

Healthy lifestyle and Aging: An overview

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Abstract

Aging could be associated with many negative health impacts. Many previous studies have shown its underlying mechanisms such as oxidative stress. However, the interrelation between healthy lifestyle and aging has been studied extensively, there is still a need to raise awareness of this issue. This review throws more light to live the whole life of someone as a young person in his twenties and why it is essential to take care of our health in all its aspects. How aging is affected by nutrition, common nutrition-related conditions, and some ways to have a healthy nutrition for older people. How exercise can lead to healthy aging and programs needed to maintain healthy aging. Also, this minireview discusses the effect(s) of aging on sleep regarding healthy aging, the 4 stages of sleeping, and it demonstrates the brain function during aging, and some sleeping disorders. Thus, it could be recommended to help people age properly with less age-related diseases.

Introduction

Aging was defined as an inevitable process, manifested as progressive reduction of function at cellular, tissue and organ level denoted by physical and cognitive impairment (1). Also, aging may predispose to many diseases, namely diabetes mellitus, cancer, many cardiovascular diseases, and dementia (2).

Due to increased life expectancy, several theories raised the use of “healthy” aging (3). Meanwhile, modification of many lifestyle factors can affect the aging process namely smoking, physical activity, and diet (4, 5). Up to authors knowledge, few overviews demonstrated the effects of many lifestyle factors on aging process. As we live in a developing country, almost all people are exposed to unhealthy lifestyle such as obesity, smoking and many other stressors. Thus, the aim of our study was to highlight combined and individual lifestyle factors and aging.

Materials and Methods:

This minireview was carried out using PubMed and Google Scholar to reach out the previously published papers that investigated aging and lifestyle. This short review highlighted the most essential factors that may have an impact on the aging process.

We were divided into 3 groups, each one was searching and collecting data as much as possible from different studies and medical websites in nutrition, sleep, and exercise. In order to get the complete information needed for this study.

Keywords used in the PubMed search engine: Aging, nutrition, sleep, exercise, physical activity, healthy lifestyle, nutrition-related conditions, the sleep cycle and anti-aging therapy through fitness.

Study Inclusion

Articles relating to studies with any design or setting were included if they measured appetite (nutrition, sleeping, skin health, and skeletal movement) in people with a mean age of 65+ years.

Studies focusing on a cohort with a specific physical or mental health condition known to impact appetite (including cancer, chronic obstructive pulmonary disease (COPD), heart failure, renal failure, depression, anorexia nervosa, and dementia) were excluded.

Data Collection

Screening of titles and then abstracts for relevance was performed independently by two authors in each subgroup concerned with one factor of healthy lifestyle. Hand searching of the reference list and citing works of included texts and relevant manuscripts was completed.

Data Analysis

Data from included studies were abstracted into a short paragraph.

Results and Discussion:

1) Nutrition:

With aging, lean body mass and metabolic rate decrease. In turn, the body no longer effectively absorbs some minerals and vitamins. As older adults can have smaller appetites and a lower caloric requirement, they may need more nutrients than before. So, they must care more about what they eat or drink every day in order to have a healthy lifestyle. However, there are some additional factors that can alter the amount of nutrients the elderly receive: forgetfulness and

growing cognitive impairments. A reduced or fixed income limits how much can be spent on food. Medication side effects may alter how well the body absorbs certain nutrients. Hormonal and neurotransmitter changes affect how hunger and fullness are experienced (6, 7).

On aging, the human body experiences a physiological decline in fluid levels, The older you get, the lesser the water content. This reduction can cause a range of age-related issues, ranging from dry skin to dehydration. The decreasing water percentage is due in large part to having more body fat and less fat-free mass induced by aging. Also, as people age their bodies produce less insulin than before, because aging reduces our ability to maintain homeostasis. Over time, this increases the risk of diabetes and other health problems (6, 7).

