



# THE EFFECTIVENESS OF FOOT REFLEXOLOGY MASSAGE IN IMPROVING SLEEP QUALITY AMONG ELDERLY PATIENTS WITH DIABETES MELLITUS AND INSOMNIA IN SUMBER PORONG VILLAGE LAWANG

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## Abstract

This study aimed to determine the effectiveness of foot reflexology in improving sleep quality among elderly patients with diabetes mellitus experiencing insomnia in Sumber Porong Lawang Village. Insomnia is a common problem among older adults and may negatively affect physical condition, daily activities, and overall quality of life. Foot reflexology was selected as a non-pharmacological intervention because it is simple, safe, and easy to apply in elderly care.

This study used a descriptive case study design with a pretest–posttest approach involving two elderly respondents selected through purposive sampling. Data collection instruments included the Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), knowledge questionnaire, and observation sheet. The intervention was conducted for six consecutive days through health education and practical implementation of foot reflexology before bedtime.

The findings showed improvements in both respondents after the intervention. Knowledge regarding foot reflexology increased from the “knowing” level (C1) to the “application” level (C3). Sleep quality also improved, indicated by decreased ISI and PSQI scores, easier sleep initiation, reduced nighttime awakenings, and improved physical comfort upon waking. The respondents reported feeling more relaxed and refreshed after receiving foot reflexology therapy.

This study highlights that foot reflexology may serve as an effective complementary nursing intervention to improve sleep quality among elderly individuals with insomnia and diabetes mellitus. The intervention also provides practical value for nurses, families, and community health services in promoting non-pharmacological sleep management for older adults..

Keywords: diabetes mellitus, elderly, insomnia, reflexology, sleep quality

## 1. INTRODUCTION

Sleep disorders in the elderly are commonly found in healthcare practice and are characterized by difficulty initiating sleep, frequent awakenings during the night, and poor sleep quality. This condition can lead to physical fatigue, decreased fitness, and reduced ability of older adults to perform daily activities. In elderly individuals with diabetes mellitus, sleep disturbances may further worsen metabolic control, increase the risk of complications, and decrease overall quality of life. Moreover, prolonged use of pharmacological sleep therapy in older adults may cause side effects such as dependency, dizziness, falls, and cognitive impairment. Therefore, safe, affordable, and easily applicable non-pharmacological interventions are urgently needed to improve sleep quality among elderly populations in community settings. Despite the recurrent

nature of sleep disturbances, interventions in the community remain limited and are still predominantly focused on pharmacological approaches, while non-pharmacological interventions have not been optimally utilized [1].

Globally, the prevalence of insomnia among older adults ranges from 20% to 59%, and approximately one in three adults experiences sleep difficulties at least once in their lifetime [2]. In Indonesia, data from the National Basic Health Research (Riskesdas) indicate that around 20%–24% of elderly individuals experience insomnia symptoms, with prevalence increasing with age [3]. Furthermore, a study conducted in East Java reported that approximately 29% of elderly individuals experienced insomnia and most complained of difficulty sleeping more than three nights per week [4].

Insomnia in older adults may negatively affect concentration, increase fatigue, worsen chronic illnesses such as hypertension and diabetes mellitus, and reduce overall quality of life [5]. Therefore, appropriate and safe interventions are required to improve sleep quality among elderly populations. One non-pharmacological intervention that has gained attention is foot reflexology. Foot reflexology is a technique involving pressure on specific points of the feet associated with body organs and the nervous system [6]. This therapy is believed to stimulate nerve function, improve blood circulation, enhance relaxation, and support better sleep quality.

Several previous studies have demonstrated the positive effects of foot reflexology on sleep quality in older adults. Hwang and Shin (2022) reported that foot reflexology reduced sleep disturbances and depression among elderly individuals [7]. Similarly, Nissa et al. (2021) found that foot reflexology therapy improved sleep quality in older adults through relaxation effects and stress reduction [8]. In addition, Heriyanto et al. (2021) revealed that sleep management education combined with foot massage improved sleep quality among patients with type 2 diabetes mellitus [9]. However, most previous studies primarily focused on the direct therapeutic effects of foot reflexology, while limited studies have explored the implementation of repeated foot reflexology education and practice among elderly individuals with both diabetes mellitus and insomnia in community settings. This study highlights the practical application of a six-day educational and reflexology intervention as a complementary nursing approach to improve sleep quality among older adults in rural communities.

