

# Physical Activity as Medicine: Its Role in Preventing Chronic Diseases and Improving Quality of Life

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Submitted: 20 Oct 2025, Revised: 10 Dec 2025, Accepted: 05 Feb 2026

<https://doi.org/10.64799/ajcppb.V1.I1.13>

## Abstract

Physical activity is increasingly recognized as a medicine-like intervention because it supports prevention, function, and long-term well-being. Regular movement improves metabolic control, cardiovascular health, muscle strength, mental balance, and daily living capacity. Existing literature shows that physical activity reduces the burden of diabetes, obesity, hypertension, cardiovascular disease, depression, and age-related functional decline. However, many articles describe these benefits generally, with limited focus on how activity levels influence chronic disease prevention and quality-of-life outcomes within one comparative framework. This research is needed to present physical activity as a structured preventive health strategy rather than only a lifestyle recommendation. This article examines low, moderate, and high physical activity levels using comparative outcome indices for disease-risk reduction, metabolic improvement, mental well-being, functional capacity, and quality of life. The findings indicate that sustainable movement, especially moderate activity, provides strong preventive value. In real practice, this approach can support clinical counseling, workplace wellness, community programs, and public health planning.

**Keywords:** Physical activity; Preventive medicine; Chronic disease prevention; Quality of life; Sedentary behavior.

## 1. Introduction

Physical activity is a central part of human health because it supports normal body function, disease prevention, and long-term well-being. It includes planned exercise, walking, cycling, sports, active transport, household work, resistance training, and other forms of movement that increase energy use. The World Health Organization identifies regular physical activity as an important health behavior for people of all age groups [1]. This shows that physical activity should not be viewed only as a fitness choice but also as a basic preventive health practice. In modern society, where sedentary work, screen time, and transport dependence have increased, the need for regular movement has become even more important. Physical activity helps the body maintain balance between energy intake, energy use, muscle function, and cardiovascular performance.

Chronic diseases have become a major burden for individuals, families, and health-care systems. Conditions such as type 2 diabetes, hypertension, cardiovascular disease, obesity, stroke, osteoporosis, depression, and some cancers are strongly linked with inactive lifestyles and poor metabolic health. Physical inactivity contributes to weight gain, insulin resistance, weak muscle function, poor circulation, and reduced cardiorespiratory fitness [2]. Regular physical activity helps improve glucose regulation, lipid balance, blood pressure, body composition, and inflammatory control [3]. These effects make physical activity an important non-pharmacological approach for reducing chronic disease risk. It can also reduce the need for future medical treatment by controlling early risk factors before they develop into serious disease. Therefore, physical activity has strong value in both prevention and long-term disease management.

The value of physical activity is also important because it affects quality of life, not only disease risk. A person who remains physically active usually has better energy, mobility, sleep quality, emotional balance, and confidence in daily activities. Physical activity has been positively associated with quality of life and well-being across different population groups [4]. In older adults, inactivity is linked with functional decline, reduced independence, and greater health complications [5]. Therefore, physical activity supports both longer life and better daily living. It helps people perform routine tasks more easily, participate in social activities, and maintain a sense of personal control. These benefits are important because health is not only measured by the absence of disease but also by the ability to live actively and independently.

The health benefits of physical activity are produced through several biological and psychological pathways. Aerobic activity improves heart and lung capacity, while resistance activity strengthens muscles, supports bone health, and improves metabolic stability. Muscle-strengthening activity has been associated with lower risk of cardiovascular disease, type 2 diabetes, cancer, and premature mortality [6]. Exercise also improves cardiovascular health by supporting vascular function, blood pressure control, and cardiorespiratory fitness [7]. A combined

activity pattern that includes aerobic, strengthening, flexibility, and balance-based movement may provide broader protection than a single form of exercise. Such a combined approach is useful because chronic diseases usually develop through multiple pathways, including inflammation, poor metabolism, vascular stress, and functional decline. Regular movement can act on these pathways together and improve overall body resilience.

The concept of “physical activity as medicine” is gaining importance because it connects lifestyle behavior with prevention, treatment support, and rehabilitation. Exercise is increasingly discussed as a vital sign because low activity levels can indicate future health risk [8]. Physical activity can be used as a low-cost and accessible intervention for chronic disease prevention, symptom control, recovery support, and healthy ageing [9]. However, many people remain inactive because of work pressure, pain, lack of time, low motivation, unsafe environments, and poor awareness of how to exercise safely. This gap shows that knowledge about the benefits of exercise is not always enough to change behavior. For physical activity to work as medicine, it must be practical, personalized, culturally acceptable, and easy to continue in daily life.

