Ann. For. Res. 65(1): 3404-3413, 2022
ISSN: 18448135, 20652445

ANNALS OF FOREST RESEARCH
https://www.e-afr.org/

IMPACT OF CORE AND PELVIC FLOOR MUSCLES STRENGTHENING AMONG OBESE POSTMENOPAUSAL WOMEN WITH DIABETIC PERIPHERAL NEUROPATHY – AN EXPERIMENTAL STUDY

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AUTHOR'S CONTRIBUTION

LG : performed work & manuscript preparation, SM: Designed, SS: generated idea, RA & LK : scrutinized the manuscript

Abstract

Background: Obesity is more common in middle age women especially after menopause because of hormonal imbalance and it is also followed by estrogen depletion affecting the pelvic floor muscles. The global consensus is that individuals with type II diabetes should avoid improper mechanical overloads in order to minimize the risk of tissue damage. **Objective:**To evaluate the impact of core and pelvic floor muscles strengthening among obese postmenopausal women with Diabetic Peripheral Neuropathy.

Methodology : A Quasi experimental study was conducted for 25 obese postmenopausal women with diagnosed Diabetic Peripheral Neuropathy with regular medications were included in this study. Proprioceptive Neuromuscular Facilitation for core (combination of Rhythmic stabilization training [RST] and isometric exercises) and pelvic floor muscles was taught for 12weeks, 3 days in a week. The training session was conducted for 50 mins with 5mins warm-up and 5 mins cool down period. The outcome measures included in the study are One Minute Sit Up , Pelvic Floor Distress Inventory(PFDI). The pre and post test values were measured.

RESULT: There was a significant difference ($P<0.05$) after the comparison of the pre and post values in the group after the 12 weeks of intervention. The mean value of one minute sit up score before the test was 4.68 (SD ±2.30) and after the test was 8.28 (SD±2.42), which indicate that 1 minute sit up score was increased after the treatment. The mean value of PFDI score before and after the test was 16.88 (SD±3.99) and 13.12 (SD ±2.03) respectively, indicating that the mean PFDI score has decreased after the treatment.

CONCLUSION: Thus, this study concludes that obese postmenopausal women with Diabetic Peripheral Neuropathy can be beneficial using PNF techniques with isometric exercises and thereby their quality of life improves which has been proved in this study using one minute sit – up score and reduction in PFDI score within the group.

Keywords : Menopause, Diabetic Peripheral Neuropathy, Obesity, OneMinute sit – up, Pelvic floor Distress inventory

Introduction :

Menopause is one of the most significant events in a woman's life and brings in a number of physiological changes that affect the life of a woman permanently (1). There have been a lot of speculations about the symptoms that appear before, during and after the onset of menopause. These symptoms constitute the postmenopausal syndrome; they are impairing to a great extent to the woman and management of these symptoms has become an important field of research lately. Principal health concerns of menopausal women include vasomotor symptoms, urogenital atrophy, osteoporosis, cardiovascular disease, cancer, psychiatric symptoms, cognitive decline, and sexual problems.

Many symptoms are found related to postmenopausal syndrome: Hot flushes, irritability, mood swings, insomnia, dry vagina, difficulty concentrating, mental confusion, stress incontinence, urge incontinence, osteoporotic symptoms, depression, headache, vasomotor symptoms, insomnia etc, (2). The major consequences of menopause are related primarily to estrogen deficiency. It is very difficult to distinguish the consequences of estrogen deficiency from those of aging, as aging and menopause are inextricably linked.

