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To what extent, which factor has the most significant role contributing to the risk of hypertension?

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Abstract. The existing lifestyle that people have in contemporary society is certainly insufficient to maintain a physical health which can be related to cardiovascular and other diseases, especially like hypertension. While for the inherited or natural genes, they can be mutated or born with the diseased gene fragment that could lead to the potential risks of hypertension, such as congenital hypertension. One of the most significant current discussions in the field of research is which factors are more associated with hypertension. There are two mainstream opinions on this: lifestyle factors and genetic factors. However, there is still some uncertainty about it, such as a lack of data, exceptional examples and especially which kinds of factors really have a dominant role which means they can have a joint role in hypertension. In this essay, the author discusses some specific lifestyle and genetic factors including sleep, diets, exercise, weight, and tooth brushing (minority), and aims at finding detailed information on what play a dominant role leading to the risk of hypertension. Besides, it also illustrates that hypertension is associated with many aspects of factors, not only have combined but also separate roles and some other factors like area, age and gender can also play a role in it.

Keywords: risk of hypertension, genes, lifestyle

1. Introduction

The issue of hypertension has attracted widespread attention from countries around the world and various sectors of society, because of the high incidence rate and mortality. Among them, the Comprehensive Analysis Report on Global Hypertension Epidemic Trends, the largest global study on hypertension to date, shows that in the past 30 years, the number of hypertensive adults aged 30-79 has increased from 650 million to 1.28 billion (Zhou, Bin ,2021). Nearly half of them are unaware that they have high blood pressure. The diagnostic rate of hypertension remains high.

For the sufferers who contract the hypertension, the symptoms are usually headache, fatigue, restlessness, arrhythmia, palpitations, and tinnitus. What is more serious is that hypertension can induce some related and potential diseases, consequently, it will cause panic among citizens and overload and paralysis of the healthcare system as well as increase a heavy burden on financial budget on medical care.

And obviously has become the focus of discussion among many scholars about what causes hypertension. It now gradually has a common consensus: the factors contributing to hypertension or high blood pressure are multifaceted, with genetics playing a primary role in causing this issue. Indeed, the progress of modern medicine, people's medical condition can be guaranteed, while modern people are more willing to crave food high in salt, fat, and sugar as well as having a sedentary lifestyle, so objectively, lifestyle factors also cause the potential of it. In order to alleviate the associated diseases and risks that hypertension brings to people, it is without doubt that we should take more preventative measures to prevent it. More research on exploring the factors that contribute to hypertension is an imperative prerequisite for achieving this goal. More and more scholars have begun to focus on genetic and lifestyle factors and extend to a variety of aspects. Among them, the early and previous studies may focus on one aspect of factor and single discussion object, and they all display there is an obvious association between hypertension and genetic and lifestyle factors. And then, with further research and sufficient data, scholars are focusing on not only which factor play a primary role leading to the risk of hypertension but also whether there are any joint effects that work together to cause hypertension, which are also based on different races and comparison. And the research points out that although we consider that certain factors contribute to hypertension, hypertension may not be a single disease process, for instance, factors like sleep quality may be determined by genetics.

2. Literature review

In this section, the author will investigate

1) What is the definition of hypertension with its related basic knowledge?
2) What kinds of indicators can lead to the risk of hypertension?
3) What is the most significant factor contributing to the hypertension?

Hypertension is, as the name suggests, when blood pressure (BP) elevates and the pressure on the walls of blood vessels as blood flows through them is consistently higher than normal. It has been defined as when, without the use of antihypertensive drugs, there were three times when the blood pressure values in the consultation room were higher than normal, that is, the systolic blood pressure (commonly known as high pressure) in the consultation room was ≥ 140mmHg and/or the diastolic blood pressure (commonly known as low pressure) was ≥ 90mmHg, and these three blood pressure measurements were not taken on the same day. It is classified as either essential hypertension, which is characterized by a lack of identifiable trigger for blood pressure raise, or categorized as secondary hypertension, which is caused by various medical conditions. (Guidelines for the Prevention and Treatment of Hypertension in China, 2020). As the disease progresses, blood pressure significantly continues to rise along with the symptom headache, dizziness, lack of concentration, decreased memory, numbness in limbs, increased nocturia, palpitations, chest tightness, fatigue which is called chronic hypertension, while blood pressure suddenly rises to a certain extent, severe symptoms such as headache, vomiting, palpitations, and dizziness may even occur. In severe cases, confusion and convulsions may occur, and severe damage and lesions to organs such as the heart, brain, and kidneys may occur in a short period of time, which is called accelerated hypertension.

