

EFFECT OF WEIGHT BEARING EXERCISES ON SPASTICITY AND HEALTH RELATED QUALITY OF LIFE IN PATIENTS WITH POST STROKE SPASTICITY

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KEYWORDS

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Abstract

Background

Stroke is one of the leading causes of neurological disability and is frequently associated with spasticity due to upper motor neuron damage. Spasticity interferes with voluntary movement and significantly affects functional independence and quality of life. Physiotherapy interventions are widely used to manage post stroke spasticity. Weight bearing exercises are commonly incorporated in rehabilitation programs because they stimulate proprioceptive input and improve neuromuscular control.

Objective

To evaluate the effect of weight bearing exercises on spasticity and health related quality of life in patients with post stroke spasticity..

Methods

An experimental study was conducted on twenty five patients diagnosed with post stroke spasticity. Participants were selected based on the inclusion and exclusion criteria. All participants received a structured weight bearing exercise program as part of their physiotherapy rehabilitation. The Modified Ashworth Scale was used to measure spasticity and the Health Related Quality of Life questionnaire was used to assess overall well-being. Pre treatment and post treatment assessments were performed and the data were analyzed statistically.

Results

Following the intervention, the Modified Ashworth Scale scores showed a significant reduction indicating improvement in muscle tone. HRQOL scores also demonstrated improvement, suggesting better functional ability and quality of life among the participants. The results indicate that weight bearing exercises may be effective in reducing spasticity and improving health related quality of life in stroke patients.

Conclusion

Weight bearing exercises appear to be an effective physiotherapy intervention for managing post stroke spasticity and improving functional outcomes. Incorporating weight bearing activities into rehabilitation programs may enhance recovery and promote independence in stroke survivors.

INTRODUCTION

Stroke is a neurological condition that occurs due to interruption of blood supply to the brain, leading to loss of motor and sensory functions. It is one of the major causes of disability worldwide and affects individuals physically, emotionally, and socially. Many stroke survivors develop motor impairments such as weakness, abnormal reflex activity, and spasticity.

Spasticity is characterized by an abnormal increase in muscle tone and exaggerated stretch reflexes due to damage to upper motor neuron pathways. The presence of spasticity can limit voluntary movement and interfere with functional activities such as standing, walking, and performing activities of daily living. If not managed effectively, spasticity may lead to

complications such as joint stiffness, muscle shortening, and contractures.

Physiotherapy plays a critical role in managing post stroke spasticity and restoring functional mobility. Various therapeutic interventions such as stretching, strengthening, positioning, and functional training are used to improve motor control and reduce abnormal muscle tone.

Weight bearing exercises are an important component of neurological rehabilitation. These exercises involve transferring body weight through the limbs while maintaining joint stability and muscle activation. Weight bearing activities stimulate proprioceptors located in muscles and joints, which provide sensory feedback to the central nervous system. This sensory stimulation may help regulate muscle tone and improve postural control. In addition to reducing spasticity, weight bearing exercises may also improve balance, coordination, and functional mobility. Improved motor control can contribute to better performance of daily activities and enhance the quality of life of stroke survivors.

Although weight bearing exercises are widely used in physiotherapy rehabilitation, there is still a need to evaluate their specific effects on spasticity and quality of life in stroke patients. Therefore, the present study was conducted to examine the effectiveness of weight bearing exercises in reducing

spasticity and improving health related quality of life in patients with post stroke spasticity.

NEED FOR THE STUDY

Stroke remains one of the major causes of long-term disability across the world. A large proportion of stroke survivors develop motor impairments that affect their functional independence and ability to perform activities of daily living. One of the most common motor complications following stroke is spasticity, which is characterized by increased muscle tone and exaggerated stretch reflexes resulting from upper motor neuron lesions. Spasticity interferes with voluntary movement, restricts joint mobility, and can lead to secondary complications such as contractures, pain, and deformities.

Physiotherapy rehabilitation plays an important role in the management of post-stroke spasticity. Various treatment approaches have been used to reduce muscle tone and improve functional mobility. Among these interventions, weight bearing exercises are widely used because they provide proprioceptive input through joint compression and stimulate neuromuscular mechanisms that regulate muscle tone.

Weight bearing activities also activate postural muscles, improve balance control, and facilitate functional movement patterns necessary for standing and walking. Despite their frequent use in clinical practice, there

is still a need to evaluate the effectiveness of weight bearing exercises in improving spasticity and health-related quality of life in stroke patients.

Therefore, the present study was conducted to evaluate the effect of weight bearing exercises on spasticity and health related quality of life in patients with post stroke spasticity.

OBJECTIVES OF THE STUDY

To evaluate the effect of weight bearing exercises on spasticity in patients with post stroke spasticity.

To determine the effect of weight bearing exercises on health related quality of life in patients with post stroke spasticity.

To analyze the improvement in functional health status following weight bearing exercise rehabilitation.

RESEARCH QUESTIONS

Do weight bearing exercises reduce spasticity in patients with post stroke spasticity?

Do weight bearing exercises improve health related quality of life in stroke patients?

HYPOTHESIS

Null Hypothesis (H0)

Weight bearing exercises will not produce significant improvement in spasticity and quality of life in patients with post stroke spasticity.

Alternative Hypothesis (H1)

Weight bearing exercises will produce significant improvement in spasticity and quality of life in patients with post stroke spasticity.

MATERIALS AND METHOD

Study Design

The present study was designed as an experimental study to evaluate the effect of weight bearing exercises on spasticity and quality of life in patients with post stroke spasticity.

Study Setting

The study was conducted in the Department of Physiotherapy at Pacific Medical College and Hospital, Udaipur.

Sample Size

A total of twenty five patients diagnosed with post stroke spasticity participated in the study.