It was found that there are some common nutrition-related conditions among aged people: **Anemia**, which is a problem of not having enough healthy red blood cells or hemoglobin to carry oxygen to the body's tissues. **Cognitive Impairment**, A Vitamin B12 deficiency. **Vitamin D Deficiency**, Decreased sunlight exposure with decreased skin's ability to convert 7-dehydrocholesterol to pre-vitamin D3. **Calcium Deficiency intercellularly**, Ca^{+2} is shifted from intracellular fluid, thereby lowering intracellular Calcium resulting to reduced cardiac excitability. **Iodine Deficiency** affects levels of thyroid hormone that will decrease $Na^{+}-K^{+}$ pump activity that maintains the ions concentration gradient across the cell membrane, sharing in the establishment of the membrane potential at rest (RMP) and other physiological functions (8).

It was reported that there is more needs for balanced and variable nutrition in older adults: The **Energy Requirements** for people ages 51 and older are 1,600- 2,200 calories for women and 2,000-2,800 calories for men, depending on activity level. In order to slow bone loss, the recommendations for **Calcium** increase from 1,000 to 1,200 milligrams per day. **Vitamin D** recommendations increase from 600- 800 IU per day. For **Vitamin B12**, older adults need an additional 2.4 micrograms per day. **Vitamin B6** recommendations rise to 1.7 milligrams per day for older men and 1.5 milligrams per day for older women, therefore, it can help lower the levels of homocysteine and protect against cardiovascular disease. **Dietary Fiber** is a type of carbohydrate that includes the parts of plant foods being indigestible and non-absorbable in human body. The Daily recommended Value for dietary fiber is 28 grams per day. **Potassium** is an important mineral that helps the body a lot with fluid balance and heart, muscle, and nervous system function. The Daily recommended Value for potassium is 4,700 milligrams per day. The body needs **Sodium** and **Added sugars** in relatively small amounts. The Daily Value for sodium must be less than 2,300 milligrams per day. The Daily Value for **Added Sugars** should be less than 50 g per day (8).

Recommendations:

Firstly, drinking plenty of fluids is very important for the elderly in order to avoid dehydration which is a common problem. Symptoms of dehydration include fatigue, dry skin, headache, dizziness, and confusion. If dehydration is not addressed, it can lead to more

serious health problems, such as kidney stones, urinary tract infections, and electrolyte imbalances.

Secondly, eating a balanced diet is, also, an important step for maintaining healthy aging. Older people should have a well-balanced diet full of all the required vitamins, minerals, and all the other nutrition with the needed amount. Also, it is advised to reduce the daily value of added sugar as much as possible, in order to avoid diabetes mellitus, a serious health condition that can lead to a variety of complications. To reduce the risk of diabetes, it is important to maintain a healthy lifestyle and keep insulin levels in check.

2) Sleeping:

One-third of human’s lives are spent sleeping, Sleeping is controlled by elaborate and precise mechanisms, which change over a person’s lifetime as the recommended sleep duration

decreases linearly. The sleep cycle has 4 stages: N1, N2 (both forming light sleep), N3(deep sleep), Rapid Eye Movement (REM, vivid dreaming). A single night of insufficient sleep can make an older adult’s cells age quickly. This might not seem like a big deal, but it has the potential to bring on a lot of other symptoms such as depression, irritability, and forgetfulness, as well as it can cause many diseases such as Alzheimer’s disease, sclerosis, insomnia, sleep apnea, and movement disorders. Feeling sick or being in pain are some of the reasons why people may not get enough sleep at night (9).

As people grow up, there is a decline in sleep duration and efficiency. Also, there may be a decline in slow wave sleep (deep sleep) (stage 3). In addition, stage 1 significantly increases. Further, REM decreases as a result of the decline in slow-wave sleep (10), as shown in figure 1.

