

Why do we age and how can we elongate our lifespan by using holistic and affordable methods?

By Riya Sherlekar

Abstract

Aging is the biological process involving the deterioration of human cells which in turn slow down the daily process of the body. This can be harrowing for people as they age, leading to physical and mental health problems. It is, therefore, important to understand the biological reason of why humans age. I have conducted a systematic literature review and analysed previous papers published on topics related to aging, age-related diseases as well as other topics to help gather helpful information. From the information collected, it can be said that biohacking may be used as a tool to reduce the grievances of old age. Old age can be a painless experience if the right diet and exercise is put in place.

Introduction

Aging is the progressive decline in the function of the body at the cellular, tissue and organismal levels.[1] As we age, our organs become more susceptible to diseases and therefore become more frail which affects the biological age of the body.[1] As the aging process progresses, physical and mental health declines due to perceived loss of independence and increased internal anxiety about the future.[2] Elderly individuals tend to lose mobility which increases their reliance on the assistance of caregivers and in some cases may cause social isolation which in turn affects the person's morale. Elderly people are also seen to battle social problems like lack of proper housing and insufficient resources which also contributes to their mental health decline. Signs of mental health issues like depression and anxiety have been seen in the elderly due to their lack of ability to do things that they were accustomed to doing when they were younger. [2,3]

As people age, they also might face age-related diseases like Alzheimer's which puts a strain on the patient as well as their caregivers. Another age-related disease is Parkinson's. This condition is

characterized by neurodegeneration in the brain and decreases in dopamine levels. As the symptoms progress, there may be changes in speech, loss of automatic movement and slowed movements.[4,5] This causes the patient to not only suffer physically but also mentally. In the initial stages, little to no help is needed but as the patient progresses in age, medical help and assistance might be required.[6] This increases their reliance on medical insurance to cover the cost of caregivers and also any medications that they might need.[7] Elderly individuals around the world are unfortunately experiencing financial strain due to government reductions in pension funding. In 2008, the financial market had its biggest downfall with the stock market which affected all parts of society. As a result, many countries have cut down on certain expenses like the pensions given to the elderly. This decrease in pension plans is causing major worry and distress to those who rely on it entirely for their healthcare and basic needs.[8]

Another reason why it is important to understand the aging process and how it affects the quality of life is the increasing number of elderly people. By 2050, the number of people aged above 80 is estimated to triple. This estimated increase in the portion of the population that will consist of elderly individuals will have a significant impact on different sectors of society such as the healthcare industry and the economy of the country etc.[9] Hence, it is very important to understand why we age and how we can improve the quality of life of the elderly so that we can increase the longevity of our societies and the people who live in them.

As mentioned previously, aging can be debilitating for individuals and as such it is imperative that appropriate measures are taken to assist them during this process. This paper proposes biohacking as a method of combating the negative effects of aging. Biohacking is a type of citizen science where people incorporate various items into their routines to help boost their overall health.[10] It has been a controversial topic, but with more research and clearly mandated regulations, this method could stand to improve the overall health of a person drastically. Biohacking could help to alleviate some of the physical and mental implications of the aging process, potentially ensuring longevity. The objective of this paper

is to discuss the mechanisms underlying the aging process which includes both molecular as well as social factors and provide an avenue for mitigating the negative implications of aging through biohacking.

Methods

I will conduct a systematic literature review. Utilising resources like PubMed and Google Scholar, I will gather information to help me write this paper. The papers used for this review will be authored in the recent years(from 2005-2025) and will be extensively reviewed by peers by making sure the paper has been cited more than 15 times. Keywords that I will use are 'Biohacking', 'Aging', 'Metabolic diseases', 'Social determinants of health', 'Holistic Health'. These keywords listed above will help me retrieve all the knowledge needed to write this review.

