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A STUDY TO FIND OUT THE EFFECT OF DYNAMIC REVERSAL PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION (PNF) TECHNIQUE ON ANKLE MOBILITY IN PARTICIPANTS OCCUPIED IN PROLONG STANDING OCCUPATION– AN INTERVENTIONAL STUDY

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Abstract: **BACKGROUND AND OBJECTIVE:** Prolonged standing Occupations require extended periods of standing work, leading to muscle fatigue in the lower extremities, causing maladaptive ankle joint positioning. A challenging function of the postural control system in humans is to maintain safety within bipedal stance movement patterns for our upright body position. And because locomotion is an integral part of many daily activities, mobility in the ankle joint complex is a constant requirement of these tasks. Limited ROM of the ankle joints prevents activities of daily living (ADLs) such as walking, standing up, and climbing stairs. In addition, the technique of dynamic reverse proprioceptive neuromuscular facilitation forms the movement pattern of activities of daily life. **OBJECTIVE:** To compare the effect of dynamic reverse proprioceptive neuromuscular facilitation technique and intermittent stretching on dorsiflexion range of motion, planterflexion range of motion, and foot and ankle range of motion in participants with prolonged standing occupation. **METHODOLOGY:** A total of 60 participants occupied in Prolong standing Occupation, male and female in the age group of 30-50 years were included. Written informed consent was obtained from participants who met the selection criteria. 60 subjects were divided into two groups as Group A: Intervention (PNF) group, Group B: Control group (Intermittent Stretching). Participants were divided into two groups with odd and even randomization methods. Outcome measures were dorsiflexion and planterflexion range of motion and FAAM score. **RESULTS:** Data analysis was performed using SPSS version 21.0 software. Data analysis indicated that both the dynamic reverse PNF group and the intermittent stretching group showed significant changes in improvement in range of motion ($p<0.05$) and left and right leg FAAM scores ($p<0.05$). But in the intergroup comparative analysis, neither group was found to be superior to the other in increasing dorsiflexion range of motion ($p>0.05$), plantar flexion range of motion ($p>0.05$), and the degree of foot and ankle measurement. ($p>0.05$. **CONCLUSION:** Based on this study, dynamic reversals were effective in improving both planterflexion and dorsiflexion range of motion along with an increase in FAAM scores but was not superior to that of the control group.

Index Terms **- Dynamic Reversal PNF Technique, Intermittent Stretching, Weight Bearing Lunge Test, Functional Heel Raise Test, Ankle Mobility**

I. INTRODUCTION

Prolonged standing can be defined as standing for more than one hour without moving from a workstation and standing for more than four hours a day.[1] However, numerous occupations require extended periods of standing work[2]. Long tenure is commonly required in jobs related to sales, catering, healthcare, education, and manufacturing. Currently, prolonged standing can mean anything from 4 to 8 hours and from 62% to 75% of a work shift.[3] According to an analysis by the European Foundation in the Fifth European Survey of Working Conditions in 2012, "47% of the above-mentioned professionals performed work tasks while standing for more than 75% of their working time."[4] In addition, prolonged standing is associated with ankle/foot related disorders. Additionally, increased tension in the posterior muscles of the lower limb has been reported in such cases, leading to musculoskeletal pain (MSP) and musculoskeletal disorders. Uncomfortable or unsafe standing positions are reported to contribute to work-related MSP.2 According to the Dutch ergonomic guidelines for prolonged standing, prolonged standing is classified into one of three zones: Green (safe – continuous standing ≤ 1 hour and total/day ≤ 4 hours), orange (action recommended - continuous standing > 1 hour or total/day > 4 hours) or red (direct action required - continuous standing > 1 hour and total/day > 4 hours). Standing longer