Type 2 diabetes (T2D) has become increasingly prevalent over the last decades, and this trend is largely driven by the obesity epidemic. Diabetic neuropathy ((DN) is common serious complication of diabetes. Most peripheral neuropathies damage nerves of the limbs, especially the foot, on both sides and thus lead to balance impairment (3). However it is not surprising that emerging studies have reported that even subtle declines in somatosensory functions can result in balance impairments and increased fall risk in older adults with diabetic neuropathy patients (4). Diabetes and obesityhas become life style diseases which are the ultimate cause or stepping stone of all the health issues (3). Typical weight loss resulting from lifestyle change is between 5 and 10% of baseline weight, so such approaches rarely bring an obese individual to a normal body weight. Another common problem that affects postmenopausal women is incontinence. It is an important social problem that affects more than 50% of postmenopausal women(5). The number of patients increases from year to year, affected by the rapid social development contributing to a sedentary lifestyle.

These factors weaken the overall performance of the body, leading to weakness of the muscles or bones, respiratory disorders and circulatory problems. The result is the emergence of numerous pathologies and dysfunctions of the body that cause a significant reduction in quality of life. Awareness of women regarding this disease increases from year to year (6). Nevertheless, many patients still considers incontinence as a natural symptom of aging. According to recent data,

UI affects women twice as often as men. This condition occurs in about 20-30% of young women, 30-40% in middle age and up to 50% of women in old age (7). Core muscles are responsible for all the major movements of the body. These muscles give strength and stability to the movements like bending, twisting, crouching etc. Core muscles are situated at the lower back and abdominal area. The important role these muscles are to hold the body straight. The core and pelvic floor plays a key role any imbalance or alterations in the firing motor unit causes improper posture, imbalance and gait alterations. International Continence Society Guidelines indicate that treatment of UI should begin with conservative therapy (8). Obese persons' treatment of UI should start with weight reduction of at least 5%. Hence this study was aimed to know the effect of stabilization and strengthening of core and pelvic floor muscles among obese postmenopausal women with type II Diabetes Mellitus.

Methodology : A Quasi experimental study was conducted for 25 obese postmenopausal women with diagnosed Diabetic Peripheral Neuropathy with regular medications were selected based upon the Inclusion criteria: Female Patients clinically diagnosed with with Diabetic Peripheral Neuropathysubjects with regular medications for 10 years, recent HbA1c value 6.5% – 7.0%5, obese individual [BMI between the range [30-40 kg/m2], Age group of 40 – 60years, Urinary Incontinence[moderate score (6 to 12) depends on ICIQ – UI SF], Trunk control [Morse fall risk score between 0-24], POMA score - 19-23 and Exclusion criteria: Uncooperative subjects, Uncontrolled hypertension (blood pressure > 160/90 mm Hg), Any recent abdominal and gynecological surgery, Vasculopathies, Genital prolapse, Any other Neurological Deficits like Stroke, Parkinsonism, Myopathies, etc, Recent Lower limb Trauma, Any other Cardiovascular Deficits Like CAD, MI,Any Respiratory disorders Like Asthma, COPD. The subjects were taught Proprioceptive Neuromuscular Facilitation for core muscles (combination of Rhythmic stabilization training [RST] and isometric exercises) and pelvic floor muscles for 12weeks, 3 days in a week. The training session was conducted for 50 mins with 5mins warm-up and 5 mins cool down period. The outcome measures included in the study are 1 MIN SIT UP, Pelvic Floor Distress Inventory(PFDI). The pre and post test values were measured.

PROCEDURE:

The willing subjects who fulfilled the inclusion criteria were included for the study and informed consent was obtained from them. Subjects demographic data , onset duration and treatment duration was noted. 25 obese diabetic post menopausal women participating in this study were informed that they have to do the exercise regularly and can withdraw from the study if they have any difficulty.Proprioceptive Neuromuscular Facilitation techniques for core includes combination of rhythmic stabilization training [RST] and Isometric exercises

- **TRUNK FLEXION :**

- Made them to sit comfortably on a stool. Therapist had given a resistance on anterior part of shoulder while asked to flex their trunk as much as they can.