Biohacking

Biohacking, also known as Do-It-Yourself Biology, is citizen science which incorporates biological advances in science to help improve the quality of life.[10] It involves personal data acquisition which then is used to make alterations to the body using diet, sleep, exercise or external additives which may be administered. Biohacking also includes methods like stress management and mindfulness which play an important part in how your body ages. Biohacking has just come into popularity under the efforts of Bryan Johnson , a tech millionaire who has now dedicated his life to the biohacking movement and sharing his findings online. Bryan started his journey of Biohacking in 2020 and has now accumulated a large fan base[11]. Although people believe that biohacking is a new-age finding , it has actually been around for centuries just under different names like Ayurveda and Homeopathy, which I will explain in detail later in the paper. Yoga is also considered as a method of biohacking when it comes to physical

exercise. It is composed of a mixture of stretches , breathing exercises and meditation. Additionally, yoga is known for its stress reducing benefits through breathwork and meditation[12]. It is a lifestyle where people follow strict regimens when it comes to diet and lifestyle factors.

Ayurveda is an ancient form of treatment arising out of India. Its first known source is the religious books known as the Rig Veda and Ayurveda. Ayurvedic medicines stem from herbal and animal extracts which have specific properties[13]. Homeopathy also is a form of treatment which can be considered a type of biohacking. It believes in overall health and can be used to relieve the pain and reduce the symptoms certain ailments may possess[14] .This may therefore , be an effective way to help increase the quality of life as we age. People using these methods have seen positive effects but must not be interchanged with standard medicine that is to be taken.

Metabolic Reasons For Aging

Aging is the progressive decline of physiological activities which in turn, leads to death. It is characterised by the degeneration of cells.[15] One proposed theory of aging is excess reactive oxygen species generation. Reactive oxygen species are by-products of cellular metabolism. The mitochondria is the prime source due to its main role in the generation of ATP (Adenosine Triphosphate). This process is known as oxidative phosphorylation, where electrons pass through a collection of proteins bound to organic molecules in a series of redox reactions, and release energy.[16] Molecular oxygen acts as the final electron acceptor in this process. When the electrons get transferred to molecular oxygen prematurely, it leads to the formation of superoxide radicals (a highly reactive oxygen radical). ROS is produced in each and every person's body and is completely normal in regular amounts. The oxidative stress that ROS causes the bodily cells is combated by multiple systems of antioxidants around the cell

which allows for homeostasis between these two processes. However, as we age, these systems start to disintegrate as antioxidant mediated neutralization of ROS begins to fail resulting in the accumulation of these highly reactive radicals. As ROS accumulates they begin to negatively impact cellular function which often leads to cell death. This is known as the 'Free Radical Theory of Aging.'[17] Mitochondrion generated ROS was widely shown to be implicated in various pathologies like inflammation, cancer, chronic aging and diabetes.

In addition to ROS generation, other biological defects that underlie aging include reduced metabolic efficiency, increased insulin resistance, dyshomeostasis of the immune system and increased adiposity. Reduced metabolic efficiency is indicated during aging by decreases in cellular oxygen consumption rate as one ages. During oxidative phosphorylation, oxygen is consumed and so cellular metabolism/ energy production is intimately connected to oxygen consumption. This means that reductions in metabolic function with age may be a contributing factor for cell and tissue decline, especially those that have high oxygen consumption rates.[18] Skeletal muscle and the brain are good examples of these tissues. The brain tissue starts to shrink over time as the cells start to deteriorate over time. This causes cognitive changes as well as increased susceptibility to dementia , strokes , etc.

One of the main characteristics of aging due to metabolic changes is Insulin Resistance, which is observed in older adults. Insulin Resistance is the defective response of the body to insulin, causing elevated levels of glucose in the body. This is one of the main reasons for metabolic diseases like type 2 diabetes.[19] Abdominal obesity is also seen as a major contributor to aging (connected to IR). We also see an increase in the proinflammatory cytokines (controls the immune system cells and blood cells) which interfere with insulin action, therefore these metabolic activities in our body are a major cause of aging.[20]

One way to combat insulin resistance is caloric restriction which can be done by reducing the calories ingested but still maintaining important nutrient levels. This helps improve metabolic activity in our body in accordance with thyroid function as well as the impact of insulin in our body. The thyroid gland plays a major function in regulating metabolism and growth of the body.