And based on it, there have been some conventional methods to examine:

1. Physical history examination
2. Urine analysis
3. Blood test
4. Ultrasonic test
5. Fundus test
6. Carotid test can all be helpful for prevention

Nowadays, there is an exponential growing number of people suffering from hypertension, so more scientists are looking for the causes of hypertension. Of the many who have looked at the relation between lifestyle or genetic factors and hypertension in academies, none has as yet produced a definite answer to the apparently simple question “To what extent which factor can have the most significant role contributing to hypertension?”

3. Lifestyle factors

3.1. Sleep

B.Han found evidence to suggest that sleep can lead to the possibility of hypertension happening. His study is valid due to the reason that it is based on meta-study taking into account 54 studies which explore the association between hypertension and obstructive sleep apnea (OSA), oxygen desaturation index (ODI) and the length of duration. The study found that for the subjects, no matter whether they were in poor sleep status, which means a lower sleep condition, or in high (compared with the normal), they were more likely to raise the risk of developing a hypertension and he concluded that OSA and ODI may lead to the risk of hypertension and the extreme sleep length can raise disease in a long-term period [3]. Besides, he added that to a certain extent, snoring can be a dangerous factor causing hypertension [3] as well as hypertension is associated with poor sleep status. A study conducted by Coronary Artery Risk Development in Young Adults, focusing on the objective sleep duration of 578 Americans aged 33 to 45 years between 2003 and 2005, used wrist actigraphy to measure sleep quality and duration over a period of three days, twice during the study period [4]. The research analyzed the relationship between sleep duration, the 5-year incidence of hypertension, and changes in systolic and diastolic blood pressure. The findings revealed that individuals with short sleep duration had a higher likelihood of developing hypertension. Specifically, every hour of decreased sleep duration correlated with a 37% increase in the risk of developing hypertension, emphasizing the significant association between inadequate sleep and hypertension. Conversely, long sleep duration did not display a statistically significant relationship with hypertension [7].

3.2. Diets

Similar aspects from studies working on diets have been observed that may also lead to hypertension. As a common cause, most of the people that suffer from hypertension are those who are accustomed to eating food high in salt, sugar, and fat. Given the prevalent belief that excessive salt intake is a primary factor contributing to hypertension and cardiovascular disease, public health guidelines widely advocate for dietary salt restriction. The Intersalt study underscored a robust correlation between salt consumption and a gradual elevation in blood pressure (BP) as individuals age, with an estimated increase of up to 4 mm Hg per

year for those consuming 6 grams of salt daily. Consequently, reducing salt intake is anticipated to not only immediately lower BP but also mitigate the age-related rise in BP, offering a dual benefit for cardiovascular health (no author,1988). A follow-up study spanning ten to fifteen years discovered that individuals initially prescribed a lower salt diet exhibited a 25% reduced risk of experiencing major cardiovascular events compared to their counterparts. While accurately assessing dietary sodium intake poses a challenge, and recent findings have called into question the traditional renal-centric understanding of sodium handling, there is a prevailing consensus that limiting dietary sodium intake can effectively prevent hypertension and its attendant cardiovascular complications [9]. It is evident that the superfluous salt intake has a relationship with hypertension.

