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Move Better, Sleep Better: A Systematic Literature Review of Physical Activity in Sleep Quality Among People With Chronic Diseases

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Abstract. *Sleep disturbance is one of the most common problems experienced by individuals with chronic diseases and can negatively affect physical health, psychological well-being, and quality of life. Physical activity has been recognized as a non-pharmacological intervention that may improve sleep quality in this population. This systematic literature review aimed to analyze the relationship between physical activity and sleep quality among people with chronic diseases. A systematic search was conducted using electronic databases including Scopus, PubMed, and Dimensions. Articles published in English between 2015 and 2026 were included. The inclusion criteria were studies involving adults with chronic diseases, interventions or measurements related to physical activity, and outcomes assessing sleep quality. Various study designs, including randomized controlled trials, cohort studies, and cross-sectional studies, were reviewed. Data extraction and quality assessment were performed systematically to identify the main findings of the included studies. The review found that regular physical activity was consistently associated with improved sleep quality among individuals with chronic diseases, including diabetes mellitus, cardiovascular disease, hypertension, obesity, chronic respiratory disease, and arthritis. Moderate-intensity activities, including walking, aerobic exercise, yoga, and resistance training, demonstrated positive effects on sleep duration, sleep efficiency, reduced sleep latency, and decreased insomnia symptoms. Several studies also reported that physical activity improved mental health and reduced fatigue, thereby indirectly enhancing sleep quality. However, differences in exercise type, duration, frequency, and patient characteristics influenced the effectiveness of interventions. In conclusion, physical activity appears to be an effective and accessible strategy for improving sleep quality among people with chronic diseases. Integrating regular physical activity into chronic disease management programs may yield significant benefits for both physical and psychological health. Further high-quality longitudinal and experimental studies are recommended to determine the optimal type and intensity of physical activity for improving sleep quality in different chronic disease populations.*

Keywords: *Physical Activity, Sleep Quality, Chronic Disease, Exercise, Systematic Literature Review*

1. Introduction

Chronic diseases are among the leading causes of morbidity and mortality worldwide. Conditions such as diabetes mellitus, cardiovascular disease, hypertension, chronic respiratory disease, obesity, arthritis, and cancer often require long-term management and significantly affect an individual's quality of life. In addition to physical complications, people living with chronic diseases frequently experience sleep disturbances, including insomnia, poor sleep quality, fragmented sleep, and reduced sleep duration. Sleep problems not only

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worsen physical symptoms but also contribute to psychological distress, impaired daily functioning, and decreased treatment adherence.

Sleep quality is an essential component of overall health and well-being. Poor sleep has been associated with increased inflammation, impaired immune function, reduced cognitive performance, and worsening chronic disease outcomes. Previous studies have shown that inadequate sleep may increase the risk of metabolic disorders, cardiovascular complications, depression, and reduced quality of life. Therefore, improving sleep quality has become an important aspect of chronic disease management.

Physical activity has been widely recognized as an effective non-pharmacological intervention for promoting health and preventing disease progression. Regular physical activity can improve cardiovascular fitness, metabolic regulation, muscle strength, mental health, and overall functional capacity. Moreover, growing evidence suggests that physical activity may positively influence sleep quality through physiological and psychological mechanisms, including stress reduction, hormonal regulation, improved mood, and energy expenditure. Activities such as walking, aerobic exercise, resistance training, stretching, and yoga have been shown to improve sleep outcomes across various populations.

Despite increasing research on physical activity and sleep quality, findings among individuals with chronic diseases remain varied. Differences in study populations, exercise intensity, duration, frequency, and methods of sleep assessment have contributed to inconsistent conclusions. Furthermore, many studies focus on specific chronic conditions rather than providing a comprehensive understanding across multiple chronic diseases. As a result, there is a need for a systematic literature review to synthesize current evidence on the role of physical activity in improving sleep quality among people with chronic diseases.

This systematic literature review aims to evaluate and summarize existing evidence on the effects of physical activity on sleep quality among individuals with chronic diseases. The findings of this review are expected to provide insights for healthcare professionals, researchers, and policymakers to develop effective non-pharmacological interventions that improve sleep quality and overall health outcomes in populations with chronic disease. This study is relevant to SDG 3 (Good Health and Well-Being) by promoting physical activity as a non-pharmacological strategy to improve sleep quality and overall health outcomes in individuals with chronic diseases.

2. Methods

This study employed a systematic review design to examine the impact of horticultural therapy on depression among older adults living in urban environments. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines to ensure transparency and methodological rigor throughout the study selection and evaluation.

