

Lifestyle, diet, and physical activity in the prevention and rehabilitation of chronic diseases: A review

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ABSTRACT

Aim: The aim of this review article is to conduct a thorough analysis of scientific publications on the importance of lifestyle, diet, and physical activity in the prevention and rehabilitation of people with chronic diseases.

Materials and Methods: The review article takes into account obesity, type 2 diabetes, and cardiovascular disease due to the high prevalence of these chronic diseases on a global scale. The study is based on a thorough analysis of publications containing up-to-date information on healthy behaviors in people struggling with chronic diseases. The results clearly indicate the positive aspects of leading a healthy lifestyle. It is worth noting that regular exercise, a balanced and nutritious diet, health education, and psychological support have a huge impact on the health of people with chronic diseases. The article also emphasizes the importance of following recommendations, regular check-ups, and appropriate patient motivation under the supervision of medical staff.

Conclusions: The review article clearly indicates that the lifestyle of patients with chronic diseases has a significant impact on their quality of life. Prevention and rehabilitation play a key role in reducing the risk of developing chronic diseases or slowing down their progression.

KEY WORDS: life style, diet, exercise, chronic disease, cardiovascular diseases

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INTRODUCTION

Chronic disease is a global health problem in modern medicine. It is characterized by a long-term treatment process, the need for constant monitoring, and often the inability to achieve a complete cure. Conditions such as type 2 diabetes, obesity and cardiovascular disease significantly affect the quality of life of patients. They usually have a negative impact on patients, affecting their biological, psychological, and social functioning. This is associated with a decline in mood and self-esteem [1]. At the same time, they place a huge burden on healthcare systems and national economies. A factor that reduces the risk of developing or slows the progression of chronic diseases is education focused on behavioral changes in society, such as lifestyle, diet, and physical activity [2]. These are modifiable factors that can be implemented at any stage of a patient's life. It is crucial to provide patients and their families with good guidance and support at every step of the way from medical staff. Appropriately selected prevention and rehabilitation measures can reduce the incidence

of chronic diseases and lower the number of premature deaths [3].

AIM

The aim of this study is to analyze and systematize, based on a review of current literature, the role of lifestyle, diet, and physical activity in the prevention and rehabilitation of chronic diseases.

MATERIALS AND METHODS

This review article was conducted in accordance with guidelines and copyright laws. The PubMed and Google Scholar databases were searched to find studies on the importance of lifestyle, diet, and physical activity in the prevention and rehabilitation of chronic diseases such as obesity, diabetes, and cardiovascular disease. The literature search covered the latest publications, which allowed us to present the most up-to-date scientific information. Keywords such as lifestyle, diet, exercise,

chronic diseases, and cardiovascular diseases were used to search the literature.

REVIEW

LIFESTYLE AS A MAJOR RISK FACTOR FOR CHRONIC DISEASES

SCALE OF THE PROBLEM

Chronic illness is much more than just a medical definition of conditions lasting a year or more and requiring ongoing care. It's primarily a complex problem stemming from a combination of genetics, environmental factors, and, to a large extent, our lifestyle and daily behaviors [4]. While communicable diseases are declining, non-communicable ones like diabetes and Alzheimer's are becoming more prevalent. Ischaemic heart disease is the primary global killer (13% of deaths), showing the steepest increase since 2000 - a rise of 2.7 million, totaling 9.0 million deaths in 2021 [5]. Studies show that how we live determines not only our lifespan but, more importantly, how long we will enjoy health free from serious illness [6].

As we celebrate living longer, we face the bittersweet reality. Our aging societies are increasingly burdened by heart disease, type 2 diabetes, and obesity. This means that for many adults, the gift of extra years is often shadowed by the daily challenge of managing complex illnesses rather than enjoying a life free from disease [4, 6, 7].

LIFESTYLE AS A MODIFIABLE FACTOR

Clinically, lifestyle is defined not only as personal preference, but as a composite of specific, habitual behaviors. Physiological stability is influenced by dietary patterns, physical activity, smoking status, sleep hygiene and stress management [8]. Understanding these habits only as individual choices ignores the main role of environmental and behavioral determinants. A patient's physical and socioeconomic surroundings often dictate the availability of healthy options, making behavior inseparable from context [9]. Recognizing this interaction helps for medical intervention, where lifestyle modification serves a dual purpose. It acts as primary prevention to avert the initial onset of chronic disease in healthy populations. At the same time functions as secondary prevention to arrest progression or reduce comorbidities in patients with established diagnoses [10].