3.3. Excess weight

It regards body shape as a factor causing hypertension. Health experts emphasize that weight gain and obesity are pivotal risk factors for hypertension, with a significant impact on the elevation of blood pressure (BP) (Julián, 2021). Typically, excess weight leads to an increase in BP, whereas weight loss tends to decrease it. The primary link between obesity and hypertension lies in the augmented cardiac output and a relatively unaltered systemic vascular resistance. This underscores the importance of maintaining a healthy weight to mitigate the risk of hypertension and its consequences. Normally, obesity is related to the amount of body fat and its distribution. Numerous studies have illuminated that obese individuals face a 3.5-fold greater risk of developing hypertension, with approximately 60% of hypertension cases attributed to the accumulation of adipose tissue (Julián, 2021). Further, data from the National Health and Nutrition Examination Survey (NHANES) reveal striking disparities in hypertension prevalence, with obese individuals (BMI $\geqslant$ 30 kg/m²) experiencing a prevalence rate of 42.5%, significantly higher than the 15.3% observed among lean individuals. This heightened vulnerability to hypertension among the obese population ultimately heightens their risk of developing cardiovascular diseases (Jeffery,2021). Moreover, there exists a distinct correlation between blood pressure elevation and weight gain, suggesting that excessive weight undeniably plays a role in the development of hypertension. This implies that maintaining a healthy weight is crucial to prevent or manage hypertension effectively. Beyond salt intake, excessive sugar consumption, particularly in the form of fructose, has also been implicated in elevated blood pressure levels. Studies have documented a correlation between blood pressure and both fructose intake, notably from sugar-sweetened beverages (SSBs), and serum uric acid levels (Simonetta, 2021). Given that high fructose consumption is linked to higher uric acid concentrations, disentangling the individual effects of uric acid and fructose on blood pressure in clinical research poses challenges. A recent meta-analysis, encompassing 14 studies among children and adolescents, underscores this link, revealing that heavy SSB consumption is associated with a significant increase of 1.67 mmHg in systolic blood pressure (SBP). Notably, frequent SSB consumers were found to be 1.36 times more likely to develop hypertension compared to those with more moderate consumption habits [10]. These discoveries underscore the crucial role of regulating sugar consumption, especially from sugar-sweetened beverages (SSBs), in reducing the likelihood of developing hypertension. By moderating one's intake of such beverages, individuals can potentially mitigate their risk of hypertension and maintain better cardiovascular health. It is fair to draw a conclusion that there is a link between excess sugar intake and hypertension.

3.4. Exercise

Contemporary children are estimated to engage in 600 kcal/day less physical activity compared to their counterparts from 50 years ago, while a staggering 57% of the European population fails to partake in regular vigorous exercise. This sedentary lifestyle trend translates into limited opportunities for physical exertion, exacerbating health concerns. Notably, research by Ruivo (2012) underscores an inverse relationship between the total amount and intensity of exercise and cardiovascular mortality, a finding that holds true for both healthy individuals and those with pre-existing cardiovascular conditions [11]. Aerobic exercise, in particular, elicits immediate physiological responses such as enhanced cardiac output and redistribution, leading to elevated systolic blood pressure (BP) and a stable or slightly reduced diastolic BP, as described by Ilargi [12]. During predominantly static physical activity, tension levels tend to rise. However, post-exertion effects, observable within the first 72 hours after exercise, involve a modest decline in BP, particularly pronounced among hypertensive individuals (post-exertion hypotension), with greater reductions observed in those with higher baseline BP. Furthermore, the chronic effects of regular exercise are marked by physiological adaptations, including lower resting BP, relative bradycardia, muscle hypertrophy, physiological left ventricular hypertrophy, and increased maximum oxygen consumption in physically active individuals. These observations underscore the undeniable correlation between exercise and hypertension, emphasizing the importance of incorporating regular physical activity into daily routines to promote cardiovascular health.