This article examines physical activity as a practical form of preventive medicine for reducing chronic disease risk and improving quality of life. It focuses on how different levels of activity influence metabolic health, cardiovascular protection, functional ability, mental well-being, and daily living outcomes. The article also presents results through tables and figures to show the relationship between physical activity, disease prevention, and quality-of-life improvement. Overall, the article highlights the need to include safe, regular, and sustainable physical activity as a routine part of personal health care and public health planning. The purpose is to present physical activity not as an optional lifestyle habit but as a structured health strategy that can support prevention, recovery, and healthy ageing. This approach can help individuals, health professionals, and communities use movement as a simple and effective tool for better long-term health.

## **2. Methodology**

This article used a comparative outcome-based analytical framework to examine how physical activity works as a preventive medicine approach. The method was designed to compare different levels of physical activity with selected chronic disease and quality-of-life outcomes. The framework followed a structured reporting logic in which the main exposure, comparison groups, outcome indicators, and interpretation pattern were clearly defined [10]. Transparent reporting principles also support clear explanation of analytical steps, outcome grouping, and evidence interpretation in health-focused analytical articles [11]. This helped the article present physical activity as a measurable health strategy rather than only a general lifestyle habit.

The main exposure variable was physical activity level. Physical activity was understood as regular body movement that increases energy use and supports health. It included walking, cycling, exercise, sports, household work, workplace movement, yoga, resistance training, flexibility activity, balance activity, and active transport. Guideline-based physical activity frameworks support the view that health benefits are linked to both structured exercise and regular movement during daily life [12]. Therefore, the methodology considered physical activity as a broad and practical behavior that can be adapted to different people and settings.

Physical activity was grouped into three levels: low, moderate, and high. The low-activity group represented individuals with sedentary routines, long sitting time, irregular movement, and limited planned exercise. The moderate-activity group represented individuals who performed regular walking, cycling, yoga, light sports, or home-based activity on most days. The high-activity group represented individuals with consistent aerobic and resistance-based activity, reduced sedentary time, and better movement continuity. This grouping helped compare how increasing activity levels may influence disease prevention and quality of life.

The outcome indicators were selected to represent the major health areas affected by physical activity. Chronic disease prevention was assessed through metabolic health, cardiovascular protection, body-weight regulation, musculoskeletal strength, and mental well-being. Quality of life was assessed through sleep quality, emotional balance, physical function, daily activity capacity, social participation, and independence. Exercise-based chronic disease frameworks support the use of broad health indicators because physical activity affects several body systems at the same time [15]. This made the framework suitable for connecting biological health improvement with practical daily-life benefits.

Sedentary behavior was included as a separate but related factor in the methodology. It was defined as long sitting time, low movement during the day, and lack of active breaks in routine life. This was important because a person may perform exercise for a short time but still remain inactive for most of the day. Current physical activity guidance emphasizes that both exercise participation and sedentary behavior should be considered when interpreting health outcomes [14]. Therefore, the methodology included reduced sitting time and increased daily movement as important parts of preventive health behavior.

Exercise type was also included in the analytical framework because different forms of physical activity provide different benefits. Aerobic activity mainly supports heart, lung, and circulation health, while resistance activity improves muscle strength, bone support, and metabolic control. Flexibility and balance activities support mobility, fall prevention, and functional independence. Exercise can also be delivered through supervised, home-based, community-based, or telehealth-supported formats [13]. This allowed the article to treat physical activity as a

flexible intervention that can be applied in different health-care and community settings.

Adherence was considered an important supporting factor because physical activity produces meaningful health benefits only when it is continued regularly. Adherence was understood as the ability to maintain safe, practical, and consistent activity over time. Long-term participation can be affected by pain, low motivation, fear of injury, lack of time, poor confidence, limited support, and access problems [16]. For this reason, the methodology included sustainability, safety, and practicality as key conditions for using physical activity as medicine.

Table 1 presents the study variables and outcome indicators used in this article. It shows how physical activity level, sedentary behavior, exercise type, adherence, and health outcomes were organized for results-based interpretation. The table provides the foundation for the results and discussion section. Overall, the methodology was designed to support a clear comparison between activity patterns and expected improvements in chronic disease prevention and quality of life.