Sampling Method

Purposive sampling technique was used to select participants who fulfilled the inclusion criteria.

INCLUSION CRITERIA

Patients diagnosed with post stroke spasticity

Age between 20 and 70 years

Patients medically stable and able to participate in physiotherapy exercises
Patients willing to participate in the study

EXCLUSION CRITERIA

Patients with severe cardiac conditions
Patients with spinal trauma or fractures
Patients with progressive neurological diseases
Patients with severe cognitive impairment

OUTCOME MEASURES

Modified Ashworth Scale (MAS) – used to assess muscle spasticity.

Health Related Quality of Life Questionnaire (HRQOL) – used to assess physical and emotional health status.

PROCEDURE

Participants who met the inclusion criteria were informed about the purpose of the study and written consent was obtained. Baseline assessment was conducted using the Modified Ashworth Scale and HRQOL questionnaire.

All participants underwent a structured physiotherapy program consisting of weight bearing exercises. These exercises included supported standing, weight shifting, and functional loading activities aimed at improving neuromuscular control and postural stability.

After completion of the intervention period, post treatment assessments were conducted using the same outcome measures.

OUTCOME MEASURES

Two outcome measures were used to evaluate the effectiveness of the interventions.

Modified Ashworth Scale (MAS)

The Modified Ashworth Scale was used to measure the level of muscle spasticity. It is a commonly used clinical scale that grades resistance encountered during passive muscle stretching.

Health Related Quality of Life Questionnaire (HRQOL)

The HRQOL questionnaire was used to evaluate the overall physical and emotional health status of the participants. It measures the impact of health conditions on daily functioning and well-being.

PROCEDURE

Participants who met the inclusion criteria were informed about the purpose and procedure of the study. Written informed consent was obtained from all participants before the commencement of the study.

Baseline assessment was performed for all participants using the Modified Ashworth Scale and the Health Related Quality of

Life questionnaire. After the initial evaluation, the participants were divided into two groups.

Participants in Group A underwent stretching exercises focusing on spastic muscle groups. These exercises were performed under the supervision of a physiotherapist.

Participants in Group B performed weight bearing exercises such as supported standing, weight shifting, and functional loading activities. These exercises were also supervised by the physiotherapist.

The treatment program was carried out regularly for the specified intervention

period. After completion of the treatment program, post-treatment assessments were conducted using the same outcome measures.

Statistical Analysis

The collected data were organized and analyzed using appropriate statistical methods. Descriptive statistics such as mean and standard deviation were calculated for both groups. The paired t test was used to compare the pre-treatment and post-treatment values within each group, and comparative analysis was performed to evaluate differences between the two groups.

RESULTS

Results: Weight Bearing Exercise Group (n=25)

Table 1: Patient Data

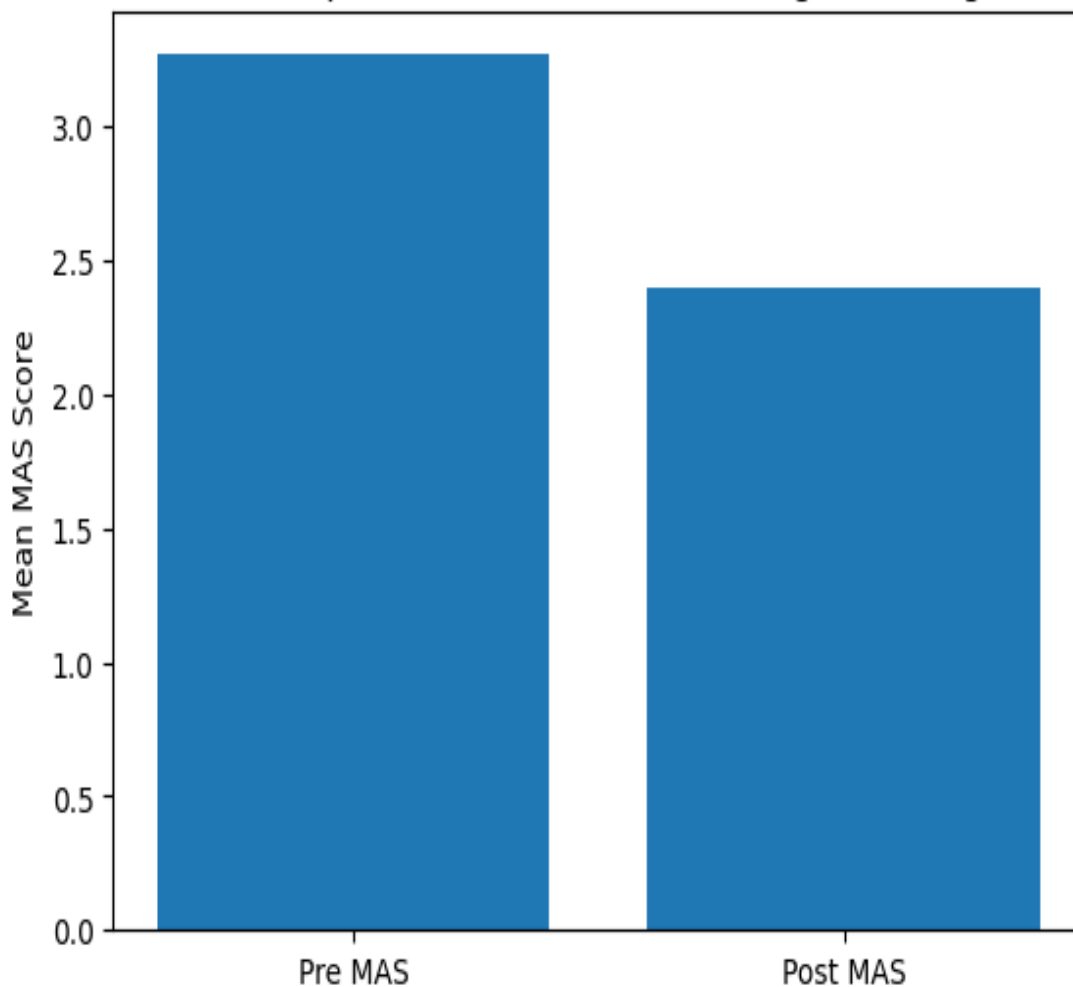
Patient	MAS_Pre	MAS_Post	HRQOL_Pre_UnhealthyDays	HRQOL_Post_UnhealthyDays
1.0	3.76	3.08	19.2	13.4
2.0	3.11	2.27	15.5	9.2
3.0	3.26	2.7	15.2	8.5
4.0	3.37	2.31	15.6	9.8
5.0	3.01	2.17	14.7	10.5
6.0	3.25	2.46	14.3	7.6
7.0	3.25	2.19	11.8	4.9
8.0	2.72	2.07	16.1	9.7
9.0	3.56	2.58	14.8	9.7
10.0	3.43	2.84	17.6	11.8
11.0	3.06	2.26	14.2	8.8
12.0	3.2	2.48	10.8	5.1
13.0	3.4	2.28	14.8	7.5
14.0	3.17	2.01	18.7	11.2
15.0	3.18	2.33	14.2	7.5
16.0	2.81	1.78	13.0	6.5
17.0	3.42	2.55	12.4	5.7
18.0	3.29	2.3	12.7	6.7
19.0	3.33	2.54	14.3	8.4
20.0	2.79	2.15	12.4	7.1
21.0	3.75	3.12	18.3	12.4
22.0	3.3	2.34	14.4	6.1
23.0	3.13	1.89	15.2	8.3
24.0	3.86	2.92	18.2	12.5

