ORIGINAL ARTICLE

Annals of Agricultural and Environmental Medicine 2014, Vol 21, No 4, 835–838
www.aaem.pl

Biological psychological and social determinants of old age: Bio-psycho-social aspects of human aging

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Dziechciaż M, Filip R. Biological psychological and social determinants of old age: Bio-psycho-social aspects of human aging. Ann Agric Environ Med. 2014; 21(4): 835–838. doi: 10.5604/12321966.1129943

Abstract

The aging of humans is a physiological and dynamic process ongoing with time. In accordance with most gerontologists' assertions it starts in the fourth decade of life and leads to death. The process of human aging is complex and individualized, occurs in the biological, psychological and social sphere. Biological aging is characterized by progressive age-changes in metabolism and physicochemical properties of cells, leading to impaired self-regulation, regeneration, and to structural changes and functional tissues and organs. It is a natural and irreversible process which can run as successful aging, typical or pathological. Biological changes that occur with age in the human body affect mood, attitude to the environment, physical condition and social activity, and designate the place of seniors in the family and society. Psychical ageing refers to human awareness and his adaptability to the ageing process. Among adaptation attitudes we can differentiate: constructive, dependence, hostile towards others and towards self attitudes. With progressed age, difficulties with adjustment to the new situation are increasing, adverse changes in the cognitive and intellectual sphere take place, perception process involutes, perceived sensations and information received is lowered, and thinking processes change. Social ageing is limited to the role of an old person is culturally conditioned and may change as customs change. Social ageing refers to how a human being perceives the ageing process and how society sees it.

Key words

ageing, social determinant, psychological factors

INTRODUCTION

Aging is a physiological process, dynamic and irreversible, which occurs in the individual development of living organisms over time [1]. It is a universal phenomenon in the lives of humans from conception, and according to most biologists the aging begins from the fourth decade of life and ends with death, the end of biological life. The process of human aging is complex and individualized, occurs in the biological, psychological and social sphere [2]. The genetic code is considered the basic etiological-pathological mechanism of aging, in addition to the important role attributed to extracorporeal, biological and psychosocial factors. The biological agents include: physical inactivity, improper nutrition, psychomotor load, acute and chronic medical conditions, and the psychosocial: changes in the environment, isolation, loneliness, and lack of preparation for old age [3].

The aim of the study is to present the aging processes of humans and changes in bio-psycho-social areas by reviewing available literature.

Old age is defined as the final stage of the aging process, ending in death [1]. It is defined by biologists and physicians as the stage of life after the age of maturity, in which there is a reduction in bodily functions and various changes in systems and organs [4].

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Received: 10 July 2012; Accepted: 11 December 2012

With the limits imposed, retirement age is assumed by the following:

- calendar (chronological, determined by years of age);
- biological (functional, determined in individual characteristics);
- law (statutory retirement age limit);
- economics (lack of activity, a reduction of income);
- social (related to the loss of prestige and social roles) [5];
- psychological (determined by the study of intellectual function) [6].

Due to the individualized process of human aging, the beginning of old age is difficult to determine; therefore, its beginning must be considered in accordance with the convention of the so-called calendar age, which means the threshold of old age [7]. There is no single universally recognized and applied threshold of old age, although in the literature various researchers refer to this problem. According to a German psychologist L. Aschoffa, aging begins at the age of 45, and by the Russian gerontology, at the age of 80 (!) [4]. The World Health Organization (WHO) adopted a threshold age of 60, and this age limit is accepted in Europe, including Poland. However, the United Nations (UN) decided that old age begins at 65, and this limit is accepted in both the United States and United Kingdom [8].

Old age is divided into periods, which is consistent with the literature. According to the World Health Organization old age is divided into 3 periods:

1) aging (early old age): 'young-old' – 60–74 years old;
2) old age (late age): 'old-old' – 75–90 years of age;
3) longevity (long-lived) – 90 years and older [7].

J. Kocemba also distinguishes 3 periods of old age:
1) early old age (third age): 60–75 years of age;
2) mature old age – 75–90 years of age;
3) longevity – 90–120 years of age [3].

