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Review article

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An overview on facts and myths on aging and prevention of anti-aging

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ABSTRACT

The 'anti-ageing' movement claims many unprecedented features to combat the symptoms of ageing, to slow down the ageing process, to enhance health and vitality, to increase life expectancy and ultimately to improve the quality of life of older persons and thus of society as a whole. Two tendencies are included in the anti-ageing movement: (i) the practice of preventive ageing medicine using a large area of interventions, and (ii) the promotion of promising solutions, offered by life science biotechnologies and scientific progress to consumers of all ages, often despite systematic evidence. Striving to extend human life to its highest limit is reflected in what is called 'longevity' medicine" or 'prolongevity' and which has been also called 'antiageing medicine'. Advances in all aspects of medicine, especially in the fundamental metabolic and functional process of ageing have led to new findings susceptible of transforming the traditional concept of physiological decline with age. Today researches based on prevention and treatment of ageing symptoms has reached a point where a new paradigm of human development is about to be offered a reversal of some ageing symptoms, control of different age-related illnesses, regeneration processes, human enhancement and replacement of different body parts are possible.

Keywords: Aging, Prolongevity, Longevity, Prevention, Regeneration.

INTRODUCTION

Ageing is the process of growing old or maturing, it's an artificial process for imparting the characteristics and properties of age. Many biologists, medical doctors and some psychologists said that ageing is associated with decline of most elements. Ageing is the point at which development has ceased and subsequent changes are seen as an aggregate of biological change beyond the point of optimal maturity. On the other hand, lifespan developmental psychology considers ageing in more positive terms: "The psychology of ageing,

geropsychology, focuses on the behavior of individuals involved in the processes of post-maturity development."¹

In this perspective, ageing is seen as a continuous development in old age as opposed to an irreversible decline. In medicine, ageing is generally characterised by the declining ability to respond to stress, increasing homeostatic imbalance, and an increased risk of disease. Because of this, death is the inevitable consequence of ageing. Differences in maximum life span between species correspond to different 'rates of

ageing'. For example, inherited differences in the rate of ageing affect a mouse elderly at 3 years and a human over 90 years.¹

These genetic differences affect a variety of physiological processes. Despite the strong call of 'anti-ageing' redefining 'ageing as a disease', most scientists are currently opposed to this view. Hayflick is one of them and states that even if it leads to death, ageing cannot be considered as a disease per se and stresses that four criteria clearly differentiate ageing from disease: (1) it occurs in every living being that reaches a fixed size in adulthood, (2) it takes place in virtually all species, (3) it occurs in all members of a species only after the age of reproductive success, and (4) occurs in animals removed from the wild and protected by humans even when that species has not experienced ageing for thousands or even millions of years.

More than 75% of all human deaths in developed countries now occur in those over the age of 75. If the causes of these deaths are resolved we will not become immortal, but we will have revealed how death occurs in the absence of disease. The underlying cause of these deaths is the inexorable loss of physiological capacity in the cells is the hallmark of ageing. If ageing research is to advance, it will not only be necessary to distinguish biogerontology from geriatric medicine, but it will also be necessary to distinguish ageing from longevity determination. Since last century, researchers have focused on trying to understand the mechanisms of ageing and the factors influencing morbidity and mortality. An impressive body of research is now available, from the cellular to the socio behavioral perspective of the ageing processes.¹

Each scientific discipline has built its own set of theories on the mechanisms and processes of ageing and tried to reach a consensus on what is 'normal ageing' versus 'pathological ageing'. There is growing interest from diverse perspectives of science to search for a general theory that explains what ageing is and why and how it happens. Therefore, theories have been developed allowing researchers to handle an enormous amount of diverse observations related to this phenomenon.

Empirical observations on ageing have become so, abundant and complex that the 'Handbooks' or 'Encyclopaedias of Ageing' existing today have grown over the past decade from a single volume to multiple volumes, for example, a special four

volume 'Encyclopaedia of ageing' is today required to cover the full extent of accumulated knowledge or the 'Handbooks of Ageing', at their 6th edition now have three different handbooks distinguishing: biology, psychology, and social science perspective on ageing.¹

Few growing evidence in humans regarding aging¹

Environmental factors passed down to future generations

Researchers in Sweden have shown that a famine at critical times in the lives of the grandparents can affect the life expectancy of the grandchildren. This is the first evidence that an environmental effect can be inherited in humans.