3.5. Tooth brushing

Tooth brushing, a fundamental self-care practice integral to a healthy lifestyle, is pivotal in maintaining oral hygiene and overall health [13]. Epidemiological research underscores the detrimental consequences of inadequate tooth brushing habits, linking them to a range of health issues, such as gingivitis, dental caries, periodontal disease, head and neck cancers, dyslipidemia, and

endothelial dysfunction [14]. Notably, a significant correlation has been observed between infrequent tooth brushing and an elevated risk of hypertension, corroborated by a mechanistic study conducted by INVEST that involved 731 participants. This relationship is attributed to inflammation, which transforms the periodontal tissue into a conducive environment for the release of numerous local pro-inflammatory factors into the bloodstream. These factors, in turn, impact the sympathetic nervous system and the renin-angiotensin-aldosterone system, resulting in elevated blood pressure. Moreover, infrequent tooth brushing fosters the proliferation of Porphyromonas gingivalis bacteria, exacerbating the gut environment and triggering periodontal inflammation and aberrant immune responses. Periodontal disease, furthermore, triggers the immune system directly or indirectly through its influence on the gut microbiome, fostering chronic inflammation that ultimately leads to hypertension [15]. Regular tooth brushing, as demonstrated by trained dental examiners through sub-gingival plaque sampling and quantification, effectively eliminates plaque and minimizes the risk of periodontal disease [16]. In light of the substantial economic burden associated with hypertension, the findings of this study offer invaluable insights into the prevention of this prevalent condition, emphasizing the significance of maintaining good oral hygiene through consistent tooth brushing practices.

4. Genetic

Studies involving diverse populations have revealed that while lifestyle factors are crucial, genetic factors also play a significant role in hypertension. A Canadian investigation of 120 families with early-onset hypertension identified a cluster of quantitative trait loci on chromosome 1, associated with BMI, fasting insulin, leptin, and diastolic blood pressure. Notably, genetic predisposition influences visceral fat distribution, which can elevate blood pressure in obese individuals. Increasingly, primary hypertension is viewed as a syndrome, characterized by a common symptom—elevated blood pressure—stemming from various individual causes or diseases. Genetic tools are being increasingly utilized to unravel these underlying mechanisms. A review in 2005 highlighted the discovery of an additional 37 genes between 2004 and 2017, bringing the total number of genes associated with primary hypertension to 62 by December 31, 2017, according to PubMed data [17]. To date, approximately 50% of primary hypertension cases can be attributed to positive genetic associations, though some of the proposed genes may be false positives due to operational factors such as repeated use of detection substrates, overflow during washing procedures, and inadequate washing leading to enzyme preparation residues [17]. These findings underscore the substantial link between genetics and hypertension.

5. Discussion

The author will discuss the hypertension about:

1. The different and mutual roles of lifestyle and genetic factors hypertension.
2. Some other potential factors about social and individual stuffs relating to the risk of hypertension.

It is crucial to differentiate between two varied types: lifestyle factors for nurture, which is acquired development, and genetic factors for nature, which is what the person is born with. The proposal of the application to both categories is considered. The outcomes of this study demonstrate the correlation between the lifestyle factors, genetic factors and causes of hypertension and have provided insight into preventing and treating hypertension through personal interference and dietary habits. However, caution must be exercised in interpreting the results due to the limitations inherent in the current research. This chapter serves as a reflective analysis of the research methodology, delving into the constraints and potential repercussions of the study's design. Additionally, it explores the implications these limitations have on the interpretation of the findings. The chapter concludes with a series of suggestions for future research endeavors.

5.1. Lifestyle factors

Lifestyle factors are very important as causes of hypertension. There is research that shows that lots of lifestyle factors contribute to this condition. Based on the findings above, the following are all important: we found that sleep could be one of the factors leading to hypertension. The results indicated that OSA, ODI, sleep quality, short or long sleep duration, and snoring, were the risk factors of hypertension [3]. However, the observed association exhibited variability across different subgroups. Notably, the issue of publication bias was solely identified in the meta-analysis investigating the link between obstructive sleep apnea (OSA) and hypertension. Nevertheless, the sensitivity analysis conducted affirmed the robustness and stability of the combined results. And the generalizability of the results is limited by certain races which means the relationship between them may only concern this narrow group. Despite this, the results are still reliable as they took into account considerable samples by establishing multiple groups as well as distinct variables.

