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THE EFFECT OF YOGA ON ENHANCEMENT OF BIOMARKER BETA-ENDORPHINS IN THE AGING PROCESS : LITERATURE REVIEW

Peter Djoko Tjahjono[1*], Dikes Melati[1], Najmi Puspasari Marsabessy[1], Tuti Hartati[1]
Nyoman Rama Aditya Kurniawan[1], Indira Vidiari Juhanna[2], I Putu Gede Adiatmika[2]
1. Magister Program of Biomedical Science Anti Aging Medicine, Faculty of Medicine, Universitas Udayana, 80234, Denpasar, Indonesia
2. Physiology Department, Faculty of Medicine, Universitas Udayana, 80234, Denpasar, Indonesia
Email: peterdjoko_md@yahoo.co.id

ABSTRACT

Lifestyle interventions based on yoga and meditation are very effective in increasing beta-endorphin, and also can reduce levels of oxidative stress, cellular aging, and inflammation, thereby inhibiting and slowing the aging process. The above can be assessed as an increase in biomarkers, one of which is an increase in β-endorphins. The effect of yoga and meditation on the enhancement of beta-endorphin biomarkers is the aim of this literature review in the aging process. The method uses a database from Google Scholar, Researchgate, and Mendeley. Search articles using keywords: yoga, sport, exercise, endorphins, anti-aging. Journals in English and Indonesian in the last 10 years have become our literature review material. The effect of yoga exercise intervention on the aging process (increase in one of the biomarkers, namely beta-endorphins) is obtained from 4 articles. What happens in the aging process is a decrease in functional capacity both at the cellular level and the loss of the ability to maintain body homeostasis, organ systems, and changes that occur in the body. Essence; The physiological process of aging can be slowed down by doing yoga (endocrine, also cognitive, cardiovascular, musculoskeletal, and immunological), biomarkers, one of which is an increase in beta-endorphins, so that yoga will improve body functions including increased heart rate, blood circulation, helping to provide oxygen, nutrients to the skin, increasing collagen production and keeping new cells glowing and for antiaging and a better quality of life.

Keywords: yoga; sport; exercise; endorphins; anti-aging

INTRODUCTION

Indonesia, like other nations in the Asia Pacific region, wants to face an aging society rapidly. In 2012 Indonesia was positioned third in Asia with 25 million individuals aged over 60 years, after Tiongkok (200 million) and India (100 million). In fact, Indonesia is predicted to reach 100 million elderly people by 2050. In developing countries, people are categorized as old if people over 60 years old have reached 7% of the total population. In 2010 the ratio of the elderly in Indonesia has reached around 10% [1]. Longer and healthier life expectancy is very beneficial for human welfare [2].

Aging is a sequential change of a living thing, or a decline in physiological function which is characterized by an increase in the occurrence of a disease, weakness, the inability of a living being to adapt to metabolic stress, and lead to death. Aging at the genomic level is mostly the result of DNA destruction caused by ROS, chemicals such as benzopyrene, UV/IR radiation, spontaneous hydrolytic reactions, DNA replication errors that cause various genetic lesions including point mutations, gene disorders, telomeres. shortening, translocation, etc. The destruction caused by this lesion will be corrected by DNA recovery mechanisms eg base excision restoration (BER), nucleotide excision restoration (NER), non-homologous end join (NHEJ). Excessive DNA destruction and inappropriate DNA recovery mechanisms will increase the occurrence of an aging process [3].

Aging is the progressive build-up of time-related changes and is responsible for the increased susceptibility to disease and death, which occurs in old age and the plethora of destructive free radical reactions continuously in all cells and tissues. It will cause the destruction of the structure and function of cells and tissues. This destruction will cause a pathological condition and can end in death [4]. Aging is characterized by a continuous loss of physiological integrity, which will lead to impaired function and increased sensitivity to death. This deterioration represents serious consequences for major human

pathologies, including malignancy, diabetes mellitus, cardiovascular disorders, and neurodegenerative diseases [5].

The desired life expectancy is gradually increasing around the world. For healthy aging there are several options that can be used, including a healthy diet and exercise habits. In addition to eating habits, nutrition, and not smoking, physical activity and exercise habits are factors that can be individually modified and these play a role in healthy aging [6]. Physical activity, pranayama, meditation, yoga, music therapy, acupuncture play a role in the release of endorphins [7]. In conditions of inflammation, endorphin receptors will increase in peripheral nerves and immune cells. The binding of -endorphins to receptors in the nervous system and immune cells will produce anti-inflammatory cytokines, such as IL-10, IFN-γ, and TGF-β which are beneficial for reducing inflammation.