Based on these findings, foot reflexology may serve as a simple, safe, and effective complementary intervention to improve sleep quality and reduce insomnia among elderly individuals. Therefore, this study aims to examine the implementation of foot reflexology education in improving sleep quality and reducing insomnia in elderly individuals. The findings of this study are expected to provide evidence-based information for nurses, families, and communities regarding the use of foot reflexology as a promotive and preventive intervention for sleep disorders in the elderly.

## 2. METHODOLOGY

This study employed a descriptive case study design using a pretest–posttest approach to evaluate the implementation of foot reflexology education on sleep quality among elderly individuals experiencing insomnia. The study was conducted in Sumber Porong Village, Lawang, involving two elderly respondents selected through purposive sampling based on inclusion criteria, including elderly individuals experiencing insomnia symptoms and willing to participate in the intervention program.

The inclusion criteria in this study were elderly individuals aged  $\geq 60$  years, experiencing insomnia symptoms based on ISI and PSQI assessments, diagnosed with diabetes mellitus, able to communicate effectively, and willing to participate throughout the intervention period.

The exclusion criteria included elderly individuals with severe cognitive impairment, severe foot injuries or infections, unstable medical conditions, hearing or communication difficulties that interfered with the educational process, and respondents who were unable to complete the six-day intervention program.

Data collection was conducted in three stages: pre-intervention assessment, intervention implementation, and post-intervention evaluation. Before the intervention, respondents were assessed using the Insomnia Severity Index (ISI), Pittsburgh Sleep Quality Index (PSQI), and a knowledge questionnaire to identify baseline sleep quality and understanding of foot reflexology. Observations and interviews were also conducted to obtain additional information regarding respondents' sleep patterns and daily conditions. questionnaire was used to evaluate respondents' understanding of foot reflexology education.

The intervention was conducted for six consecutive days through health education and practical foot reflexology sessions before bedtime. The educational materials included the definition of insomnia, signs and symptoms, factors affecting sleep disorders, benefits of foot reflexology, reflexology points on the feet, and step-by-step foot reflexology techniques. The foot reflexology procedure involved hand hygiene, warming movements on the feet, and thumb pressure applied to several reflex points, including the brain area, pineal gland, central nervous system, and solar plexus points. Each reflex point was stimulated for approximately 3–5 seconds, with a total therapy duration of 10–15 minutes per session.

After completion of the six-day intervention, post-test assessments using the ISI, PSQI, and knowledge questionnaire were administered to evaluate changes in insomnia severity, sleep quality, and respondents' knowledge levels. The collected data were processed descriptively by comparing pre-test and post-test results and were presented in narrative form and tables to describe changes observed during the intervention period.

The implementation process consisted of educational sessions, demonstrations, discussions, and direct observation of respondents during the intervention. Data obtained from interviews, questionnaires, and observation sheets were analyzed descriptively to identify changes in respondents' knowledge levels and sleep quality after receiving foot reflexology education and therapy.

### 3. RESULTS

This section presents the findings of the study regarding the implementation of foot reflexology education and its effect on sleep quality among elderly individuals experiencing insomnia. The results include respondent characteristics, implementation of the intervention, improvement of knowledge levels, and changes in insomnia severity and sleep quality based on the Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI).

#### 3.1 Characteristics of Respondents

The subjects in this study consisted of two elderly respondents selected based on predetermined inclusion criteria. Both respondents had experienced insomnia symptoms and had never previously received foot reflexology education or therapy.

*Table 1. Characteristics of Respondents*

Characteristics	Mrs. S	Mr. S
Age	74 years	68 years
Gender	Female	Male
Living Status	Living with children and grandchildren	Living alone
Living Environment	Quiet residential area	Noisy roadside area
Daily Activities	Gardening and housework	Light household activities
Main Complaint	Difficulty sleeping and frequent awakening	Difficulty sleeping and frequent awakening
Sleep Latency	>30 minutes	>30 minutes
Previous Reflexiology Experience	Never	Never

The two respondents had different social and environmental conditions. However, both respondents had never previously received foot reflexology education or intervention, making the therapy a new experience for them.