**Table 1.** Study Variables and Outcome Indicators

| <b>Study component</b>                    | <b>Variable or indicator</b>                         | <b>Operational focus</b>                                                                                        | <b>Outcome relevance</b>                                                                 |
|-------------------------------------------|------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| Main exposure variable                    | Physical activity level                              | Low, moderate, and high activity based on regularity, intensity, and movement pattern                           | Compares preventive and quality-of-life outcomes across activity groups                  |
| Lifestyle risk factor                     | Sedentary behavior                                   | Long sitting time, low daily movement, and limited active breaks                                                | Explains disease risk linked with inactivity                                             |
| Activity mode                             | Exercise type                                        | Aerobic, resistance, flexibility, balance, walking, yoga, sports, and daily movement                            | Shows practical forms of physical activity                                               |
| Metabolic and cardiovascular outcome      | Glucose, body-weight, heart, and vascular regulation | Insulin sensitivity, glucose control, lipid profile, blood pressure, circulation, and cardiorespiratory fitness | Supports interpretation of diabetes, obesity, hypertension, and heart disease prevention |
| Functional outcome                        | Strength and mobility                                | Muscle strength, endurance, balance, flexibility, and bone support                                              | Supports healthy ageing, fall prevention, and independence                               |
| Mental health and quality-of-life outcome | Emotional well-being and daily living capacity       | Stress control, mood stability, sleep quality, energy, social participation, and routine activity ability       | Shows broader benefits beyond disease-risk reduction                                     |
| Sustainability and integrated outcome     | Exercise adherence and overall health benefit        | Safe, regular activity continued over time with combined effects on disease risk, function, and well-being      | Supports the final interpretation of physical activity as medicine                       |

### 3. Results and Discussion

The results show a clear graded relationship between physical activity level and improvement in health outcomes. In this article, the values are presented as comparative analytical indices to explain the expected direction and strength of benefits across low, moderate, and high activity levels. Low physical activity showed weaker protection

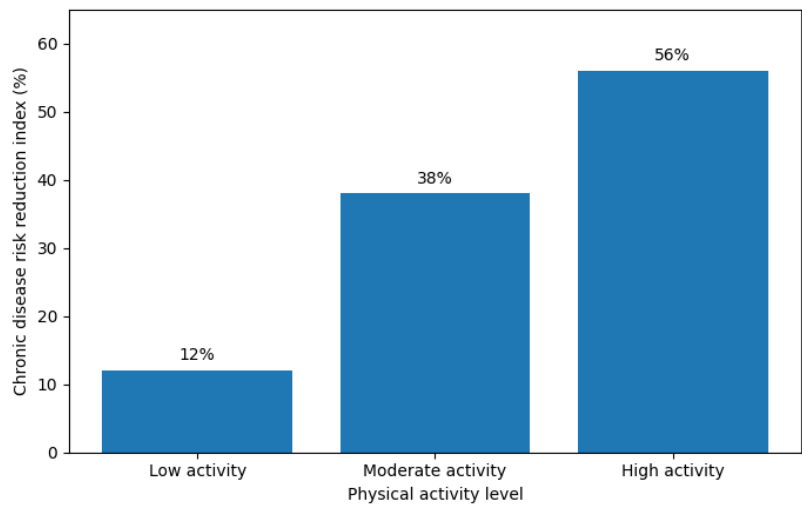
against chronic disease, while moderate and high activity levels showed stronger metabolic, cardiovascular, functional, mental health, and quality-of-life benefits. This pattern supports the idea that physical activity can work as preventive medicine when it is regular, safe, and continued over time.

Table 2 presents the comparative health outcomes across the three physical activity levels. The low-activity group showed the lowest chronic disease risk reduction index and weaker scores for metabolic improvement, mental well-being, functional capacity, and quality of life. The moderate-activity group showed a clear improvement in all indicators, showing that regular movement can produce meaningful benefits even without intense exercise. The high-activity group showed the strongest overall health profile, especially in functional capacity and quality of life, as shown in Table 2.

**Table 2.** Comparative Health Outcomes Across Physical Activity Levels

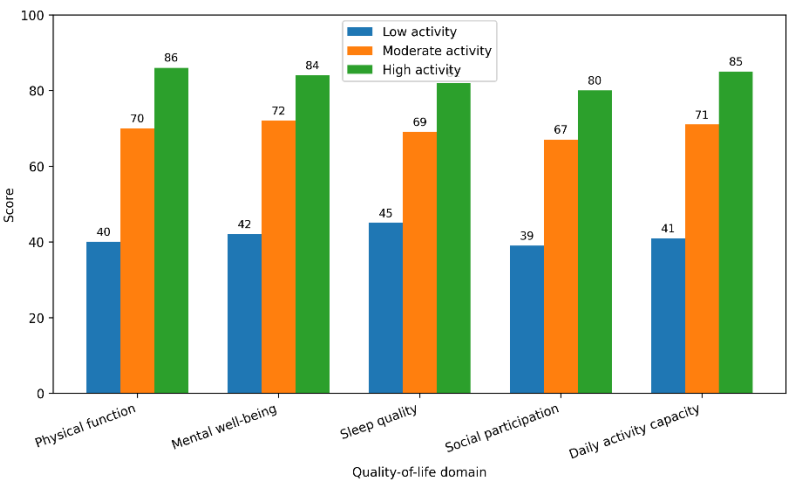
| Physical activity level | Chronic disease risk reduction index (%) | Metabolic improvement score | Mental well-being score | Functional capacity score | Overall quality-of-life score |
|-------------------------|------------------------------------------|-----------------------------|-------------------------|---------------------------|-------------------------------|
| Low activity            | 12                                       | 38                          | 42                      | 40                        | 41                            |
| Moderate activity       | 38                                       | 68                          | 72                      | 70                        | 71                            |
| High activity           | 56                                       | 82                          | 84                      | 86                        | 85                            |