In-vitro fertilisation impact

Studies show that babies conceived by IVF have a three- to four-fold increased chance of developing the Beckwith-Wiedemann Syndrome, a rare disorder linked to abnormal gene expression.

Impact of stress and tragic events on the embryo

Pregnant women present during the September 11 World Trade Centre collapse have passed on markers of Post Traumatic Stress Disorder (PTSD) to their unborn babies through trans-generational transmission. The findings strengthen the evidence for in-utero or early-life risk factors for the later development of adult mental or physical disorders.

During the ageing process, much impairment will take place both anatomically and physiologically and affect physical, mental and social wellbeing aspects of individuals to some extent, further it will lead to certain pathological conditions. India is an ageing society.² The ratio of ageing population was exceeding the general population.³ In India, it is estimated that elders in aging 60 and above is expected to increase from 71 million in 2001 to 179 million in 2031 and in the case of those 70 yr and older, the value was projected from 27 million in 2001 to 132 million in 2051.⁴

Reports from India suggest that almost 50 percent of the elders suffer from chronic diseases with increased prevalence rising from 39 percent in 60-64 years to 55 percent in those older than 70 years.⁶

Focusing the elders, the topic of world health day in the year 2012 is "Ageing and Health" with the theme of "Good health and life to years".⁶ In India numbers of elders aged 60 years or more

were increased from 5 percent in 1951 to 7.5 percent in 2011.⁷ Older persons constitute one of the most vulnerable sections of the society. They are not only physically weak, but also lack economic resources and self-esteem social status.⁸ The common health problems on Musculo skeletal, cardiovascular, neurological, endocrinological systems, cataract, hearing difficulties, respiratory diseases are the leading causes of death among the elders in India.⁹

Hearing and visual impairments are two of the common causes of morbidity in the aged population. A National survey noted that 5 percent of the elders have difficulty in physical mobility are known to impair the quality of life. The care of elders is gradually showing shift from family to community level as old age home concept worldwide. Old age homes are being established by government and voluntary organizations to provide care, shelter, financially poor, lacking family support and destitute. Many studies are available on problems of geriatrics conducted among the community in India. Inmates of old age homes constitute an important community in our country but there is lack of adequate information on health problems of these groups.

EPIDEMIOLOGY

By 2050, life expectancy at birth is projected to reach 74 years. Fertility rates in India have declined to 2.6 children per women, less than one-half of early 1950s rate of 5.9 children per woman.¹⁰ As India's population ages, the nation will face a shrinking pool of working age people to support the elderly population. A report regarding old-age dependency ratio, the number of people ages 60 and older per person ages 15 to 59 and is expected to rise from 12 per 100 to 31 per 100 by 2050.¹¹ By 2042, the share of Indians projected to exceed children and youth ages 14 and younger.¹²

A report regarding the burden of old-age dependency "will be substantially offset by the decline in youth dependency associated with declining fertility." Pointing India's 16 languages, as a "collection of semi-independent countries united under one democracy", fertility rates in India's southern states of Kerala and Tamil Nadu were low 1.7 children per woman in 2009, while the fertility rates in the northern states of Bihar and Uttar Pradesh were twice as high.¹⁰

Theories regarding aging¹

'Wear and Tear' Theory

Introduced by August Weismann in 1882, 1891, 1892 and provided detailed explanation regarding the ability of normal somatic cells to replicate and function is limited, therefore ageing occurs because the body and the cells are damaged by overuse and abuse; a worn out tissue cannot renew itself forever.