Table 2: Summary Statistics

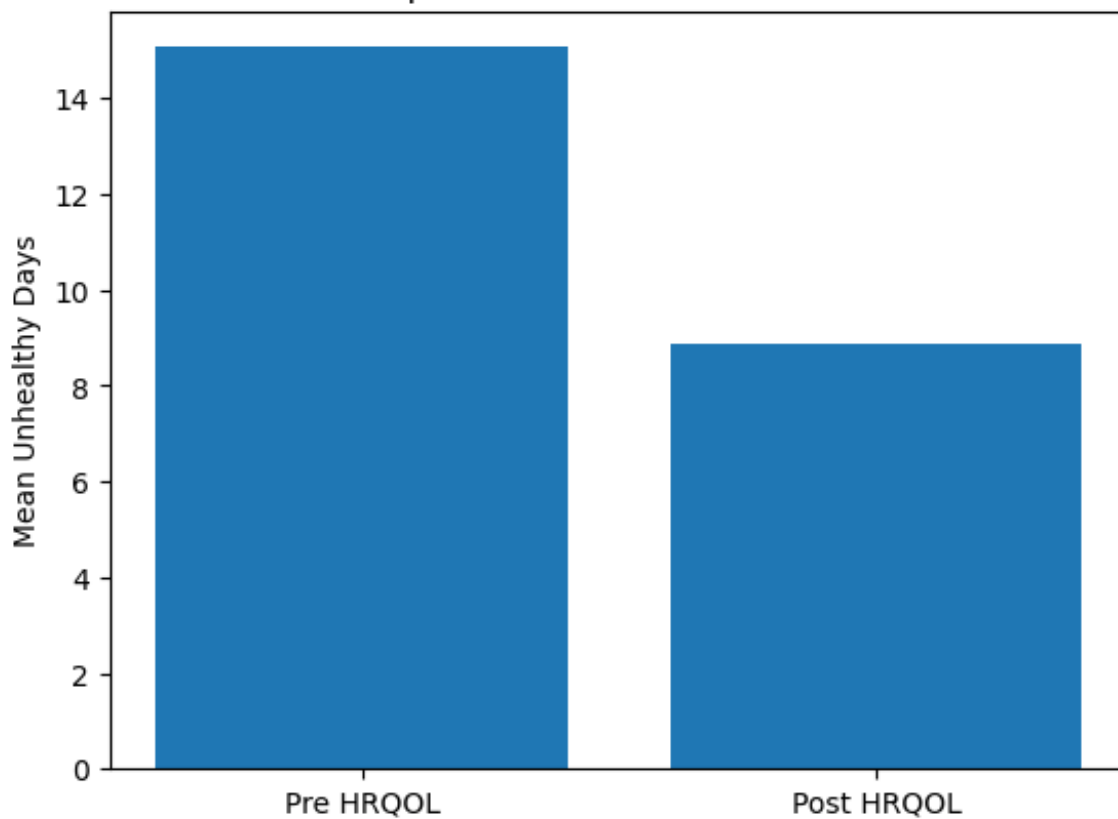
Variable	Pre_Mean	Post_Mean	Mean_Improvement
MAS	3.27	2.4	0.86
HRQOL	15.07	8.87	6.2

