Age-Related Physiological Changes in Women with Age and their Consequences

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Abstract: Physiological changes occur with aging in all organ systems. The cardiac output decreases, blood pressure increases and arteriosclerosis develops. The lungs show impaired gas exchange, a decrease in vital capacity and slower expiratory flow rates. The creatinine clearance decreases with age although the serum creatinine level remains relatively constant due to a proportionate age-related decrease in creatinine production. Functional changes, largely related to altered motility patterns, occur in the gastrointestinal system with senescence, and atrophic gastritis and altered hepatic drug metabolism are common in the women. Progressive elevation of blood glucose occurs with age on a multifactorial basis and osteoporosis is frequently seen due to a linear decline in bone mass after the fourth decade. The epidermis of the skin atrophies with age and due to changes in collagen and elastin the skin loses its tone and elasticity. Lean body mass declines with age and this are primarily due to loss and atrophy of muscle cells. Degenerative changes occur in many joints and this is, combined with the loss of muscle mass.

Keywords: Cardiovascular diseases, Muscle mass, Gastrointestinal, Body Mass Index.

Introduction

“Aging affects all physiological processes. Subtle irreversible changes in the function of most organs can be shown to occur by the third and fourth decades of life, with progressive deterioration with age. The rapidity of the decline in function varies with the organ system under consideration but is relatively constant within a given system. A group of processes that take place in living organisms from birth death called aging, and this process linked with functional, structural and morphological alterations. These changes arise at the whole-body level, cellular level, and the tissue level (Boss GR). Morphological and body structural changes in humans occur over their life time. In the human body, there are many physical changes specifically seen at every stage of life. Although every person experiences a unique pattern of growth and development but during early stages of life these changes are known as growth and development (https://medlineplus.gov > Medical Encyclopedia).

Generally, physical dimensions are at peak from age 20 to 35 years, between the late teen and 3rd decade of life. In this stage a maximum level is attained by the physiological capacity of various systems. Physiological functions start to decline after 35 years at different rates in different people (Sharma and Goodwin, 2006). After the age of 35, there is continuous quantitative and qualitative reduction of skeletal muscle mass and fat redistribution in the body. Reduction in muscle mass occurs with greater accumulation of fat in the intra-abdominal region. Although there is no significant changes in BMI (Body Mass Index). An important concept not widely appreciated is the distinction that must be made between the normal attrition of function occurring in all persons with advancing age and the loss of function that marks the onset of pathological changes from one or more of the diseases encountered with increased prevalence in the older age group. Failure to recognize this difference can lead to progressive disability from treatable diseases in many cases. In this review we will discuss some of the physiological changes that occur with aging in the cardiovascular, gastrointestinal, endocrine, and musculoskeletal systems and its consequence on women health (Rana et al, 2017)”.

Different Health Problems

Obesity: “High body fat is called obesity which is a pathological condition with excess body fat. It is a chronic disorder having complex interaction between environmental and genetic factors. It is being characterized by high cholesterol, excessive adipose mass accumulation, fatty acid levels, high blood pressure and insulin desensitization (Gupta et al, 2011). Obesity is one of the most widespread problems all over the world. About 25% of children and 40-60% of adults in all developed countries suffer from the excess weight which causes physiological and psychological changes of the body, as well as serious health problems. The prevalence of obesity is higher (39.4%) among middle age adults between 40 years to 59 years, than lower (32.0%). Fat can subcutaneous or visceral according to its location. The saturated fat is linked with the primitive fat around the middle body section, which may hamper with the proper functioning of vital organs. There is an association between specific fat deposits and overall fat deposits. For degenerative diseases, abdominal fat is most correlated factor (Gungor, 2014). A good nutritional status of adults has important for her health and health of her children too. In comparison of men and women, the essential fat level is higher in women as it includes sex-characteristic and issues linked to fat during child bearing. It is clear that increased body fat affects our health and health of specific organs. The prevalence of obesity among younger women has been found to be lower in comparison of middle aged or older women (Soliman et al, 2014). In the years surrounding menopause, women are particularly vulnerable to weight gain. In many ways, obesity negatively affects on the health of women which enhances the relative risk of coronary artery diseases, diabetes, and higher risk of multiple cancers, including breast cancer and endometrial cancer. With increased age, incidence of obesity makes a complicating relationship between muscle mass, weight changes and decreasing strength (Soliman et al, 2014).
Hypertension: The prevalence of hypertension has increased over the last decade. Essential hypertension accounts for more than 90% of cases of hypertension. In a recent review; the lifetime risk of becoming hypertensive in industrialized countries was estimated to exceed 90%. In blood pressure levels, the gender difference appears during adolescence but a transfer in relative prevalence of hypertension occurs in the elderly. In comparison with age-matched men, premenopausal women have lower risk and incidence of hypertension but this advantage for women gradually disappears after menopause. A higher percentage of women in comparison with men, have hypertension after 65 years of age, and the gap will probably increase with the continued aging of the female population (Gudmundsdottir et al, 2012).