than 2 hours affects the hips and more than 3 hours overall affects the lower limb. Physiological/biomechanical measures are not affected by exposure time or floor/shoe condition. Acute periods of standing (30 minutes to 4 hours) also have harmful effects on the body. Levels of leg, leg and lower back discomfort, as well as feelings of fatigue, have been shown to increase over time. The combination of gravity and insufficient muscle contraction contributes to increased venous pressure, venous stasis, and increased foot/calf volume, which is thought to cause accumulation of pain-inducing metabolites and stress on passive structures. Muscle coactivation during standing may vary between individuals and it is possible, that fatigue in individual muscles could also depend on the specific standing position of the participant or on pre-existing muscle preferences. Changes in plantar pressures over time most likely led to changes in ankle kinetics. However, when an individual is in prolonged standing, the anterior and posterior both muscle groups of the lower limb are activated simultaneously to maintain the ankle joint in a neutral position on the ground. During this joint contraction, the calf muscles, which are antigravity muscles, neutralize the effect of ground reaction forces and the eccentric contraction of the ankle dorsiflexors in standing.

Constant co-contraction of lower limb muscles causes them to fatigue, which in turn leads to lower peak motor unit discharge rates, slower contractile properties, and greater reliance on oxidative metabolism, which limits overall muscle flexibility. Limited flexibility of the foot during prolonged standing leads to a reduction in the range of motion of the ankle. Altered biomechanics can predispose individuals to develop pathologies such as metatarsalgia, ankle sprain, and tibial medial traction periostitis, as well as Achilles tendinopathy, plantar fasciopathy, and gastrocnemius strain even in the healthy population. Also, limited ankle ROM has been associated with poor balance and increased risk of falls in the elderly. Limited Range of motion (ROM) of the lower extremity joints hinders activities (ADLs) such as walking, standing up, and climbing stairs. Patients may also have difficulty with activities such as dressing, using the toilet, bathing, picking up objects, crouching, etc.[5] Since long standing is a strenuous activity, the weighted lunge test (WBLT) would be a functional and reliable method to indirectly assess the dorsal flexi While the Functional Heel Raise Test (FHRT) is used to measure planterflexion. In addition, the Foot and Ankle Measurement Scale (FAAM) is a functional scale to measure the functional limitation of an individual with an ankle-related condition. A stretching therapy maneuver was used to improve the range of intermittent stretching (cyclic stretching) when there was a decrease in flexibility due to muscle impairment leading to reduced range of motion. While the dynamic reverse (DR) PNF technique is a type of reversal of the antagonistic PNF technique. Which is based on Sherrington's principle of gradual induction. This technique involves active movement changing from one direction (agonist) to the opposite (antagonist) without pausing or relaxing. In normal life, we often encounter this kind of muscle activity: throwing a ball, riding a bicycle, walking, etc. So, standing for a long time leads to a decrease in flexibility, which leads to a decrease in the range of motion of the ankles, which is an essential component for maintaining human biomechanics, which in turn affects activities of daily living. Thus, the measurement tool to access the range of motion and therapeutic intervention to increase the affected range of motion should be in a weight-bearing position.

II. AIM & OBJECTIVES

Aim: - To find out the effect of dynamic reversal proprioceptive neuromuscular facilitation (PNF) technique on ankle mobility in participants occupied in prolong standing occupation.

Objectives: - To measure ankle ROM and FAAM score pre and post intervention in interventional group and Control Group in participants occupied in prolong standing occupation.

III. HYPOTHESIS

- **Null Hypothesis: -** There is no significant difference in ROM and FAAM score after intervention.
- **Alternative Hypothesis: -** There is significant difference in ROM and FAAM score after intervention.

IV. METHODOLGY

Study setting: - Study was conducted at Shri.K.K. K Sheth Physiotherapy College, Rajkot

Source of data: - Areas in and around Rajkot city.

Study population: - Subjects being indulged in prolong standing work for more than or equal to 3 hours; for since more than 4 years. (Professors, Salesman, vegetable venders, Traffic police)

Sampling technique: - Purposive sampling technique for subject selection and Simple random sampling technique for group allotment.

Study design: - An Interventional study.

