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OBESITY AND AGING - A REVIEW

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ABSTRACT:

The main aim of this study was to know the recent studies on obesity and aging. The incidence of obesity has been growing progressively over the last several decades. Obesity is a severe health problem and a very huge number of people have the complication of obesity. The complication of obesity arises when a person regularly eats more calories than they burn. The risk of obesity occurs in individuals who consistently eat more calories than burn., lack of tolerance, genetics, and other medications that slow down burning calories, elevated appetite, or water retention. Obesity affects the complete functional capacity of the body. A person has excess body fat in this condition. Aging is the process of becoming older. Age-related change in some researchers had postulated that obesity as a condition of metabolic dysfunction of aging. socio-economic conditions play a crucial role in obesity. Data on age-related changes in obesity has led some researchers to postulate that obesity might be considered a condition that resembles premature metabolic dysfunction. aging is associated with increased abnormality white tissue deposition. a key Reactive oxygen species inactivates phosphatases and is also responsible for redox changes that change the structure and function of the proteins. The changes lead to the effect of Reactive oxygen species on a wide range of cellular events such as proliferation, activation of the antioxidant gene, and response to DNA damage. The review article deals with the relationship between obesity and aging and its related complications.

INTRODUCTION

The condition of obesity has steadily risen over the past decade and is currently at alarming levels (1,2) . The risk of obesity occurs in individuals who consistently eat more calories than burn., Lack of tolerance, genetics, and other medications that slow down burning calories, elevated appetite, or water retention (3). Obesity causes many health issues such as the risk of diabetes, heart disease, stroke, arthritis, etc. In order to avoid obesity, it is important to lose 5-10% of the weight to prevent the complication of obesity. Knowing the main causes of aging and age-related diseases has become an important issue. The growing incidence of obesity raises the prevalence of the associated disease, a significant global health crisis has emerged (4). It is clear that the obese condition contributes to decreased effects on life expectancy and body health, which are similar to those seen in advanced aging. Because fat is typically the largest organ in humans, age-related changes in AT function may result in significant systemic changes

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Modern Trends In Research:

In recent decades , treatment is done with evidence based research using plants and plant products .Plants such as *Caralluma fimbriata*, *Cassia alata*, *Brassica oleracea*, *Garcinia* mangostana, *Acacia catechu*, *Azadirachta indica*,*Mangifera indica* are reported to have good pharmacological profile in different disease conditions (5-7). Diabetes, cancer, hepatotoxicity ,inflammatory conditions and hepatotoxicity . Moreover plant based nanoparticles such as silver, zinc oxide and selenium are extensively explored by researchers and many of them are even available in modern medicine as different formulations (8–18).

Aging And Its Complication:

Aging is correlated with the changes in the physiology of an individual over time (19). The aging phenomenon differs across organisms and is genetically based. In humans, the aging phenotype is defined by hearing loss, visual impairment wrinkles, and other skin disorders, resulting in a gradual deterioration in certain cognitive functions, a reduction in sex and growth hormones, and increased inflammation (20). Elderly people are the fastest-growing segment of the population and it is projected that by 2050 there will be two billion people over the age of 60 and they will outnumber the children (21). While scientists have shown that dietary restriction increases life expectancy, aging remains the single biggest risk factor for heart attacks, strokes, cancers, diabetes, and most chronic diseases (22). Another significant thing is that with age people often become less healthy, which leads to a reduction in overall energy consumption and has effects on the energy balance. Typically, AT increases in the middle ages and decreases at the end of life, and during the aging phase, fat is redistributed from subcutaneous to abdominal depots and to the liver, muscle, and other ectopic locations (23). Data on age-related changes in obesity has led some researchers to postulate that obesity might be considered a condition that resembles premature metabolic dysfunction (16). Other studies say that molecular regulatory mechanisms affecting obesity and aging are divergent and unique, or at least not (24) . While it is unknown how to classify or quantify tissue age, obesity is likely to increase the biological age of certain types of tissues and cells or, at

least, strongly affects aging. The comprehensive literature on obesity adipose tissue (AT) dysfunction can reverse the processes that lead to aging-related metabolic dysfunction (25). It is important to remember that aged rodents produce increased fat mass with strong similarities to aged humans. Identification of common aging and obesity functional genes and biomarkers obtained from several microarray studies conducted in different species; Including humans, by comparing young to old individuals, metabolic relationships between obesity and aging can be revealed. Metabolic relationships between obesity and aging can be revealed from several studies conducted in different species including humans by comparing old individuals (26).

Reactive Oxygen Species In Aging:

In mitochondria, reactive oxygen species that are created by normal cell metabolism are largely formed (17). Through the Krebs process, reducing equivalents such as NADH and FADH2 are generated and transferred to the electron transport chain where the ATP synthase is powered by a transmembrane electrochemical proton gradient (14, 27). Electrons that are distributed along the electron transport chain have enough free energy to reduce molecular oxygen and eventually createReactive oxygen species (15). Well-known functions of ROS include oxidizing DNA and lipids, altering protein activity, and damaging cellular structures (28). Optimal ROS levels mediate neuroendocrine metabolism control such as feeding and energy expenditure regulate normal vascular functions and support thermogenesis of the adipose tissue (9). Hydrogen peroxide, a key Reactive oxygen species, inactivates phosphatases and is also responsible for redox changes that change the structure and function of the proteins. The changes lead to the effect of ROS on a wide range of cellular events such as proliferation, activation of the antioxidant gene, and response to DNA damage (29). If ROS production exceeds the antioxidant potential, and/or the ability to handle ROS is impaired, there is a redox imbalance. The free radical current shortens human life (13).