PATHOPHYSIOLOGICAL MECHANISMS

The journey from an unhealthy lifestyle to chronic disease is rarely simple because it requires a lot of

inattention to the signs given by your own body. Instead it involves a complex, overlapping set of metabolic errors. It usually begins with insulin resistance, a condition heavily driven by physical inactivity and poor diet. This compromises how our muscles and fat tissue process glucose [11]. But this metabolic struggle doesn't happen in isolation. It is closely tied to a state of systemic, chronic inflammation. As adipose tissue grows, it begins to behave like an endocrine organ. It starts releasing inflammatory signals that further block insulin pathways and create a toxic environment for the body's cells [12].

Over time this persistent inflammation disrupts the balance between free radicals and our natural defenses. This is leading to oxidative stress. This excess of reactive oxygen species damages cellular structures and depletes nitric oxide availability [13]. This cascade hits the vascular walls causing endothelial dysfunction. Loss of vascular integrity is often the tipping point where general risk factors turn into actual cardiovascular or renal pathology. The good news is that lifestyle modifications can intercept this process. Exercise helps restore endothelial function through increased shear stress and a nutrient-rich diet can dampen oxidative damage. These actions are effectively breaking the cycle of disease progression [14].

IMPORTANCE OF DIET IN THE PREVENTION AND TREATMENT OF CHRONIC DISEASES

DIET AS A NON-PHARMACOLOGICAL THERAPY IN METABOLIC SYNDROME

Scientific evidence clearly indicates that a proper diet can significantly reduce the risk of developing chronic diseases and serve as a valid therapeutic approach for managing existing illnesses. Metabolic Syndrome (MetS) is especially important because it involves a group of co-occurring cardiovascular and diabetic risk factors, including: abdominal obesity, hypertension, lipid disorders, and elevated blood glucose [15]. Since most individuals with MetS are overweight or obese, body mass reduction through dietary intervention is vital. Weight loss not only improves insulin sensitivity but also has a beneficial impact on other metabolic components of the syndrome. Another key factor is replacing saturated fatty acids with monounsaturated and polyunsaturated fatty acids, which improves the serum lipid profile [16], enhances insulin sensitivity, assists in lowering body mass index (BMI), and reduces blood pressure, ultimately helping to reverse MetS [15]. Therefore, dietary management should focus on adopting comprehensive nutritional models, among

which the Mediterranean and DASH diets have proven to be the most effective.

THE MEDITERRANEAN DIET: COMPOSITION AND CLINICAL BENEFITS

As its name suggests, the Mediterranean diet (Med-diet) originates from the traditional eating habits of people living in Mediterranean countries. It is based on using olive oil as the primary source of fat, along with high amounts of seasonal vegetables and fruits, which are often used instead of sugary desserts. The diet also includes regular consumption of nuts, seeds, legumes, and whole-grain products. Fish and dairy, such as yogurt and cheese, are eaten frequently, while many herbs and spices are used to season meals. On the other hand, sweets are avoided, and red meat is consumed only in small quantities. A fundamental part of the Med-diet is the focus on fresh, unprocessed foods, which is a major difference compared to the high intake of ultra-processed foods commonly seen in developed countries [17]. In one study involving 180 participants with MetS, researchers found that those assigned to a Mediterranean diet achieved greater weight loss and improved endothelial function. These individuals also showed lower levels of inflammatory markers, such as hsCRP, IL-6, IL-7, and IL-18, compared to the control group [18]. In addition, many studies have shown that the Med-diet has a positive effect on metabolic disorders and certain types of cancer. There is also a growing amount of evidence suggesting that the Mediterranean diet can help prevent neurodegenerative diseases and depression [17].

THE DASH DIET AND METABOLIC BENEFITS

Dietary Approaches to Stop Hypertension (DASH) diet is a nutritional model, that was originally created to help prevent and treat high blood pressure. This diet focuses on foods that are high in magnesium, potassium, and calcium. It recommends eating a large amount of fruits and vegetables, lean meat, and low-fat dairy products. It also limits the amount of salt in the daily diet [19]. Reducing sodium intake, which is an element of the DASH diet, helps lower blood pressure in patients who suffer from hypertension and type 2 diabetes [20]. Research has also shown that the DASH diet is effective in lowering the risk of metabolic syndrome and its components, such as high triglycerides, and low serum HDL-C levels. Additionally, individuals following the DASH diet are less likely to suffer from insulin resistance, inflammation, thrombosis, and atherosclerosis [15].

