Cardiovascular Risk Factors Why? How?

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Coronary Heart Disease continues to be one of the main causes of morbidity and mortality in developed countries [1]. Acute myocardial infarction (AMI) accounts for around one third of cardiovascular mortality [2]. In Cuba, in 2017, 64.9% of deaths from heart disease occurred specifically due to ischemic diseases; of them, 45.3% due to acute myocardial infarction [3].

AMI is the necrosis of the myocardial cells as a consequence of prolonged ischemia caused by the sudden reduction of the coronary blood supply, which involves one or more areas of the myocardium [4]. Several authors agree that its main cause is acute coronary occlusion. to the rupture of a vulnerable atheromatous plaque, with the consequent formation of an occlusive thrombus, to which the reactive vasoconstriction of the coronary vessels and the distal microembolization is associated [5,6].

There are people who have more risk of suffering from an AMI than others. Alvarez Sintes en his book Integral General Medicine [7] defines as risk the probability of suffering a damage, getting sick or dying of a certain condition or accident in the presence of certain circumstances that affect a person, group of people, community or environment. The risk factors are the set of phenomena on which this probability depends, so a risk factor can be defined as an attribute or characteristic that gives the individual a variable degree of susceptibility to contracting a disease or alteration of health.

Among the cardiovascular risk factors are: obesity, advanced age (over 55 years in men and 65 years in women), diabetes mellitus, arterial hypertension (HBP), sedentary lifestyle, chronic kidney disease, smoking, dyslipidemia, family history of premature coronary heart disease in first-degree relatives. It has also been found that obstructive sleep apnea is a cardiovascular risk factor [8]. In a study conducted in Honduras it was found that the risk factors of heart diseases in order of frequency were: arterial hypertension (98%), hypertriglyceridemia (56%), hypercholesterolemia (54%), diabetes mellitus and obesity with 33% [9], while in a similar study in Ecuador the incidence of cardiovascular risk factors manifested as follows: smoking (90.1%), dyslipidemia (73.1%), HTA (55.8%), Diabetes Mellitus (48.1%) and APF (26.9%) [10]. In Cuba, at the Hospital "Mártires del 9 de Abril" in Sagua la Large, in an analysis performed on patients admitted for AMI, it was found that the risk factor that had the greatest impact was advanced age (92.20%), followed by smoking habit (67.53%), dyslipidemia (58.44%). Arterial hypertension (42.86%), diabetes mellitus (41.56%) and APF (11.695) [11]. But in this last study they emphasize that in 55.9 3% coexisted 2 or more of these risk factors in the same patient, which in the opinion of several authors increases

the possibility of suffering a heart attack compared to patients who only have one of these factors [12-15]. Also, in the same study, it was found that more than 50% of these patients had high blood pressure, lipemia or glycemic, mainly due to non-adherence to treatment, which could increase this risk even more.

Knowing the way in which these risk factors act to predispose to the occurrence of AMI is a very important aspect if it is intended to influence them as prevention.

With advanced age the activity of the heart tends to deteriorate. It can increase the thickness of the walls of the heart by hypertrophying them, the arteries can harden and lose their flexibility, and the heart valves suffer fibrous thickening with calcium deposition that can cause stenosis, when this happens, the heart cannot pump blood so Efficiently as before to the muscles of the body [16]. This could result in an increase in heart rate as well as in systolic blood pressure in order to compensate for the body's demand, it should also be borne in mind that comorbidity is common in the elderly. Such as hypertension, hypercholesterolemia and diabetes that contribute to exponentially increase cardiovascular risk.

Recent studies have found several causes related to high cholesterol levels as molecular mechanisms of atherogenesis. One of the most important are the inflammatory processes that take place in the vascular tissue. Often, the initiation of atherosclerosis represents a response of the natural immune system, as well as the accumulation and modification of lipoproteins in the intimal arterial layer. These modifications include the oxidation of lipids or proteins and the non-enzymatic glycosylation of lipoproteins [17]. Although atheromatous plaques are not the only cause in the genesis of infarction, it has been shown to be the most frequent [2].

The prolonged elevation of the blood pressure figures has two direct consequences on the vessel wall: the normal function of the endothelium is altered and the structure of the vascular wall is modified, a phenomenon known as vascular remodeling, hardening and thickening The arteries. This double vascular alteration linked to chronic tensional overload compromises perfusion, on the other hand this causes structural alterations of the myocardium by thickening the left ventricle geometry [18]. This increases the oxygen demand for this hypertrophied muscle while at the same time complicating the passage of blood through the thickened arteries, losing the balance between supply and demand, and as a compensating mechanism increases the heart rate and systolic pressure.

The pernicious effects of nicotine on the heart are due to multiple mechanisms: catecholamine discharge, action on the nerve centers that control blood pressure and heart rate, changes in cardiac output, increase in free fatty acids in blood, recurrent elevations of blood lipid levels and increased platelet adhesiveness [18]. All of which results in the formation and often rupture of atheromatous plaque in the coronary arteries, which would cause the interruption or reduction of blood flow through these arteries, preventing the oxygenation of the cardiac muscle.

Diabetes Mellitus damages the cardiovascular system due to lipid metabolism and contractile dysfunction. Lipid metabolism is substantially altered with the appearance of the typical "atherogenic dyslipidemic triad", composed of elevated triglycerides, lowering HDL cholesterol (high density lipoproteins) and the appearance of small and dense LDL (low density lipoprotein) cholesterol particles. The latter and other macro molecules are very vulnerable to the glycosylation process in the presence of hyperglycemia. Under these conditions, exposure to the endothelial receptors increases to about 25% and the intimal layer of the vascular wall is increased [6]. In diabetics, the myocardium is affected and its contraction capacity is reduced, which is why it is not It is rare that there is heart failure in these patients. Likewise, diabetes has the ability to affect the nerves that supply the heart and cause alterations in heart rhythm and even reduce pain sensitivity, so that sometimes diabetic patients can suffer from silent infarcts [6].

The knowledge of the way of acting of the cardiovascular risk factors in the production of a heart attack is of vital importance for the health personnel and for the population. The knowledge can provide the population with the perception of risk and together with the health personnel could influence the prevention of this disease.

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