External Reasons for Aging

Although aging is a biological process there are many external factors that contribute to its progression. These external reasons may alter the aging timeline as well as the severity of the symptoms highlighted above. Nutrition, Physical Health, Community and Health Insurance are a few examples of social as well as external reasons that can impact the aging process. When it comes to nutrition there are many diets that have been shown to help the aging person with their ailments as well as reduce the risk of age-related diseases like Alzheimer's [21].

The Okinawan and Mediterranean diets are anti-inflammatory diets which consist of high protein and low fat. These diets are one of the main reasons people living in these areas are extremely healthy. The places of origin of these diets house some of the oldest living humans and are known as 'Blue Zones' [22]. Blue Zones house some of the oldest people known to man. They have been studied to understand the factors which go into aging and longevity.

These diets share a few important characteristics that can help be utilized as a starting point for the development of diets tailored to fit the individual needs of the aging person. They both share high amounts of unrefined carbohydrates, are rich in protein from vegetables, legumes, fish and lean meat and contain high amounts of omega-3 and low amounts of saturated fats. In the food sources mentioned above the unsaturated fats help to reduce inflammation and the plant-rich diet helps to reduce calorie intake. Both diets contain antioxidants which are crucial for healthy living and longevity. [23]

Additionally, physical activity is an extremely important part of healthy living as we age. People living in the blue zones tend to take part in low impact high intensity exercise like walking or yoga [24].

Yoga is an exercise form originating in India and has been around for millions of years. Yoga is not a practice but a lifestyle known for its stress reducing benefits through breathwork and meditation. It is composed of a mixture of stretches, breathing exercises and meditation. Like yoga, Biohacking also prioritizes stress management and mindfulness [25]. Biohacking focuses on maintaining all important

functions of the body such as sleep, nutrition and physical activity which aligns with the yogic belief system. Yoga and biohacking can be integrated into daily living through wearable technology such as health trackers which can help individuals to monitor progress and key health metrics such as heart rate, weight, sleep patterns and recovery.[13]

Another important factor which contributes is access to affordable healthcare. We can take a look at certain countries and compare how easily available public healthcare can affect how we age. We can compare the healthcare systems of The United States of America which does not have universal healthcare to Iceland, one of the healthiest countries in the world with state-funded universal health care. Chronic disease is running rampant in the USA, partially because of unhealthy habits but also because of the one size fits all mentality when it comes to healthcare. It is extremely hard to find a healthcare professional who can deliver specific healthcare plans for a patient for a low price. Healthcare can not be generalised as each person has their own medical background. This is a flaw in the American system.[26] Iceland on the other hand, is one of the few countries who have a life expectancy of more than 80 years. Iceland's healthcare system is of a public character and all private practitioners also take public funding for their working. Iceland's healthcare is built in such a way that people can receive equality when they approach the healthcare system for their needs.[27] This allows the elderly, regardless of their financial or societal standing, to receive quality healthcare for their grievances. This allows the elderly to catch age-related diseases early on and receive treatment required. This increases the overall health and in turn increases the lifespan of the elderly in Iceland. The US is not on this list as the life expectancy of their citizens is 76 years old. Looking at these statistics, there is a clear difference in the life expectancy as well as the ailments in both of these countries. Even though diet and physical activity play an important role in the aging process, access to affordable healthcare can affect longevity as well. In the above paragraphs, it is shown that the healthcare system in Iceland is geared more for the betterment of public health with it being universal and priding itself on equality and quality healthcare whereas in the United States, healthcare is becoming increasingly expensive and not in the reach of the general public. This

prevents the elderly from approaching medical personnel when the symptoms arise due to financial worry.

We can say that access to medical care therefore plays an important role in longevity.[27]

Universal healthcare can ease the mind of the elderly patient by relieving them of financial worry they face during medical treatments. This also allows them to use the medical facilities available to diagnose ailments in the early stages so that they can be focused on treating their ailments before they culminate into something larger. [28] In today's world, if universal health is not available, health insurance may be the next best option but for some elderly citizens, it is extremely hard to acquire. It is perceived that elderly people are more susceptible to disease or ailment, hence most insurance companies may not be willing to take a financial risk on the elderly. Insurance does help the affordability of healthcare but for older people as well as for people with a pre-existing illness, the administrative processes are extremely complicated as well their chances of the insurance getting approved is low. Healthcare and health insurance are two major factors which can either help or obstruct the healthy aging process.