Hypertension:

A recent study showed that more than 60 percent of adults over the age of 65 have hypertension compared to around 20 percent for adults aged 35 to 44 (30). The changes in systolic and diastolic blood pressure indicate stiff blood vessels, reduced arterial compliance, and subsequent rise in aging pulse pressure (31). Similarly, people with obesity have a greater chance of vascular diseases. It is believed that adiposity is directly due to over 60 percent of hypertension. Excess adiposity raises the risk of developing hypertension through the retention of renal sodium via increased activation of the renin-angiotensin system, hyperinsulinemia, structural changes in the kidneys, and elevation of circulating adipokines such as leptin (32). As such, with increasing categories of BMI in adults, the prevalence of hypertension increases significantly. Hence both BMI and central adiposity are critical factors in the development of hypertension, a condition traditionally associated with age.

Atherosclerosis:

Atherosclerosis is a pathological condition that underlies CVD, in which lipids accumulate in the major arteries at susceptible sites. Identifying calcified plaque in ancient mummies indicates atherosclerosis is a growing phenotype of natural aging in humans. However, early-age obesity speeds up this aging cycle decades before it clinically occurs. There is a well-established greater risk of CVD in obesity. Even those with metabolically healthy obesity have been shown to have a greater chance of developing coronary heart disease and heart failure compared with normal-weight individuals (33). Collectively, abdominal obesity can be a powerful catalyst in encouraging the early onset of CVD. In nine cohort studies, a meta-analysis of 82 000 subjects showed that a higher waist-to-hip ratio and waist circumference increased the risk of cardiovascular disease mortality by 15% Children who exceed the 75% of the waist and waist-to-height ratio have significantly higher cardiovascular disease values risk factors including blood pressure, total cholesterol, low-density lipoprotein cholesterol, and lower high-density lipoprotein cholesterol.

Alzheimer Disease:

Alzheimer's disease is an irreversible neurological condition characterized by deterioration in self-care capacity and gradual loss of cognition. It is well known that age is the most determining factor for Alzheimer's disease development, affecting about 11 percent of people over the age of 65 and about 32 percent of people over the age of 85 (34). Obesity is believed to increase the onset of Alzheimer's disease. A systematic review of 580 000 participants in 19 trials showed that midlife obesity raises the risk of dementia at older ages like Alzheimer's disease. A 14-year longitudinal study has also shown that mid-life adiposity is associated with β-amyloid burden, accelerated cognitive decline, and neurodegeneration; accelerating the clinical course of Alzheimer's disease (35). This study also showed that every unit increase in mid-life BMI is 6.7 months advancing the onset of AD. Conversely, a healthy mid-life BMI profile can delay the onset of Alzheimer's disease (36).

Diabetes Mellitus:

Type 1 diabetes occurs most commonly in children, but it can sometimes also occur in adult age groups, especially those in their late 30s and early 40s. Type 1 diabetes patients are generally not obese and often have an emergency status known as ketoacidosis. Ninety percent of people with T1DM have overweight or obesity and T1DM are exacerbated by the existence of obesity (5). Children with T1DM have seldom been reported. As the incidence of obesity in children has increased over the past 30 years.DM has also increased. The frequency of T1DM is estimated to be four times higher in children with normal BMI compared to those with moderate BMI (37) . BMI also adjusts the lifetime risk of T1DM. In adulthood, childhood and adolescent obesity were associated with an increased risk of obesity and diabetes. While the development of obesity in adulthood increases the risk of T1DM by five times, persistent childhood obesity increases the risk of T1DM by 12 folds. Individuals who are overweight in childhood and become lean in adulthood may also be more likely to develop insulin resistance and Impaired glucose metabolism which puts T1DM at risk. It is noteworthy that some children with obesity and diabetes may have glutamic acid decarboxylase (GAD) and/or

protein tyrosine phosphatase, receptor type N (IA-2), which is a characteristic of islet autoimmunity that contributes to insulin deficiency (38). In addition, abdominal obesity can further impair the functioning of β-cells through pancreatic ER stress. Recent research showed that hyperglycemia and hyperinsulinemia cause accelerated β cell aging. Either biological aging or obesity-induced aging would decrease the replicative capacity of β cells, resulting in a larger population of old and senescent islet cells. Obesity-associated proinflammatory cytokines can lead to β cell death through impaired mitochondria and ER stress (39). Consequently, obesity could potentially make T2DM closer to T1DM due to insulin deficiency which is also commonly seen in older adults. It has been shown that glucose sensitivity due to peripheral insulin resistance and poor β-cell function is a part of aging, predisposing older people to T2DM. Insulin resistance is associated with the accumulation of intramyocellular lipids in both obesity and aging (40).

Association Between Obesity And Aging:

Obesity enhances gene expression in the human liver associated with aging resulting in an apparent age acceleration of 2.7 years for a 10-point increase in BMI supporting the idea that obesity may speed up the aging process (41). Society and financial pressures demonstrate the correlation between obesity and aging in both the immediate effects on obesity performance and the effects on obesity and aging such as dementia. As the prevalence rate of obesity increases, the aging range is expected to be consistent. The strong association of obesity with aging and CV risk increases as aging occurs due to the accumulation of fat causing cardiovascular disease (42).

CONCLUSION

Aging and obesity are closely associated. Aging is correlated with the changes in the physiology of an individual over time. DNA damage is responsible for increased aging in people with obesity. Moreover , obesity can lead to many other health complications. Future studies will investigate whether obesity accelerates aging by understanding the link between inan advanced level. This review concludes that in general obesity can hasten age and maintaining proper body mass index with proper food and exercise may help early aging and related health complications .

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