Research on the relationship between sleep and aging

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Abstract. With the in-depth development of population aging, the level of health reduction of the elderly groups sharply increased, the rapid aging of the population brought health problems became a major challenge of 21st-century Chinese society, how to healthy aging, continuously improve the health level of older people, improve the quality of life in old age, there is no doubt more holistic, targeted and innovative thinking. Several studies have proved that a healthy lifestyle can effectively improve the health of the elderly. However, a series of factors, such as poor sleep quality, continue to harm the health of the elderly, resulting in reduced quality of life. With the large scale and rapid aging, the proportion of the elderly in the population is also increasing. In an aging society, the biggest problems plaguing the elderly are the loss of sleep quality and the loss of memory and concentration. People may have sleep disorders as they get older, and sleep problems will affect memory. This study used literature research to summarize the relationship between population aging and sleep. Compared with previous studies, this paper is more targeted and comprehensive in explaining the relationship between the three from micro and macro perspectives: aging leads to changes in sleep structure and duration, which further affects memory ability.

Keywords: Sleep, aging, memory, the elderly.

1. Introduction

With the acceleration of population aging and urbanization, the incidence of chronic diseases in urban and rural populations in China has increased rapidly, and the elderly have become the most affected population. As physiological functions decline with age, older people are more likely to develop chronic diseases or become ill as a result of reduced resistance, which affects the ability of older people to live independently and their quality of life. Long-term irregular working hours, lack of exercise, and bad lifestyle behavior are risk factors for chronic diseases and seriously threaten the health of urban and rural residents. Among them, insufficient physical activity and decreased quality of sleep are becoming key factors affecting the health of the elderly. In our country, about half of people have experienced varying degrees of sleep disturbances, and elderly people suffer from sleep disorders. To the objective of improving the life expectancy and quality of life of the elderly, it is necessary to promote healthy aging, maintain basic health, and improve the quality of their lives through multidisciplinary and multi-faceted integrated interventions such as health care, physical exercise, environmental protection, and healthy behavior. Therefore, it is important to actively pay attention to and guide the daily behavior patterns of the elderly and to help them build healthy lifestyles, thereby improving the quality of life and well-being of older people.

Healthy aging is characterized by a diminished quality of sleep with decreased sleep duration and increased time awake after sleep onset. Older adults awaken more frequently and tend to awaken less from rapid eye movement (REM) sleep and more from non-REM (nREM) sleep than young adults. Sleep architecture also begins changing in middle age leading to a dramatic decrease in the deepest stage of nREM-slow wave sleep (SWS)-as aging progresses. Other less marked nREM changes include reduced numbers of sleep spindles and K-complexes. In contrast, the amount of REM diminishes only slightly. Both circadian and homeostatic sleep-regulatory processes are affected by aging. Circadian rhythms of temperature, melatonin, and cortisol are phase advanced and their amplitude diminished. An increased number of nocturnal awakenings and diminished daytime sleepiness suggest diminished homeostatic sleep pressure. A variety of endocrine and neuromodulatory changes (e.g., reduced growth hormone and dopamine levels) also accompany healthy aging [1]. There is also a relatively new article on sleep memory, which discusses the aging effects of sleep-dependent memory consolidation. Changes in sleep-dependent memory consolidation ability during aging have received extensive attention from researchers. Although there is considerable evidence that the sleep-dependent memory consolidation effect is impaired during aging, the results are inconsistent due to factors such as memory types (the four forms of image memory, logical memory, emotional memory, and motion memory respectively), sleep phases (These include rapid eye movement (REM) and non-REM stages. REM is the stage when dreaming occurs.) and memory extraction methods [1]. This paper explains how age can affect sleep specifically, for later study of older people's sleep compared to young people can lead to memory decline as a mattress and theoretical basis [2].

2. Analysis of factors affecting sleep

On the factors affecting the sleep nerve level, from the perspective of the diffuse regulation system. Let's start with a brief overview of the dispersive regulation system, which is very important in many psychiatric diseases and medications. The dispersive regulation system in the brain operates like a radio volume switch, which is the overall adjustment of volume but does not change the content of a song. These neurons do not convey detailed sensory or motion information but rather perform regulatory functions that regulate the post-syntax neurons. So how does the dispersive regulation system affect the sleep nerve levels? The transmitter molecules released by the synaptic prefrontal membrane of the dispersed modulating system neurons act as a regulator of the activity of other neurons, whose post-synaptic receptors are usually metabolic receptors associated with G-protein couplings. Dispersive regulation systems include the de-methyl adrenaline energy system, the 5-phosphate amine energy system, and the dopamine energy system. About the adrenaline-resistant system, humans have about 12,000 neurons per blue patch, a total of two blue patches, one on each side, and the axis of the blue patch neurons leaves the blue Patch through several channels, projecting finally to almost every part of the brain: all to the cerebral cortex, the hippocampus and the hypothalamus, the olfactory nodes, the small brain, the central brain, and the spinal cord. In addition to participating in the regulation of learning and memory, anxiety and pain, emotions, and brain metabolism, bluetongue neurons are also involved in attention regulation, awakening, and sleep-awakening cycles [3]. The blue spots sound like nothing. The keyword used here is "involving", which means that almost everything is included. For example, our heart, liver, lungs, and kidneys are also involved in every function of the brain, because without these organs, all behavior cannot be done. Because of its extensive connection to the brain, it can affect all parts of the brain. About the 5-phosphamide energy system, the brain's 5-phosphamide neurons are distributed in nine central seams. The central seam nucleus near the end of the head is dispersive and projected into most areas of the brain to wake up and maintain the active state of the prefrontal brain; it is involved in the various stages of sleep regulation and coordinates with other transmission systems to the regulation of the sleep-wake cycle; it participates in the control of emotions and certain emotional behaviors, and pain-related sensory signals. The dopamine energy system, originating in the blackness of the basal nerve nodes, is projected to the strained body, facilitating the initiation of arbitrary movement originating in the abdominal area of the middle brain, close to the black matter, projected into the