❑ **TRUNK EXTENSION**

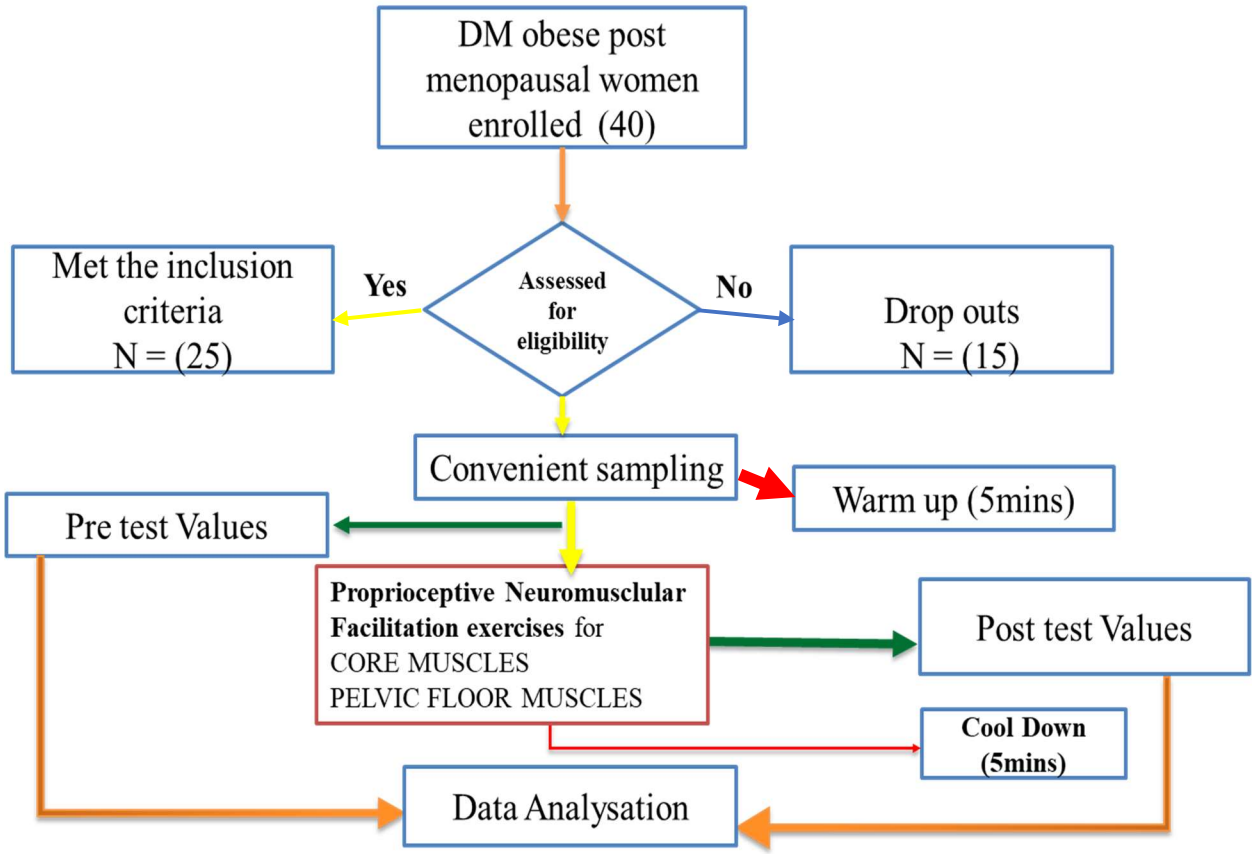
- Made them to sit comfortably on a stool. Therapist had given a resistance on the proximal part of back of the shoulder. And asked them to extend the trunk as much as possible.

❑ **TRUNK LATERAL ROTATION**

- Made them to sit comfortably on a stool. Therapist had given a resistance on the lateral mid of the trunk and they were asked to rotate the trunk. (for both sides of lateral rotation)

PELVIC FLOOR MUSCLE EXERCISES

EXERCISE	DURATION
Perineal contraction The proper way of doing the exercises are : Squeeze around the urethra, anus, rectum and (cranial) lift, elevating the pelvic floor muscles.	6 – 8 seconds with 6 second rest in between 15 minutesession (twice daily) 15-20 contractions / day The training volume per session includes 3 sets of 15 repetitions.