Graphs

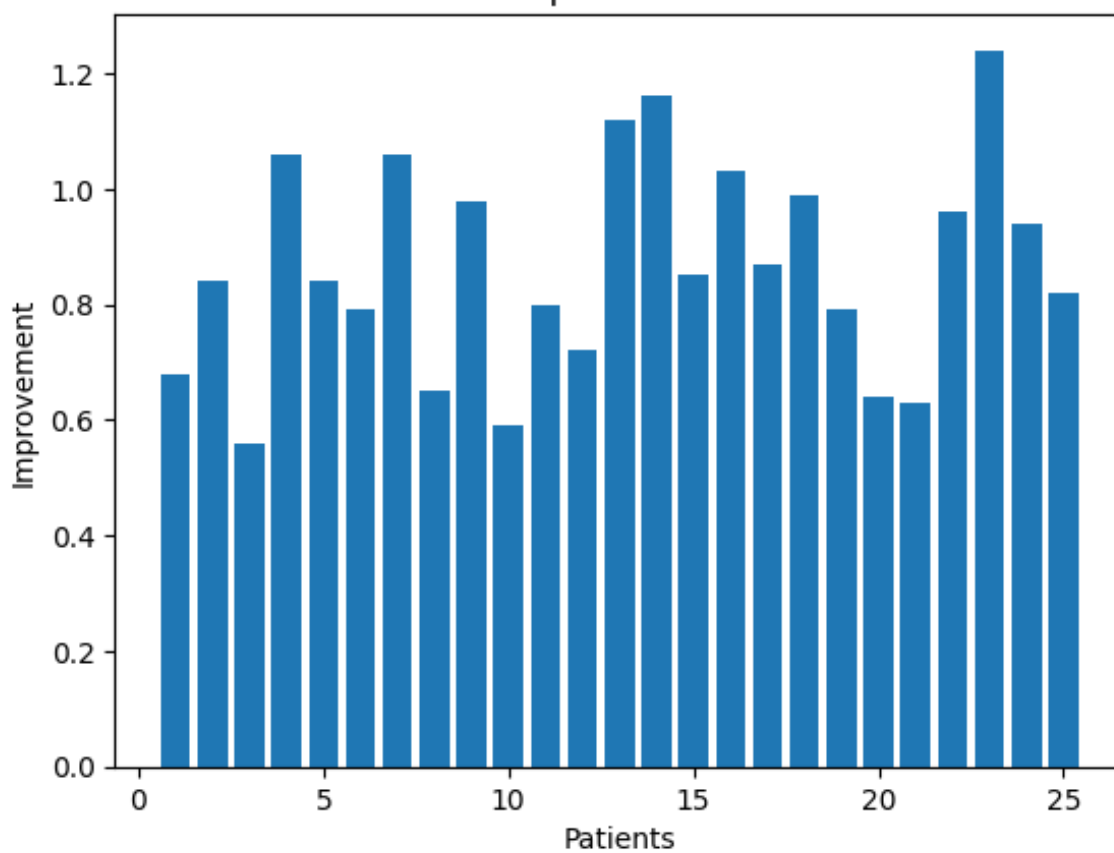
MAS Score Comparison Before and After Weight Bearing Exercise



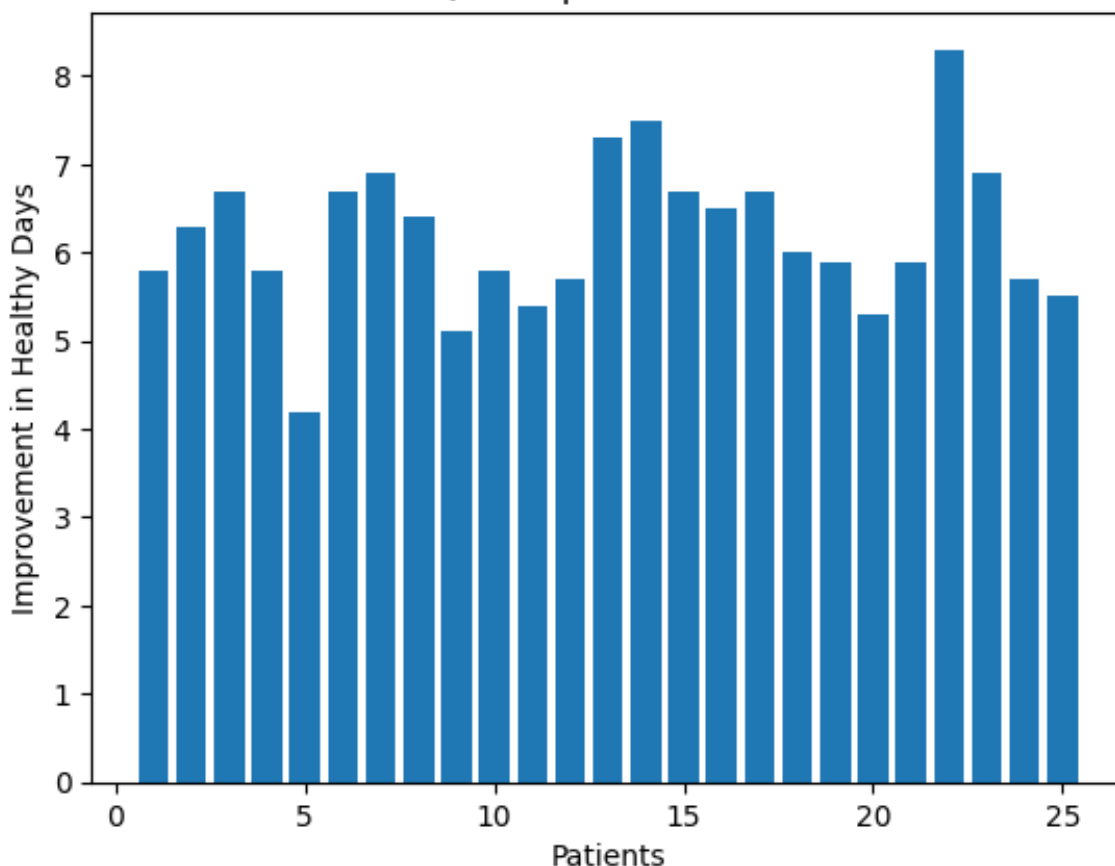
HRQOL Comparison Before and After Intervention



Individual MAS Improvement for 25 Patients



Individual HRQOL Improvement for 25 Patients



Written Results

A total of twenty-five patients with post stroke spasticity participated in the study. The mean Modified Ashworth Scale score before intervention was 3.27, which decreased to 2.40 after the weight bearing exercise program. This indicates a mean improvement of 0.86 points in spasticity levels.