The shift from low activity to moderate activity produced the most important practical improvement. Chronic disease risk reduction increased from 12 to 38, while metabolic improvement increased from 38 to 68. This indicates that moving away from a sedentary lifestyle may be more important than immediately aiming for high-intensity exercise. Moderate activity can improve glucose use, blood pressure control, energy balance, body composition, and circulation. The disease-risk reduction pattern increased steadily with higher physical activity levels, as shown in Figure 1.



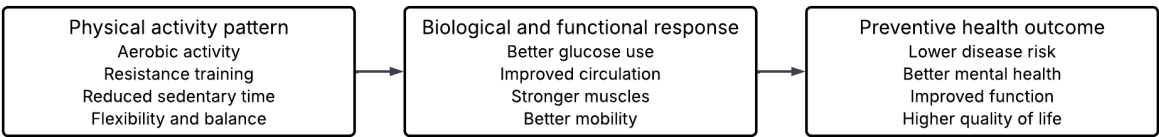
**Figure 1.** Chronic Disease Risk Reduction Across Physical Activity Levels

The quality-of-life outcomes also improved as physical activity increased. Physical function improved because regular movement supports muscle strength, joint mobility, balance, endurance, and body control. Mental well-being improved because physical activity helps reduce stress, support mood stability, and increase confidence. Sleep quality, social participation, and daily activity capacity also improved because active individuals are usually better able to manage routine tasks and remain socially involved. These quality-of-life improvements are shown in Figure 2.



**Figure 2.** Quality-of-Life Improvement Across Physical Activity Levels

The integrated mechanism shows that physical activity works through several connected pathways. Aerobic activity improves heart function, circulation, oxygen use, and endurance, while resistance activity improves muscle strength, glucose uptake, bone support, and body composition. Reduced sedentary time improves daily energy use and reduces the harmful effects of long sitting. Flexibility and balance activity support posture, joint movement, coordination, mobility, and fall prevention. Together, these pathways explain how physical activity can reduce disease risk and improve daily living, as shown in Figure 3.



**Figure 3.** Integrated Mechanism of Physical Activity as Preventive Medicine

The overall results show that physical activity has a progressive and integrated benefit. Low activity provides limited protection because it does not sufficiently support metabolic, cardiovascular, functional, and psychological health. Moderate activity provides strong and realistic benefits because it improves early disease-risk pathways and daily living capacity. High activity provides the strongest overall profile when it is safe, progressive, and suitable for the individual. Therefore, physical activity should be understood as a structured preventive medicine

strategy that can reduce chronic disease risk while improving quality of life.

#### 4. Conclusion

Physical activity can be understood as a practical form of preventive medicine because it improves several health pathways at the same time. The results showed that low activity was linked with weaker metabolic, cardiovascular, functional, psychological, and quality-of-life outcomes, while moderate and high activity levels showed stronger overall health profiles. This pattern confirms that movement is not only a fitness behavior but also a structured health strategy that can reduce chronic disease risk. By supporting glucose regulation, blood pressure control, circulation, muscle strength, mobility, sleep quality, and emotional balance, physical activity contributes to both disease prevention and better daily functioning.

The most important finding is that the shift from low activity to moderate activity produced a major improvement in health outcomes. This has strong practical value because moderate activity is realistic for many people, including those who cannot perform intense exercise. Activities such as regular walking, cycling, yoga, light sports, resistance exercise, active commuting, and reduced sitting time can create meaningful health benefits when continued consistently. Therefore, moderate physical activity should be treated as a key intervention point for individuals, workplaces, communities, and health-care systems aiming to reduce the burden of chronic disease.

Overall, this article highlights that physical activity has both preventive and restorative value. It can lower disease-risk pathways, improve functional independence, support mental well-being, and strengthen quality of life across different age groups. The findings support the need to include safe, regular, and sustainable physical activity in everyday health planning rather than treating it as an optional lifestyle choice. Physical activity as medicine is most effective when it is personalized, progressive, culturally acceptable, and easy to maintain. Promoting this approach can help build healthier individuals, more active communities, and stronger long-term public health outcomes.

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