Free Radical Theory

Introduced by Rebeca Gerschman and her colleagues in 1954, and then developed by Denham Harman, 1956. Studied regarding normal oxygen consumption inevitably results in the production of oxygen free radicals, which in turn damage important biological molecules. Over the last half-century the free radical theory has developed into the oxidative stress theory of ageing following the observation that the damaging reactive oxygen species (ROS) are not all free radicals and by also taking into account the organism's antioxidant defence mechanism. This theory proposes oxidative stress and the consequent damage is also responsible for processes such as the clustering of degenerative diseases in the terminal part of the life.

Waste Product Accumulation Theory

The theory was introduced by Henry Hirsch in 1978 conducted study regarding the elimination of metabolic waste from the cell. In the course of their life spans, cells produce more waste than they can properly eliminate and when accumulated it can interfere with normal function and trigger degeneration processes. As the body ages, its cells are less able to dispose of accumulated waste and they slowly die. This is similar to the limited number of cell divisions theory: the number of cell divisions is directly affected by the accumulations of the cell's waste products. The more wastes we are accumulating over time the faster cells degenerate.

Errors and Repairs Theory

This theory was introduced by Peter Medawar in 1952 and the study regarding the theory was continued by Leslie Orgel in 1963, this theory explains that the natural repair processes are incapable of making perfect repairs. As a result, errors creep into the molecules that compose our

body, causing metabolic failure, resulting in age changes and finally death.

Cross-Linkage Theory

Introduced by Johan Bjorksten in 1942, theory states that with age some proteins, including collagen become increasingly cross-linked and may obstruct the passage of nutrients and wastes in/out of cells. In addition, excess sugar molecules in the blood can react with proteins causing cross-links and the formation of harmful free radicals.

Theory of Cell Damage, Balance and Transportation

Adherents of this current point out that cell survival require detoxification, the appropriate balance of nutrients, water, electrons, antioxidants, electrolytes, hormones, and acid-base. This means open capillaries and lymphatic's imbalance will cause cell suffers and finally will bring cell degeneration or death.

Immune System Theory

The immune system is the most important line of defense against foreign substances. With age the immune system's ability to produce antibodies necessary to fight disease in adequate numbers and its ability to distinguish between antibodies and proteins declines. The ageing immune system may mistakenly produce antibodies that work against it.

LIFESTYLE AND HEALTH CONDITION ON AGING

A study found that the ratios of the working-age population to the nonworking-age population for Tamil Nadu and Bihar are widely different, comparing that difference to the gap between the ratios for Ireland and Rwanda today.¹⁰ Economic development and urbanization have brought life-style changes that have led to unhealthy nutrition, physical inactivity, and obesity contributing to the prevalence of diabetes. A report stated that high rate of smoking (26 percent) and inadequate physical activity (18 percent) among Indians will translate them into future unhealthiest.¹²

Almost one-half (47 percent) of older Indians have at least one chronic disease such as asthma, angina, arthritis, depression, or diabetes.¹⁶ The aging of India's population will lead to increases in the prevalence of chronic conditions such as diabetes and hypertension. With single measure,

nearly one-half (45 percent) of India's disease burden is projected on older adults in 2030.¹²

Fewer than 10 percent of Indians have health insurance from private or public sources, and about 72 percent of health care expenses are paid out-of-pocket, according to national surveys.¹⁴ India's health insurance scheme only covers those ages 65 and younger, leaving India's elderly population particularly who are vulnerable. Within the older Indian population, women face additional risks. They tend to have poor health and less access to health care than men of similar backgrounds.¹⁵ The Indian government have begun a variety of programs designed to increase access to health care or health insurance for the majority of the population for those who lack sufficient access.¹⁶

Rising numbers of older people will have new and increasing demands on the health care system. A study suggests that the "health care services will need to shift resources and services to respond to an aging population."¹² An analysis by Farahani, Subramanian, and Canning linked public health spending in India to increase survival of the elderly and other vulnerable groups.¹⁷ They found that 10 percent increase in public health spending decreases deaths by 3 percent among elders, women, and children.

