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A Review on Long-term Health Benefits of Physical Activity

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ABSTRACT: ***The treatment of noncommunicable diseases (NCDs) such as coronary heart disease and type 2 diabetes mellitus drives up health-care expenditures. Physical exercise is thought to lower the chance of developing certain illnesses. Cross-sectional research revealed that physical exercise is linked to improved health and that it may help to avoid the development of certain illnesses. The goal of this study is to synthesize the available data regarding the long-term (>5 years) link between physical activity and weight gain, obesity, coronary heart disease, type 2 diabetes, Alzheimer's disease, and dementia. Using digital databases, fifteen longitudinal studies with at least 5-year follow-up periods and a total of 288,724 individuals (>500 participants in each study) aged 18 to 85 years were found. Only studies involving healthy people at baseline, purposeful physical activity, and the specified NCDs that were published in English were included. The findings of these research indicate that physical exercise has a long-term beneficial effect on a variety of illnesses. There are few long-term research on the connection between physical activity and the occurrence of NCDs, according to this review.***

KEYWORDS: ***Adults, CHD, Dementia, NCD, Physical activity, Type 2 Diabetes Mellitus, Weight Gain.***

1. INTRODUCTION

Most Western nations have seen substantial demographic shifts, particularly in the past century, with an increasing number of elderly individuals facing medical and functional difficulties, as well as illnesses that are age-specific yet frequently began in people's earlier years. Obesity, coronary heart disease (CHD), and type 2 diabetes mellitus are only a few of the illnesses that are induced by civilisation. These three illnesses have been recognized by the World Health Organization as the most serious noncommunicable diseases (NCDs) creating issues in the Western world today. Non-communicable illnesses are often slow-moving and last a long time. Cardiovascular disease, cancer, chronic respiratory disease, and diabetes are the four major kinds of NCDs recognized by the WHO.

The majority of NCDs are caused by unhealthy lifestyles that include eating too much or bad food, drinking too much alcohol, and smoking too much, all of which are coupled with physical inactivity. Inactivity and poor eating habits are linked to weight increase, and overweight and obesity are significant underlying causes of contemporary illnesses including coronary artery disease and type 2 diabetes mellitus. Many cross-sectional and intervention studies have investigated the link between an unhealthy lifestyle, such as physical inactivity, bad eating habits, smoking, and alcohol use, and illnesses in various study groups, such as high-risk groups or different age groups. Overall, cross-sectional studies indicate that physical exercise may be a significant component in improving overall health and avoiding the development of NCDs such as those listed above. Understanding the development of NCDs and its connection with habitual variables such as physical activity is essential for creating long-term preventive programs and recommendations since NCDs develop over a long period of time by definition and may have a variety of causes. Longitudinal studies involving healthy people, that is, people who don't have any apparent illnesses at the start of the study, as well as a long-term epidemiological

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perspective, are required to examine the progression of these disorders. To find the general development of the studied problems in the general population, it is necessary to monitor the entire population rather than particular subgroups, such as high-risk groups, those with signs of NCD (e.g. hypertension or obesity / high body weight), or top sportsmen [1], [2].

Despite the fact that these illnesses are common in many Western nations, there are few longitudinal studies that look at how they develop over time and how they are linked to other habits like physical exercise.

Many cross-sectional studies have looked at the link between physical activity and health outcomes, and the findings have been presented in many reviews. In contrast, there are few long-term research on the effects of physical exercise on illnesses, and no reviews that focus on long-term outcomes from an epidemiologic standpoint exist to date.

The goal of this study was to look at the long-term impact of physical exercise on the development of weight gain and obesity, heart disease, and type 2 diabetes in healthy people. Furthermore, dementia and Alzheimer's disease, two illnesses that are becoming increasingly prevalent in contemporary cultures and that develop over time, are considered in the context of long-term physical activity effects. Physical exercise may help prevent the onset and progression of these two illnesses, according to some research.

Only studies looking at the effects of physical activity on weight gain and obesity, CHD, type 2 diabetes mellitus, dementia, and Alzheimer's disease were included in this review to evaluate the significance of physical activity for the above-mentioned prevalent health issues. Articles published between January 1980 and May 2012 were found in the electronic databases Pubmed, BASE, and OVID. Only longitudinal studies with five or more years of follow-up time were chosen from these research to demonstrate intermediate to long-term benefits of physical exercise rather than short-term effects. Furthermore, only studies involving adults were selected in order to demonstrate the progression of illness from childhood to old life. Only major epidemiological studies with more than 500 participants were considered to illustrate the evolution in the overall population rather than subsets.

In addition, to evaluate the effect of typical everyday activities done by the general population, only epidemiologic longitudinal studies including healthy adult participants at baseline examination were considered. Clinical trials, cross-sectional research, patient studies, and reviews and overviews were all omitted from the study. Publications that used the same research population were included if they included additional information or looked at other subjects.