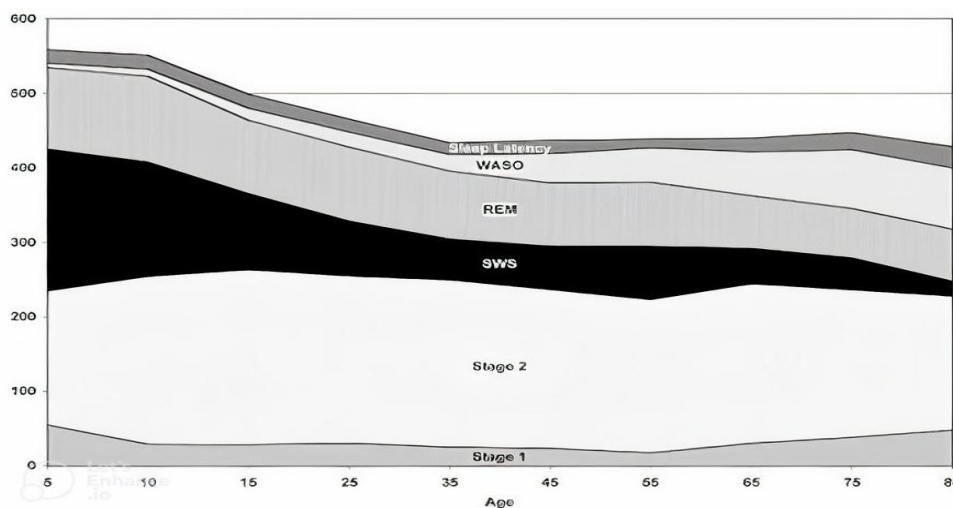


Figure (1): Changes of sleep stages with aging (10).

Relationship between Sleeping and brain aging:

It was stated that the less elderly people sleep, the faster their brains age. Each hour of reduced sleep duration changed the annual expansion rate of the ventricles, the internal chambers of the

brain, by 0.59 percent. Ventricular expansion is a reliable marker for the risk of developing cognitive impairment. It was, also, found that reduced sleep may speed up the annual decline rate in cognitive performance by 0.67 percent. In addition, adults in

their 50s and 60s who got six hours of sleep or less a night were at a higher risk of developing dementia later in life. This may be due to that inadequate sleep is associated with the buildup of beta-amyloid, a protein involved in Alzheimer's disease (11).

Sleeping and skin aging:

It was mentioned that poor sleeping, also, affects skin aging as chronic poor sleep quality is associated with increased signs of intrinsic aging and diminished skin barrier function (12).

It was reported that aging may alter sleep pattern in many forms; Insomnia: is the most common sleep problem facing adults aged 60 and older. People with this condition have trouble falling asleep and staying asleep. Also, sleep apnea: people with sleep apnea have short pauses in breathing while they are asleep which can happen many times during the night. If not treated, other negative impacts may be present, such as high blood pressure, stroke, or memory loss (13).

Regarding movement disorders: Restless legs syndrome (RLS), People with this disorder may feel tingling, crawling, or pins and needles in one or both legs. This feeling is worse at night. In addition, periodic limb movement disorder (PLMD) causes people to kick their legs every 20 to 40 seconds during sleep (14).

It could be suggested that to maintain good sleep (quality, duration, schedule), it is essential to follow a regular sleep schedule and avoid napping late in the day, as this may keep the person awake at night. Some pre-bed tips to help old persons to maintain such good sleep are by keeping their bedroom at a comfortable temperature and using low lighting as a preparation of themselves for bed. Also, exercising at regular times each day, but not within 3 hours of the bedtime, can help in maintaining good sleep, as well as avoiding large meals close to bedtime as they can keep the subject awake. An important substance should be avoided is drinking caffeine late in the day. Caffeine (found in coffee, tea, soda, and chocolate) can keep the person awake for long hours (14).