### 3.2 Implementation of Foot Reflexology Education

The implementation of foot reflexology education was conducted for six consecutive days. Educational activities were delivered according to the prepared health education plan and supported by educational leaflets. Respondents actively participated during the intervention process, including listening to explanations, asking questions, and following the reflexology demonstrations.

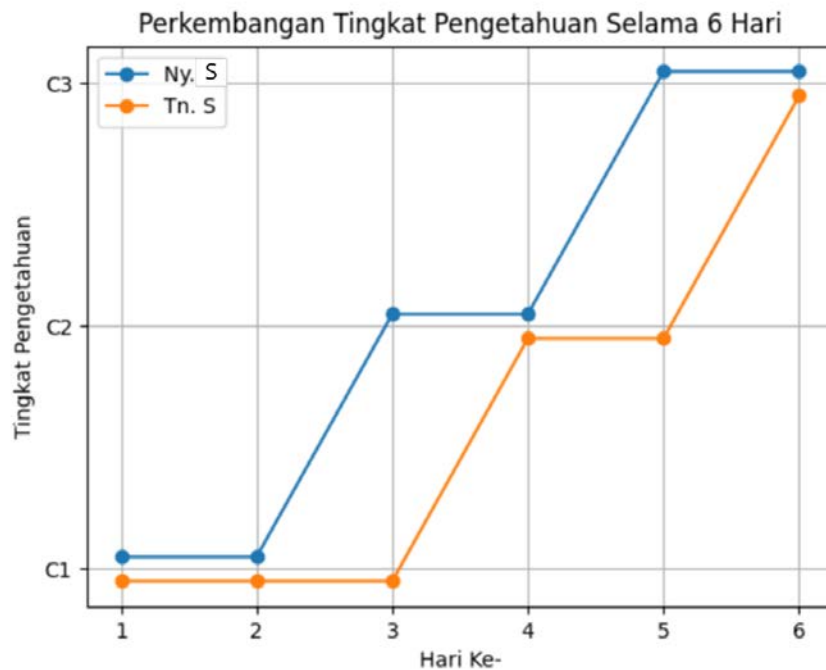
*Table 2. Observation Results of Foot Reflexology Education*

No	Observed Aspects	Mrs. S	Mr. S	Description
1	Education delivered according to plan	✓	✓	Implemented properly
2	Materials matched educational leaflet	✓	✓	Materials appropriate
3	Explanation understandable for elderly	✓	✓	Respondents understood
4	Reflexology demonstration conducted	✓	✓	Performed by researcher
5	Respondents paid attention	✓	✓	Cooperative responses
6	Respondents actively asked questions	✓	✓	Good participation
7	Procedure followed standard operating procedure	✓	✓	Procedure implemented correctly
8	Education repeated for 6 days	✓	✓	Consistent

The observation results indicated that the intervention was implemented successfully and consistently throughout the study period. Both respondents demonstrated active participation and positive responses during the educational sessions.

### 3.3 Knowledge Improvement During Six Days

The respondents' knowledge levels improved gradually after receiving repeated education for six days. Mrs. S reached the application level (C3) faster than Mr. S, although both respondents ultimately achieved the same level of knowledge improvement.

**Figures 1.** Development of Respondents' Knowledge Levels During Six Days

The figure above illustrates a gradual increase in respondents' knowledge levels during the six-day intervention period. Mrs. S demonstrated faster improvement compared with Mr. S.

**Table 3.** Knowledge Questionnaire Results Before and After Intervention

Respondent	Pre-test Score	Category	Post-test Score	Category
Mrs. S	2	C1 (Knowing)	6	C3 (Application)
Mr. S	2	C1 (Knowing)	6	C3 (Application)

The results showed that both respondents initially had limited knowledge regarding foot reflexology. After six days of education and practice, their knowledge levels improved from the "knowing" category (C1) to the "application" category (C3).

### 3.4 Results of ISI and PSQI Interview Assessment

Sleep quality and insomnia levels were assessed using the Insomnia Severity Index (ISI) and Pittsburgh Sleep Quality Index (PSQI) before and after the intervention. Prior to the intervention, both respondents experienced poor sleep quality characterized by difficulty initiating sleep, frequent nighttime awakenings, and prolonged sleep latency.