Between the ages of 65 and 74 years, the prevalence of hypertension is as high as 58% in women. Hypertension is a chief risk factor for the early development of heart disease, stroke, and heart and kidney failure. In comparison with normotensive individuals, the risk of a heart attack or kidney failure increases four-fold in individuals with (systemicarterial hypertension) SAH>160 mmHg; and the risk of heart failure doubles after 40 years of a age. Basically, this high prevalence of hypertension is a development that is part of the ageing process in individuals of both sexes. Obesity is also a significant risk factor in the pathogenesis of arterial hypertension. There is the additional effect of the estrogen depletion that occurs at menopause among women (Hage et al, 2013)

Cardiovascular diseases (CVD): “CVD are non communicable diseases having a major share of incidences which have been leading cause of morbidity and mortality. In India, females of urban population are more prone to CVD. Recent trends declare that the prevalence of these diseases has also occurred into younger age groups (Upadhyayaya, 2012). Generally women are less likely to get heart disease until menopause. It is believed that estrogen hormone provides protection to the heart until natural menopause but after menopause risk increases. By the age of 60 to 65 years, women and men have the same risk of heart disease (Rebecca and Sweeney, 2000).

Osteoporosis: It is a disease in which bones are more fragile and have less density, thus, there is a high risk of fracture. It most common in women after menopause between the ages of 45 to 55 years. Bone mass of women begins to lose more rapidly in comparison of men. After menopause, women produce much less of the estrogen hormone and this hormone make the bone strong. Human body changes during adulthood may be affected by various modify able factors they can determine the health status (Meng and Qi, 2015).

Changes in Respiratory System

Lung Volume: A linear decrease of vital capacity is found that amounts to a decrement of about 26 ml per year for men and 22 ml per year for women starting at age 20.3 The total lung capacity remains constant, however, and thus the residual volume increases with age. The ratio of residual volume to total lung capacity (RV/TLC) is about 20 percent at age 20 and increases to 35 percent by age 60, with most of this increase in RV/TLC occurring after age 40. In most studies the functional residual capacity also increases, although not as rapidly as the residual volume (Sharma and Goodwin, 2006).

Gas Exchange: Although alveolar oxygen tension remains constant with age, arterial oxygen pressure shows a progressive decrease, thus increasing the alveolar arterial oxygen difference (A-a)O.9 Most of this decrease in arterial oxygen pressure results from a mismatch of ventilation and perfusion. The elastic recoil of the lungs decreases with age and thus there is a greater tendency for airways to collapse. This is measured as an increase in “closing volume” which increases linearly above the age of 20. Airway closure occurs predominantly in the dependent zones of the lung and in the upright position this will result in a ventilation perfusion mismatch because more perfusion occurs in the lower lobes. Although an age-related decrease in carbon monoxide diffusing capacity has been shown, it is unclear whether this contributes to the reduction in arterial oxygen pressure. Flow Rates there is a 20 percent to 30 percent decrease in maximum voluntary ventilation, forced expiratory volume in one second, maximal expiratory flow rate and maximum mid expiratory flow during adult life. The basis for these changes is not known but again may relate to a decrease in the elastic recoil properties of the lung. This would result in both a decreased ability to generate normal expiratory pressures as well as increased resistance to expiration due to abnormally early airway collapse.

Changes in Gastrointestinal System

Esophagus
“Age-related changes of esophageal function, so called presbyesophagus, are due primarily to disturbances of esophageal motility. The esophagus in an elder person may have a decreased peristaltic response, an increased non peristaltic response, a delayed transit time or a decreased relaxation of the lower sphincter on swallowing. The decrease in peristalsis and delay in transit time may lead to dysphagia with a voluntary curtailment of caloric consumption. Non peristaltic contractions are found almost exclusively in the elderly. They occur in the lower two thirds of the esophagus and are the cause of the “corkscrew” esophagus seen on barium swallow studies. Decreased relaxation of the lower esophageal sphincter on swallowing is the basis of achalasia and is more common in the elderly population.