While there is controversial debate over the coffee intake, recent research found that there is a relationship between them that the more coffee intake they have, the higher risks they will get. However, the previous studies conducted by Steffen Xie and D ' Elia suggest that there is no association when having 1-2 cups or even an inverse correlation when having more than 3. The inconsistency in results observed across these meta-analyses could potentially stem from variations in the study populations, the

incorporation of studies that utilized different outcome measures, and the inclusion of unpublished data, all of which may have influenced the findings. And from the research we find that body shape is regarded as a contributor to hypertension, it is deniable it did not provide intrinsic factors leading to hypertension, but instead proved BRI (body round index) and ABRI (body shape index) as direct effects and subsequently, ingeniously make the conclusion that obesity and overweight could increase risk. There may be differences in the causes of hypertension in different populations and so it is important not to generalize. Hypertension may not be a single disease process. It is likely to have multiple underlying pathophysiology and so may have different causes in different individuals. And still some lifestyle factors might also be influenced by genetics, for instance sleep quantity can be determined somewhat by genetics.

5.2. Genetic factors

Non-lifestyle factors also play a role. A study focusing on Europeans examined 535 novel blood pressure loci and emphasized the pivotal role of the vasculature and its associated signaling pathways in the genetic architecture underlying blood pressure (BP) traits. For instance, in the case of systolic blood pressure (SBP), the percentage of variance explained by genetic loci underwent a notable increase, from 2.8% for the 274 previously reported loci to 5.7% when incorporating single nucleotide polymorphisms (SNPs) identified across all 901 loci. Notably, one of these BP-associated loci harbors the Bone Morphogenetic Protein 2 (BMP2) gene, which is part of the transforming growth factor beta (TGFβ) pathway. BMP2 plays a crucial role in preventing growth suppression in pulmonary arterial smooth muscle cells and has been linked to pulmonary hypertension, further highlighting the intricate connections between genetic factors, vascular function, and BP regulation [21]. The research data indicates that hypertension has genetic susceptibility and familial aggregation which means it is likely to be a certain genetic tendency.

The risk of their children suffering from hypertension is significantly elevated, being severalfold higher compared to that observed in individuals without such predisposition, which can reach around 40%. Instead, for those whose parents do not both have hypertension, the probability of developing hypertension is relatively low, usually below 10%. From the intrinsic aspect, at the cell level, almost all changes occurring within cells are controlled by DNA molecules, and the information contained by DNA molecules far exceeds the actual needs of cells. This means that in each cell, some genes are dominant, while more recessive genes only temporarily do not play their role. If, due to various reasons, some previously latent recessive genes begin to be activated, or some previously active dominant genes cease to function, then although the DNA itself remains unchanged, changes in both dominant and recessive genes will be transmitted through inheritance to the next generation. For example, within the vasculature, endothelial cells, vascular smooth muscle cells (VSMCs), and adventitial fibroblasts perform critical functions in maintaining vascular homeostasis. Dysregulated interactions among these vascular cell types can potentially give rise to hypertension and initiate processes of vascular remodeling (Zhang,2020).

5.3. Stress

Stress has been properly defined as an "unclear" variable. Despite the lack of a universally agreed-upon definition for stress, its precise nature remains elusive (Pollock, 1988). Nonetheless, the concept of stress has become widely popularized, and extensive research on the topic has firmly established the connection between stress and illness as a common aspect of everyday life. A national survey revealed that half of the respondents attributed "emotional pressure, worry, and anxiety" as contributing factors to hypertension, surpassing those that stated excess weight (0.26) or heredity (0.12) (National Institutes of Health,1981). Besides, stress is mainly classified as emotional, sociocultural or occupational stress.

For the first type, psychological stress arises when newly acquired information fails to align seamlessly with the established patterns stored in our memory. Studies have indicated that the transient elevation in blood pressure observed during acute psychogenic stress, such as forced mental arithmetic, is attributed to sympathetic activation. When the sympathetic nerve is stimulated, it exerts its effects on beta-adrenergic receptors, leading to an increase in heart rate, enhancement of myocardial contractility, and an elevation in cardiac output. (Mustacchi,1990). Upon stimulation of the vascular alpha receptors, small arteries undergo vasoconstriction, augmenting peripheral resistance and subsequently elevating arterial pressure. This phenomenon, which is a hallmark of hypertension, often coincides with an increased heart rate. When combined, visceral vasoconstriction tends to outweigh muscular vasodilatation, frequently resulting in elevated cardiac output.