To evaluate the effect of leisure time physical exercise in the general population, only studies that included deliberate physical activity, such as playing soccer, or intentional daily life activities, such as riding a bike to the store, were included. Instead, tasks of everyday living that are required to lead a normal self-determined existence, such as getting out of a chair or ascending stairs, are prohibited. Finally, our review only included papers published in English.

1.1. Physical activity's impact on weight gain and obesity:

Overall, the research reviewed found a link between physical activity and weight increase or obesity over time. The Aerobics Center Longitudinal Research (ACLS), which looked at 2,501 healthy males aged 22 to 55 years at baseline and five years later, is a significant study that looked at how obesity develops in relation to physical activity. Weight increase throughout the follow-up period was inversely linked to daily physical activity levels. Those who decreased

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their daily physical activity acquired a significant amount of weight, while those who maintained their activity level did not gain weight throughout the research. Additionally, individuals who increased their degree of physical activity throughout the research lost weight. To lose weight, you must engage in regular physical activity that raises your metabolic rate by at least 60% above your resting metabolic rate. In order for middle-aged men to maintain their weight, 45 to 60 minutes of brisk walking, gardening, or cycling should be incorporated in their daily regimen [3]–[6].

Walking and weight growth have a connection. They studied 4,995 women and men aged 18 to 30 years at baseline (1985/1986) who were re-examined 2, 5, 7, 10, and 15 years later in the Coronary Artery Risk Development in Young Adults (CARDIA) Study. Depending on the percentile of initial weight, there was a negative link between 30 minutes of daily walking and weight increase after 15 years. There was no significant relationship between walking time and weight increase for individuals in the 25th percentile of baseline weight. Weight increase was 0.15 kg per year less for males and 0.29 kg per year less for women for individuals in the 50th percentile of baseline weight. Finally, data from individuals in the 75th percentile of baseline weight revealed the lowest weight gain: for every 30 minutes of daily walking, males lost 0.25 kg per year and women lost 0.53 kg per year without making any other lifestyle adjustments. As a consequence, the findings of this research suggest that being physically active benefits individuals with a greater baseline weight (for instance, for women: the total weight gain in 15 years was 13 kg for inactive women compared to only 5 kg for active women).

Walking and weight gain: what's the connection? They studied 4,995 women and men aged 18 to 30 years at baseline (1985/1986) who were re-examined 2, 5, 7, 10, and 15 years later in the Coronary Artery Risk Development in Young Adults (CARDIA) Study. Depending on the percentile of initial weight, there was a negative link between 30 minutes of daily walking and weight increase after 15 years. There was no significant relationship between walking time and weight increase for individuals in the 25th percentile of baseline weight. Weight increase was 0.15 kg per year less for males and 0.29 kg per year less for women for individuals in the 50th percentile of baseline weight. Finally, data from individuals in the 75th percentile of baseline weight revealed the lowest weight gain: for every 30 minutes of daily walking, males lost 0.25 kg per year and women lost 0.53 kg per year without making any other lifestyle adjustments. As a consequence, the findings of this research suggest that being physically active benefits individuals with a greater baseline weight (for instance, for women: the total weight gain in 15 years was 13 kg for inactive women compared to only 5 kg for active women) [7]–[10].

The physical activity level in relation to a 20-year weight increase was investigated in the same research group (CARDIA). At the 20-year follow-up, individuals with high habitual activity had a lower rise in mean BMI, waist circumference, and weight per year than those with low habitual activity, according to a study of 1,561 men and women. Over a 20-year period, men and women who maintained greater levels of exercise acquired 2.6 and 6.1 kg less weight than men and women who did not. Furthermore, the findings of that research showed that women benefit more from keeping a greater level of physical activity than males, and that maintaining a higher level of exercise throughout maturity may reduce weight gain over time.

To assess the evolution of weight increase, Petersen, Schnohr, and Sorensen's Copenhagen City Heart Study included cross-sectional and 10-year long-term studies. At three 5-year periods, they evaluated 3,653 women and 2,626 males. At the outset, the volunteers ranged in age from 20 to 78. Physical activity and weight were shown to have a negative association in all three cross-

sectional studies (1st at baseline, 2nd after five years, 3rd after ten years). For both genders, medium leisure time physical activity (LTPA) had poorer obesity-preventive effects than high LTPA. For males, there was a strong direct relationship between LTPA levels and the chance of becoming obese, but not for women, according to the longitudinal study. The more active individuals had a greater chance of becoming fat, contrary to the findings of the cross-sectional study. Furthermore, the study's findings suggest that obesity may lead to inactivity.