Sample size: - 60 subjects (Group A- 30 subjects & Group B- 30 subjects)

Methodology: -

60 subjects indulged in prolong standing occupation and of age group 25-50 years were selected for the study that fulfilled the inclusion and exclusion criteria as follows: -

~Inclusion criteria: **-** Age group between 30-50 years of age, both male as well as female, Participants being indulged in prolong standing work for more than or equal to 3 hours; for since more than 4 years. (Professors, Salesman, vegetable venders, Traffic police). Participants with decreased Ankle Dorsiflexion and Planterflexion Range of motion (i.e., ADROM less than 20° and PFROM less than 50°)

~Exclusion criteria: **-** Subjects with Systemic Disease, on Analgesics, with recent (1 year) Lower limb or spine fractures, with recent (1year) Lower limb or spinal surgeries, with Fibromyalgia, having any neurological or vascular symptoms in lower limb, Pregnant subjects, having any deformity of spine, taking other physiotherapy treatment for same condition, apprehensive for the Stretching Techniques, Un-cooperative patient.

After Selection of the patients in the study they were divided into 2 groups with odd and even sampling method where the A group had odd numbered of patients while B group have even numbered patients. The procedure was explained to the patient and consent form was signed by them while the study setup includes Measure tape, Marker, Ruler, Chair, Plinth, Consent Form, Data collection sheet & Goniometer (Figure 4.1,4.2). Later on, Pre and post measurements for ROM and FAAM score where taken as follows: -

~Measurement Procedure:

- **Foot and Ankle Ability Measure (FAAM) Activities of Daily Living Subscale21: -**

The subjects were asked questions present in the FAAM scale and the total score was calculated before applying treatment and after 2 weeks of applying the treatment.

- **Ankle Dorsiflexion range of motion (Figure 4.3): -**

Subjects were in a standing position facing a wall with the test foot parallel with a tape measure secured to the floor with the second toe, center of the heel, and knee perpendicular to a wall. To promote upright balance during the test, the opposite limb was positioned approximately 1-foot length behind the test foot in a comfortable tandem stance and subjects placed their hands on the wall. Subjects performed a total of 6 trials of the WBLT on each limb. While maintaining this position, subjects were instructed to perform a lunge in which the knee was flexed with the goal of making contact between the anterior knee and the wall while keeping the heel firmly planted on the floor. When subjects were able to maintain heel and knee contact, the test foot was progressed away from the wall and the subjects repeated the modified lunge. Subjects were progressed in 1 cm increments until the first lunge that the heel and knee contact could not be maintained. At that point, foot placement was adjusted in smaller increments to achieve the maximum distance from the wall and continue to maintain knee contact without lifting the heel. Maximum lunge distance on the WBLT was measured to the nearest 0.1 cm by a tape measure secured to the floor. Previous research indicates every 1 cm away from the wall is equivalent to approximately 3.6º of ankle/subtalar dorsiflexion. Maximum lunge distance was defined as the distance of the great toe from the wall based on the furthest distance the foot was able to be placed without the heel lifting from the ground while the knee was able to touch the wall.[6]

- **Ankle Planter flexion range of motion (Figure 4.4): -**

The heel-rise was performed on each limb with the participant in a standing position. The stance limb was positioned in relative extension and participants stood facing the wall with the tip of their great toe 15 cm from the wall. Balance was maintained by allowing the participant's fingertips to touch the wall with elbows in 90 degrees of flexion. Participants were instructed to shift their weight onto the test limb and stand as erect as possible. The non-stance limb was held in slight knee flexion to attain a non-weight bearing NWB position.[7]Participants were instructed to perform a maximal unilateral heel-rise by rising onto their toes. The participant was instructed to perform a simple up and down motion at a self-selected speed, without any prolonged hold. The participant's maximum height was recorded at the completion of the movement. The examiner calculates the height by marking the point on wall parallel to the vertex of the head of participant. FHRT score was calculated by subtracting the starting height from the participant's maximum height. Three FHRT measurements were recorded on each limb and averaged, respectively. Each participant underwent three practice trials followed by a 30-second rest period prior to three test trials on each limb.[8]

