SRIWIJAYA JOURNAL OF MEDICINE

Walking as a Modality for Enhancing Physical Fitness: A Review

Rachel Maya[1*], Irfannuddin[2], Siti Sarahdeaz Fazzaura Putri[2]

[1]Master of Biomedical Sciences Program, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia
[2]Department of Physiology, Faculty of Medicine, Universitas Sriwijaya, Palembang, Indonesia
*E-mail: rchlmym@gmail.com

Abstract

Walking plays a key role in maintaining overall physical fitness which is essential for good health. Physical fitness consists of two main aspects health-related and skill-related components. It is commonly measured by assessing cardiovascular endurance muscle strength muscle endurance flexibility and body composition. This review conducted a comprehensive literature search using reputable publications such as Elsevier, PubMed, PubMed Central, and other relevant sources. The search focused on peer-reviewed studies that examine the effects of walking on physical fitness. Many studies highlight walking as a simple and accessible form of exercise that offers significant benefits such as improved cardiovascular endurance muscle strength and flexibility. It is recommended to engage in at least 150 minutes of walking each week for optimal benefits. To maximize walking's impact on fitness it is crucial to maintain good posture and proper breathing techniques. In addition to physical benefits walking also promotes mental and social well-being. It is a versatile activity suitable for all ages including adolescents, adults, children, seniors, and individuals with specific health conditions or diseases. By understanding the connection between walking and fitness people can incorporate it into their daily routines to enhance overall health. Future research could focus on specific fitness aspects related to walking to develop personalized guidelines for different populations.

Keywords: Walking, Exercise, Fitness, Aerobic, Health

1. Introduction

Physical fitness is an integral aspect of maintaining individual health. Maintaining a level of body fitness has a positive impact on overall well-being. Physical activity is a key factor in supporting and enhancing this level of fitness. Studies show that a regular physical activity routine can reduce the risk of chronic diseases, improve cardiorespiratory function, and enhance mental health.[1] Physical activity can vary widely, but one of the most accessible forms for many is walking. Walking is a simple exercise that can easily be integrated into daily routines without the need for special equipment. The sustainability of walking can provide significant benefits for individuals looking to improve their fitness.[2]

Recognizing the importance of fitness for individual health, physical activity is acknowledged as a primary pillar of maintaining a healthy lifestyle. The World Health Organization (WHO) recommends at least 150 minutes of moderate physical activity per week to maintain body health.[3] In this context, walking emerges as a viable option, as it not only meets daily physical activity recommendations but also offers additional benefits such as improved cardiorespiratory endurance, weight management, and reduced cardiovascular disease risk.[4]

Thus, gaining a deeper understanding of the relationship between walking and fitness becomes essential. This review aims to provide information on the role of walking in fitness components by examining various reliable studies from sources such as Elsevier, PubMed, PubMed Central, and other relevant publications.

2. General Fitness Theory

2.1. Definitions and Types of Fitness

Physical fitness is a concept that encompasses the body's ability to perform physical activities without excessive fatigue. Health-related fitness refers to the body's capacity to carry out daily activities without incurring injury or chronic disease risk.[5] On the other hand, skill-related fitness pertains to the ability to perform specific tasks with a high level of proficiency.[6]

Physical fitness can be divided into two main categories: health-related fitness and skill-related fitness.[7] Health-related fitness includes components such as cardiorespiratory endurance, muscular strength, muscular endurance, flexibility, and body composition. Cardiorespiratory endurance reflects the heart and lungs' ability to supply oxygen throughout the body during physical activity. Muscular strength and endurance help support daily activities and prevent injuries. Flexibility is the ability of joints to move freely, while body composition includes the ratio of fat to muscle mass, both of which play important roles in overall body health.[8]

Skill-related fitness encompasses components such as speed, balance, coordination, reaction time, and power. Speed is defined as the ability to move quickly, while balance and coordination are critical for maintaining stability and effectively synchronizing body movements. Reaction time measures the rapidity with which an individual can respond to a specific stimulus, and power refers to the capacity to exert force at a high level of proficiency.[9]

Both health-related fitness and skill-related fitness are interdependent, contributing to a comprehensive understanding of overall physical fitness. The enhancement of health-related components supports the functionality of various organ systems, while the improvement of skill-related attributes can optimize performance in specific physical activities. By fostering an understanding of and engagement with both types of fitness, individuals can achieve optimal health outcomes and enhanced performance in diverse physical activities and sports contexts.[8,9]