3) Exercise:

Helen Hayes stated that "Resting is rusting". They found that men who regularly exercise can gain about 2 hours of life expectancy for each hour of exercise. On the other hand, physical inactivity is an actual cause of type 2 diabetes and a lot of other chronic diseases interacting with other factors such as age, gender, and diet (15, 16).

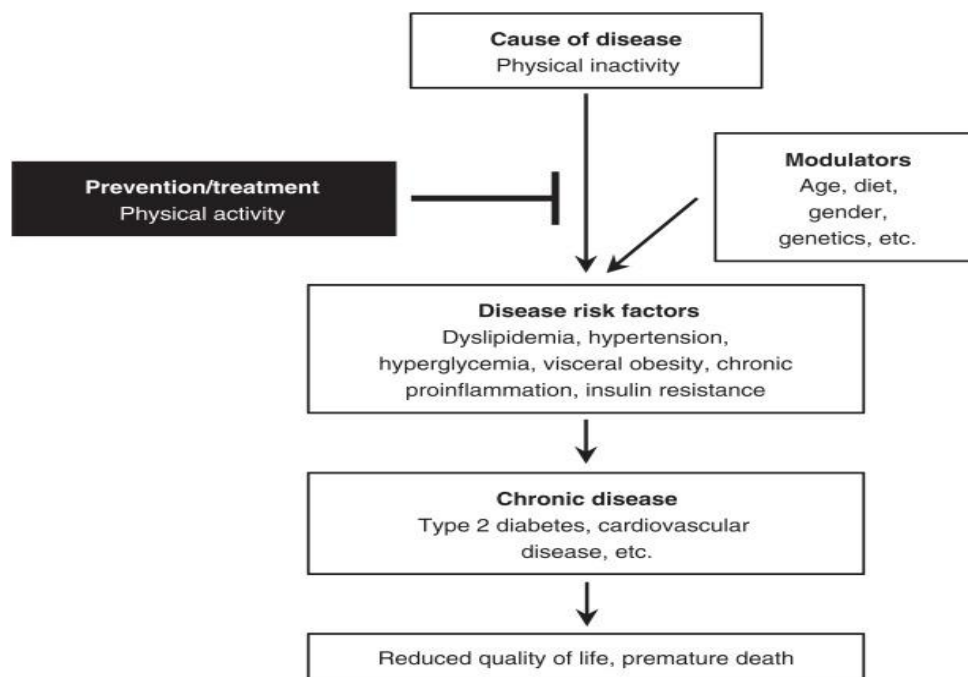


Figure (2): Interactions of exercise to reduce risk factors of chronic diseases (16).

A study, was performed by the medical school of the University of Texas (The Dallas Bed Rest and Training Study), demonstrated body responses to physical activity and inactivity with aging. This study included 5 healthy volunteering men and was done in 2 different ages, at the age of 20 they were asked to rest in bed for 3 weeks and after conducting the results they were asked to start an 8-week intense exercise program, they agreed for a second look at the age of 50 to investigate the relationship between exercise and aging, the 5 subjects were healthy and they did not need long-term medication but the 30 years had been tough to their health, they were not asked to rest to avoid detrimental health effects, therefore, they were requested to start a 6-month gradual exercise program. It was revealed that 3 week-rest worsened health states, in the form of general lethargy, and at age of 40s; palpitation, higher blood pressures, decline in heart's maximum pumping capacity, higher body fat and less muscle

strength, but after the 8 weeks intense program the exercise reversed these negative impacts resulted from the rest (17).

In the same study, the researchers found that even low-level- physical activity may reverse effects of rest, thus they applied post-operative physical activity, also, it helped a lot in the era of space travel. The gradual 6-month exercise program caused return of resting heart rate, average blood pressure, and pumping capacity to the baseline. They reported that 100% reversing of the damage present by their 30 years age process, even though the program didn't bring them back to their maximum health performance as they were at their twenties, but it delayed the age induced health damage. They recommended that four types of exercises should be followed to increase quality of life and produce healthy aging (endurance, resistance, flexibility, and balance), the 5 men's physical health returned to their baseline after the 6-month program as their body responded to

exercise even if they were old, thus the good news is “it's never too late”.