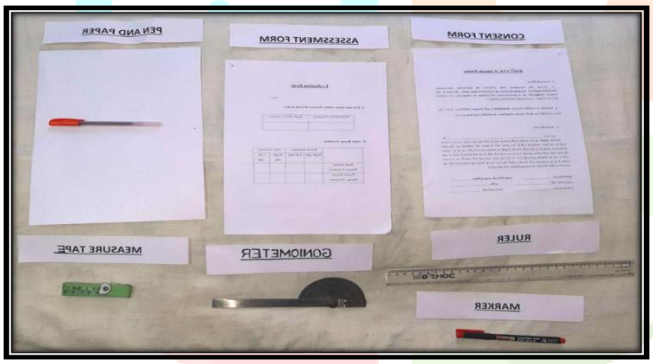


Figure 4.1

Figure 4.2

~Treatment Protocol: -

- **Group A Treatment Protocol (Figure 4.5): - (Dynamic Reversal PNF Technique) [9]**

→ *Patient's position:* - Supine lying with foot outside the edge of plinth.
→ *Therapist position:* - Standing at the foot side of the subject in stride standing position.
→ *Procedure:* - Subject being in supine lying and therapist at side of feet asked the patient to actively move the foot one after the another in dorsiflexion and Planterflexion. Thereafter therapist resists Dorsiflexion and Planterflexion movement in full available range without any pause. 3 sets per day, 6 times per week for 2 weeks were applied to patient.

- **Group B Treatment Protocol (Figure 4.6,4.7): - (Intermittent Stretching Technique)[10]**

→ *Patient's position:* - Supine lying with foot outside the edge of plinth.
→ *Therapist position:* - Standing at the foot side of the subject in stride standing position.
→ *Procedure:* - Subject being in supine lying and therapist at side of feet asked the patient to relax their feet. Thereafter therapist applied stretch to dorsiflexors and planterflexors one after another, each with hold of 30 secs with total 3 sets per day, 6 times per week for 2 weeks.

Figure 4.3

Figure 4.4

Figure 4.3 Measurement of ankle dorsiflexion range of motion of left foot by WBLT
Figure 4.4 Measurement of ankle planterflexion range of motion of right foot by FHRT

Figure 4.5

Figure 4.6

Figure 4.7

Figure 4.5 Dynamic reversal for left ankle joint
Figure 4.6 Intermittent stretching for ankle planterflexors
Figure 4.7 Intermittent stretching for ankle dorsiflexors

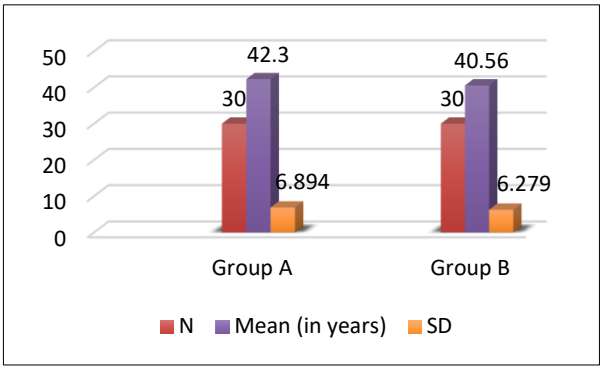
V. RESULTS

Statistical analysis: -
-Statistical software:
All statistical analysis was done by SPSS statistics version 21.0 for windows software &Microsoft excel was used to calculate mean and to generate graphs and tables.
-Statistical test:
Baseline values for demographic data and outcome measures were checked and they were same at the baseline. Mean was calculated as a measure of central tendency for Ankle Range of Motion and Foot and Ankle Measure (FAAM) Scale respectively and Standard Deviation (SD) was calculated as a measure of dispersion. Normality of data was checked by using Shapiro Wilk test which shows that data for ROM of group A and B is of non-parametric type and data for FAAM of group A and group B is of non-parametric type. Intra-group pre-treatment and post treatment data of Ankle Range of Motion and Foot and Ankle Measure (FAAM) Scale was analyzed by Wilcoxon signed rank test. Inter-group comparison of NPRS and AKE was analyzed by Mann-Whitney U baseline. Mean of significance (p value) was set to 0.05 value.