2.2. Fitness Assessment

Physical fitness extends beyond mere theoretical concepts; it can be quantitatively assessed through various methods that address different components of health. One of the primary assessment methods is cardiorespiratory endurance testing, which may involve activities such as distance running, ergometer cycling, or treadmill exercises, all designed to measure the efficiency of the cardiovascular and respiratory systems during physical exertion.[10]

However, a comprehensive evaluation of fitness must consider demographic factors such as age and gender. These factors are crucial, as fitness standards are adjusted to reflect the physiological changes that individuals experience throughout their lifespan. For instance, differences in muscle mass, hormonal levels, and aerobic capacity can vary significantly between males and females, necessitating distinct benchmarks for each group.[10] Assessing cardiorespiratory endurance provides insight into the efficiency of the heart and lungs in supplying oxygen throughout the body during physical activity, with maximal oxygen consumption (VO_2 max) generally used as a criterion. The "V" in VO_2 max stands for volume, while "O2" stands for oxygen. The unit for VO_2 max is milliliters of oxygen consumed per minute per kilogram of body weight (mL/min/kg). Thus, VO_2 max measures how much oxygen your body consumes while exercising.[11,12]

On the strength side, muscle strength tests measure muscle strength based on

specific muscle groups, such as the one-repetition maximum bench press or maximum push-up repetitions. These tests provide information about the muscles' ability to generate contraction strength. Next, muscle endurance tests assess the muscles' ability to sustain activity over a prolonged period, such as plank tests or sit-ups that reflect abdominal muscle endurance.[13] Muscle endurance tests demonstrate the body's capacity to perform activities at low to moderate intensity for extended durations. Body composition measurements using tools such as DEXA scans, bioimpedance, or skinfold measurements help determine the proportion of body fat and muscle mass. Body composition is an important indicator, providing information about obesity risk and overall health.[10,12] Flexibility tests, such as the sit-and-reach test, measure joint range of motion, which is crucial for preventing injuries and ensuring optimal body function.[13]

These types of fitness have significant impacts on individual health. Health-related fitness helps improve cardiorespiratory endurance, which is a vital indicator of heart and lung health. Moreover, good muscle strength and endurance support efficient muscle function and reduce injury risk. Flexibility provides an adequate range of motion, while balanced body composition can decrease obesity risk.[10,12] The benefits of fitness extend beyond physical aspects; they also encompass mental and social health. Physical activity has been shown to alleviate stress, enhance mood, and reduce depression risk. Socially, fitness activities often involve social interaction, whether through group fitness classes or other group activities, which can enhance social and mental well-being.[14]

3. Walking and Fitness

3.1. Definition of Walking

Walking, in the context of fitness, refers to a rhythmic, dynamic aerobic activity involving large skeletal muscles and providing various benefits with minimal side effects.[2] It is a popular physical activity accessible to everyone, requiring little skill and posing a low risk of injury.[15] Walking can be done at various speeds, either alone or in groups, and does not require special equipment.[16] This weight-bearing activity strengthens muscles, maintains joint flexibility, and can enhance bone strength. Walking also positively impacts cardiovascular capacity, endurance, and metabolism.[17] This form of exercise is suitable for all ages and fitness levels and is particularly beneficial for individuals with specific health conditions, including pregnancy, who aim to improve their health but face physical limitations. As a gentle starting point for less active individuals, walking presents an effective option for increasing physical activity across the general population.[18]

3.2. Effective Walking Methods for Fitness

According to WHO recommendations, at least 150 minutes of walking activity per week is beneficial. This aerobic activity can be divided into 30-minute sessions over five days, keeping heart rate in mind. If heart rate increases to 70%, it indicates good outcomes, but adjustments may be necessary based on physical conditions before starting an exercise regimen, particularly for seniors.[4]

Various studies show that walking for as little as 10 minutes can lead to measurable improvements in health-related fitness. Walking has also been found to enhance sleep quality. A study by Wang and Boros (2020) examined healthy adults aged 19 to 36 who participated in a pedometer-based aerobic intervention, concluding that daily walking exercises significantly improved sleep quality and its components.[19] Outdoor walking in fresh air is often recommended although various factors can occasionally impede this activity. Therefore, alternative aerobic exercises that provide comparable

physiological benefits to walking should be considered such as utilizing a treadmill or stationary bicycle. The recommended walking speed is approximately 5-6 kilometers per hour, classified as brisk walking.[20] For beginners or those with specific physical conditions walking at a comfortable speed is essential. Steps per minute can measure speed and daily step targets can motivate consistent walking.