For the second type, the inverse correlation between blood pressure and educational attainment as well as social class aligns with the belief that proficient problem-solving and communication skills are crucial in diverse settings, both occupational and non-occupational, within industrialized societies. These skills are predominantly acquired through formal education. Research has observed a low prevalence of hypertension in regions like Alaska, South America, and Africa, which is attributed to lifestyles rooted in traditional cultural values and minimal technological intervention. Conversely, the heightened occurrence of hypertension among urban Zulus is thought to stem from the additional social stress caused by their frequent arrests and humiliations, which their normotensive rural counterparts do not encounter [23].

As for occupational stress, the rudimentary precondition is threat which can contribute to insecurity and inadequacy, another is from time pressure which workers need to finish before the deadline and fulfill tasks at an accelerating pace. If workers are paid

according to the amount of work, they do, rather than the base wage, although efficiency will increase it will be followed by physical discomfort. Fatigue and stress will increasingly be reflected in the heavy workload. The investigation revealed a notable variation in the prevalence of hypertension among male hourly workers, with a minimum of 10 years' experience in noisy plants, which was markedly influenced by their suppressed anger levels and three distinct job-related aspects: uncertainty about job prospects, dissatisfaction with colleagues, and the availability of promotional opportunities [24].

5.4. Sex

Globally, it is approximated that 1.4 billion adults, encompassing 20% of females and 25% of males aged 18 and above, suffer from hypertension. And since the 1940s, there has been a recognized trend of men experiencing more pronounced elevations in blood pressure (BP) than women. The research indicates that there exist notable disparities in the epidemiology and clinical manifestations of hypertension between males and females. Additionally, these gender distinctions are associated with specific types of hypertensions, such as postmenopausal hypertension, white coat hypertension, masked hypertension, and hypertensive disorders during pregnancy. While gender variances are implicated in the prevalence and determinants of hypertension and pre-hypertension, the control rate among those undergoing antihypertensive therapy is comparable between sexes. Notably, distinct mechanisms involving angiotensin-converting enzyme 2/Apelin signaling, sex hormones, endothelin-1, and sympathetic nervous activity contribute to the gender-specific differences in blood pressure regulation [27]. Furthermore, a study examining the impact of hourly work status on females, grounded in gender-based hypotheses, suggests that women in manufacturing settings may encounter a lack of support, unequal advancement opportunities, heightened harassment and discrimination, as well as domestic responsibilities, all of which could uniquely influence their response to workplace exposures. Notably, the intensified effects observed among both women and men who are classified as hourly workers hint at potential interactions between socioeconomic status (SES) and job-related exposures, implying a heightened vulnerability among individuals with lower SES (Jane ,2010).

5.5. Age

It is obvious that high blood pressure is much more common and frequent in the elderly than in young people. In the majority of populations, the likelihood of developing cardiovascular disease escalates significantly with advancing age, a potent influence that has profound implications for disease risk when tied to blood pressure and other predisposing factors. This disparity gradually diminishes as individuals grow older, yet it remains more pronounced for coronary heart disease compared to strokes. Specifically, in the United States, among individuals aged 34 to 74, men face a 2- to 3-fold higher risk of death from coronary heart disease (Gensini,2000). This is because as elderly people age, individuals may commence experiencing symptoms including the thickening of arterial walls, accompanied by an increase in the proliferation and migration of vascular smooth muscle cells (VSMCs). Concurrently, the elastic properties of the blood vessels deteriorate. Moreover, the impairment of endothelial function leads to diminished vasorelaxation and vasoreactivity (Forte,2020). A comparison of salty food preferences between elderly individuals with hypertension and those with normal blood pressure revealed that hypertensive seniors have a stronger preference for and consume greater amounts of salty foods compared to their normotensive counterparts. Furthermore, several studies have indicated that older adults tend to favor more intense flavors than younger individuals, due to the natural decline in the number of papillae and taste buds with advancing age. This suggests that age and salt intake may jointly contribute to the development of hypertension.