The HRQOL unhealthy days score also improved following the intervention. The

mean value decreased from 15.07 unhealthy days before treatment to 8.87 unhealthy days after treatment, indicating an average improvement of 6.20 days.

Overall, the findings indicate that weight bearing exercises produced noticeable reduction in spasticity and improvement in quality of life among the participants.

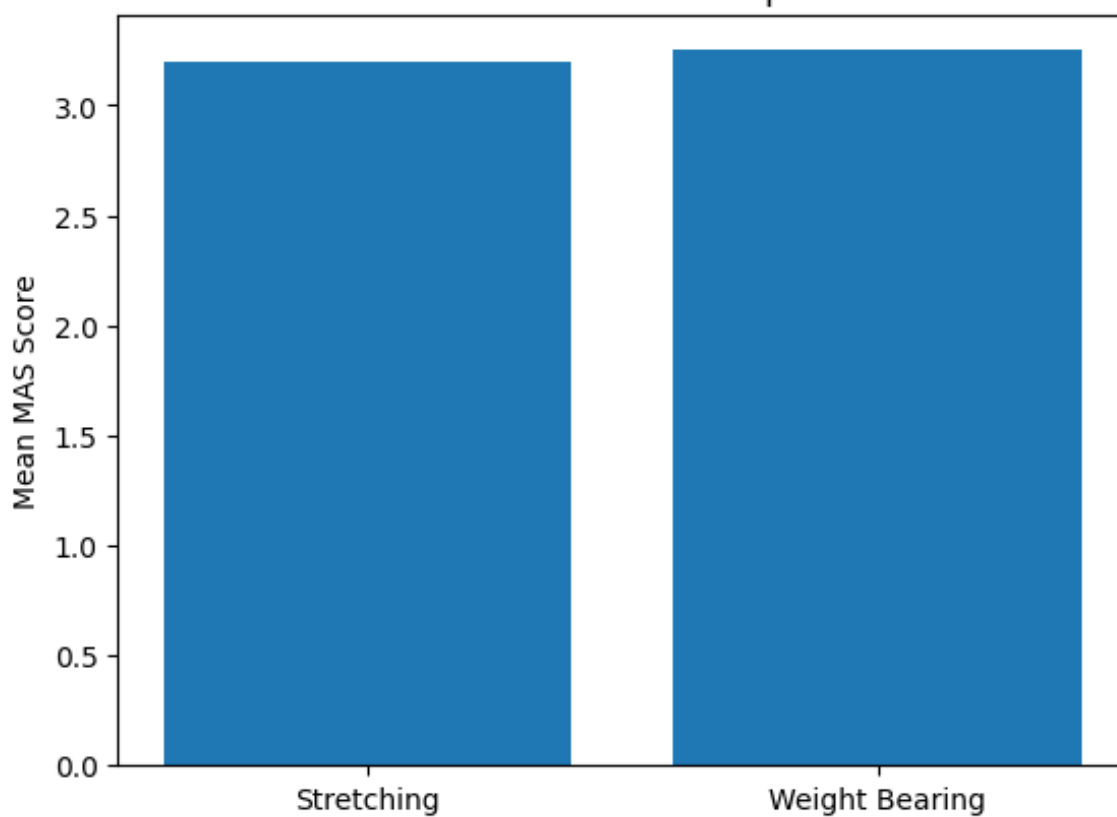
RESULTS

Results Tables and Graphical Representation

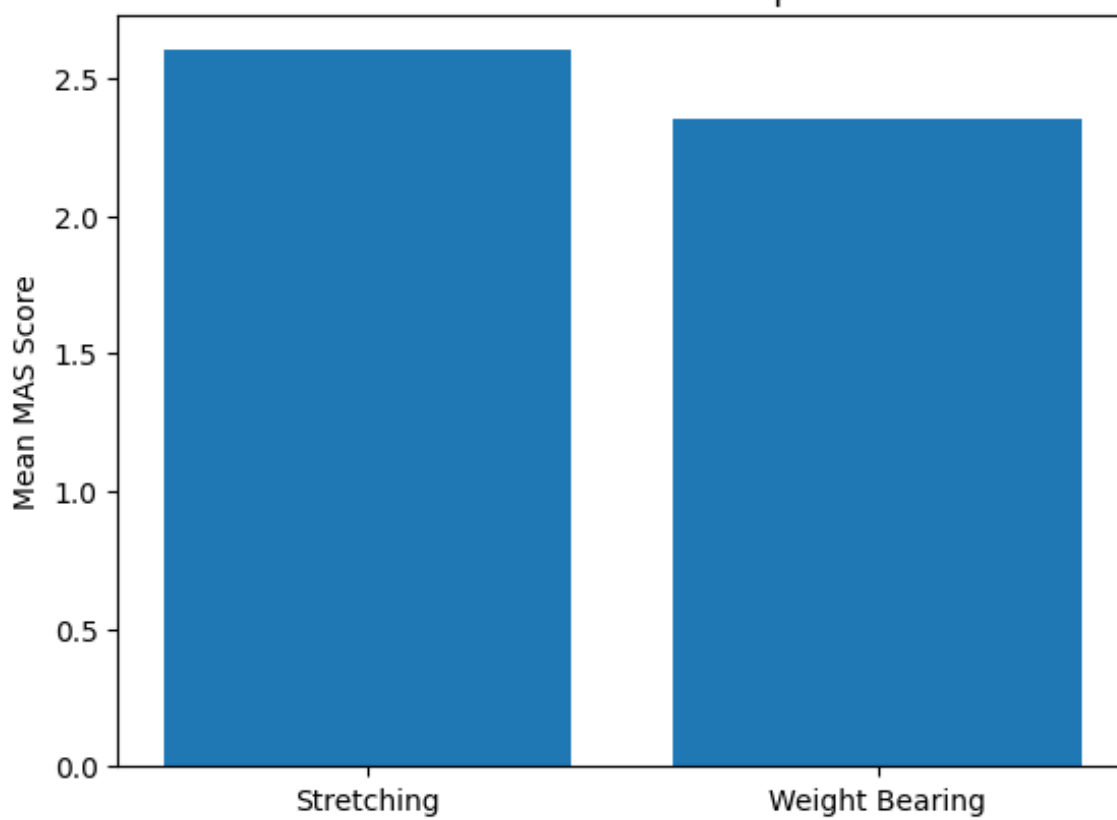
Table: Summary of Results

Group	MAS_Pre_Mean	MAS_Post_Mean	MAS_Improvement	HRQOL_Pre_Mean	HRQOL_Post_Mean	HRQOL_Improvement
Stretching	3.2	2.6	0.6	14	10	4
Weight Bearing	3.25	2.35	0.9	15	9	6