Table 5.1: Mean (in years) and SD of Age of Group A and B

Group	N	Mean (in years)	SD
Group A	30	42.30	±6.894
Group B	30	40.56	±6.2790

Graph 5.1: Mean (in years) and SD of group A and group B

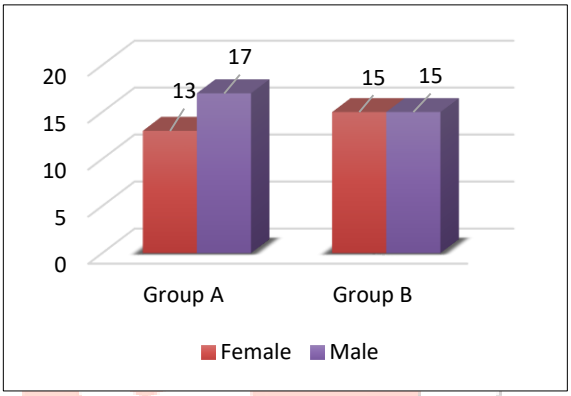


Interpretation: The above table shows the mean age of subjects for Group A (30) and for Group B (30). The mean age of Group A is 42.3 ±6.894 and mean age of Group B is 40.56 ±6.279. Result shows that mean age of group A > group B, and SD of group A > group B.

Table 5.2: Gender distribution of Group A and Group B

Gender	Group A	Group B
Female	13	15
Male	17	15

Graph 5.2: Gender distribution of Group A and Group B



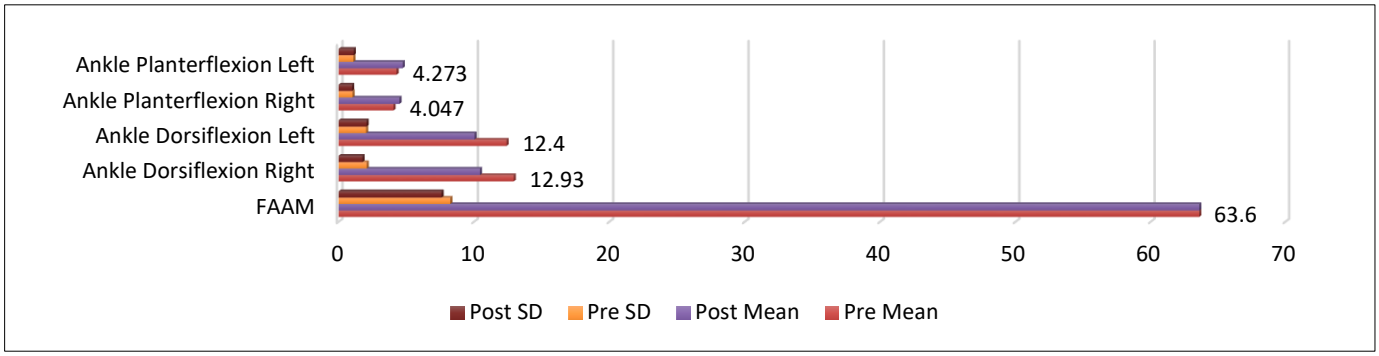
Interpretation: The above table shows 13 females and 17 males in group A, 15 females and 15 males in group B i.e., there was unequal ratio of gender distribution between groups

Table 5.3: Intragroup comparison of Ankle ROM and FAAM Scale of Group A

Outcome measure		Z value	P value	Result
FAAM	**Pre treatment**	-4.798	0.001	Significant
	Post treatment			
Ankle Dorsiflexion Right	**Pre treatment**	-4.310	0.002	Significant
	Post treatment			
Ankle Dorsiflexion Left	**Pre treatment**	-4.745	0.002	Significant
	Post treatment			
Ankle Planterflexion Right	**Pre treatment**	-4.628	0.004	Significant
	Post treatment			
Ankle Planterflexion Left	**Pre treatment**	-4.471	0.003	Significant
	Post treatment			

Interpretation: Result showed negative Z score and $p < 0.05$. The average mean of post dorsiflexion range of motion in both right and left side is decreased to that of pre dorsiflexion range of motion which indicates increase in dorsiflexion range of motion suggesting more amount of lunge in weight bearing position. While the average mean of post planterflexion range of motion in both right and left side is increased to that of pre planterflexion range of motion which indicates increase in planterflexion range of motion suggesting more amount of heel raise in weight bearing position. The FAAM score showed insignificant change in pre and

post measurements. Thus, it can be said that., a significant difference was found between pre and post treatment scores of ankles range of motion in Group A.