frontal cortex and part of the peripheral system, involved in the regulation of mental activity and other advanced brain functions, participated in the reward system to strengthen certain adaptive behavior [4]. The choline energy system is involved in regulating the general excitability of the central nervous system during the wake-up and sleep-party wake cycles. The underlying pre-brain complex may play a special role in learning and memory formation. Injury in these areas is associated with aging dementia [5].

The sleep process can be divided into five different stages, alternating. During the fast eye phase, sleep is in the dream phase and is associated with the activity of the eye and physical paralysis. The marginal structures involved in memory and emotional regulation increased during this phase, but the activity of analytical thinking involved in the frontal system decreased. During sleep, things of the day are processed into memories that are combined in a novel way. Learning memory that promotes motor skills in non-rapid eye movements. So in memory, quick eye movement and non-fast eye movement play a role. But older people waking up more frequently, a slight reduction in the number of rapid eye movements and a sharp decrease in non-fast eye sleep can lead to less learning memory in older people. And as we age, our sleeping time changes. Because we usually feel tired earlier than we used to, it might make us wake up earlier in the morning. As a result, older people sleep less than we do, which may hinder memory consolidation. Elderly sleepers are prone to silence, which is caused by breathing suspension while sleeping. This belongs to sleep disorders that make the elderly sleep poor and low oxygen. Daytime fatigue is one of the symptoms. Breathing interruption while sleeping and night insomnia overnight sleep are sleep problems vulnerable to elderly people with dementia [6-7].

3. Conclusion

In conclusion, with aging the old will have sleep disorder, and then sleep problems affect the memory. In the future, drugs can be developed to overcome sleep disorders and prevent Alzheimer's disease [8]. However, the deficiency of this article is only the reasoning and summary based on theory and life experience without real experimental proof. Subsequently, we can focus on medical research to solve the problem of memory decline caused by aging from the molecular aspect. Future research could better understand the complex relationship between these factors by exploring the mediating role of physical activity between sleep and health, providing an empirical basis for healthcare professionals and health promotion policymakers to develop interventions that target older adults to improve their health and well-being. The results of this study also make empirical exploration for promoting the health and well-being of the elderly to a certain extent and guide future research and practice.

References

[1] Pace-Schott EF, Spencer RM. Age-related changes in the cognitive function of sleep. Prog Brain Res. 2011;191:75-89. doi: 10.1016/B978-0-444-53752-2.00012-6. PMID: 21741545.

[2] Wang Hongdan. Old people sleep, the influence of physical activity on health research [D]. Jilin University, 2023. The DOI: 10.27162 /, dc nki. Gjlin. 2023.006999.

[3] Wang Xiaofeng; Wang Hongdan. A study on the relationship between healthy lifestyle behaviors in elderly people: A case study of sleep and physical activity [J]. Population Journal, 2022, 44 (6) : 69-80. The DOI: 10.16405 / j.carol carroll nki. 1004-129 - x. 2022.06.006.

[4] Zhang T J. Study on the level of successful aging of the elderly in urban areas of Liaoning Province and its influencing factors [D]. China Medical University,2018.

[5] Liang Yunlie. Improving sleep is an important link to improving the quality of life [C]// Gerontology Development Committee of Chinese Society of Gerontology; Research Center of Gerontology, Tsinghua University. Proceedings of academic discussion on the development of talent resources for the elderly. [Publisher unknown],2003:2.

[6] Liu Xuechun. Study on the relationship between sleep quality and cognitive function and related factors in elderly people in community [D]. Anhui Medical University, 2021. DOI: 10.26921 /, dc nki, ganyu. 2021.001312.

[7] Xue Jing; Yuan Xiaodong; Xing Aijun; Wang Lianhui; Ma Qian; Zhang Pingshu. Research progress on the correlation between sleep duration and stroke [J]. Chinese journal of health psychology, 2023, 31 (12): 1779-1785. The DOI: 10.13342 / j.carol carroll nki CJHP. 2023.12.004.

[8] LIU Su. Human-computer Interaction Design and Innovation Exploration of Sleep Experience [J]. Science and Technology Innovation and Application,2023,13(33):45-48.DOI:10.19981/ j.CN23-1581/G3.2023.33.011.