One of the main epidemics that has been running rampant is the 'Loneliness Epidemic'. People have very less social interaction with one another and are socially isolated. It has been seen that social isolation can rapidly decrease a person's life expectancy.[29] Lack of social interactions may cause higher risk for physiological dysregulation at any stage in life. It was also seen that certain types of relationships between people have unique effects on health. The more types of relationships a person has the higher the chances the person has to live a longer life. A purpose is also another way to increase a person's moral. This concept was developed in Japan and is known under the name Ikigai. Ikigai is described as something a person wakes up for or looks forward to. It could be something as simple as walking the dog or watering the plants but it's an activity that sparks joy in a person's life. Therefore aging is not just restricted to the molecular actions of our cells, but also to our everyday activities and choices.[29]

Age-Related Diseases

As we age, our cells start to slow down and start to deteriorate due to oxidative stress. This causes certain tissues and muscles of our body as well as our metabolism to slow down and causes inflammation to build up. This deterioration usually then manifests in ailments and other diseases called Age-related diseases. These diseases can affect the quality of aging and might decrease the lifespan of the person. Although genetics does play an important role in these diseases, a better lifestyle can help decrease the chances of it occurring.[30]

Parkinson's is a multi-system neurodegenerative disease that affects people in the later stages of their lives. It is the second most common neurodegenerative disease seen in older adults.[31] Parkinson's disease is caused by the loss of the chemical messenger of the brain-the Dopaminergic neurons. This causes an imbalance in the circuitry movement. A major contributor to the loss of these neurons is by the effect of Reactive Oxygen Species as explained above. [31] The symptoms of Parkinson's disease are muscle tremors, rigidity and inability to move. Parkinson's can be debilitating for the patient suffering and can therefore, lower the life expectancy of the person and cause anxiety and depression. There can be some external reasons for the development of this disease like long term abuse of alcohol and nicotine. Genetics do play an important role when it comes to the development of this disease but with the right lifestyle and habits, it can lower the probability of it arising. People suffering from Parkinson's disease do not need assistance in the early stages of the disease but as it progresses and symptoms worsen, the patient will require full time assistance and would need a caretaker. This disease can be extremely difficult for the patient and for the people around them, but with the right medication and medical care, it can be managed and the person can live a comfortable life.

Similarly another disease that occurs when a person ages is Type 2 Diabetes. [32] This occurs when the body stops responding to the insulin resulting in excess glucose in the blood of the patient. A genetic

predisposition may increase the probability of being diagnosed with diabetes. Some symptoms are lethargy, blurry vision, extreme urination, tingling sensation in hands and feets, etc.[32] Although genetics play an important role in the diagnosis of diabetes, a better lifestyle may help decrease the risk. In today's world, the increased fast food, lack of physical exercise and excessive electronic usage has estimated that the percentage of patients suffering will increase drastically from 2.8% in 2002 to 4.4% in 2030.

Age-Related Diseases can affect many aspects of a person's life and be extremely debilitating. In the above paragraphs, two age related diseases have been explained-Parkinson's as well as Diabetes. These topics have been picked because they explain how much a disease can affect the human body. People can lose their physical movements and can develop tremors or they can develop a resistance to certain hormones which can disrupt the bodily functions. This also shows how important it is to understand and implement healthy lifestyle habits and supplements.