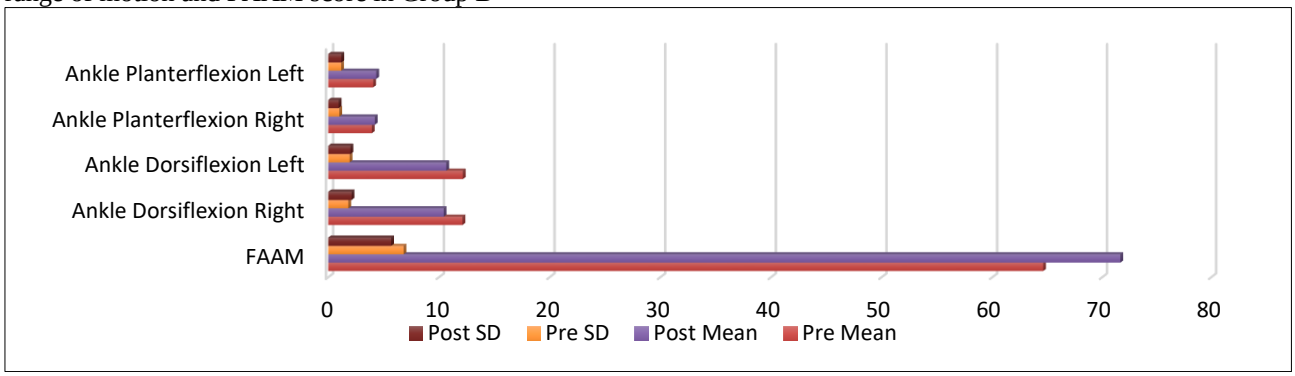


Graph 5.3: Intragroup comparison of Ankle ROM and FAAM Scale of Group A

Table 5.4: Intragroup comparison of Ankle ROM and FAAM Scale of Group B

Outcome measure		Mean	SD	Z	P value	Result
FAAM	**Pre treatment**	64.600	±6.8107	-4.825	0.001	Significant
	Post treatment	71.667	±5.6832			
Ankle Dorsiflexion Right	**Pre treatment**	12.133	±1.8144	-4.513	0.002	Significant
	Post treatment	10.433	±2.1121			
Ankle Dorsiflexion Left	**Pre treatment**	12.167	±1.9313	-4.272	0.002	Significant
	Post treatment	10.667	±2.0057			
Ankle Planterflexion Right	**Pre treatment**	3.940	±0.9985	-3.817	0.001	Significant
	Post treatment	4.207	±0.9476			
Ankle Planterflexion Left	**Pre treatment**	4.063	±1.1663	-3.765	0.002	Significant
	Post treatment	4.337	±1.1854			

Interpretation: Result showed negative Z score and $p < 0.05$. The average mean of post dorsiflexion range of motion in both right and left side is decreased to that of pre dorsiflexion range of motion which indicates increase in dorsiflexion range of motion suggesting more amount of lunge in weight bearing position. While the average mean of post planterflexion range of motion in both right and left side is increased to that of pre planterflexion range of motion which indicates increase in planterflexion range of motion suggesting more amount of heel raise in weight bearing position. The FAAM score showed significant change in pre and post measurements. Thus, it can be said that., a significant difference was found between pre and post treatment scores of ankle range of motion and FAAM score in Group B