THE ROLE OF PHYSICAL ACTIVITY IN PREVENTION AND REHABILITATION OF CHRONIC DISEASES

WORLD HEALTH ORGANIZATION (WHO) RECOMMENDATIONS ON PHYSICAL ACTIVITY

Physical activity offers a range of benefits for all age groups, regardless of health status. The World Health Organization (WHO) states that even a small amount of physical activity is better than no activity at all.

The WHO states that to achieve significant health benefits, adults should engage in at least 150 to 300 minutes of low-intensity aerobic activity or 75 to 150 minutes of high-intensity aerobic activity, or an equivalent combination.

The main benefits of physical activity in adults include lower mortality from cardiovascular disease, lower incidence of hypertension and type 2 diabetes, and improved obesity rates [21].

THE IMPACT OF ACTIVITY OF VARIOUS INTENSITIES

There are different types of physical activity. Interval training (e.g., HIIT - high-intensity interval training) is characterized by exertion at $\geq 90\%$ of maximal oxygen uptake (VO_2 max) or $>75\%$ of maximal power, with periods of rest. Another form of physical activity is moderate-intensity continuous training (MICT), which involves 30-60 minutes of moderate exercise at 40-60% of VO_2 max. Available scientific research clearly indicates that HIIT improves central cardiovascular adaptation and increases metabolic stress, while MICT improves metabolic efficiency and the ability to uptake oxygen from the blood and utilize it in skeletal muscle cells. Interval training, when performed regularly, improves endurance capacity, insulin sensitivity, body composition, and cognitive function. Other benefits include a reduction in cardiovascular events, the risk of breast cancer, metabolic syndrome, osteoarthritis, and rheumatoid arthritis [22]. Both HIIT and MICT improve lipid profiles: they lower total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C), while increasing high-density lipoprotein cholesterol (HDL-C). They also lower alanine aminotransferase (ALT) levels and sensitize cells to insulin. Through these biochemical and cellular changes, both types of physical activity significantly improve prognosis in the treatment of obesity and type 2 diabetes [23].

Comparing moderate and vigorous physical activity, vigorous physical activity is more effective in improving cardiorespiratory fitness [24].

THE IMPACT OF A SEDENTARY LIFESTYLE

A sedentary lifestyle significantly contributes to the increased morbidity and mortality from atherosclerotic cardiovascular disease (ASCVD). Studies show that maintaining a sedentary posture for >6 hours and watching television for >4 hours significantly increase this risk. However, each 30-minute change from sitting, standing or light physical activity to moderate physical activity brings a noticeable improvement in body mass index (BMI), glycated hemoglobin (HbA1c) and lipid profile, which translates into a decrease in cardiovascular incidents [21, 24].

THE IMPACT OF LIFESTYLE INTERVENTIONS ON SELECTED CHRONIC DISEASES

OBESITY

Obesity is a condition characterized by excessive and abnormal accumulation of body fat, which negatively impacts health. It can lead to the development of numerous chronic diseases, a reduced quality of life, and a shortened lifespan. Obesity, and visceral adiposity in particular, plays a key role in the development of insulin resistance, a central component of metabolic syndrome. It is closely linked to dyslipidemia, which manifests as elevated triglyceride levels, increased small, dense LDL particles, and decreased HDL cholesterol. Lipid abnormalities are a characteristic component of metabolic syndrome and significantly increase the risk of cardiovascular disease [25]. A key aspect in the fight against obesity is following a proper diet and a healthy lifestyle. Following a diet that leads to an energy deficit, enabling weight loss and then maintaining the achieved results, regardless of the diet type, is a key element of obesity treatment. Various nutritional strategies, varying in caloric content and macronutrient ratios, can lead to clinically significant weight loss in a short period of time [26]. Maintaining regular physical activity is just as important as a proper diet. Research indicates that both contribute to improving lipid profiles, including lowering total cholesterol, triglycerides, and LDL cholesterol levels, and may also increase the body's sensitivity to insulin [27]. All these activities significantly support the body's health and help prevent the development of many diseases that are caused by obesity.

DIABETES

Lifestyle changes through implementing a proper diet and regular physical activity are also crucial for patients with type 2 diabetes. These actions lead

to improved body weight, lower HbA1c levels, and blood pressure regulation, which is associated with a reduction in microvascular complications such as renal dysfunction. Research findings also indicate that intensive lifestyle interventions effectively support the control of cardiovascular risk factors and reduce the need for pharmacological treatment for diabetes [28]. Additionally studies have also shown that a healthy lifestyle primarily reduces the risk of developing and progressing diabetes in previously healthy individuals. A combination of healthy lifestyle habits, including a healthy BMI, a healthy diet, regular physical activity, no smoking, and moderate alcohol consumption, was associated with an approximately 90% lower incidence of type 2 diabetes in individuals compared to those without these factors [29]. A properly balanced diet, rich in all essential nutrients, can not only support the prevention and treatment of diabetes, but also improve metabolic parameters and reduce the risk of other conditions such as depression in these patients [30]. All this data indicate that lifestyle modification could prevent most cases of type 2 diabetes and have a beneficial effect on the course of this disease in the population.