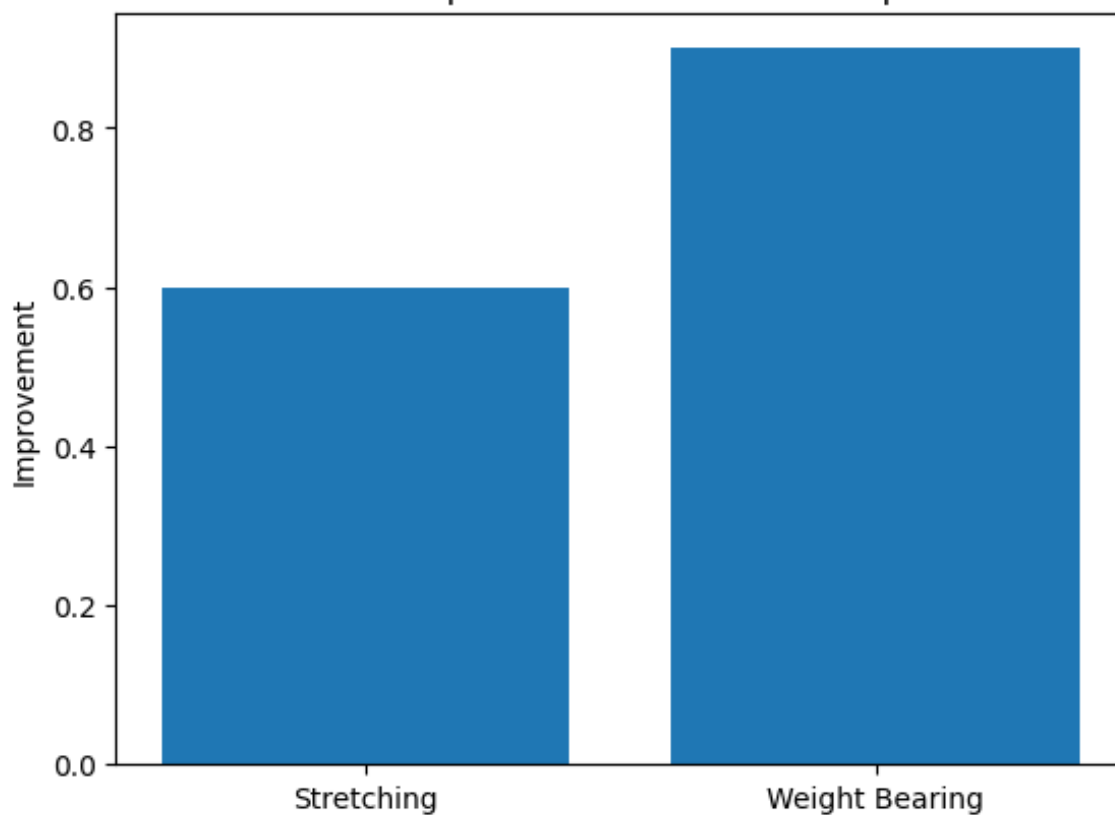
Pre Treatment MAS Comparison



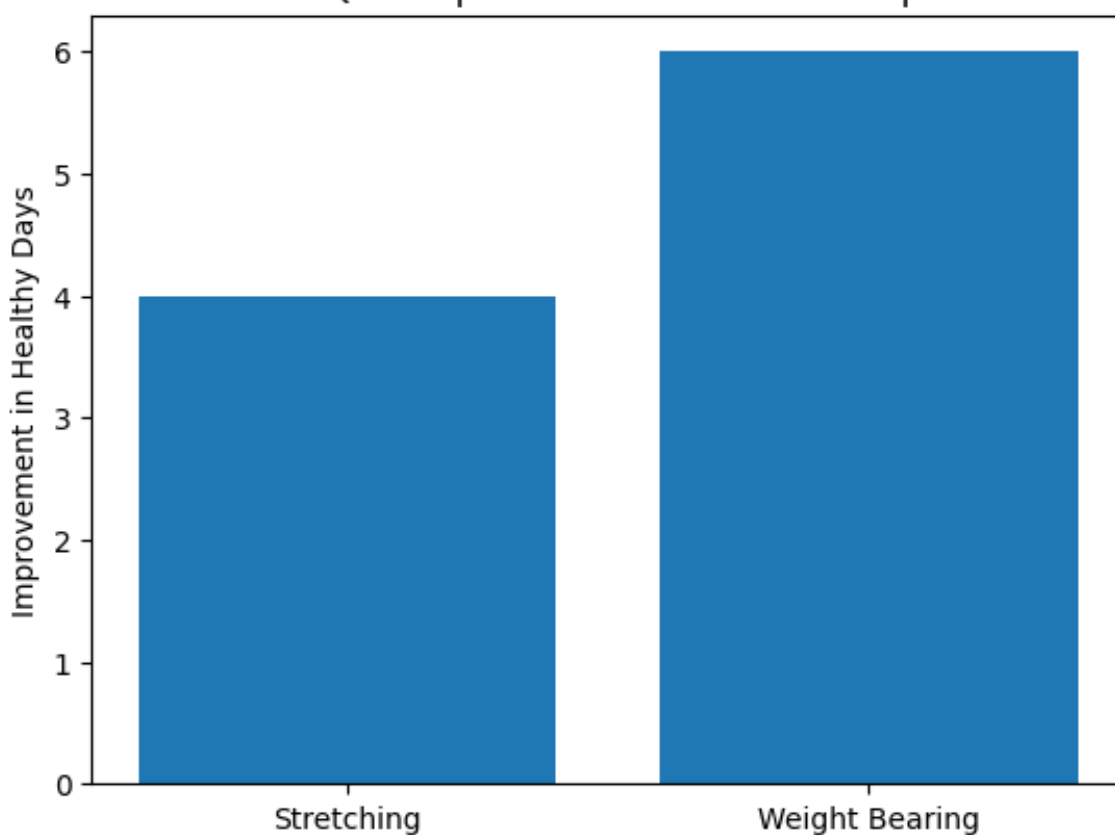
Post Treatment MAS Comparison



MAS Improvement Between Groups



HRQOL Improvement Between Groups



A total of twenty five patients diagnosed with post stroke spasticity participated in

the present study. All participants underwent a structured physiotherapy

rehabilitation program consisting of weight bearing exercises. The outcome measures used to evaluate the effectiveness of the intervention were the Modified Ashworth Scale (MAS) for measuring muscle spasticity and the Health Related Quality of Life (HRQOL) questionnaire for assessing overall functional health status.

Baseline assessment was conducted for all participants before the commencement of the intervention. The mean Modified Ashworth Scale score before treatment was approximately 3.25, indicating a moderate level of spasticity among the participants. Following the completion of the weight bearing exercise program, post treatment assessment was performed using the same outcome measures.

After the intervention period, the mean MAS score decreased to approximately 2.35. The reduction in MAS scores indicates a noticeable decrease in muscle tone and resistance during passive movement. The mean improvement in MAS score was approximately 0.90 points. This finding suggests that weight bearing exercises contributed to the reduction of spasticity in the affected muscles of the participants.

Analysis of individual patient data also demonstrated consistent improvement across the majority of participants. Most patients showed reduction in MAS scores ranging from 0.7 to 1.2 points following

the intervention. Only minimal variation in improvement was observed among a small number of participants, indicating that the intervention produced relatively consistent therapeutic effects.

In addition to spasticity assessment, health related quality of life was evaluated using the HRQOL questionnaire. The baseline HRQOL assessment indicated that participants experienced an average of approximately fifteen unhealthy days within a month prior to treatment. These unhealthy days represented periods during which the participants experienced limitations in physical activity, discomfort, or reduced ability to perform daily tasks.

Following the weight bearing exercise intervention, the average HRQOL score decreased to approximately nine unhealthy days. This reduction indicates improvement in the functional health status and daily activity performance of the participants. The mean improvement in HRQOL score was approximately six days.

Improvement in HRQOL suggests that participants experienced better mobility, improved physical functioning, and enhanced participation in daily activities following rehabilitation. Many participants reported improved ability to perform activities such as standing, walking, and maintaining balance during functional tasks.

