), cerebral vascular disease (27[5.6%]) and peripheral arterial disease (16 [3.3%]); and among the traditional atherogenic factors, high blood pressure (203 [41.9%]) and smoking (109 [2.5%]) predominated.
Conclusions: Identifying early atherogenic signs in apparently healthy children and adolescents, and the study of their relatives' background are of vital importance for the identification of atherovulnerable families.
Key words: Atherosclerosis, Early signs, Major atherosclerotic crisis, Family, Risk Factors, Primary health care, High blood pressure

Señales tempranas de aterosclerosis en familias aterovulnerables en un consultorio médico de atención primaria

RESUMEN

Introducción: Las enfermedades cardiovasculares constituyen un importante problema de salud pública en muchos países en desarrollo, y Cuba no es una excepción.

Objetivo: Identificar señales tempranas de aterosclerosis en familias aterovulnerables en un consultorio médico de atención primaria.
Método: Estudio observacional descriptivo de corte transversal, de octubre del 2015 a septiembre del 2016, en el consultorio Nº 7 perteneciente al Policlínico Docente Dr. Mario Muñoz Monroy, de Guanabo, municipio La Habana del Este, en La Habana, Cuba. Se escogieron 200 familias con sus niños y adolescentes, y se exploraron las señales tempranas de aterosclerosis como: sobrepeso, obesidad, circunferencia abdominal aumentada e hipertensión arterial. En los parientes se buscó alguna «gran crisis aterosclerótica» y la presencia de factores de riesgo aterogénico tradicionales (sobrepeso, obesidad, hipertensión arterial y tabaquismo).
Resultados: Se estudiaron 225 niños y adolescentes, con predominio del sexo masculino (56,4%), donde sobresalieron la obesidad abdominal (32%) y la general (según índice de masa corporal) con un 18,2%. Las grandes crisis de aterosclerosis identificadas en los 485 familiares adultos fueron cardiopatía isquémica (60 [12,4%]), enfermedad vascular cerebral (27 [5,6%]) y enfermedad arterial periférica (16 [3,3%]); y entre los factores aterogénicos tradicionales predominaron la hipertensión arterial (203 [41,9%]) y el tabaquismo (109 [2,5%]).
Conclusiones: La identificación de las señales aterogénicas tempranas en niños y adolescentes aparentemente sanos y el estudio de los antecedentes de sus parientes, son de vital importancia para la identificación de familias aterovulnerables.
Palabras clave: Aterosclerosis, Señales tempranas, Gran crisis aterosclerótica, Familia, Factores de riesgo, Atención primaria de salud, Hipertensión arterial

INTRODUCTION

Chronic noncommunicable diseases are the first cause of death in Cuba. According to an article published in 2015[1]. From 100.000 inhabitants 211.6 people die due to heart disease. Hence, the medical community is very interested in reinforcing prevention and control strategies[1]. Today, when health statistics are reviewed, an increase of 218.3 in the rate of the same diseases is observed[2]. These conditions currently represent the largest health burden worldwide accounting for more than 17 million deaths every year[3].

The Mexico Declaration for Circulatory Health[3] brings together global health organizations committed to reducing and improving the burden of cardiovascular and cerebrovascular diseases; for which we want the World Health Organization (WHO) to set "25 by 25" non-communicable diseases goals to prevent millions of premature deaths and save lives by organizing a coordinated response to the global pandemic of cardiovascular disease[3].

The intervention on risk factors (RF) from an early age is usually critical to solve the problem[4-7]. Early atherogenic signs (EAS) are those atherosclerotic manifestations and known atherogenic RF that may be detected by health personnel, even when their symptoms or signs are not evident to the patient[8]. Detecting EAS within families and its concomitance with other RF or damage to health will help to identify aterovulnerable families which would be those more likely to suffer the consequences of atherosclerosis when compared to others in the same period.

The objective of this work was to identify early atherogenic signs in aterovulnerable families at a physician's office of primary health care.