The newest aging concept is characterized by the liberation ROS also RNS free radicals from inflammatory cells as well as neutrophil cells, macrophages, and dendritic cells during oxidative stress through the NADPH oxidase pathway which will result in cell aging, gene mutations, tissue destruction, prolonged inflammation, and cell death [8]. The task from of beta-endorphins in aging because it has anti-aging action by lowering the liberation of free radicals (ROS, RNS) from immune cells for example neutrophils, macrophages, dendritic cells as well as cytokines such as IL-1, IL-8, TNF-α during blast oxidative stress, which is involved in DNA damage, genetic mutations, cell aging, cell death and β-endorphins related to telomere lengthening, on the other hand, accelerate with aging. Endorphins reduce or eliminate superoxide also hinder the aging process [9].

The average life expectancy continues to rise sharply and is expected to increase further. To understand the molecular processes underlying the aging process and the deterioration of health can contribute to preventing, delaying, and reducing the incidence of diseases associated with the aging process. Yoga can be effective in the process of cell aging by changing the levels of various biomarkers that act in the cell aging process [10]. Based on this background, the authors are motivated to learn more about the effect of yoga on biomarker components including β-endorphins on the cell aging process.

METHOD

This literature study was obtained by searching scientific research articles using Google Scholar, Researchgate, Pubmed and Mendeley in electronic form from a virtual library. This type of research uses a literature review method sourced from journals and publications of preliminary studies related to the effect of yoga on increasing beta-endorphin biomarkers in the aging process. The keywords used for the search are yoga, sport, exercise, endorphins, anti-aging. The results of the literature study obtained 148 articles, which after the identification, screening, and eligibility process from 148 articles there were 4 articles that matched the inclusion criteria of the researcher. The inclusion criteria of respondents in the literature are: the year of publication of the literature from 2012 to 2022, and using Indonesia or English language. Libraries that are not available full-text will be excluded. The review are limited by the year of publication and the accessible of the search engine.

RESULTS

As shown in table 1, the screening results obtained 4 articles about the effect of yoga on increasing beta-endorphin biomarkers in the aging process. These studies have a time span ranging from 10 days to 90 days. The number of participants varied from 1 - 94 subjects with age ranges of 18-65 years old. The 4 articles titled: [11121314]. Limitations to the survey are just exploration distributed over the most recent 10 years. The impediment of the strategy utilized is that there is no quality investigation and chance evaluation of predisposition.

Table 1. Study analysisthe effect of yoga on increasing beta-endorphin biomarkers in the aging process

No	Article	Destination	Physiological	Age	N and Gender	Study Length	Intervention and Duration	Results
1	Madhuri Tolahunase,	To look at the impact of yoga and	Endocrine	30-65 years	N = 96 ; F = 52	12 weeks	Yoga and meditation	There is a significant value of

	et al [11] ; 2017	meditation (YMLI) on cellular aging in apparently healthy individuals			M = 42		90 minutes	biomarkers associated with cellular aging, namely decreased cortisol and IL-6, increased beta-endorphins, BDNF and sirtuins.
2	RK Yadav,et al [12] ; 2012	To assess the efficacy of yoga in reducing stress and inflammation in patients with chronic inflammatory diseases.	Endocrine	40.07 ± 13.91 years	N = 86 ; F = 44 M = 42	10 days	Yoga 60 minutes	Decreased biomarker of stress and inflammation like cortisol and IL-6. Increased beta-endorphins
3	Surabhi Gautam et al [13] ; 2019	To explore the effect of Yoga-based MBI (Mind-body Intervention), on disease-specific inflammatory markers and depression severity in active RA patients on routine disease-modifying antirheumatic drug therapy (DMARDs)	Endocrine	18-60 years	N = 72 ; F = 56 M = 16	8 weeks	Yoga and meditation 90 minutes	There is a significant value of biomarkers associated with cellular aging, namely, increased beta-endorphins, increased BDNF and increased sirtuins.
4	Shiv Basant Kumar et al [14] ; 2015	To assess the efficacy of this intervention in reducing levels of biochemical markers of cellular aging, oxidative stress, and inflammation	Endocrine	31 years	N = 1 ; M = 1	90 days	Yoga 60 minutes	Telomerase and beta-endorphins activity are increased. There was a decrease in oxidative stress markers, such as levels of ROS, plasma cortisol, interleukin-6, and 8-OhdG, from

								baseline to day 90

DISCUSSION

The effect of yoga intervention on the aging process can be seen from the results of a study on 4 articles used. Where the aging process is a decrease in functional capacity, both at the organ level, cellular level, as well as the loss of the body's homeostatic ability, physiological changes in the body and loss of organ function [15]. In slowing down the aging process of cells, yoga changes the levels of various biomarkers that play a role in the aging process of cells [10161718]. Where yoga is done in conjunction with Meditation (YMLI - Yoga and Meditation based Lifestyle Intervention) and YMBI - Yoga-based Mind-body Intervention) are very effective in increasing beta-endorphin levels and telomerase activity, which also reduces various markers of oxidative stress such as plasma cortisol, 8-hydroxy-2'-deoxyguanosine (8). -OH2dG) and also ROS.