Methods In Use

There are many methods that are currently in use that have been present for millions of years. Yoga is one of these methods which has changed the lives of many people around the world. It originated in India about 5000 years ago. The first mention of yoga is in the vedic scriptures. It connects spiritual, physical and mental aspects of our body and soul, leading to a better quality of life. It is composed of a mixture of stretches, breathing exercises and meditation. Yoga is not just a form of exercise, but is a lifestyle which is known to improve the overall well being of the person.[33] It is known for its stress reducing benefits through breathwork and meditation. Yoga can be called a form of Biohacking. Biohacking also has a sector for stress management and mindfulness, therefore joining the two. It is focused on maintaining all important functions of the body such as sleep, nutrition and physical movement which aligns with yogic belief lifestyle which is characterized by practising yoga poses or asanas.[12] Yoga asana or exercise can help build the core muscles as well as lubricate the joints with synovial fluid, helping with mobility as we

age. Chronic stress can affect the aging process negatively but with the breathing techniques in yoga , we can decrease the stress hormones in our body .[34] One way in which we can integrate yoga and biohacking is by wearing technology such as health trackers , etc which can help us maintain progress checks in regards to our heart rate , weight , sleep patterns and recovery. Another way is by maintaining a nutrient filled diet that complements their yoga objectives and biohacking efforts. Yoga can be used to achieve a longer and healthier life if implemented consistently.[12]

Similarly,another method that has been implemented to help in the treatment of diseases as well as reduce pain is Homeopathy. Christian Friedrich Samuel Hahnemann was the founding father of Homeopathy .He founded homeopathy and it reached other parts of the world when German missionaries started distributing medicines to the local residents. Homeopathy is an alternate form of medicine that takes its properties from natural sources like red onions and stinging nettle. Homeopathy can be used to relieve pain in the person.[35] This can improve the life of the elderly person by allowing them to go about their daily activities without any pain. Homeopathy can be extremely controversial when it comes to its efficacy. Some say that it might just be a placebo effect while some disagree saying it does have an actual biological effect on the body.[36] More clinical trials have to be conducted to ascertain the true nature of homeopathy but we can see that it has had an effect on the person,regardless of whether it is mental or physical.The methods discussed are indirect methods which can be used to target certain elements of life which can decrease the lifespan of a person. Methods like these can be utilized to make a major difference in a person's lives and if consumed properly, it can improve the quality as well as the duration of a person's life.

Discussion

Aging can be an extremely debilitating process. This is why it is extremely important to find ways in which we can help to ease the pain of aging as well as find ways to elongate the lifespan of aging

individuals. To go about this, it is essential that we first understand the underlying mechanisms that facilitate aging. The ROS attacks the cells of our body, causing cell death. As this process continues, certain parts of our bodily tissues start to die leading to overall aging. It is important to understand why we age so that we can pinpoint the main cause and find biological solutions. By providing something that can supply the body with necessary nutrients needed for cell health and longevity. This is then provided by healthy eating which stems from nutrient dense diets like the Mediterranean or Okinawan Diets. These diets also help to decrease inflammation in our body. Inflammation can cause senescence of immunity cells causing susceptibility to diseases and weakened immunity system which can stir up further health complications in the elder's body.

Exercise has also seen to make a major difference when it comes to improving quality of life as we age. Yoga can be used as an example. It helps to lubricate the joints and strengthen the muscles, helping with mobility as a person ages. Regular exercise can also help with the antioxidant defenses of our body, therefore helping with the reduction of the effect of ROS on our cells. Aging does come with certain age-related diseases which can take a toll on the person's physical as well as mental health and in turn, affect the wellbeing of their caretakers. Things like Homeopathy as well as Ayurveda can be extremely helpful when it comes to pain and inflammation management. This can not only relieve the patient from pain but also help to elongate the person's life by decreasing the inflammation in the body. Biohacking, as discussed above, is a citizen science where people can improve their lifestyle and elongate their lifestyle by making small changes to their diet or exercise routine. Community is an extremely important part of longevity and can help to combat the mental barriers that may unfold as one ages. Community can help to keep the brain active as well as help give elders a sense of purpose.