CARDIOVASCULAR DISEASES

Cardiovascular diseases are the leading cause of death and morbidity worldwide. Their development is determined by both genetic predisposition and lifestyle factors. Numerous studies confirm that modifiable health behaviors, such as smoking, physical activity levels, diet, and body mass index (BMI), significantly influence the risk of developing cardiovascular disease [31]. Studies show that people with unhealthy health habits had almost twice the risk of coronary artery disease (CAD) than those with a healthy lifestyle, despite having a similar genetic background [32]. It has also been shown that non-smokers, those with a normal body weight, a healthy diet, at least 30 minutes of physical activity every day and moderate alcohol consumption had an over 80% lower incidence of coronary events compared to the rest of the population [33]. It was also observed that a diet rich in vegetables, fruits, whole grains, fish, and legumes, along with moderate alcohol consumption, was associated with a 57% reduction in the risk of primary heart attack. Combining such a diet with additional beneficial behaviors such as not smoking, regular physical activity, and maintaining a healthy body weight reduced this risk by as much as 92% [34]. Establishing and maintaining good health habits is therefore a fundamental element of the strategy to protect the heart and blood vessels.

DISCUSSION

A review of available research shows that lifestyle plays a key role in both the prevention and treatment of chronic diseases. Many studies demonstrate that changes in diet and physical activity, as well as weight and substance abuse management, can significantly reduce the risk of these conditions and improve treatment outcomes and quality of life. This also demonstrates that non-pharmacological approaches can be a helpful complement to pharmacological treatment and can sometimes even reduce its need.

Both observational and interventional studies indicate that diet plays a key role as a key factor in the prevention and non-pharmacological treatment of chronic diseases. Numerous publications emphasize the beneficial effects of diets based on healthy eating principles. A good example is the Mediterranean diet, which demonstrates significant benefits in the treatment of many common chronic diseases. It has anti-inflammatory and antioxidant effects and helps regulate metabolism and intestinal function. It is a valuable tool for supporting therapy and improving the health of patients with chronic diseases [35]. Another example is the DASH (Dietary Approaches to Stop Hypertension) diet. Its primary goal is to alleviate hypertension and prevent its potential complications. Numerous clinical trials confirm the effectiveness of this diet in controlling blood pressure. In addition to its significant impact on reducing hypertension, the DASH diet has been shown to be beneficial in other conditions, such as heart failure, lipid disorders, dyslipidemia, and uric acid dysregulation. This makes the DASH diet a valuable tool in the treatment of hypertension [36]. Unfortunately, in recent decades, globalization and the rapid growth of fast food chains have contributed to unfavorable changes in people's dietary habits. Traditional diets based on fresh vegetables and fruits, nuts and fish are increasingly




being replaced by highly processed, high-energy foods. These products are characterized by a high content of refined carbohydrates, simple sugars, sweetened beverages, and animal fats. Combined with reduced physical activity and a predominant sedentary lifestyle, these changes are among the key factors responsible for the rising incidence of obesity and cardiovascular disease in the population [37].

Regular physical activity is also a crucial element of a healthy lifestyle. Research clearly shows that regular exercise, even at a moderate level, tailored to the patient's age, health status, and functional abilities, contributes to lower blood pressure, better control of cholesterol levels and body weight, and helps prevent some diabetes complications. All of these effects reduce the risk of cardiovascular disease, such as heart attack or stroke. Furthermore, regular physical activity helps reduce the number of medications used to treat diabetes and hypertension [38]. In the rehabilitation of chronic diseases, such as heart failure, physical activity plays a significant role, improving physical fitness, improving patients' quality of life, and reducing the risk of rehospitalization [39]. However, despite the obvious health benefits of physical activity, very few people lead an active lifestyle. This is due to various reasons. These are often personal barriers related to self-efficacy, lack of self-confidence, or lack of time [40].

CONCLUSIONS

Research indicates that the greatest health improvements arise when changes happen in many lifestyle areas together. A mix of a healthy diet and regular exercise and health learning and psychological help works better than concentrating on just one area. But success of these methods hinges on patient adherence to advice which means motivation and understanding and consistent support from the medical staff are vital.

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CONFLICT OF INTEREST

The Authors declare no conflict of interest

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