

## Obesity, Metabolic and Cardiovascular Disorders

Selthofer-Relatic K<sup>1,2</sup>

<sup>1</sup>Department of Cardiovascular Disease, Osijek University Hospital, J.Huttlera, Osijek, Croatia

<sup>2</sup>Department of Internal Medicine, Faculty of Medicine Osijek, University Josip Juraj Strossmayer, Cara Hadrijana Osijek, Croatia

\*Correspondence Author: Kristina Selthofer-Relatic, MD, PhD, Department of Cardiovascular Disease, University Hospital Osijek, Croatia, Tel: 00385-31-511-717; E-mail: selthofer.relatic@gmail.com

Received date: January 25, 2018; Accepted date: February 08, 2018; Published date: February 12, 2018

Copyright: © 2018 Selthofer-Relatic K, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

### Editorial

According to World Health Organization in 2014, 39% of adults worldwide are overweight with body mass index  $>25$  kg/m<sup>2</sup> and 13% of adults are obese with body mass index  $>30$  kg/m<sup>2</sup> [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 adipo-cytokines, 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 a 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-thrombotic 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

1. Bonomini F, Rodella LF, Rezzani R (2015) Metabolic syndrome, aging and involvement of oxidative stress. *Aging Dis* 6: 109-120.
2. Paoletti R, Bolego C, Poli A, Cignerella A (2006) Metabolic Syndrome, inflammation and atherosclerosis. *Vasc Health Risk Manag* 2: 145-152.
3. Hall JE, do Carmo JM, da Silva AA, Wang Z, Hall ME (2015) Obesity-induced hypertension: Interaction of neurohumoral and renal mechanisms. *Circ Res* 116: 991-1006.
4. Badimon L, Bugiardini R, Cenko E, Cubedo J, Dorobantu M, et al. (2017) Position paper of the European society of cardiology-working group of coronary pathophysiology and microcirculation: Obesity and heart disease. *Eur Heart J* 38: 1951-1958.
5. Selthofer-Relatic K, Mihalj M, Kibel A, Stupin A, Stupin M, et al. (2017) Coronary microcirculatory dysfunction in human cardiomyopathies: A pathologic and pathophysiologic review. *Cardiol Rev* 25: 165-178.
6. Selthofer-Relatic K, Bosnjak I (2015) Myocardial fat as a part of cardiac visceral adipose tissue: Physiological and pathophysiological view. *J Endocrinol Invest* 38: 933-939.

- 
7. Gonzalez N, Moreno-Villegas Z, Gonzalez-Bris A, Egidio J, Lorenzo O (2017) Regulation of visceral and epicardial adipose tissue for preventing cardiovascular injuries associated to obesity and diabetes. *Cardiovasc Diabetol* 16: 44.
  8. Kibel A, Selthofer-Relatic K, Drenjancevic I, Bacun T, Bosnjak I, et al. (2017) Coronary micro vascular dysfunction in diabetes mellitus. *J Int Med Res* 45: 1901-1929.
  9. Selthofer-Relatic K, Bosnjak I, Kibel A (2016) Obesity related coronary microvascular dysfunction: From basic to clinical practice. *Cardiol Res Pract*: 8173816.