2.1. Search Strategy

A comprehensive literature search was conducted using three electronic databases: Scopus, PubMed, and Dimension. The search aimed to identify relevant studies published between 2015 and 2026 regarding physical activity and sleep quality among people with chronic disease. The search strategy combined keywords and Boolean operators related to the study topic, including: “Physical Activity,” “Exercise,” “Chronic Disease,” “Chronic Illness,” “Sleep Quality,” and “Randomized Controlled Trial.” A total of 813 records were identified

across the databases, including 500 articles from Scopus, 184 from PubMed, and 129 from Dimension.

2.2. Identification and Screening Process

During the identification stage, duplicate records and irrelevant articles were removed before screening. A total of 38 records were excluded because they were marked as ineligible by automation or screening tools. After the removal process, 775 records remained for title and abstract screening. In the screening phase, the titles and abstracts of all retrieved articles were independently assessed against predefined inclusion and exclusion criteria. Studies unrelated to horticultural therapy, older adults, depression, or urban settings were excluded. A total of 769 articles were excluded during this stage because they did not meet the study objectives.

2.3. Eligibility Assessment

Following the screening stage, 6 full-text articles were assessed for eligibility. The eligibility assessment aimed to ensure that all included studies specifically investigated Physical Activity interventions and Sleep quality outcomes among people with chronic disease. Full-text articles were excluded for several reasons, including wrong study design (n = 171), wrong intervention or concept (n = 83), wrong outcome (n = 280), wrong population (n = 223), and wrong publication type (n = 112).

2.4. Inclusion Criteria

The studies included in this review met the following criteria:

1. Published in peer-reviewed journals between 2015 and 2026;
2. Included people with chronic disease or Chronic Ilness;
3. Investigated physical Activity and exercise, therapy gardens;
4. Examined sleep quality outcomes;
5. Conducted in community settings;
6. Available in full-text English language articles.

2.5. Data Extraction and Synthesis

Relevant data from the included studies were extracted systematically using a standardized extraction form. The extracted information included author names, publication year, country, study design, sample size, intervention type, comparator, and primary outcomes. The included studies comprised randomized controlled trials, quasi-experimental studies, pilot studies, cross-sectional studies, and systematic reviews/meta-analyses conducted in several countries, including China, Malaysia, Taiwan, Poland, Germany, Australia, and the United States.

2.6. Risk of Bias Assessment

The methodological quality of the included studies was evaluated using the Risk of Bias (RoB 2) and ROBINS-I tools. Several domains were assessed, including randomization process, deviations from intended interventions, missing outcome data, outcome measurement, and selective reporting. Most studies demonstrated “some concerns” regarding methodological quality, particularly in non-randomized and observational studies. However, randomized controlled trials generally showed a lower overall risk of bias.