The methods that have been mentioned in this paper have been used for many years and may be effective. Biohacking should be made affordable so that each person can have access to it and so that it isn't reserved for the top 1%. Income has also affected the people when it comes to longevity and overall

health. Only 51% of Americans can afford healthcare. This has put extreme pressure and worry on people. It acts as a barrier preventing the elderly from accessing healthcare facilities, therefore certain age-related diseases like Diabetes go undiagnosed. If we can find ways in which we can get people affordable healthcare through better medical insurance as well as reduce the pricing of medications, it would make an incredible difference from a longevity perspective. It would allow supplements to be easily available as well as provide preventive care for certain patients who are at risk. By understanding how and why we age, we can incorporate multiple current as well as potential methods to better our lifestyle in such a way where it can have long lasting effects.

Conclusion

Aging is something each human must go through. For some people, it can be a harrowing experience and causes major distress to the person aging as well as the people around them. With the decrease in birth rate in the coming century, it is important to learn how we can elongate the life of a human being, making sure that said elongated life is grievance-free. I have concised the finding of multiple papers to narrow down the search for holistic methods to combat aging as well as the underlying reasons for aging. With a proper diet and lifestyle, a person may be able to extend their lifespan assuming they do not have an underlying genetic disorder. By following certain regimens and fitness plans, a person may be able to age painlessly as life goes on. More studies on clinical methods for age elongation and biological health that can be afforded by the middle class should be done to ensure uniformity in its distribution among all people.

Citation

- 1). Booth, L. N., & Brunet, A. (2016). The aging epigenome. *Molecular cell*, 62(5), 728-744.
- 2). Escourrou, E., Cesari, M., Chicoulaa, B., Fougère, B., Vellas, B., Andrieu, S., & Oustric, S. (2017). How older persons perceive the loss of independence: the need of a holistic approach to frailty. *J Frailty Aging*, 6(2), 107-112.
- 3). Ferraro, K. F., & Wilkinson, L. R. (2012). Age, aging, and mental health. In *Handbook of the sociology of mental health*(pp. 183-203). Dordrecht: Springer Netherlands.
- 4). Clarke, C. E. (2007). Parkinson's disease. *Bmj*, 335(7617), 441-445.
- 5). Marsden C. D. (1994). Parkinson's disease. *Journal of neurology, neurosurgery, and psychiatry*, 57(6), 672–681. <https://doi.org/10.1136/jnnp.57.6.672>
- 6). Prizer, L. P., & Browner, N. (2012). The integrative care of Parkinson's disease: a systematic review. *Journal of Parkinson's Disease*, 2(2), 79-86.
- 7). Kim, S. H., Park, E. C., & Jang, S. Y. (2023). Impact of long-term care insurance on medical costs and utilization by patients with Parkinson's disease. *Social Science & Medicine*, 317, 115563.
- 8). Pino, A., & Yermo, J. (2010). The Impact of the 2007-2009 Crisis on Social Security and Private Pension funds: A threat to their financial soundness?. *International social security review*, 63(2), 5-30.
- 8). Chen, X., Maguire, B., Brodaty, H., & O'Leary, F. (2019). Dietary Patterns and Cognitive Health in Older Adults: A Systematic Review. *Journal of Alzheimer's disease : JAD*, 67(2), 583–619. <https://doi.org/10.3233/JAD-180468>
- 9) He, W., Goodkind, D., & Kowal, P. R. (2016, March). *An aging world: 2015*.
- 10) Yetisen, A. K. (2018). Biohacking. *Trends in biotechnology*, 36(8), 744-747.
- 11) Odenbach-Wanner, S. (2025). The Biohacking-Code: An Eternal Pursuit of Perfection—The Myth About Living Forever?! From the Fine Line of Self-Optimization to Self-Destruction. In *Innovations in Healthcare and Outcome Measurement: New Approaches for a Healthy Lifestyle* (pp. 93-104). Cham: Springer Nature Switzerland.
- 12) Sarmah, M. B. YOGA AND BIOHACKING: A COMPREHENSIVE OVERVIEW
- 13) Mukherjee, P. K., Harwansh, R. K., Bahadur, S., Banerjee, S., Kar, A., Chanda, J., ... & Katiyar, C. K. (2017). Development of Ayurveda—tradition to trend. *Journal of ethnopharmacology*, 197, 10-24.
- 14) Jonas, W. (2003). A critical overview of homeopathy. *Annals of internal medicine*, 139(8), W-76.