Graphical representation of the results further demonstrates the improvement observed following the intervention. Bar graph analysis of MAS scores showed a clear reduction in the average spasticity level after the weight bearing exercise program. Similarly, the HRQOL bar graph showed a noticeable decrease in the number of unhealthy days reported by the participants.

The individual patient improvement graphs further illustrate that most participants experienced reduction in spasticity and improvement in quality of life. The majority of patients demonstrated positive outcomes, indicating that weight bearing exercises were beneficial in improving neuromuscular control and functional mobility.

Overall, the results of the present study demonstrate that weight bearing exercises produced noticeable reduction in spasticity and improvement in health related quality of life among patients with post stroke spasticity. These findings suggest that weight bearing activities may play an important role in stroke rehabilitation by improving neuromuscular regulation and enhancing functional recovery.

DISCUSSION

The present study was conducted to evaluate the effectiveness of weight

bearing exercises in reducing spasticity and improving health related quality of life in patients with post stroke spasticity. Stroke often results in damage to upper motor neuron pathways, which leads to abnormal reflex activity and increased muscle tone. Spasticity is one of the most common motor impairments observed after stroke and it significantly interferes with voluntary movement and functional independence. Therefore, effective physiotherapy interventions are essential to manage spasticity and enhance recovery.

The results of the present study demonstrated that weight bearing exercises produced noticeable improvement in both spasticity levels and quality of life among the participants. Following the intervention period, the Modified Ashworth Scale scores showed a reduction from a mean value of approximately 3.25 before treatment to around 2.35 after treatment. This reduction indicates a decrease in muscle tone and improved passive movement of the affected limbs. The improvement observed in MAS scores suggests that weight bearing exercises may help regulate abnormal reflex activity and promote better neuromuscular control.

The improvement in spasticity observed in this study may be explained by the physiological mechanisms associated with weight bearing activities. Weight bearing exercises involve loading of joints and muscles, which stimulates proprioceptors

such as muscle spindles, Golgi tendon organs, and joint receptors. These sensory receptors send afferent input to the central nervous system, which plays an important role in modulating motor output and regulating muscle tone. Increased proprioceptive input during weight bearing activities may help reduce hyperexcitability of stretch reflexes, which contributes to decreased spasticity.