S. Klonowicz in turn suggests also suggests 3 stages of old age:
1) for men – 60–79 years of age;
2) for women – 65–79; for men -
3) hoary old age – over the age of 80.

D.B. Bromley divides age into 4 phases:
1) time prior to retirement from work – up to 65 years of age;
2) retirement – over 65 years of age;
3) old age – over 70;
4) late old age – up to 110 years of age [4].

Biological aging is defined as the natural occurrence of irreversible, increasing with age changes in metabolism and the physicochemical properties of cells, leading to impaired self-regulation and regeneration, and structural and functional changes in tissues and organs [9]. The most important structural changes are:
- atrophy of tissues and organs, which develop slowly, leading ultimately to death;
- polymorphic amyloid degeneration (in areas of tissue where amyloid is deposited) and lipofuscinoid (in the cytoplasm of cells of solid organs the pigment lipofuscin, termed the 'senile pigment', accumulates);
- internal and external cell dehydration, in which the total volume of body fluids is reduced from 60% of body weight in younger people and adults, to about 45% of body weight in the elderly;
- increased fat and reduced muscle tissue.

The most significant functional changes include abnormal adaptation on all levels of the structure of the human body, and weakness or failure of regulatory mechanisms leading to systemic imbalances (homeostasis) [10].

Biological aging may proceed as successful aging, typical or pathological. Successful aging occurs when the aging process is free from disease, and factors known as predictors of old age which slow it down.

Aging, typically called ordinary physiological aging, means a process of progressive deficits, evenly distributed in time, with no apparent pathology.

Pathological aging is the rapidly progressive impairment of many vital functions of the body, leading to premature death [6, 11].

Physiological changes occurring during aging run unevenly in the various organs and systems of the body, and may also take place at different rates in individuals [12].

Circulator system changes. Along with age, there occurs a decrease in the velocity conduction of myocardial cells, hypertrophy of the left ventricle [13], an increase in the number of cells of connective tissue, and the deposition of calcium and lipofuscin, as well as amyloid degeneration, fatty degeneration [14], calcification and fibrosis of the valve and mitral apparatus [2]. Diameter expansion of the arteries is diagnosed, together with thickening of the medial and internal membrane and stiffening of walls. In veins, failure of the venous valves is observed and the capillaries become less robust [10]. With age, blood flow in the kidneys may be reduced by as much as even 50% and in the brain by about 15–20%. [10]

Respiratory system changes. With age, the size of the trachea and bronchi decrease [15], causing a reduction in the vital capacity and maximum respiratory capacity [13]. Lung elasticity and the number of bronchioles and alveoli is reduced, increasing the physiological dead space. This leads to muscle weakness and impaired respiratory cilia which, in turn, leads to impaired self-cleansing of the bronchial tree [14]. The chest becomes stiffer and barrel shaped [2].

Digestive system changes. Old age results in receding gums and missing teeth, decrease in the secretion of saliva and mucus, reducing gastrointestinal motility, together with gastric emptying and slowing of muscle tension [14]. In the stomach, there is a decrease in the secretion of gastric acid secretion and the gastrin sequence. Decongestion of the pancreatic endocrine function and regenerative capacity of the liver are impaired [10], and in about 30% of those aged over 60, bowel divericula are present [15].

Urogenital system changes. The elderly have kidneys reduced in size and weight [10], and a gradual decrease in renal blood flow and volume of glomerular filtration [14]. Research carried out on a large population indicated that with age there are also decreases in the creatinine clearance rate [15], which leads to reduced bladder capacity, and to a reduction in the force and strength of the detrusor sphincter [2]. There are also diagnosed among men an increase in weight and size of the prostate, and among women – vaginal atrophy [13].

Changes of musculoskeletal-locomotor system. With age, bone density decreases, leading to the degeneration of joint cartilage and mobility limitations, resulting in the slow loss of muscle mass and loss of muscle strength [10] due to thinning of intervertebral cartilage between the ages of 20 – 70. Thus, body height is reduced by 5 cm [14].