From the aforementioned studies, it could be concluded that exercise can remove the rust of aging, however, it must be combined with other factors such as: Avoiding tobacco and alcohol; eating a well-balanced diet; paying attention to the multivitamins needed; keeping our minds active to be protected from cognitive disorders; having a good sleep time and quality to reduce cognitive disorders such as Alzheimer's.

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References:

1. **López-Otín C, Blasco MA, Partridge L, Serrano M, Kroemer G.** The hallmarks of aging. *Cell*. 2013; 153:1194–1217
2. **Bao Q, Pan J, Qi H, et al.** Aging and age-related diseases—from endocrine therapy to target therapy. *Mol Cell Endocrinol*. 2014; 394:115–118.
3. **Cosco, T.D., Prina, A.M., Perales, J., Stephan, B.C.M., Brayne, C.** Operational definitions of successful aging: A systematic review. *Int. Psychogeriatr*. 2014; 26:373–381.
4. **Britton, A.; Shipley, M.; Singh-Manoux, A.; Marmot, M.G.** Successful aging: The contribution of early-life and midlife risk factors. *J. Am. Geriatr. Soc.* 2008; 56: 1098–1105.
5. **Kieffe-de Jong, J.C., Mathers, J.C., Franco, O.H.** Nutrition and healthy ageing: The key ingredients. *Proc. Nutr. Soc.* 2014; 73: 249–259.
6. **Barrett, Kim E., and William F. Ganong. (2012).** Ganong's Review of Medical Physiology. 24th ed., McGraw-Hill Medical; McGraw-Hill.
7. **Hall, J. E. (2015).** Guyton and hall textbook of medical physiology (13th ed.). W B Saunders.
8. **Cox, N. J., Ibrahim, K., Sayer, A. A., Robinson, S. M., and Roberts, H.C.** Assessment and treatment of the anorexia of aging: A systematic review. *Nutrients*, 2019; 11(1): 144.
9. <https://www.sleepfoundation.org/stages-of-sleep>
10. **Ohayon, M. M., Carskadon, M. A., Guilleminault, C., and Vitiello, M. V.** Meta-analysis of quantitative sleep parameters from childhood to old age in healthy individuals: developing normative sleep values across the human lifespan. *Sleep*, 2004; 27(7): 1255–1273.
11. **Lo, J.C., Loh, K.K., Zheng, H., Sim, S.K. and Chee, M.W.** Sleep duration and age-related changes in brain structure and cognitive performance. *Sleep*, 2014; 37(7): 821
12. **Oyetaquin-White, P., Suggs, A., Koo, B., Matsui, M. S., Yarosh, D., Cooper, K. D., and Baron, E.D.** Does poor sleep quality affect skin ageing?. *Clinical and experimental dermatology*, 2015; 40(1): 17–22.
13. <https://sleepeducation.org/how-sleep-deprivation-ages-you-quicker>
14. <https://www.nia.nih.gov/health/good-nights-sleep#alzheimers>

15. **Castillo-Garzón, M. J., Ruiz, J. R., Ortega, F. B., and Gutiérrez, A.** Anti-aging therapy through fitness enhancement. *Clinical interventions in aging*, 2006; 1(3):213–220.
16. **Rueggesser, G.N., and Booth, F. W. (2018).** Health Benefits of Exercise. *Cold Spring Harbor perspectives in medicine*, 8(7), a029694.
17. **McGavock J.M., Hastings J.L., Snell P.G., McGuire D.K., Pacini E.L., Levine B.D., Mitchell J.H.** A forty-year follow-up of the Dallas Bed Rest and Training study: the effect of age on the cardiovascular response to exercise in men. *J Gerontol A Biol Sci Med Sci*. 2009; 64(2):293-9.