To achieve optimal benefits from walking for fitness, attention must be paid to good posture. Standing upright is essential for maintaining proper body alignment during walking. Good posture involves aligning the head, shoulders, hips, and feet in a straight line. Keeping the spine straight and avoiding slouching or leaning forward can help maintain balance and stability while walking. Engaging core muscles and keeping shoulders relaxed also contribute to proper walking posture. Choosing comfortable and suitable footwear enhances walking's effectiveness for fitness.[21]

Effective breathing processes are also crucial during walking. When walking for fitness, focusing on diaphragmatic breathing, or abdominal breathing, is advisable. Diaphragmatic breathing involves deep inhalation into the abdomen, allowing the diaphragm to fully expand and contract.[22] To practice diaphragmatic breathing while walking, inhale deeply through the nose, allowing the abdomen to rise, and exhale completely through the mouth, allowing the abdomen to fall. It is essential to maintain a steady and rhythmic breathing pattern throughout the walk, avoiding shallow or rapid breaths. By practicing diaphragmatic breathing while walking, individuals can increase oxygen intake, enhance relaxation, and support core stability. Breathing exercises can also be applied during warm-up and cool-down sessions of each walking routine. In addition to consistent exercise selection, adequate nutrition, hydration, and sufficient rest are necessary for supporting optimal fitness routines.[23]

3.3. Effects of Walking on Fitness Components

Walking has been shown to have positive effects on aerobic endurance measurements. Aerobic endurance is the ability of the cardiovascular and respiratory systems to supply oxygen to muscles over an extended period. A study by Jakatama and Wahyudati (2017) involving obese adolescents in a 10,000-step walking program showed improvements in cardiorespiratory endurance as measured by VO_2 max after a 6-week intervention. Interval training involving periods of high intensity followed by brief rest can improve VO_2 max. For example, brisk walking for several minutes, then walking at a slower pace and returning to brisk walking.[24] Larose et al. (2025) found that walking programs, whether supervised or unsupervised, improved cardiorespiratory fitness in older adults with knee osteoarthritis.[25] Campana and Costa (2017) compared walking with and without handheld weights and discovered that weighted walking did not significantly increase energy expenditure or cardiorespiratory response compared to normal walking.[26] Even in past studies, Hartung et al. (1977) highlighted that longer durations of exercise, specifically 15 to 25 minutes, are necessary for optimal endurance improvements in treadmill walking.[27] Murtagh et al. stated that walking interventions improved aerobic capacity by 3.04 ml/kg/min.[28] Collectively, these studies demonstrate the effectiveness of walking in enhancing aerobic endurance, making it a practical and accessible exercise option for various populations.

Walking has also been linked to improvements in muscle strength and body flexibility.[29] While it may not be as intensive as

resistance training, walking engages major muscle groups, including the quadriceps, hamstrings, calves, and glutes. Incorporating varied terrains, such as inclines or uneven surfaces, can further enhance muscular engagement and challenge muscle groups differently. This variation can lead to improvements in functional strength, allowing individuals to perform daily activities with greater ease and reduced risk of injury. Walking combined with intervals of jogging or faster-paced walking can further enhance these benefits. A consistent walking routine contributes to muscle strength development, promotes endurance, and improves joint mobility, particularly in the lower body.[30] In older adults, walking has been shown to improve aerobic endurance, lower body strength, static balance, as well as dynamic balance and agility. In older adults, walking has been shown to improve both static and dynamic balance, as well as agility.[31]

In addition to increasing VO_2 max in a study involving older men, walking exercise also reduced their LDL (low-density lipoprotein) cholesterol and body fat.[32] A study conducted in elementary school children showed similar results with decreases in BMI and improvements in physical fitness.[33] Regular walking can help create a caloric deficit, essential for weight loss and maintenance. Moreover, the combination of walking and proper dietary habits amplifies the effects on body composition. Maintaining a healthy balance of macronutrients while increasing physical activity supports overall health and fitness goals. Walking serves as an effective tool for individuals aiming to achieve and maintain a healthy body composition.