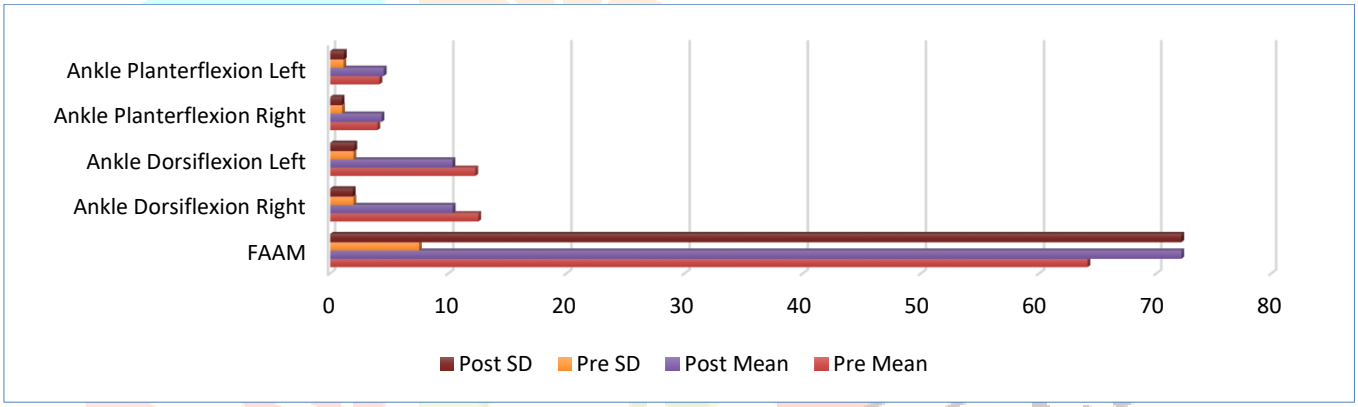


Graph 5.4 Intragroup comparison of Ankle ROM and FAAM Scale of Group B

Table 5.5: Intergroup comparison of Ankle ROM and FAAM Scale of Group A and Group B

Outcome measure	Treatment	Z	P value	Result
FAAM	**Pre**			
	Post	-1.628	0.833	Non Significant
Ankle Dorsiflexion Right	**Pre**			
	Post	-1.891	0.863	Non Significant
Ankle Dorsiflexion Left	**Pre**			
	Post	-1.06	1.193	Non Significant
Ankle Planterflexion Right	**Pre**			
	Post	-1.06	1.231	Non Significant
Ankle Planterflexion Left	**Pre**			
	Post	-2.977	0.522	Non Significant

Interpretation: Result of comparison of FAAM Scale score, ankle dorsiflexion and ankle planterflexion shows no significant difference between Group A and Group B as Z value is negative and p value is more than 0.05. Thus, it can be stated that none of the group is superior to another in terms of increase in ankle range of motion and FAAM score.



Graph 5.5: - Intergroup comparison of Ankle ROM and FAAM Scale of Group A and Group B

VI. DISCUSSION

The aim of the study was to determine the effect of the dynamic reverse PNF technique in participants engaged in prolonged standing work by comparing dorsiflexion and planterflexion range of motion and FAAM scale scores with a control group (intermittent stretching). In this study, within-group analysis, the dynamic reverse PNF technique group was found to be statistically significant with a difference in both groups for FAAM and ROM scale scores of right and left ankle dorsiflexion and planterflexion ($p<0.05$). While there was no significant change in the range of motion of ankle planterflexion and dorsiflexion and FAAM scale scores in the intergroup comparison of group A (intervention group) and B (control group), indicating that neither group was superior to the other in terms of increasing above parameters, however, which supports this study that the change in ROM and FAAM scale scores of the dynamic inversion technique was significant compared to the conventional intermittent stretching technique. Thus, the result of this study accepts the null hypothesis that there was no significant difference between the dynamic reverse PNF technique and the intermittent stretching technique (control group) for FAAM scores, ankle dorsiflexion, and ankle planterflexion.

The result of the intervention group (dynamic reverse PNF technique) showed a negative Z score and $p < 0.05$, with the average mean of the post-dorsiflexion range of motion on both the right and left sides being reduced to the pre-dorsiflexion range of motion, indicating an increase in dorsiflexion range of motion indicating a greater amount of lunge in a weight-bearing position. While the average mean of the range of motion after planterflexion on both the right and left sides is increased to the range of motion before planterflexion, indicating an increase in the range of motion of planterflexion, indicating greater heel lift in the weight-bearing position. This suggests that the dynamic reverse PNF group resulted in an increase in the range of motion in the ankle joint that was limited due to muscle involvement. When applying the dynamic reverse PNF technique to the ankle joint, the alternating movement pattern activates the Ib fibers of the golgi tendon organ (GTO), which in turn activates an inhibitory interneuron in the spinal cord, leading to muscle fiber inhibition by alpha motor activation. neuron, this mechanism of autogenous inhibition causes a reduction in ankle muscle fatigue, which was one of the main causes leading to incorrect muscle adaptation in prolonged posture. However, due to the sequential alternating activation of the planterflexors and dorsiflexors in the dynamic reverse PNF technique, the Ia afferent target muscle is activated, causing stimulation of an inhibitory interneuron in the spinal cord, which in turn inhibits the alpha motor neuron of the opposite muscle group to the target muscle group, causing a regular concentric eccentric contraction to be maintained muscles that keeps the joint in normal alignment with the proper range of motion that is affected in the ankle joint during long-term standing work. Furthermore, like every muscle in the body, the muscles of the ankle joint have a viscoelastic material that resists