Nervous system changes. Old ld age causes a reduction in the weight of the brain, white matter atrophy, curves flatten, furrows deepen, and widening of the lateral ventricles and third ventricle [14]. With older, healthy people, a moderate atrophy of grey matter is observed, whereas with people with stupefaction the atrophy is very high [15]. In the brain, senile plaques containing amyloid arise, lipofuscin accumulates in the cytoplasm of cells [14], leading to disorders in neurotransmission and signal transduction mechanisms [10]. There is also a weakening of reflexes and decreased muscle tone [13].

Senses organs changes. Old age results in impaired eyesight: reduced visual acuity and accommodative power, hypermetropia (Presbyopia) [10], atrophy of tissue around the eyes, reduction of adipose tissue around the eyes, causing a droopy upper eyelid and rolling inside and outside of the lower eyelid [15]. Hearing deficiency is also observed in old age – senile deafness (presbyacusis), together with a weakning in smell and taste [10]. The hearing of high frequency sounds is more impaired. There occurs a reduction in the understanding of speech in those aged over 80 – a

reduction of more than 25% of the peak level. Above the age of 50, the sense of smell is impaired, and after 80 the sense of smell is reduced by almost 50% [15].

Changes in the skin and its appendages. With age, skin thickness, the number of sweat glands and nerve endings decrease. These changes lead to impaired function of the permeability of the skin, reactivity of the immune response to inflammation, wound healing, and the thermoregulation production of sebum and sweat [10].

For the elderly, it is important to consider that the changes in various organs may be a result of the aging of the organism and may be the cause of a disease. Differentiating between involutional and disease-related changes, especially in advanced old age, is challenging. An additional difficulty is the differentiating between pathological and physiological states, and there is a different clinical picture for seniors and youngsters and co-existing diseases. Changed symptomatology include the lack of, non-specific or concealed symptoms of disease [16].

Psychosocial aging. Treated as a phenomenon secondary to biological aging. Changes that occur with age in the functioning of individual organs affect the mood, attitude to the environment, physical condition and social activity, and designate the place of the elderly in the family and society. Psychosocial aging, however, to a great extent depends on how a person is prepared for old age, and takes effect over time [6]. Z. Szarota claims that the kind of people we become in old age is determined by the quality of our earlier life [4].

Mental aging refers to the human consciousness and its adaptability to the aging process [9]. Acceptance of old age contributes to the feeling of happiness and life satisfaction, the lack of which causes the feelings of solitude and physical suffering [17].

Bromley distinguishes the five most common attitudes for adapting to old age:

1) constructive attitude – characterized by the acceptance of old age, internal integration and harmonious interaction with others;
2) dependence on attitude – characterized by an increase in dependency and passivity;
3) defensive posture – for those who refuse to accept help from others, even though they need it. People are closed in, perceiving old age in a pessimistic way;
4) attitude of hostility towards the world – occurs in those who are aggressive, suspicious, and dissatisfied with contact with others, thereby isolating themselves socially,
5) attitude of hostility towards themselves – referring to those who are self-critical, not believing that they are able to affect their own lives [18].

Liliane Israel defined psychological aging as an "effect of time on a man's personality and his emotional and spiritual life" [9].

The literature indicates that elderly people exhibit a tendency to be self-centred, conservative, bossy, hypochondriac and tend towards senility [6].

With age, there are increasing difficulties in adapting to new situations, followed by adverse changes in the cognitive and intellectual spheres, there occur changes in the evolution of the processes of perception, processing of received impressions, and the thought processes [9]. Elderly people manifest 'post-formal thinking', characterized by the acceptance of more than one solution, contradiction and ambiguity of acceptance, and the taking into consideration of limitations and the realities of life [19].

With age, memory deteriorates, especially short-term memory, to which can now be added a new type – so-called emotional memory-cardiac memory [9]. Pieniewska et al., Lezak et al., and Strauss et al., have proved that with age, attention divisibility, visual-spatial memory and ability of presenting mental processes, deteriorate [20]. Depression and stupefaction, diseases where the basic symptoms are disorders of cognitive functions are also more common in old age [21].