Stomach: The incidence of atrophic gastritis increases significantly with age. In a Scandinavian study approximately 40 percent of apparently healthy subjects older than 65 had evidence of atrophic gastritis. At present, atrophic gastritis is divided into type A which is confined to the body and fundus sparing the antrum and type B which is associated with atrophy of both antral and fundic glands. Both types increase in frequency with advancing years. Severe atrophic gastritis results in achlorhydria, deficient intrinsic factor secretion, and decreased pepsinogen production and, in type A hypergastrinemia due to lack of acid inhibition of gastrin cell
secretion. Type A atrophic gastritis appears to be an autoimmune disease, whereas type B may be due to local environmental factor such as chronic enterogastric bile reflux. Both types of atrophic gastritis are premalignant lesions (Park and Kim, 2015).

Colon: A decrease in intestinal motility occurs with age. The colon becomes hypotonic, which leads to increased storage capacity, longer stool transit time and greater stool dehydration. These are all etiologic factors in the chronic constipation that plagues the aged. Laxative abuse therefore results and is the most common cause of diarrhea in the elderly. A high-fiber diet is the treatment of choice and this can best be achieved by prescribing a diet rich in bran. Whether or not constipation is anetiologic factor in diverticulosis remains unclear but age certainly is. Diverticula are uncommon below the age of 40 but steadily increase thereafter until nearly 50 percent of those older than 80 have diverticulosis. Symptoms are present in only about 20 percent to 25 percent of those who are affected and severe disease with inflammation and bleeding occurs in a much smaller number (Andrews and Storr, 2011)

Sphincter Control: “Loss of control of the internal and external anal sphincters in the elderly in the presence of essentially normal cognitive function is a most emotionally traumatic and demeaning experience. The resulting fecal incontinence is one of the major causes for admission of many otherwise healthy persons to long-term care facilities. Recent studies have shown the cause to be a loss of tone of the external rectal sphincter. Biofeedback techniques allowed the regaining of sphincter and bowel control in as many as 70 percent of a group of patients studied (Siegfried and Rao, 2014).

Liver and Biliary Tract:-The liver decreases in weight by as much as 20 percent after the age of 50 but perhaps because of its large reserve capacity this attrition is not reflected by a decrease in the usual liver function tests. Although tests of liver function show little or no change with age, a large number of drugs such as diazepam and anti pyrine are known to be metabolized more slowly by the liver in the elderly. This alteration in hepatic drug metabolism may be due to a decrease in the appearance, amount or distribution of the smooth endoplasmic reticulum. Biliary tract disease is unusual before the third decade and the incidence of cholelithiasis is increases greatly with age. In a large autopsy series of subjects older than 70 years, 30 percent had gallstones and another 5 percent had previously had a cholecystectomy in my. In general, surgical operation is indicated in patients with gallstones, even if asymptomatic, since the risk of complications of operation (Hall and Cash, 2012).

Menopause:-Nowhere are the developments of age-related changes more apparent than in the human female climacteric. Menopause occurs because of the disappearance of oocytes from the ovary through ovulation and atresia. Little is understood about the process of ovarian atresia and whether it is due to primary ovarian failure or secondary to hypothalamic-pituitary changes. Several consequences of the menopause deserve mention. First is the vasomotor instability or hot flushes. Two thirds to three quarters of menopausal women will experience flushing, with 80 percent having the symptoms for longer than one year and 25 percent to 50 percent for more than five years. Changes in skin temperature, skin resistance, and core temperature and pulse rate occur during the flush. Besides being a major disturbance while women are awake, the hot flushes may occur during sleep, leading to waking episodes. Insomnia with possible physiologic and psychologic disturbances may thus result. It is well known that arteriosclerotic cardiovascular disease is unusual in women before the menopause. The precise protective mechanism of ovarian function is not known, but premenopausal women have a higher ratio of high-density lipoproteins to low-density lipoproteins than do postmenopausal women” (Seifer and Merhi, 2014).

Human body changes during adulthood may be affected by various modify able factors they can determine the health status.

References