**Table 4.** ISI and PSQI Interview Results Before and After Intervention

Respondent	ISI Pre-test	ISI Post-test	PSQI Pre-test	PSQI Post-test	Interpretation
Mrs. S	Moderate insomnia	Mild insomnia	Poor sleep quality	Good sleep quality	Sleep quality improved
Mr. S	Moderate insomnia	Mild insomnia	Poor sleep quality	Good sleep quality	Sleep quality improved

The results demonstrated improvements in both insomnia severity and sleep quality following six days of foot reflexology intervention. Both respondents experienced reduced difficulty in initiating sleep, fewer awakenings during the night, and increased comfort while sleeping. Respondents also reported feeling more relaxed and physically refreshed upon waking.

### 3.5 Discussion

The findings of this study showed that repeated education and implementation of foot reflexology therapy contributed to improvements in respondents' knowledge levels and sleep quality. Both respondents demonstrated increased knowledge from category C1 (knowing) to C3 (application), indicating that they were able not only to understand the information provided but also to independently apply the foot reflexology techniques during the intervention process.

This finding reflects the concept of behavioral learning theory, which states that repeated educational exposure and direct practice may improve knowledge retention and skill acquisition among older adults. Repeated health education for six consecutive days allowed respondents to gradually understand and practice the reflexology techniques more confidently and consistently.

In addition, improvements in insomnia severity and sleep quality were observed after the intervention. Both respondents reported reduced difficulty initiating sleep, fewer nighttime awakenings, and improved physical comfort upon waking. These findings support the theory that foot reflexology may stimulate the parasympathetic nervous system, promote relaxation, improve blood circulation, and reduce muscle tension, thereby enhancing sleep quality.

The results of this study are consistent with previous studies conducted by Hwang and Shin (2022), who reported that foot reflexology reduced sleep disturbances among older adults [7]. Similarly, Zhang et al. (2023) explained that reflexology and foot massage may improve circulation and relaxation responses, contributing to better sleep comfort [10]. These previous findings strengthen the assumption that foot reflexology may serve as an effective complementary non-pharmacological intervention for elderly individuals experiencing insomnia.

Differences in intervention outcomes between Mrs. S and Mr. S may also be influenced by psychosocial and environmental factors. Mrs. S demonstrated faster improvement, possibly due to stronger family support and a quieter living environment, whereas Mr. S lived alone in a noisier environment. According to Hernandez et al. (2026), sleep quality among older adults is influenced not only by physiological conditions but also by social support and environmental comfort [11].

Overall, the findings suggest that foot reflexology may provide practical benefits as a complementary nursing intervention to improve sleep quality among elderly individuals with insomnia. However, the results should be interpreted cautiously because the study involved only two respondents and used a descriptive case study design without a control group.

## 4. CONCLUSIONS

The findings of this study indicate that foot reflexology education and therapy contributed to improvements in both knowledge levels and sleep quality among elderly individuals experiencing insomnia. Prior to the intervention, respondents demonstrated limited knowledge regarding foot reflexology and experienced poor sleep quality characterized by difficulty initiating sleep, frequent nighttime awakenings, and prolonged sleep latency.

After six consecutive days of education and implementation of foot reflexology, both respondents demonstrated increased knowledge levels from category C1 (knowing) to C3 (application). Respondents were able to understand the benefits of foot reflexology and apply the technique appropriately and independently.

In addition, improvements in sleep quality were observed after the intervention. Both respondents experienced reduced insomnia symptoms, improved sleep comfort, fewer nighttime awakenings, and better physical condition upon waking. These findings suggest that foot reflexology may serve as a beneficial complementary non-pharmacological intervention for improving sleep quality among elderly individuals with insomnia and diabetes mellitus.

Foot reflexology therapy may also provide practical benefits because it is simple, safe, low-cost, and easy to implement in community and home-care settings. Therefore, nurses, caregivers, and family members may consider applying foot reflexology as a complementary intervention to help improve sleep quality among older adults. Community health centers and elderly health

programs may also incorporate foot reflexology education into promotive and preventive health services for elderly populations.

However, the results of this study should be interpreted carefully because the number of respondents was limited and the intervention duration was relatively short. Further studies with larger sample sizes, longer intervention periods, and more diverse elderly populations are recommended to strengthen the evidence regarding the effectiveness of foot reflexology therapy among elderly individuals.

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