As a consequence, after many years of follow-up, the findings of the first three studies point to a negative relationship between physical activity and weight increase (greater physical activity leads to less weight gain). The fourth research, on the other hand, found that being more physically active increases the risk of obesity. They claim that fat plays a role in the onset of physical inactivity, but they don't go into detail about potential causes and effects. The causation of the link between physical activity and weight increase is called into doubt by these findings.

1.2. Effect of physical activity on coronary heart disease (CHD):

Coronary heart disease (CHD) has been the subject of the most research of all contemporary illnesses. For physical activity levels over the minimal energy expenditure, the majority of research found a negative connection between physical activity and the development of CHD.

Framingham Heart Study was established in 1948 by the National Heart, Lung, and Blood Institute. This study looked at the causes of coronary heart disease and how it progressed in 5,209 men and women who were 30 to 62 years old at the time of the study. The findings showed a link between physical activity and the occurrence of CHD events as well as total cardiovascular mortality. The Harvard Alumni Health Study was founded when Lee and his colleagues matched the Framingham Heart Study findings with data from 18,835 Harvard University graduates between 1916 and 1950. Researchers looked at the link between physical activity and stroke and other cardiovascular diseases using five mail-back questionnaires.

A u-shape pattern was found in the association between energy consumption and stroke incidence. It was shown that increasing physical activity by at least 2,000 to 3,000 kcal per week was required to reduce the risk of stroke. Over the course of 16 years, these findings were re-evaluated for all CHD in 12,516 Harvard Alumni (from 1977 through 1996). The relationship between energy expenditure and the incidence of CHD showed the same u-shape pattern for CHD in general, but the curve was shifted towards lower additional energy expenditure: spending at least 1,000 kcal extra energy per week on physical activity was required to reduce the risk of CHD. As a result, moderate to vigorous extra physical activity of 2,000 to 3,000 kcal (min. 1,000 to 2,000 kcal) each week seems to lower the overall risk of CHD, stroke, and other illnesses (e.g. hypertension).

The Honolulu Heart Program found similar findings in a study of 8,006 males of Japanese ancestry who resided in Oahu, Hawaii, and were 45 to 68 years old at the time of baseline. Physical activity recorded at the start of the study was linked to CHD occurrences and death after 16 years. It's worth noting, however, that the impacts of hypertension, diabetes, cholesterol, and BMI were partly mediated by these findings. The research mentioned in the next section yielded comparable results, however they additionally revealed the following conclusions.

By quantifying the relative risks of various covariates (age, sex, perceived health, mobility impairment, heart problems, high blood pressure, diabetes mellitus, shortness of breath, current smoking, low BMI, and social isolation) in 6928 men and women, the researchers were able to

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determine the dependence of CHD mortality on several health factors and behavior. Even after controlling for all variables, LTPA had a protective effect.

The National Health and Nutrition Examination Study I Epidemic Follow-Up Study looked at the link between physical activity and stroke incidence in 5,852 people aged 24 to 74 at the start and found similar findings to the previous studies. While the u-shaped connection between physical activity and the risk of stroke was verified in males, the risk of stroke was shown to be negatively linear in women. Furthermore, although recreational physical activity was not linked to the risk of stroke in African-Americans, there was a significant interaction between heart rate and the risk of stroke in African-Americans. The authors only gave a cursory explanation of the disparities between Caucasian and African-American findings.

Overall, all of the studies in this part of the review found an expected negative relationship between physical activity and the risk of coronary heart disease over time. According to two studies, a weekly energy expenditure of 1,000 to 2,000 kcal is required to obtain health-related outcomes. The inclusion of highly specialized and chosen individuals (for example, Harvard Alumni in the Harvard Alumni Heart Study and Nurses in the Nurses' Health Study) is one of these research' limitations. Furthermore, because of the participants' chosen socioeconomic and ethnic origins and uneven gender distributions, these findings cannot be applied to the broader population. Furthermore, the majority of research focused only on Caucasians. In order to get generalizable findings, further study on different ethnicities is required. Furthermore, the summarized studies were not intended to determine if the link between physical activity and CHD occurrences is causative. More study is needed on the role of other lifestyle variables as mediators or moderators of the link between physical activity and CHD.