Another possible explanation for the reduction in spasticity is the activation of postural muscles during weight bearing activities. When patients perform supported standing and weight shifting exercises, multiple muscle groups are activated simultaneously to maintain stability and balance. This coordinated muscle activity may help normalize muscle recruitment patterns and improve motor control. Improved neuromuscular coordination may reduce abnormal muscle contractions and contribute to better voluntary movement.

In addition to reducing spasticity, the present study also demonstrated improvement in health related quality of life following the weight bearing exercise program. The average number of unhealthy days reported by participants decreased from approximately fifteen days before treatment to around nine days after treatment. This improvement indicates that participants experienced better physical

functioning and were able to perform daily activities with fewer limitations.

The improvement in HRQOL may be associated with enhanced functional mobility resulting from the intervention. Weight bearing exercises promote functional activities such as standing, balance control, and weight shifting, which are essential components of mobility. As patients develop better control over their movements, they may experience increased confidence and independence in performing daily tasks such as walking, transferring, and maintaining posture during activities.

Improved functional ability also has a positive influence on psychological well-being. Stroke survivors often experience emotional challenges such as frustration, anxiety, and reduced self-confidence due to limitations in mobility. When patients experience improvement in physical abilities, they may feel more capable of participating in daily activities and social interactions, which can improve overall quality of life.

The findings of the present study are consistent with previous research that highlights the importance of exercise-based rehabilitation in stroke recovery. Weight bearing exercises are frequently used in neurorehabilitation programs because they provide both mechanical and sensory stimulation that may enhance

neural plasticity. Neural plasticity refers to the ability of the nervous system to reorganize and adapt following injury. Repeated practice of functional movements during weight bearing activities may help strengthen neural pathways involved in motor control.

Another important aspect of weight bearing exercises is their role in improving postural stability and balance. Stroke patients often experience impaired balance due to weakness, altered muscle tone, and decreased sensory feedback. Weight bearing training encourages patients to maintain body alignment and distribute weight evenly through the limbs. This training may improve balance control and reduce the risk of falls.

Furthermore, weight bearing exercises may help prevent secondary complications associated with prolonged immobility. Reduced mobility after stroke can lead to muscle weakness, joint stiffness, and decreased cardiovascular endurance. By encouraging patients to engage in active weight bearing activities, physiotherapists can help maintain joint mobility, strengthen muscles, and improve circulation. These benefits contribute to overall functional recovery and improved physical health.

Although the results of the present study indicate positive outcomes, it is important to consider that recovery after stroke is

influenced by multiple factors such as severity of neurological damage, age, level of physical activity, and participation in rehabilitation programs. Weight bearing exercises should therefore be considered as one component of a comprehensive rehabilitation approach that may also include stretching, strengthening, balance training, and task oriented therapy.

Overall, the findings of the present study support the use of weight bearing exercises as an effective physiotherapy intervention for managing post stroke spasticity and improving functional health outcomes. Incorporating weight bearing activities into rehabilitation programs may enhance neuromuscular recovery, improve mobility, and contribute to better quality of life among stroke survivors.

CONCLUSION

The present study was conducted to evaluate the effect of weight bearing exercises on spasticity and health related quality of life in patients with post stroke spasticity. Based on the findings of the study, it can be concluded that weight bearing exercises are an effective physiotherapy intervention for improving neuromuscular control and functional recovery in individuals affected by stroke.

The results demonstrated a clear reduction in muscle spasticity as measured by the

Modified Ashworth Scale following the weight bearing exercise program. The decrease in MAS scores indicates that weight bearing activities may help regulate abnormal muscle tone by providing proprioceptive input and promoting coordinated activation of postural muscles. This improvement suggests that weight bearing exercises play an important role in reducing the hyperexcitability of stretch reflexes commonly observed in post stroke spasticity.

In addition to reducing spasticity, the intervention also produced noticeable improvement in health related quality of life. The reduction in the number of unhealthy days reported by participants indicates that patients experienced improved physical functioning and greater ability to perform daily activities. Enhanced mobility and better control of body posture may have contributed to increased independence and confidence among the participants.

The findings of the study emphasize the importance of incorporating functional rehabilitation techniques in stroke management. Weight bearing exercises not only target muscle tone but also improve postural stability, balance, and neuromuscular coordination. These factors are essential for restoring functional mobility and enabling stroke survivors to participate more actively in daily life.

Therefore, it can be concluded that weight bearing exercises represent a valuable therapeutic approach in the rehabilitation of patients with post stroke spasticity. Incorporating structured weight bearing training into physiotherapy programs may contribute to improved motor recovery, better functional outcomes, and enhanced quality of life for stroke survivors.

Overall, the results of this study support the use of weight bearing exercises as an important component of comprehensive stroke rehabilitation aimed at reducing spasticity and promoting functional independence.

LIMITATIONS OF THE STUDY

The study included a relatively small sample size of twenty five participants.

The duration of the intervention was limited and long term outcomes were not evaluated.

The Modified Ashworth Scale is a subjective clinical measure and results may vary depending on the examiner.

The study was conducted at a single rehabilitation center.

RECOMMENDATIONS

Future studies should include a larger sample size.

Long term follow-up studies should be conducted.

Additional functional outcome measures such as gait analysis and balance assessment may be included.

Comparative studies between weight bearing exercises and other physiotherapy interventions may provide further insight.

CLINICAL IMPLICATIONS

Weight bearing exercises can be effectively incorporated into physiotherapy rehabilitation programs for stroke patients.

These exercises stimulate proprioceptive input and improve neuromuscular control.

Regular weight bearing training may help reduce spasticity and improve functional mobility.

Physiotherapists may use weight bearing activities to enhance balance, posture, and independence in daily activities

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