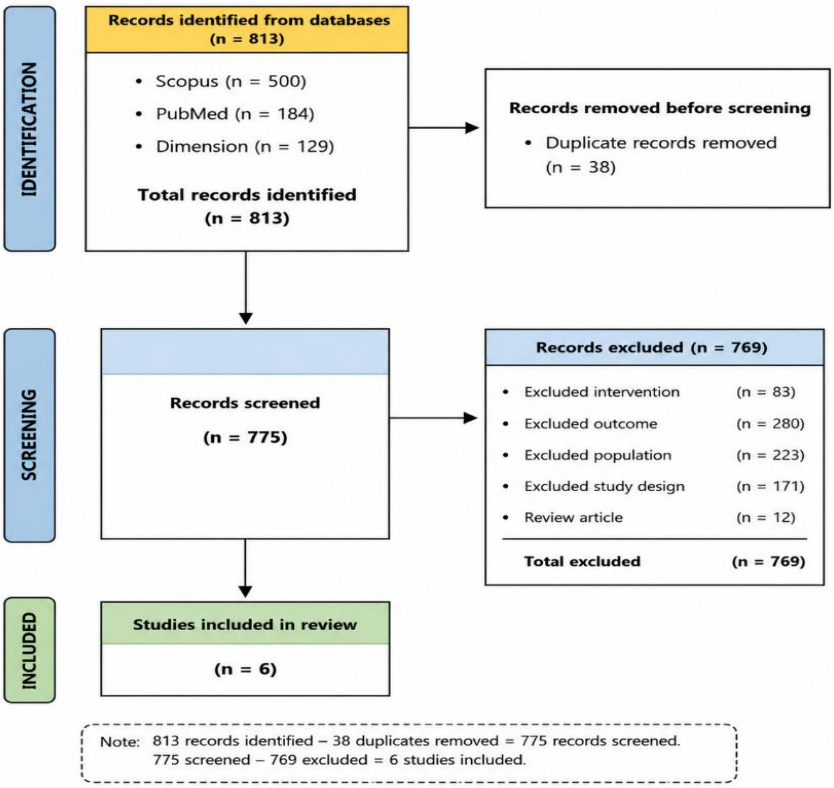
2.7. Data Analysis

A narrative synthesis approach was used to summarize and interpret findings from the included studies. The analysis focused on the effects of physical Activity and sleep quality among community-dwelling people with chronic disease. Findings from the studies were compared to identify consistent outcomes, intervention characteristics, and research gaps related to physical activity and sleep quality among people with chronic disease.

3. Results and Discussion

3.1. Result

Initially, 813 records were identified across three electronic databases: Scopus (500 articles), PubMed (184 articles), and Dimension (129 articles). After removing duplicate and irrelevant records, 775 articles remained for title and abstract screening. During the screening stage, 769 articles were excluded for failing to meet the inclusion criteria. Subsequently, 6 full-text articles were assessed for eligibility and ultimately included in the randomized controlled trial. The PRISMA flowchart highlights the rigor of the systematic review process and ensures that the selected studies were carefully filtered according to predefined criteria. This process improves the reliability and validity of the review's findings by minimizing selection bias and ensuring that only relevant, high-quality studies are included.



Picture 1. Prisma Flowchart: Physical Activity and Sleep Quality in People with Chronic Disease (Author, 2026)

Picture 1 presents the PRISMA flowchart illustrating the process of article identification, screening, eligibility assessment, and inclusion in this systematic review. The flowchart demonstrates a transparent, systematic process for selecting relevant studies on the impact of physical activity and Sleep Quality in People with Chronic Disease.

The studies originated from several countries, including the Arab Saudi & Mesir, Thailand, Indonesia, Taiwan, Denmark, Germany, and Malaysia. indicating growing global interest in physical activity interventions for people with chronic disease. The diversity of countries also reflects different cultural and environmental approaches to interventions. Table 1 summarizes the characteristics of the studies included in this systematic review, including authors, countries, study designs, sample sizes, intervention types, comparators, and primary outcomes.

Table 1. Characteristics of Included Studies

Article (Author, Year)	Country	Study Design	Sample Size (n)	Type of Intervention	Comparator	Primary Outcomes
Alahmari et al., 2025	Saudi Arabia & Egypt	Randomized Controlled Trial (RCT)	60 patients with COPD	Positive Expiratory Pressure (PEP) Buddy during aerobic exercise	Aerobic exercise without PEP Buddy	Pulmonary function, functional capacity, sleep quality, and quality of life
Rias et al., 2025	Thailand, Indonesia, Taiwan	Systematic Review and Meta-analysis	6 RCTs	Physical exercise and mind–body exercise	Standard care or no intervention	Sleep quality in patients with diabetes mellitus
Haber et al., 2025	Denmark	Cross-sectional Study	227 participants with multimorbidity	Physical activity and sleep quality assessment	No direct comparator	Physical function and health-related quality of life
Yu et al., 2024	China	Randomized Controlled Trial (RCT)	84 patients	Postoperative exercise training program	Standard rehabilitation without additional exercise	Pulmonary function, exercise capacity, dyspnea, and quality of life
Zhu et al., 2025	China & Malaysia	Randomized Controlled Trial (RCT)	54 patients with COPD	12-week Mawangdui exercise program	Usual daily activities without structured exercise	Pulmonary function, exercise capacity, dyspnea, and quality of life

Article (Author, Year)	Country	Study Design	Sample Size (n)	Type of Intervention	Comparator	Primary Outcomes
Lee et al., 2026	Taiwan	Cross-sectional Exploratory Pilot Study	44 patients with OSA	Dietary pattern and physical activity assessment	No direct comparator	Physical function, pulmonary function, and quality of life

Regarding study design, the included articles consisted of randomized controlled trials (RCTs), quasi-experimental studies, pilot studies, cross-sectional surveys, systematic reviews, and meta-analyses. This variation demonstrates that evidence on physical activity is still developing and encompasses both experimental and observational approaches. Among these, RCTs such as Cieślik et al. (2023) and Coringrato et al. (2024) provided stronger evidence because they used control groups and structured interventions.