Although a number of negative characteristics are attributed to the elderly, this is not the rule and does not correspond to the whole structure of their personality. There are also positive mental changes during the aging of the human body. Retrospective thinking allows older people to recall even the most distant events, to have great practical experience which they can use and share. However, they are cautious in making decisions and are able to avoid many mistakes [6].

In old age, the spiritual dimension also changes; there is a willingness to reflect on themselves and the world, and conduct a 'life balance' – a settlement with their own lives and themselves, reflecting on the limitations of their existence and preparing themselves internally for illness, suffering and death [9]. Some seniors openly reflect on religious issues, while others have no wish to discuss them. It is believed, however, that in the final period of life faith helps them to find hope [11].

Social old age, meaning the limitation only of being old, is culturally conditioned and may vary with the change in manners [9]. Each person living in society has defined roles, some of which disappear in old age, others become modified of continued, while brand new roles appear [22]. Sometimes, there occurs a reversal of roles, especially in the case where adult offspring need help [6]. This is a matter for the aged where they have to be reconciled to the loss or modification of certain roles and seek out a new role; this, to a large extent, depends on the environment within which they function, as well as the active role they create [22].

The aging period varies substantially with the human life situation [9] during which many losses have to be borne: sooner or later, relatives die and adult offspring leave home. With the loss of health, there is a reduction in the satisfaction with life, interest diminishes, and the sense of loneliness and danger appears [23]. Retirement often involves a big change in lifestyle, a reduction of needs and contacts, together with isolation and impoverishment [6].

Despite all the 'losses' in old age, this period can be utilised to provide a creative and useful life. A. Nowicka believes that old people are the bearers of many family, religious and social values, and old age is a period of 'harvesting' from previous existence [7]. A. Kołątaj defines old age as a period of maximum accumulation of experiences and social opportunities [6]. Seniors have at their disposal a lot of free time, and whenever they are able, they can realize themselves and help others, they can undertake new social and family roles, engage in the activities of various organizations and associations. Mostly, this depends on the earlier style of daily functioning whereby it is believed that those who were active in their youth, during their old age also attempt to live an active life, develop their interests and hobbies, or take an active part in their community associations, groups or foundations [7].

M. Dzięgielewska divided the activity of elderly people into formal (volunteering, association, politics), informal (contact with family, friends, acquaintances) and solitary (hobbies, reading) [24]. It is believed that one of the most important forms of active aging, leading to a sense of usefulness and prestige, is contacts with family, relatives and neighbours [9]. According to M. Dziegielewski, for the elderly, the family is the natural environment from which they expected spiritual, physical or material support [22].

According to gerontologists, self-activity is a factor which determines the health in 50 % [25].

Social aging refers to how a person perceives the aging process and how it relates to the society in which they live [9]. Everyone enters old age with an individual vision of what it means, although this period in life is formed by many aspects, for example, watching old people closely, existing stereotypes of old age, and their own expectations arising from past experience. The vision of old age created by humans is a kind of guide, according to which behaviour towards the aging process is shaped. Depending on which old age image is dominant – positive or negative, those who are aging develop a real dimension of their age. The subjective way of perceiving the aging process influences the aging functioning, life activity, and all actions and contact with other people [26].

Modern society promotes youth, progress, development, efficiency and cost-effectiveness. It is therefore often difficult for elderly people to be personally fulfilled, active, and to have the right to take initiatives on retirement, thus accelerating psychosocial aging, manifested as depression, apathy and indifference to the environment [6]. However, highly developed societies attempt to create the possibility to fulfil their social functioning, understood as belonging to a network of social relationships, providing social support, continuing with social roles, and the realization of interests, passions or hobbies[27].

CONCLUSIONS

The aging of humans is a diverse process in all spheres of life, including the biological, psychical and social. The aging process may be fortunate, typical or pathological. It is characterised by involutional changes in particular systems and organs, leading to the gradual reduction of body efficiency, co-existence of diseases and changes of symptomatology. In the psychical area, with age there occur adverse changes in memory and cognitive functions, and there is higher probability of depression and stupefaction. Social aging is connected with the loss of social roles, reduction of interpersonal relations and feeling of loneliness. An important factor for improving psycho-social functioning in old age is acceptance of life satisfaction in old age, and self-activity.

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