Walking is also recommended as a form of exercise for individuals recovering from a stroke to enhance their fitness levels post-illness.[34] Physical fitness training has proven beneficial for non-ambulatory stroke patients, including improvements in fat mass, peak heart rate, peak oxygen uptake, walking endurance, maximum walking speed, mobility, balance, and independence.[35] Additionally, early physical fitness training after a stroke can lead to improvements in walking speed and daily living activities.[36] However, in certain other conditions where walking is not feasible, recommended exercises may focus on physiotherapy regimens, which generally require additional assistive devices or should be performed in adequate facilities before transitioning to home-based activities.[34-36]

4. Conclusion

In conclusion, walking is recognized as an effective and accessible form of exercise that yields substantial benefits for individuals across various age groups and fitness levels. This rhythmic aerobic activity has been shown to significantly enhance multiple components of health-related fitness, including cardiorespiratory endurance, muscular strength, flexibility, and body composition. Empirical studies indicate that walking contributes to improvements in VO_2 max, reductions in LDL cholesterol levels, and decreases in body fat percentage, as well as enhancements in static and dynamic balance and agility, particularly among older adults and children.

Furthermore, walking plays a critical role in rehabilitation protocols, especially for individuals recovering from certain diseases such as stroke, facilitating improvements in mobility, physical strength, and overall independence. The versatility of walking allows for its implementation in diverse settings, whether outdoors or via treadmills, and enables adaptation to meet individual health requirements. Given the extensive body of evidence supporting the effectiveness of walking, it is imperative to advocate for its inclusion as a fundamental component of

public health initiatives and personal fitness regimens. Promoting walking as a primary physical activity can enhance health outcomes, prevent chronic diseases, and contribute to the overall well-being of populations throughout their lifespan.

References

1. Chen KS, Hsieh TH. Novel physical fitness fuzzy evaluation model for individual health promotion. Int J Environ Res Public Health. 2022 Apr 21;19(9):5060.
2. Monte RN. Walking for fitness: a case study on the experiences, challenges, and perceived benefits from regular walking exercise of young adults. Int J Soc Sci Educ Res Stud. 2021 Nov 8;1(3):42-9.
3. Pratt M. What's new in the 2020 World Health Organization guidelines on physical activity and sedentary behavior? J Sport Health Sci. 2021 May;10(3):288.
4. World Health Organization. Global action plan on physical activity 2018-2030: more active people for a healthier world. Geneva: World Health Organization; 2019 Jan 21.
5. Avijit D, Amit b. A Comparative Study of Physiological Variables Among Rural And Urban Football Players Of Murshidabad District. Paripex - Indian Journal of Research. 2023 Jun; 12(6): 1-2.
6. Davis PG. Exercise prescription for apparently healthy individuals and for special populations. In: Lifestyle Medicine. 3rd ed. Boca Raton (FL): CRC Press; 2019. p. 177-89.
7. Kapoor G, Chauhan P, Singh G, Malhotra N, Chahal A. Physical activity for health and fitness: past, present and future. J Lifestyle Med. 2022 Jan 1;12(1):9.
8. Voichun O, Tvelina A, Slobodskyi Y. Main components of fitness programs for power training with people of different age and sex. Naukovij časopis Nacìonal'nogo pedagogìčnogo unìversitetu ìmenì M.P. Dragomanova. 2023;03(161).
9. García-Hermoso A. Health-related fitness during early years, childhood, and adolescence. In: Handbook of Clinical Child Psychology: Integrating Theory and Research into Practice. Cham: Springer International Publishing; 2023. p. 763-88.
10. Bayles MP. ACSM's exercise testing and prescription. Philadelphia: Lippincott Williams & Wilkins; 2023 Jan 26.
11. Hart PD. A new and simple prediction equation for health-related fitness: use of honest assessment predictive modeling. Am J Appl Math Stat. 2018 Nov 7;6(6):224-31.
12. Britton U, Issartel J, Fahey G, Conyngham G, Belton S. What is health-related fitness? Investigating the underlying factor structure of fitness in youth. Eur Phys Educ Rev. 2020 Nov;26(4):782-96.
13. Wilder RP, Greene JA, Winters KL, Long WB 3rd, Gubler KD, Edlich R. Physical fitness assessment: an update. J Long Term Eff Med Implants. 2006;16(2):131-47.
14. Mahindru A, Patil P, Agrawal V. Role of physical activity on mental health and well-being: a review. Cureus. 2023 Jan 7;15(1):e33479.
15. Blair LM, Juan JM, Sebastian L, Tran VB, Nie W, Wall GD, et al. Oncogenic context shapes the fitness landscape of tumor suppression. Nat Commun. 2023 Oct 12;14(1):6422.
16. Morris JN, Hardman AE. Walking to health. Sports Med. 1997 May;23:306-32.