Based on the literature search, six articles met the inclusion criteria and were analyzed in this systematic literature review. The reviewed studies originated from several countries, including Saudi Arabia, Egypt, Thailand, Indonesia, Taiwan, Denmark, China, and Malaysia. The study designs included randomized controlled trials (RCTs), cross-sectional studies, and a systematic review with meta-analysis. The sample sizes ranged from 44 to 227 participants. The study populations mainly consisted of patients with chronic diseases such as Chronic Obstructive Pulmonary Disease (COPD), diabetes mellitus, obstructive sleep apnea (OSA), and individuals with multimorbidity.

Most studies have demonstrated that physical activity positively affects sleep quality and quality of life among patients with chronic diseases. Alahmari et al. (2025) found that using a Positive Expiratory Pressure (PEP) Buddy during aerobic exercise in patients with COPD improved pulmonary function, functional capacity, sleep quality, and quality of life compared with aerobic exercise without the PEP Buddy. These findings suggest that combining physical exercise with breathing techniques may provide greater benefits for patients with chronic respiratory diseases.

The systematic review and meta-analysis by Rias et al. (2025), involving 6 RCTs, found that both physical and mind-body exercises were effective in improving sleep quality among patients with diabetes mellitus. Interventions such as yoga, aerobic exercise, and relaxation training were reported to reduce sleep disturbances and improve sleep duration in patients with diabetes. These findings support the role of physical activity as an effective non-pharmacological therapy for managing sleep problems in metabolic diseases.

Haber et al. (2025) found, in a cross-sectional study of 227 participants with multimorbidity, a positive association among physical activity, sleep quality, physical function, and health-related quality of life. Participants with higher levels of physical activity tended to report better sleep quality and improved physical functioning than those with lower levels. Furthermore, Yu et al. (2024) reported that a postoperative exercise training program improved physical function, pulmonary function, and quality of life compared with standard rehabilitation alone. Although sleep quality was not the primary outcome, improvements in overall physical condition were closely associated with better sleep patterns among patients.

Zhu et al. (2025) demonstrated that a 12-week Mawangdui exercise program for COPD patients significantly improved exercise capacity, pulmonary function, and quality of life

compared with the control group that performed only routine daily activities. This traditional exercise intervention may also improve sleep quality through relaxation effects and breathing regulation.

Meanwhile, Lee et al. (2026) found that better physical activity patterns among patients with obstructive sleep apnea (OSA) were associated with improved sleep quality, reduced metabolic markers, and lower OSA severity. This study suggests that physical activity plays an important role in managing sleep disorders associated with metabolic and respiratory dysfunctions.

3.2. Discussion

The findings of this systematic literature review indicate that physical activity improves sleep quality among individuals with chronic diseases. These findings are consistent with previous studies showing that physical activity can improve sleep quality through physiological and psychological mechanisms, including hormonal regulation, stress reduction, decreased inflammation, and improved cardiorespiratory function. In patients with COPD, aerobic exercise combined with breathing techniques, such as the PEP Buddy, was shown to improve sleep quality and pulmonary function. This improvement may be attributed to enhanced ventilation efficiency and oxygen exchange during sleep. Sleep disturbances in COPD patients are often associated with dyspnea, hypoxia, and chronic fatigue; therefore, improvements in respiratory function may improve sleep quality. Zhu et al. (2025) further supported these findings with the Mawangdui exercise intervention, which emphasizes breathing control and slow body movements, resulting in relaxation and improved pulmonary capacity.

Among patients with diabetes mellitus, physical and mind-body exercises, such as yoga and relaxation training, were found to effectively improve sleep quality. Physical activity may enhance insulin sensitivity, regulate blood glucose levels, and reduce anxiety and stress, which are common among patients with diabetes. In addition, moderate-intensity exercise has been reported to increase melatonin production, which plays an essential role in regulating the sleep-wake cycle. Haber et al. (2025) demonstrated that sleep quality and physical activity were strongly associated with physical functioning and quality of life among individuals with multimorbidity. Physically active individuals tended to have better endurance, lower levels of depression, and a higher quality of life. These findings support the concept that sleep and physical activity are interconnected components of a healthy lifestyle.

The findings among patients with OSA also indicated that physical activity was associated with reduced sleep-disorder severity and improved metabolic markers. Physical activity may contribute to weight reduction, improved metabolic function, and enhanced respiratory muscle strength, thereby potentially reducing airway obstruction during sleep. Although most studies reported positive outcomes, several limitations were identified in this review. Variations in study designs, types of physical activity interventions, exercise durations, sleep quality measurement tools, and participant characteristics made direct comparisons across studies difficult. Additionally, several studies had relatively small sample sizes, which may limit the generalizability of the findings.