5.6. Area

Globally, an overwhelming 80% of cardiovascular disease (CVD) related deaths occur in low- and middle-income countries (LMICs). In sub-Saharan Africa (SSA), hypertension is often perceived as a problem confined to urban areas, attributed to the adoption of Western lifestyle habits. However, early research from rural SSA regions indicates contrasting findings, with low and stable mean blood pressures across age groups and a relatively low prevalence of hypertension. Migration studies within LMICs have demonstrated a rise in blood pressure among individuals transitioning from rural to urban settings. Hypertension prevalence in SSA varies widely, ranging from 19.0% in Tanzania to 32.0% in Namibia. This disparity is believed to stem from societal advancements, particularly in education levels, which are notably low in Nigeria, where over half of the population did not complete primary education (Hendriks, 2012). Socioeconomic status, as measured by per capita annual food and non-food consumption, exhibits significant variation across SSA countries, with rural Nigeria at the lowest end and urban Namibia at the highest. Low insurance coverage, particularly in Nigeria (0.8%) and Tanzania (1.9%), underscores the challenges faced by these populations in accessing healthcare. Moreover, a recent study highlights the importance of the living environment in determining life expectancy, beyond socioeconomic factors. Residents of wealthier areas, such as New York and San Francisco, enjoy longer life expectancies than those in less affluent regions, underscoring the impact of access to public health services and stricter smoking policies on health outcomes. While white and black populations are frequently compared in prevalence studies, Asians are also included, albeit with insufficient information. This underscores the need for more comprehensive and inclusive research to better understand the complexities of CVD risk factors and outcomes across diverse populations [32].

5.7. Social status

Since the 1920s, research has established a link between socioeconomic status and high blood pressure, with previous studies revealing that the risk of hypertension tends to decrease as education levels rise and occupational status declines. This suggests that factors related to education and occupation may play a role in modulating blood pressure levels. According to recent research, in addition to marital status, the other indicators of social and economic status were related to the exchange of hypertension bacteria. When the income of marriage education was the same, the risk of hypertension was reduced by 32% compared with that of white-collar workers, the risk of hypertension was reduced by 40% compared with that of unemployed people, at the same time, a cohort study of Swiss men and women both suggest that social economy status (SES) was negatively correlated with blood pressure —the SES composite factor was obtained by ranking socioeconomic factors, based on which the risk of hypertension increased by 30.9% with one grade and 21.2% with the second grade. Contrary to previous findings, the current study suggests that a higher socioeconomic status may actually increase the risk of hypertension, which contradicts earlier research. However, when controlling for other variables, individuals with an income level exceeding 3000 yuan exhibited a 30% lower risk of hypertension compared to those earning between 1000 and 3000 yuan, aligning with previous studies. Nevertheless, the study's limitations include a disproportionate male-to-female ratio of one to two and a narrow age range primarily between 40 and 60 years, which could skew the statistical results. Furthermore, as a cross-sectional study, it only captures a snapshot of socioeconomic status and hypertension risk factors, which are inherently dynamic and subject to change, potentially introducing bias into the analysis.