Tolahunase, M., et al. in 2017 in his research found that there was an improvement in the levels of cardinal and metabotrophic biomarkers related to cell aging when compared to the baseline value. The levels of cortisol, ROS, 8-OH2dG, cortisol, and also IL-6 were significantly lower, while the levels of TAC, -endorphins, BDNF, sirtuin-1 and telomerase activity increased significantly after yoga and meditation for 12 weeks, so it can concluded that yoga and meditation can slow down the aging process of cells in groups of people in healthy conditions [1119] .

Yoga practice has also been shown to increase blood levels of b-endorphins 5 times. Levels of b-endorphins in the blood will be higher in people who exercise frequently or with high intensity. When someone does exercise, b-endorphins will come out and be captured by receptors in the hypothalamus and limbic system, where this system functions to regulate emotions [2021]. Endorphins are endogenous morphine, which is a neuropeptide produced by the pituitary gland in response to stress as well as pain. Beta-endorphins are the most abundant endorphins synthesized and stored in the anterior pituitary gland. Beta-endorphins have various activities such as immune stimulation, telomerase activity, anti-inflammatory activity, stress control, analgesic activity, and also anti-aging activity [222324]. All of these activities have an effect and help slow down the aging process.

As long as a person does yoga, physical exercise, meditation, healing, music therapy, pranayama, acupuncture, chocolate consumption, the presence of love, care, sympathy and empathy it will produce endorphins (21). Beta-endorphins by lengthening telomeres will slow down the aging process, which in turn will shorten telomeres with aging and other mechanisms such as by inhibiting the release of free radicals such as ROS (Reactive oxygen species), RNS (Reactive nitrogen species) from inflammatory cells such as neutrophils, macrophages, red blood cells. dendritic cells, during oxidative stress via the NADPH oxidase pathway by cytokines such as IL-1, IL-8 and TNF-α [2526272829].

With yoga there is a significant decrease in cortisol levels and also increased endorphin level regulation. There are three signs of aging, namely OS, telomere shortening and DNA damage, all of which showed a significant decrease after yoga intervention and meditation activities [30]. Levels of beta-endorphins, endogenous opioids produced in the pituitary gland also increase with physical exercise [31]. In addition to physical exercise, yoga also includes exercise that can increase the secretion of endorphins, this relieves stress and tension from our body. In addition, exercise also functions to increase heart rate, help distribute oxygen and nutrients to the skin, increase blood circulation, increase collagen production, as an anti-aging and cause new cells to look bright and bright [32].

Good news for yoga practitioners because yoga can increase levels of b-endorphins, serotonin, dopamine and dehydroepiandrosterone sulfate [33]. Individuals who perform yoga activities decrease levels of 8-hydroxydeoxyguanosine, increase levels of endorphins and decrease indicators of psychological stress [34]. Any physical activity with regular and sufficient intensity will strengthen the skeletal and muscular system, strengthen lung function and improve cardiovascular system function. Positively physical exercise and yoga affect human feelings leading to increased production of endorphins [35].

Exercise also increases oxygen supply in the body and circulation, prevents depression by releasing endorphins in the bloodstream, reduces stress and anxiety and most importantly adds years to your life [36]. A yoga class joined by two hours of yoga breathing activities (pranayama) can increment alpha waves (8-13 Hz) by as much as 40% in the right worldly flap and increment the emission of endorphins, enkephalins, and serotonin. The presence of yoga practice can cause unwinding and

decrease pressure chemicals, particularly cortisol and it invigorates the body to remain youthful [37]. Actual activity clearly affects expanding the levels of the chemicals endorphins and serotonin in the blood [3839]. Practice and active work increment B-endorphin levels in plasma with a beneficial outcome on temperament [404142]. Beta-endorphins are required and may even be significant for hippocampal neurogenesis during exercise-incited [43]. Limitations to the review are only research published in the last 10 years. The limitation of the method used is that there is no quality analysis and risk assessment of bias.

CONCLUSION

The impact of yoga mediation on the maturing system should be visible from the consequences of exploration on the 4 articles utilized. Where the maturing system is an abatement in practical limit, both at the organ level, cell level, as well as the body's homeostatic capacity, physiological changes in the body and organ work.

In preventing and slowing down the aging process of cells, yoga changes the levels of various biomarkers that play a role in the aging process of cells. Where yoga is done in conjunction with Meditation (YMLI - Yoga and Meditation based Lifestyle Intervention and YMBI - Yoga-based Mind-body Intervention) are very effective in increasing beta-endorphin levels and telomerase activity, which also reduces various markers of oxidative stress such as plasma cortisol, 8-hydroxy-2'-deoxyguanosine (8). -OH2dG) and also ROS.

Moreover, yoga works on physiological capacities (endocrine, as well as cognitive, cardiovascular, musculoskeletal and immunological), so yoga will further develop body capacities, including expanding heart rate, further developing blood flow, assisting with giving oxygen, nutrients to the skin, expanding collagen creation and keep keep glowing and for antiaging and better quality of life.

CONFLICT OF INTEREST

The author declares no conflict of interest.

CONFESSION

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