METHOD

A descriptive cross-sectional observational study was conducted from October 1, 2015 to September 30, 2016, in the office No. 7 belonging to the Policlínico Docente "Dr. Mario Muñoz Monroy", of Guanabo, municipality of East Havana, in Havana, Cuba.

A number of 200 multi-stage families with their children and adolescents were intentionally chosen from 426 belonging to the physician's office. Family medical records were used and families that had suffered some of the so-called "Major atherosclerotic crisis" (cerebral, cardiac and peripheral vascular) were selected. Traditional atherogenic RF (overweight, obesity, HBP and smoking) were searched for and EAS (overweight, obesity, abdominal circumference and HBP) were screened in apparently

healthy children and adolescents from 5 to 19 years old.

Anthropometry

Abdominal circumference was measured using the Lohman technique, according to Esquivel Lauzurique *et al*[9]. The individual was placed in a standing position. Abdomen relaxed with arms straightened and the feet joined. The tape was placed in a horizontal plane at the level of the natural waist, that is, in the minimum waist circumference. The measurement was obtained without compressing the skin and at the end of normal expiration. A flexible tape was used and the measurement was recorded with an approximation of 0.1cm. Cuban reference tables were used, Esquivel Lauzurique *et al*[9], as well as those from the National Health and Nutrition Examination Survey (NHANES) of the United States[10].

Moreover, the body mass index was calculated (weight in kilograms divided by the square of the height in meters) in the children, adolescents, and in their relatives studied. All the individuals were measured in centimeters (without obstacles in the head) and weighed in kilograms in the office scale (after calibration), barefoot and wearing as light as possible clothes. The Quetelec index (kg/m^2) was applied to assess overweight and obesity, according to the Manual de procedimientos para la atención de grupos priorizados del Ministerio de Salud Pública de Cuba[11], available in any every physician's office.

Blood pressure

We used a bracelet aneroid sphygmomanometer for children to measure the blood pressure. The technique was performed after resting for approximately five minutes, sitting, with the back resting on the back of the chair, feet flat on the floor, bare right arm and positioned on a surface allowing the cuff to be leveled with their heart. The cuff was insufflated, the radial artery was palpated and the insufflation continued to 20 or 30 mmHg above pulse disappearance. Afterwards, the stethoscope diaphragm was placed over the humeral artery in the antecubital fossa and the cuff was deflated, with the needle descending at a rate of 2 mmHg per second.

Systolic blood pressure was considered at the first sound auscultated (Korotkoff 1) and diastolic, at the disappearance of the last sound (Korotkoff 5).

The reading was fixed at 2 mmHg or divisions closest to the appearance or disappearance of noises. For the diagnosis of HBP, the percentiles established by the aforementioned Procedures Manual were used[11].

In the case of adults, blood pressure was measured following the steps described in the infants and according to the norms established by the 7th and 8th reports of the Joint National Committee of High Blood Pressure[12,13].

RESULTS

As can be seen in **table 1**, there are 225 individuals among children and adolescents in a group of 200 families; male sex prevails in a 56.4%, and the majority are adolescents of 10 to 19 years (82/225).

EASs were explored in children and adolescents of these families (**Table 2**), where abdominal obesity (according to waist circumference) stood out, which was represented by 32%, followed by obesity (according to body mass index) for a 18.2%. It is noteworthy that there was no evidence of hypertension or prehypertension in any of the children and adolescents studied.

Tabla 1. Distribución de los niños y adolescentes de las 200 familias, según sexo y grupos de edad (n=225).

Grupos de edad (años)	Femenino	Masculino
5 – 9 [n=67]	34 (50,8)	33 (49,2)
10 – 14 [n=76]	32 (42,1)	44 (57,9)
15 – 19 [n=82]	32 (39,0)	50 (61,0)
Total [n=225]	98 (43,6)	127 (56,4)

Los datos expresan n (%).

Tabla 2. Señales tempranas de aterosclerosis en niños y adolescentes de las 200 familias (n=225).