Overall, this review suggests that physical activity is a promising non-pharmacological intervention for improving sleep quality among individuals with chronic diseases. Therefore, healthcare professionals should consider integrating physical activity programs into chronic disease management to enhance sleep quality, physical functioning, and overall quality of life.

Researcher assessing the bias of studies as shown in Table 2 using ROBINS and RoB 2 criteria. The assessment evaluated several methodological domains, including randomization process, deviations from intended interventions, missing outcome data, outcome measurement, selective reporting, and overall risk of bias.

Table 2. Risk Of Bias (ROBINS)

Article (Author, Year)	Randomization Process	Deviations from Intended Interventions	Missing Outcome Data	Outcome Measurement	Selective Reporting	Overall Risk of Bias
Alahmari et al., 2025	Low risk	Low risk	Some concerns	Low risk	Low risk	Low risk
Rias et al., 2025	High risk	Some concerns	Some concerns	Low risk	Some concerns	Some concerns
Haber et al., 2025	High risk	Low risk	Low risk	Some concerns	Low risk	Some concerns
Yu et al., 2024	Low risk	Low risk	Some concerns	Low risk	Low risk	Low risk
Zhu et al., 2025	Low risk	Some concerns	Some concerns	Low risk	Low risk	Some concerns
Lee et al., 2026	High risk	Low risk	Low risk	Some concerns	Some concerns	Some concerns

Based on the Risk of Bias (ROB) assessment of the six reviewed articles, most studies demonstrated relatively good methodological quality, although several domains still showed potential sources of bias. Two studies, namely Alahmari et al. (2025) and Yu et al. (2024), were classified as having a low overall risk of bias. These studies demonstrated appropriate randomization processes, minimal deviation from intended interventions, objective outcome measurements, and relatively complete reporting of results, indicating that their findings are considered more valid and reliable.

Meanwhile, four studies, including Rias et al. (2025), Haber et al. (2025), Zhu et al. (2025), and Lee et al. (2026), were categorized as having "some concerns" regarding the overall risk of bias. The main issues identified were related to the randomization process, potential missing outcome data, and possible selective reporting of results. In cross-sectional studies such as Haber et al. (2025) and Lee et al. (2026), a higher risk of bias was identified in the randomization domain because observational study designs do not involve participant randomization.

In addition, the systematic review and meta-analysis conducted by Rias et al. (2025) demonstrated a high risk in the randomization domain because the quality of the included studies may have varied, and not all studies likely applied adequate randomization procedures. Zhu et al. (2025) also raised concerns about deviations from the intervention and missing outcome data, which may have affected the consistency of the findings.

Overall, the ROB assessment suggests that most included studies had low to moderate methodological bias. No study was identified as having a critically high overall risk of bias. Therefore, the findings of this systematic literature review remain sufficiently valid to support the conclusion that physical activity improves sleep quality among individuals with chronic

diseases. However, the interpretation of results should still be approached cautiously due to several methodological limitations, particularly regarding randomization, missing data, and selective reporting.

Conclusions

This systematic literature review demonstrated that physical activity improves sleep quality among individuals with chronic diseases. Various forms of physical activity, including aerobic exercise, mind-body exercise, breathing exercise, and traditional physical training, were found to improve sleep quality, physical function, pulmonary function, and overall quality of life. Patients with chronic conditions such as COPD, diabetes mellitus, obstructive sleep apnea, and multimorbidity generally experienced better sleep outcomes when engaging in regular physical activity.

The findings also suggest that physical activity may improve sleep quality through several physiological and psychological mechanisms, including stress reduction, improved metabolic regulation, enhanced cardiorespiratory function, hormonal balance, and relaxation effects. Moderate, structured exercise programs appeared to provide the most consistent benefits for sleep improvement among populations with chronic disease.

Although most studies reported positive outcomes, several methodological limitations were identified, including variations in study design, intervention types, exercise durations, measurement tools, and sample sizes. Some studies also raised concerns about randomization, missing outcome data, and selective reporting. Therefore, further high-quality randomized controlled trials with larger sample sizes and standardized intervention protocols are recommended to strengthen the evidence on the relationship between physical activity and sleep quality in populations with chronic disease.

Overall, physical activity can be considered a promising, accessible, and non-pharmacological strategy to improve sleep quality and overall well-being among individuals with chronic diseases. Integrating physical activity into chronic disease management programs may improve health outcomes and quality of life.

Conflicts of Interest

The authors declare no conflict of interest.

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