- 15) Harman, D. (2001). Aging: overview. *Annals of the New York Academy of Sciences*, 928(1), 1-21.
- 16) Davalli, P., Mitic, T., Caporali, A., Lauriola, A., & D'Arca, D. (2016). ROS, cell senescence, and novel molecular mechanisms in aging and age-related diseases. *Oxidative medicine and cellular longevity*, 2016(1), 3565127.
- 17) Johnson, F. B., Sinclair, D. A., & Guarente, L. (1999). Molecular biology of aging. *Cell*, 96(2), 291-302.
- 18) Catic, A. (2018). Cellular metabolism and aging. *Progress in molecular biology and translational science*, 155, 85-107.
- 19) Wilcox, G. (2005). Insulin and insulin resistance. *Clinical biochemist reviews*, 26(2), 19.
- 20) Carey, D. G. (1998). Abdominal obesity. *Current opinion in lipidology*, 9(1), 35-40.
- 21) Flanagan, E. W., Most, J., Mey, J. T., & Redman, L. M. (2020). Calorie restriction and aging in humans. *Annual review of nutrition*, 40(1), 105-133.
- 22) Pes, G. M., Dore, M. P., Tsofliou, F., & Poulain, M. (2022). Diet and longevity in the Blue Zones: A set-and-forget issue?. *Maturitas*, 164, 31–37. <https://doi.org/10.1016/j.maturitas.2022.06.004>
- 23) Willcox, D. C., Scapagnini, G., & Willcox, B. J. (2014). Healthy aging diets other than the Mediterranean: a focus on the Okinawan diet. *Mechanisms of ageing and development*, 136-137, 148–162. <https://doi.org/10.1016/j.mad.2014.01.002>
- 24) Roundtable on Population Health Improvement; Board on Population Health and Public Health Practice; Institute of Medicine. Business Engagement in Building Healthy Communities: Workshop Summary. Washington (DC): National Academies Press (US); 2015 May 8. 2, Lessons from the Blue Zones®. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK298903/>
- 25) Garfinkel, M., & Schumacher Jr, H. R. (2000). Yoga. *Rheumatic Disease Clinics of North America*, 26(1), 125-132.
- 26) Dickman, S. L., Himmelstein, D. U., & Woolhandler, S. (2017). Inequality and the health-care system in the USA. *The Lancet*, 389(10077), 1431-1441.
- 27) Sigurgeirsdóttir, S., Waagfjörð, J., & Maresso, A. (2014). Iceland: health system review. *Health systems in transition*, 16(6), 1–xv.
- 28) Sen, A. (2015). Universal health care. *Harvard Public Health Review*, 5, 1-8.
- 29) Nedelcu, E. (2018). THE IMPACT OF SOCIAL RELATIONSHIPS OVER HEALTH AND LONGEVITY. THE “BLUE ZONES” CASE. *Romanian Review of Social Sciences*, (14).

- 30) Luo, J., Mills, K., le Cessie, S., Noordam, R., & van Heemst, D. (2020). Ageing, age-related diseases and oxidative stress: What to do next?. *Ageing research reviews*, 57, 100982.
- 31) Sveinbjornsdottir, S. (2016). The clinical symptoms of Parkinson's disease. *Journal of neurochemistry*, 139, 318-324.
- 32) Chatterjee, S., Khunti, K., & Davies, M. J. (2017). Type 2 diabetes. *The lancet*, 389(10085), 2239-2251.
- 33) Field, T. (2011). Yoga clinical research review. *Complementary therapies in clinical practice*, 17(1), 1-8.
- 34) Chen, Q. (2024). Neurobiological and anti-aging benefits of yoga: A comprehensive review of recent advances in non-pharmacological therapy. *Experimental Gerontology*, 196, 112550.
- 35) Loudon, I. (2006). A brief history of homeopathy. *Journal of the Royal Society of Medicine*, 99(12), 607-610.
- 36) Jones, C. L. (1991). Lifeline and longevity. *Journal of the Royal Society of Medicine*, 84(2), 122-123.