Señal temprana de ateroesclerosis	Nº	%
Sobrepeso	35	15,6
Obesidad	41	18,2
Circunferencia de cintura aumentada	72	32,0
Total	148	65,8

Table 3 shows the pathological background of the people who make up these 200 families and who have suffered some of the so-called "Major atherosclerotic crisis". Ischemic heart disease was found in 60 individuals (12.4%), cerebral vascular disease in 27 subjects (5.6%) and peripheral arterial disease in 16 (3.3%). The same table shows the traditional atherogenic factors, where high blood pressure prevails with 203 patients who suffer it (41.9%), followed by smoking, with 109 smokers (22.5%). Likewise, children and adolescents can be seen, with and without EAS (**Table 4**), who have family history and RF in their adult relatives. There are 59 children and adolescents with EAS that have a family history of HBP and 40 of type 2 diabetes mellitus, important RF for atherosclerotic disease.

Tabla 3. Gran crisis de aterosclerosis padecidas y factores aterogénicos tradicionales presentes en personas adultas de las 200 familias estudiadas (n=485 adultos).

Antecedentes patológicos familiares	Nº	%
Gran crisis de aterosclerosis		
- Cardiopatía isquémica	60	12,4
- Enfermedad vascular cerebral	27	5,6
- Enfermedad arterial periférica	16	3,3
Factores aterogénicos tradicionales		
- Hipertensión arterial	203	41,9
- Diabetes mellitus tipo 2	84	17,3
- Sobrepeso y obesidad	65	13,4
- Tabaquismo	109	22,5

Tabla 4. Niños y adolescentes con y sin señal aterogénica temprana y su relación con las familias.

Antecedentes patológicos familiares	Niños y adolescentes	
	Con SAT	Sin SAT
Hipertensión arterial	59	24
Diabetes mellitus tipo 2	40	30
Sobrepeso y obesidad	15	4
Cardiopatía isquémica	18	4
Enfermedad vascular cerebral	14	10
Enfermedad arterial periférica	17	5

SAT, señal aterosclerótica temprana

DISCUSSION

Cardiovascular and cerebrovascular diseases represent the first causes of morbidity and all-ages mortality in developed countries and Cuba[2-5]. The Framinghan study[10] has shown the strong relationship between different RF and these diseases, so the knowledge and treatment of hypertension, overweight, obesity, and other disorders underlying childhood, are of great importance, as they persist into adulthood with a great burden of "attack" because of the early development of complications[14,15].

The importance of the EAS subject is that some diseases and RF were once believed to be exclusive of adulthood[5,7,16,17]; However, in the last 10 years an increase in type 2 diabetes mellitus has been found in the pediatric age, which is linked to the increase in the prevalence of severe obesity in childhood and adolescence[18]. In the last decades the age of onset of type 2 diabetes mellitus has been modified, and a constant increase has been observed in patients under 20 years old, when these diseases were formerly almost unknown in Pediatrics, and currently represent a 2-3% of all cases. There is therefore a 10-fold increase in recent years due to an accelerated or alarming increase in obesity in children and adolescents[18].

Today it is known that essential or primary adult HBP begins many times from childhood. Recent studies have shown the increasing incidence of HBP in children, with a current prevalence of 3-5% and a rising tendency[5]. The high blood pressure levels that occur during childhood and adolescence tend to remain in adult life, a term known as tracking[5]. In the analysis of the United States national database on blood pressure in adolescents, with a single blood pressure measurement, 77% of men and 53% of women had hypertension or prehypertension figures after 2 years[5].

It is noteworthy that there was no HBP and pre-HBP in the sample studied, and when compared with a study conducted by one of the authors in another office in the same health area (pending publication) it is observed that the percentage of the first is also low (7.35%) and prehypertension is higher (16.2%). It would be nec-

essary to carry out studies like this, in other doctors´ offices in the area of Guanabo to know HBP behavior in children and adolescents, since this EAS may not be predominant in the area.