2. DISCUSSION

Physical activity appears to be an important factor that can have beneficial effects for the reviewed non-communicable diseases weight gain and obesity, CHD and type 2 diabetes mellitus, risk factors for weight gain and obesity, and age-related diseases dementia and Alzheimer's disease, according to the findings of the reviewed studies. Two of the three longitudinal studies focused on the development of obesity over time with at least a 5-year follow-up found a negative association between physical activity and obesity. Surprisingly, one research found that males who engaged in a lot of leisure-time physical exercise had a higher chance of becoming fat in the next 10 years. The cause behind this is yet unknown. Overall, the findings of the research included in this analysis are equivocal as to what amount of physical activity is needed to avoid obesity. There is no evidence that certain types, intensities, or frequencies of activities contribute to better health. Several studies looked examined the impact of physical exercise on the progression of coronary heart disease over time. Overall, the findings revealed a long-term benefit, with individuals who were physically active having a reduced chance of developing a CHD later in life. It has been discovered that an extra 1,000 kcal of energy expenditure per week spent on physical exercise is required to avoid total CHD. However, there is no evidence on the kind, intensity, or frequency of activities required to reduce the risk of CHD. The findings of research looking at the impact of physical activity on the risk of getting type 2 diabetes mellitus revealed a negative relationship, with greater levels of physical activity being linked to a reduced risk of developing type 2 diabetes mellitus. For health advantages, a greater degree of physical activity seems to be necessary, i.e., a higher intensity per training session or perhaps several sessions per week. Not just physical activity, but also weight and fitness status, as well as their relationship, are thought to have a role in the development of

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type 2 diabetes. Finally, six research investigated the link between physical exercise and the development of dementia and Alzheimer's disease. The findings of these research highlighted the need of regular physical exercise, but no information was given regarding the kind, intensity, or frequency of physical activity that is most beneficial to one's health.

3. CONCLUSION

In addition to non-communicable illnesses, this review highlights the scarcity of epidemiologic longitudinal research on the impacts of physical exercise. The investigations that have been reported thus far have all shown favorable findings. There are no additional research that we are aware of that show no or negative effects over time. No studies with subsamples or unwell individuals alone were examined to demonstrate the longitudinal gains in physical activity in addition to the reported non-communicable illnesses of a large number of people within normal populations. Only studies with more than 500 healthy individuals are included in this review. Other research with smaller samples of individuals were not included in this review, although they contribute to a long-term knowledge of the progression of non-communicable illnesses. Overall, the findings of the evaluated papers provide a broad picture of the long-term connection between physical activity and the occurrence of NCDs and other health issues. Physical exercise seems to be an important role in the prevention of age-related illnesses, although additional long-term study is needed.

REFERENCES:

[1] A. Lowe, C. Littlewood, S. McLean, and K. Kilner, “Physiotherapy and physical activity: A cross-sectional survey exploring physical activity promotion, knowledge of physical activity guidelines and the physical activity habits of UK physiotherapists,” *BMJ Open Sport Exerc. Med.*, 2017, doi: 10.1136/bmjsem-2017-000290.

[2] C. Xu, M. Quan, H. Zhang, C. Zhou, and P. J. Chen, “Impact of parents’ physical activity on preschool children’s physical activity: A cross-sectional study,” *PeerJ*, 2018, doi: 10.7717/peerj.4405.

[3] R. M. Weggemans *et al.*, “The 2017 Dutch Physical Activity Guidelines,” *Int. J. Behav. Nutr. Phys. Act.*, 2018, doi: 10.1186/s12966-018-0661-9.

[4] S. Beuchat-Mamie, N. Sperisen, P. Molnar, and S. Koçer, “Physical activity and cancer,” *Praxis*. 2018, doi: 10.1024/1661-8157/a003064.

[5] E. Füzéki and W. Banzer, “Physical activity recommendations for health and beyond in currently inactive populations,” *International Journal of Environmental Research and Public Health*. 2018, doi: 10.3390/ijerph15051042.

[6] A. Watson, A. Timperio, H. Brown, K. Best, and K. D. Hesketh, “Effect of classroom-based physical activity interventions on academic and physical activity outcomes: A systematic review and meta-analysis,” *International Journal of Behavioral Nutrition and Physical Activity*. 2017, doi: 10.1186/s12966-017-0569-9.

[7] J. S. McPhee, D. P. French, D. Jackson, J. Nazroo, N. Pendleton, and H. Degens, “Physical activity in older age: perspectives for healthy ageing and frailty,” *Biogerontology*. 2016, doi: 10.1007/s10522-016-9641-0.

[8] C. Foster, J. B. Moore, C. R. Singletary, and J. A. Skelton, “Physical activity and family-based obesity treatment: a review of expert recommendations on physical activity in youth,” *Clinical obesity*. 2018, doi: 10.1111/cob.12230.

[9] R. Gal, A. M. May, E. J. van Overmeeren, M. Simons, and E. M. Monninkhof, “The Effect of Physical Activity Interventions Comprising Wearables and Smartphone Applications on Physical Activity: a Systematic Review and Meta-analysis,” *Sports Medicine - Open*. 2018, doi: 10.1186/s40798-018-0157-9.

[10] D. G. D. Christofaro *et al.*, “Adolescents’ physical activity is associated with previous and current physical activity practice by their parents,” *J. Pediatr. (Rio. J).*, 2018, doi: 10.1016/j.jped.2017.01.007.