Obesity, Metabolic and Cardiovascular Disorders

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Editorial

According to World Health Organization in 2014, 39% of adults worldwide are overweight with body mass index >25 kg/m² and 13% of adults are obese with body mass index >30 kg/m² [1-3]. Obesity is the most general chronic illness and worldwide epidemic problem, as underlying factor for it are as follows:

1) Metabolic/cardiovascular related diseases

- Dyslipidemia Hypertriglyceridemia, increased low-density lipoprotein levels, decreased high-density lipoprotein levels, increased plasma levels of free fatty acids and triacylglycerol with intracellular accumulation of lipids and alterations of cardiac metabolism [4].
- Type 2 diabetes mellitus with hyperglycemia as the major pathogenetic factor of its micro vascular complications, and insulin resistance as the major cause of macro vascular complications;
- Arterial hypertension related to obesity caused by activation of the renin-angiotensin-aldosterone system, increased sympathetic nervous system activity, physical compression of the kidneys by fat in and around the kidneys.

2) Changes in neurohumoral system activity and adipokines synthesis

Adipose tissue secretes a variety of hormone like adipocytokines, including adipokines, cytokines and chemokines [5-7]. The release of adipokines by either adipocytes or adipose tissue infiltrated macrophages presents a chronic sub inflammatory state with a central role in the development obesity related diseases.

3) Cardiovascular changes/diseases development

Left ventricular hypertrophy, cardiac steatosis, hypertensive heart disease, atherosclerosis of epicardial coronary disease, myocardial microcirculatory dysfunction and inflammation, and diabetic cardiomyopathy:

Special role in obesity related cardio-metabolic-vascular pathophysiological processes has:
- Visceral type of obesity: Data suggest that body fat distribution and adipocyte phenotype; can be more determinant for fatal outcomes in obese patients than increased general adiposity. Localisations of local cardiac visceral fat tissue are: epicardial adipose tissue, perivascular adipose tissue and intramyocardial fat cells presence with main concept of depot-specific metabolic functions related to different adipokines secretion from different fat depots.
- Genetic susceptibility: The mechanisms through which genes influence body weight are not well understood, but appetite has been implicated as one mediating pathway.
- Ageing: It is one of the main risk factors for cardiovascular disease and heart failure, but without known pathophysiologic exact mechanisms. Mitochondria seem to be closely involved in the aging process, as main intracellular source of superoxide anion and as major target of free radical attack. Progressive accumulation of oxidant-induced somatic mutations of mitochondria during an lifetime leads to a deterioration in the bioenergetics function. Another important findings at the cellular level are interstitial fibrosis, micro vascular rarefaction, increased stiffness, systemic and myocardial inflammation, cardiomyocyte hypertrophy and intra myocardial fat deposition.

All these entities together leading to multidimensional deformation of vascular endothelial function, smooth muscle cells structure, cardiomyocytes action, activation of vasoconstrictive, pro-inflammatory, pro-thrombogenic and pro-fibrotic molecules, and deregulation of anti-coagulant regulatory proteins, increased thrombin generation and enhanced platelet activation with unique clinical manifestation of acute and chronic cardiovascular diseases [8]. Clinical manifestation of disorders is widely ranged, from asymptomatic to symptomatic with final mixed type of cardiomyopathy according to etiology and pathophysiologic mechanisms [9].

Obesity with related local and neurohumoral activities is independent risk factor for ischemic heart disease, cerebrovascular disease and heart failure, directly related to acute coronary syndrome and atrial fibrillation.

References

