Pathophysiology of Obesity

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Obesity is a major health hazard in different parts of the world. It predisposes people to other diseases, particularly heart disease, type 2 diabetes, certain types of cancer, obstructive sleep apnea, and osteoarthritis. The key causes of diabetes are physical inactivity, excessive energy intake, and genetic susceptibility. The disease may also be caused by medication, gene mutations, and endocrine disorders, as well as psychiatric illnesses. People should understand the pathophysiology of obesity in order to realize the functional changes in the body that are associated with the disease.

Pathophysiology of Obesity at the Micro Cellular Level

Obesity is basically an excessive accretion of triacyglycerols in fatty (adipose) tissue due to excessive energy intake and low energy usage. The adipose tissue plays a significant part in the development of the disease and the arising metabolic complications, as it serves as an energy store and key endocrine organ. Adipose tissue mainly contains a cell type known as adipocyte. However, the tissue also harbors adipocyte precursor sells, immune cells, nerve cells, and stromal-vascular cells. Humans have white adipocytes and a limited amount of active brown adipose which are mainly found in small mammals (Gummesson, 2009). White adipocytes not only store energy, but also service other tissues in times of negative energy balance, by discharging fatty acids and glycerol from lipolysis of trigylcerides that are stored in the lipid droplet of adipocytes. Surpass the storage capability of adipose tissue leads to an increase in the amount of fatty acids in the body circulation as well as the buildup of triglycerides in organs such as the muscle, liver, heart, and pancrease (Gummesson, 2009). The ectopic fat deposition not only affects the functioning of these organs, but also contributes to the development of obesity-related diseases such as diabetes, insulin resistance, non-alcoholic steatohepatitis, as well

as cardiovascular disease. Balistreri, Caruso, and Candore (2010) emphasize that excessive accumulation of white adipose tissue in different parts of the body such as intraabdominal area, intestines, and peri-renal areas leads to development of obesity and related complexities. The accretion of excess of white adipose tissue in the upper areas of the body leads to the onset of android and central obesity while accumulation of the tissue in lower sections of the body gives rise to gynoid obesity.

Pathophysiology of Obesity at the Organ Level

Body organs are interconnected and a disease that affects one organ may lead to adverse effects on others. Notably, obesity affects the functioning of different body organs. For instance, the disease affects the heart which is forced to use more blood vessels in order to deliver oxygen-rich blood to tissues with excess fat. Obesity can also lead to the accumulation of excess fat in the arteries, thereby thickening their walls and inhibiting blood flow. Consequently, the disease is linked with elevated risk levels for hypertension, coronary heart disease, and heart failure (Artham, Lavie, Milani, & Ventura, 2009). Obesity also affects the lungs by reducing their capacity to hold air, thereby affecting blood oxygenation. It also leads to poor ventilation in the lungs resulting in respiratory complications. Obesity also leads to functional changes in the colon. Researchers have established a relationship between obesity and colon cancer as colorectal cancers have a high prevalence among obese people who are characterized by high levels of insulin. The relationship could be explained by the link between insulin-like growth factor (IGF), adipocytes, and preadipocytes, and enhanced risk of colorectal advanced adenomas and cancers (Ma et al., 2013). Clearly, there is an intricate relationship between the digestive and immune systems.

Obesity adversely affects cognitive functioning in humans as obese persons are associated with the lowest levels of cognition, verbal fluency, immediate logical memory, as well as intelligence. Besides, the persons are characterized by delayed recall. The negative effects are related with the increase in visceral adiposity which leads to smaller hippocampus and larger ventricular volumes. Additionally, there is a inverse correlation between high visceral adiposity and verbal memory and attention (Wang, Chan, Ren, & Yan, 2016). Obesity weakens the white matter surrounding the brain's nerve fibers which serve a key role in transmitting signals around the brain.

The skin is the other organ whose functioning is affected by obesity. Obese persons are associated with high levels of transepidermal water loss and erythema compared with normal subjects. Besides, they are characterized with dry skin, impaired skin barrier repair, acne, facial wrinkles, and swelling due to lymphedema (Yosipovitch, DeVore, & Dawn, 2007). The disease also leads to diseases such as acanthosis nigricans which are associated with the hormonal changes arising from being obese. Acanthosis nigricans is characterized by thickening and darkening, swelling, and stretching of the skin (Yosipovitch et al., 2007). Besides, obesity can lead to stasis dermatitis due to redness and irritation, as well as ulcers resulting from impaired blood flow. The skin can also allow pathogens to enter the body, due to its stretched layer.

Conclusion

Obesity is a significant health concern in the modern world. The disease is characterized by excessive accumulation of adipose tissue in the body. Obesity results from high energy intake and poor usage of the energy. Excessive fats lead to the circulation of large amounts of fatty acids and triglycerides in body organs resulting in the development of obesity. The disease

negatively affects the functioning of other organs such as the heart, lungs, colon, brain, and the skin. Obesity predisposes people to different ailments that affect these organs.

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