shear flow and strain linearly when stressed and returns to its original shape from the MTU when the stress is removed. When the MTU falls below a constant stretch, a phenomenon known as "stress relaxation" occurs. This reduces the force generated by the viscous material as it resists the lengthening stimulus that the stretch causes in the MTU. As the viscous material loses its ability to resist stretching over time, the MTU slowly increases in length, a property called "creep" MTU. Although holding the stretch relaxes stress and reduces passive torque and muscle stiffness, which lasts for a short period of time. Thus, when the dynamic reversal method is used in PNF stretching, the TM contraction increases the tensile stress on the MTU, thereby promoting the "creep" of the muscle fibers when they are in a lengthened orientation, ultimately leading to increased range of motion. Literature cited in my Abraham et. al suggest that this is a protective mechanism to prevent muscle tearing and maintain a healthy relationship between the contractile units of the muscle sarcomere.

On the other hand, in this study, the control group had intermittent stretching as their treatment regimen. Statistical analysis of the control group showed a significant difference in ROM after treatment. Because stretching involves reaching a certain ROM and holding a muscle (group) stretched for a predetermined period of time, this leads to serial activation of sarcomeres, causing an increase in stretch tolerance and viscoelastic adaptation. Research (Zöllner AM, Abilez et. al) suggests that the addition of sarcomeres in series is a factor that may contribute to increased flexibility after chronic stretching.

The FAAM scale contains many components that identify activities of daily living in a weight-bearing position on both level and uneven surfaces. While there was an increase in scores during pre-post FAAM analysis, supporting the theory that the Guyatt's response index should be 5.7 at the 95% confidence limit for the minimal detectable change (MDC), test-retest reliability evidence is lacking. furthermore, the aim of this study was to find the r\influence of the dynamic reversal on the ROM and FAAM scale scores as a whole, therefore in this study individual parametric components are not analyzed.11

Dynamic reversal showed a less significant increase in FAAM scores with a mean pre-post FAAM score difference of 0.08 and while intermittent stretching was 7.067. Thus, this suggests that although the dynamic reverse PNF technique increases range of motion, it does not show more functional changes compared to intermittent stretching.

Since treatment group A (PNF group) showed a change in range of motion of ankle dorsiflexion and planterflexion along with FAAM scores compared to group B (control group), it can be concluded that PNF dynamic reversal technique can be used to increase ROM, which is limited due to muscle impairment.

Limitations of the study: -

- The study was done on general population of prolong standing occupation.
- Unequal ratio of male and female in study population.
- Blinding was not done in the study.

Further recommendations: -

- Treatment can be given for longer duration with follow up.
- Treatment can be studied for different conditions.
- These interventions can be applied in clinical setup in combination with conventional treatment for the better improvement in ROM.

Clinical implication: -

As per the result there was significant increase in ankle dorsiflexion range of motion, planterflexion range of motion and foot and ankle measure score in the interventional group that is dynamic reversal group in participants occupied in prolong standing occupation. But the results were not superior to that of the control group thus as the dynamic reversal PNF movement pattern are similar to that of activities of daily living It can be used as an adjunct to another to increase range of motion at ankle joint who have restricted mobility due to muscular structure.

Conclusion: -

On the basis of present study, dynamic reversals had effect on improving both planterflexion and dorsiflexion range of motion along with increase in FAAM scale score when compared with the control group. Thus, as there was significant difference in increase of ROM and FAAM score dynamic reversal PNF technique can be used in participants with restricted ankle mobility due to muscular involvement.

VII. ACKNOWLWDMENT

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