5.8. Separate and Joint effects

The previous study underscores the positive impact of healthier lifestyles, as measured by a composite score encompassing smoking habits, BMI, physical activity, alcohol consumption, and diet quality, on reducing premature mortality and enhancing life expectancy in the US population. Notably, the hypertensive cohort in this study exhibited distinct characteristics compared to their non-hypertensive counterparts, including advanced age, a higher proportion of males, superior educational attainment, less favorable BMI profiles, elevated genetic risk scores (GRS), a more prevalent family history of hypertension, and higher baseline systolic (SBP) and diastolic (DBP) blood pressure levels. Furthermore, the research highlights the significance of genetic factors in hypertension by identifying and replicating specific single nucleotide polymorphisms (SNPs) from East Asian studies within a rural Chinese population. The integration of these SNPs into a GRS demonstrates a strong correlation with hypertension and blood pressure levels, emphasizing the intricate interplay between genetic predisposition and hypertension risk. The results indicate that people are born with genetic predispositions that contribute to a certain degree of their vulnerability to hypertension and high blood pressure, emphasizing the innate role of genetics in these conditions. While an Australian study covered 32393 middle-aged and elderly adults over a 3-year-period, the studies revealed that being overweight/obese, consuming a high weekly volume of alcohol, and engaging in minimal physical activity were significant contributors to an increased likelihood of developing hypertension in both genders. Additionally, a greater number of adverse lifestyle habits correlated with a heightened risk of incident hypertension, both across the entire sample and in gender-specific analyses. Furthermore, the findings indicated that an unhealthy lifestyle exacerbated the risk of hypertension and elevated systolic and diastolic blood pressure across all genetic risk strata, suggesting that adopting healthy behaviors may mitigate the blood pressure-raising effects of genetic predisposition. This underscores a collaborative influence of lifestyle and genetic factors on hypertension risk, where higher genetic predisposition coupled with a less favorable lifestyle leads to a greater likelihood of blood pressure escalation, consistent with prior research. However, despite this joint impact, no additive interaction between genetics and lifestyle was detected, necessitating further investigation to clarify this relationship.

6. Conclusion

Taking all aforementioned content into consideration, hypertension is regarded as the most common chronic disease and the main risk factor for cardiovascular and cerebrovascular diseases, and without effective regulation, high blood pressure can damage the target organs of the heart, brain, and kidneys, causing complications such as atherosclerosis, damage to the heart and kidneys, and cerebrovascular accidents, ultimately leading to heart failure and renal failure. By evaluating the potential factors of high-frequency hypertension, this essay has discussed some specific factors on lifestyle or genetic aspects, though it did not cover all the contributors. It demonstrates that there is an obvious relationship between hypertension and diet, exercise, sleep, overweight, tooth brushing (less imperative) and genes, which all play a role in it. However, each contributor can vary at a considerable level in different individuals. For most males, the incidence of hypertension in male patients with abdominal obesity is also relatively high, and the occurrence of abdominal obesity often leads to hyperlipidemia and insulin resistance, which also increases the incidence of hypertension. Besides, as a social norm, men overtake the responsibility of supporting more on their families and their economic burden. In terms of current work and life, men's social competition pressure is greater than women's, and this pressure often

increases the incidence rate of hypertension. For most women, they are more likely to be affected by genetic factors, distinct roles of the angiotensin-converting enzyme 2/Apelin signaling, sex hormones, endothelin-1, and sympathetic nervous activity contribute to blood pressure control, especially for sex hormones which play a pivotal role in the pathophysiology of hypertension in postmenopausal women. Estrogens influence the vascular system inducing vasodilation, inhibiting vascular remodeling processes, and modulating the renin-angiotensin aldosterone system and the sympathetic system. While, in some circumstances, the result of hypertension is played by various factors altogether which means this issue is not a simple matter but a combined one. For instance, an individual who contracts a congenital obesity, although genes predispose people to gain weight after digesting food, the excessive weight leads to the risk of hypertension. Apart from the aforementioned content, this essay helped to analyze and compare people of varying races, genders and geographical locations which their own feathers pose hypertension and also the results can be considered to apply into reality as practical methods on preventing from or curing the hypertension with its complications. To a significant extent, people can gain the basic knowledge and insight on hypertension, effectively avoid suffering from it and alleviate the continuity of symptoms. Besides, this could also make the government relieve from the heavy burden of financial funding on medical care. Furthermore, hypertension cannot just be regarded as a single cardiovascular disease, its pathological mechanisms are complex which until now, there has not been clear and detailed enough research to explain. Recent studies can only be used as a reference to provide suggestions in order to prevent hypertension. For the further future the study could be carried out under the combination of multiple factors, that is, longitudinal combination, so as to find out the leading or dominant contributor to have a better understanding and therapeutic schedules.

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