Obesity is recognized as one of the big-gest public health problems in the world. The WHO estimated in 2014 that 52% of adults worldwide and 30% of children are overweight[19]. This disease is characterized by excessive body fat, associated with the development of multiple metabolic disorders which in turn, cause other health problems[19]. Childhood obesity has also become a major health problem worldwide, to the extent that the WHO has called it an epidemic, as well as being one of the most difficult challenges to face in the new century, with a proportional increase between children and adolescents[20].

The Biomedical Research Networking Center for Physiopathology of Obesity and Nutrition (CI-BEROBN)[21] emphasizes the fact that more than 80% of obese young people are likely to be overweight later in life, implying a growing tendency towards an obese society. Raising awareness will be key to prevent this disease which is increased by the lack of healthy habits. Therefore, from CIBEROBN[21] emphasis is placed on the necessary involvement of all social agents (parents, educators, institutions, media, among others) to fight against childhood obesity. Especially considering that Spain presents one of the most alarming figures in Europe regarding this disease at early ages. According to the latest data from the National Health Survey, 27.8% of children aged 2 to 17 are overweight, of which 9.6% are obese[21].

In another study conducted in Spain, looking for prevalence of childhood obesity, excess weight was 30.1% in the 2006-2007 period and 29.7% in 2011-2012, and obesity, 9.6 % and 9%, respectively[22].

Some call for using other methods to evaluate abdominal adiposity in both, children and adults and propose to use the conicity index, which measures weight, height and waist circumference, and is based on the idea that a person who accumulates fat in the central region of the trunk has a body shape similar to a double cone[23]. The other method used by the authors was that of the waist circumference that, as observed, proved more accurate to discriminate abdominal obesity than the body mass index.

The metabolic syndrome, a health problem that has been the subject of intense scientific argument due to its long-term clinical implications, is of particular interest in children and adolescents; and, due to its importance, needs further study in our environment[24]. This syndrome encompasses a group of cardiovascular RF represented by central obesity, dyslipidemias, abnormalities in glucose metabolism and HBP associated with insulin resistance. This syndrome increases the risk of cardiovascular disease and type 2 diabetes mellitus[24,25].

The fact that children and adolescents with EAS belong to families whose relatives present cardiovascular RF or have suffered from a "Major atherosclerotic crisis" makes it more interesting, since it makes these families atherovulnerable. Today we already talk about the "obesogenic environment" that is why it is very important to conduct family studies[26,27] which includes eating foods that contain many saturated fatty acids, sodium, sugar and replacing physical activities by idleness. One could even speak of the "atherogenic", "diabetogenic", "hypertensive", "dyslipidemic" environment, because one problem leads to the other and all are connected[4,17]. The other importance of identifying EAS is that they are present in apparently healthy children and adolescents. Even family members do not realize it[5].

In a study conducted only in adolescents[28], when the frequency of the EAS was analyzed it was detected that most of them had two or three EAS and we identified more than three in a large group of adolescents. Moreover, the history of diseases resulting from atherosclerosis had a low prevalence in families, the most frequent was peripheral arterial disease in relatives of 4 adolescents (8.9%). Also, the bad habit of smoking was RF most frequently found, which is similar to the results of the present study, where smoking is in second place with 22.5%.

The authors of the previous reference[28] state that: "the background of parents, siblings or grandparents who have suffered a coronary disease before 55 years in men and 65 years in women, represent an increased risk of cardiovascular disease; the greater the risk the earlier the family history is and the greater the number of affected members".

González Sánchez *et al*[5] insist that the family plays an important role in the different prevention programs and intervention strategies in children. Hence, the knowledge that parents may have about diseases that originate in childhood is of great interest.

Our group has been working on the concept of atherovulnerable families or family aterovulnerability, which becomes a new concept[29,30]. The originality of this work is also that the early atherogenic signs are studied in children and adolescents living

in their familiar clinical-epidemiological context.

Limitations

The main limitation of our study is that it was conducted with children and adolescents from a single physician's office.

CONCLUSIONS

The identification of the early atherogenic signs in apparently healthy children and adolescents, and the study of their relatives' background is critical for the identification of atherovulnerable families and the establishment of the health behavior to be followed.

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