17. Freund P, Martin G. Walking and motoring: fitness and the social organisation of movement. Sociol Health Illn. 2004 Apr;26(3):273-86.
18. Sithichoksakulchai S, Chen MC, Chen KM. Walking promotes physical fitness of community-dwelling older adults: a systematic review and meta-analysis. Top Geriatr Rehabil. 2022 Apr 1;38(2):101-9.
19. Wang F, Boros S. The effect of daily walking exercise on sleep quality in healthy young adults. Sport Sci Health. 2021 Jun;17:393-401.
20. Yuliatin E, Noor M. Bugar dengan olahraga. Jakarta: PT Balai Pustaka (Persero); 2012 Jan 2.
21. Furkan F, Rusdin R, Shandi SA. Menjaga daya tahan tubuh dengan olahraga saat pandemi corona COVID-19. J Ilmu Sosial dan Pendidikan. 2021 Jan 20;5(1):12-8.
22. McKeown P. The oxygen advantage: the simple, scientifically proven breathing technique that will revolutionise your health and fitness. London: Hachette UK; 2015 Sep 15.
23. Jansang S, Eksakulkla S. The effect of a breathing training program using a toy blower on lung function, respiratory muscle strength, 6-minute walking test, and functional capacity in obesity level 2. J Exerc Physiol Online. 2023 Jun 1;26(3).
24. Jakatama W, Wahyudati S. Effects of 10,000 steps walking program on cardiorespiratory endurance of obese adolescents. Indones J Phys Med Rehabil. 2017 Nov 1;6(2):35-42.
25. Larose J, King J, Brosseau L, Wells GA, Reid R, Maetzel A, et al. The effect of walking on cardiorespiratory fitness in adults with knee osteoarthritis. Appl Physiol Nutr Metab. 2013 Aug;38(8):886-91.
26. Campaña CT, Costa PB. Effects of walking with hand-held weights on energy expenditure and excess post-exercise oxygen consumption. J Exerc Rehabil. 2017 Dec;13(6):641.
27. Hartung GH, Smolensky MH, Harrist RP, Rangel R, Skrovan C. Effects of varied durations of training on improvement in cardiorespiratory endurance. J Hum Ergol (Tokyo). 1977 Sep 15;6(1):61-8.
28. Murtagh EM, Nichols L, Mohammed MA, Holder R, Nevill AM, Murphy MH. The effect of walking on risk factors for cardiovascular disease: an updated systematic review and meta-analysis of randomised controlled trials. Prev Med. 2015 Mar;72:34-43.
29. Selanon P, Chuangchai W. Walking activity increases physical abilities and subjective health in people with seven different types of disabilities. Front Public Health. 2023;11:1120926.
30. Beck JH, Cho O. Impact of physical activity program on elementary school students' health-related fitness and stress. Korean J Sports Sci. 2023;32(1):513-27.
31. İri R, Ersoy A, İri R. The effect of walking exercise on aerobic capacities and some blood values of females. J Hum Sci. 2010 Jul 25;7(2):504-14.
32. Paillard T, Lafont C, Costes-Salon MC, Dupui P, Riviere D, Vellas B. Cholesterol reduction and increased cardiovascular fitness following a 12-week brisk walking program. J Nutr Health Aging. 2002 Jan 1;6(2):138-40.
33. Kim JW, Jung SG, Kim DY. Effects of fitness walking exercise on physique, BMI and physical fitness for 5th and 6th grade elementary children. J Korea Acad-Industr Coop Soc. 2012;13(11):5005-14.
34. Lloyd M, Skelton DA, Mead GE, Williams B, van Wijck F. Physical fitness

interventions for non-ambulatory stroke survivors: a mixed-methods systematic review and meta-analysis. Brain Behav. 2018 Jul;8(7):e01000.

35. Flöel A, Werner C, Grittner U, Hesse S, Jöbges M, Knauss J, et al. Physical fitness training in subacute stroke (PHYS-STROKE)—study protocol for a randomised controlled trial. Trials. 2014 Dec;15(1):1-2.
36. Marsden DL, Dunn A, Callister R, McElduff P, Levi CR, Spratt NJ. A home- and community-based physical activity program can improve the cardiorespiratory fitness and walking capacity of stroke survivors. J Stroke Cerebrovasc Dis. 2016 Oct 1;25(10):2386-98.