An analysis by Yip documented wide disparity in access to health care by people those who are poor or live in rural areas. They suggest health care reforms should not just increase funding, but also address inequality by accessing and include regulations to limit cost inflation. Money channelled through insurance and infrastructure, strengthening is inadequate to address the current problems of affordable health care and the future challenges posed by aging populations that are increasingly affected by non-communicable diseases.¹⁸

Livelihood and Support

2005-2006 National Family Health Survey in India examined living arrangements by household, shown separate cooking facilities, even if older parents and adult children live in adjacent structures. The survey found that more than four out of five (78 percent) Indians ages 60 and older lived in the same household with their children, while about 14 percent live with spouse and 5 percent lives alone. This represents a doubling of the share of older Indians living with only a spouse or alone since the early 1990s. During the same

period, the share of older Indians living with their children declined by about 7 percentage points.¹⁹

A number of trends may explain these changes in living arrangements, including declining fertility leaving fewer children available to care for older parents, rural to urban migration for employment that separates families, and changing social expectations regarding intra-family obligations.¹⁶ Recent surveys confirm this shift in attitudes, with a 40 percentage point decline in the share of adult

children who said caring their elderly parents was their duty from 91 percent in 1984 to 51 percent in 2001.²⁰

Intergenerational conflict may also explain why elders live in separate residences from their offspring. Both generations may prefer living separately and there is evidence that even when they reside apart, adult children and elderly parents remain economically and socially interdependent.²¹

MYTHS FOR ANTI-AGING¹

| Hormone Therapy | Mind Over Matter |
|---|--|
| <ul style="list-style-type: none"> • Growth hormone (The Fountain of Youth) • Adrenal hormone (DHEA) (The Grace Factor) • Melatonin (The Wonder Drug) • Oestrogen and progesterone (The Female's Monitors) • Testosterone (The Male Motor) • Thyroid hormone (The Regulator) | <ul style="list-style-type: none"> • Meditation • Progressive relaxation • Selected awareness • Breath control • Exercise and physical activity • Massage • Think young and live young |
| Nutrition and Nutrients | Lifestyles for Longevity |
| <ul style="list-style-type: none"> • Vitamins, co-vitamins and co-factors • Minerals • Amino acids • Additional cutting-edge anti-ageing nutrients (selected list of fatty acids, lipids and oils) | <ul style="list-style-type: none"> • Long-life diet: nutrition and longevity • Detoxification basics • Exercises for longevity • Sleep (The Revitaliser) • Mind over matter: anti-stress tips for anti-ageing |
| Emerging Environment Hazards affecting the Ageing Process | |
| <ul style="list-style-type: none"> • Home pathogens: bedroom allergies, cleaning products and material, laundry bacteria, garden soil toxicity and pesticides. • Bacterial outdoor hazards or the 'sick house' syndrome, day care centre, sick building syndrome (office), health care settings, gym, swimming pool, hotel • Cellular phone radiation • Car gas | |

CONCLUSION

Successful ageing goes beyond the absence of illness and the maintaining of functional capabilities. Their combination with an active involvement in life represents the concept of successful or optimal ageing that involves several dimensions such as lifestyle, nutrition, developmental psychology, and also genetics. The various patterns invite us to be very cautious about generalising a model of ageing marked by the inevitable decline of the human being and to distinguish the fields and dimensions of ageing without prejudice and age discrimination. The first layer includes the close family relations such as children's relations with adults, the social network and support from friends and neighbours and the

community. The next layer includes the lifestyle factors such as eating habits, physical activity, sleeping habits, alcohol, and tobacco use. The more peripheral circle includes social, environmental and institutional conditions in which people live and work. These are determined by housing, education, social services, traffic, work environment, health care and others. In addition, there are major structural determinants, including environmental and socio-economic strategies. By maintaining the psychological stability all the above parameters that lead to early aging will be reversed because the psychological variation will play a key role on the each and every aspect of once life categorising from the cognitive capability to other skills of life. So, psycho-educational interventions should be provided to the older

people in order to maintain the levels of happiness, which is the crucial agent for increasing the life span and for maintaining all the aspects of the life in a healthy way. All the aspects of ageing such as diet, stress, medication, literacy, dependency, and

other factors emerging from olden days was modernized and increased to pinnacle whereas the individuals psychological status was at the same level which leading to the early aging in current generation.

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