These exercises were done for 12weeks, 3 days in a week, The training session was conducted for 50 mins with 5mins warm-up and 5 mins cool down period. The outcome measures included in the study used for core muscle strength & Pelvic floor Muscles strength were One Minute SIT Up & Pelvic Floor Distress Inventory(PFDI) respectively. The pre and post test values were measured.

DATA ANALYSIS:

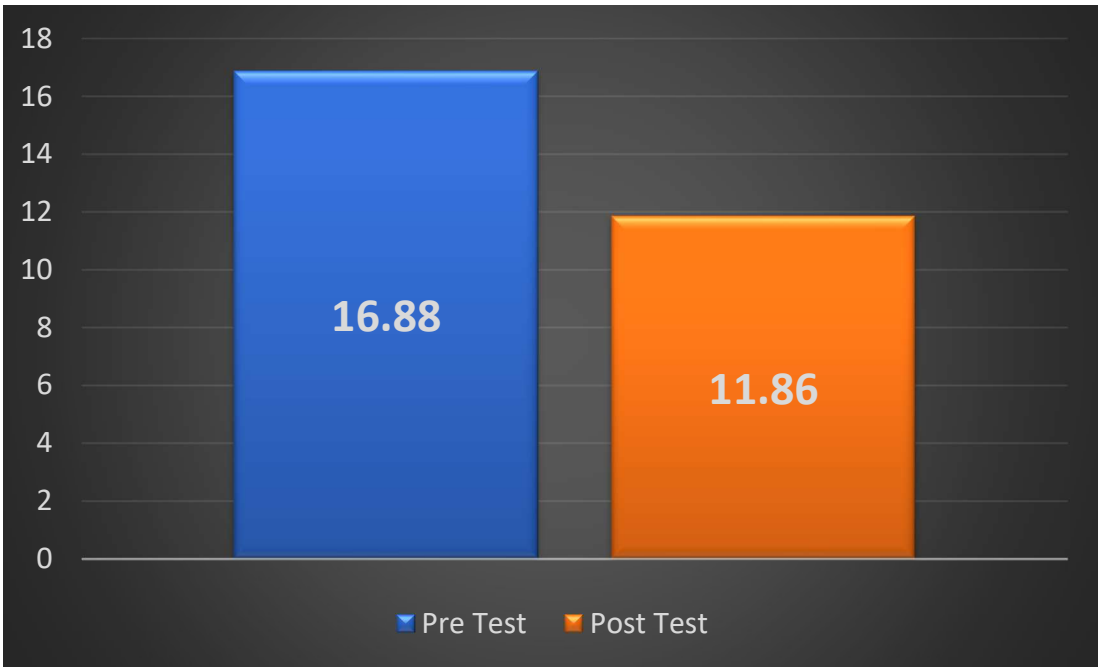
All statistical analysis were performed using statistical package for the social sciences (SPSS 20.0). The significance was set at alpha = 0.005 level paired t- test was used to compare the pre and post values of1 Minute SIT Up & Pelvic Floor Distress Inventory(PFDI)

Table 1: Effects of Stabilization and Strengthening of Core and Pelvic Floor Muscle among Diabetic Peripheral Neuropathy obese postmenopausal women

OUTCOME MEASURE	MEAN		SD		t - value	p-value
	Pre test	Post test	Pre test	Post test		
1 MIN SIT UP	4.68	8.28	2.30	2.42	16.10	0.05
PFDI	16.88	11.86	2.80	2.18	19.98	0.05

GRAPH 1: COMPARISON OF PRE & POST MEAN VALUE OF 1 MINUTE SIT UP SCORE

Graph 2: **COMPARISON OF PRE & POST MEAN VALUE OF PFDI**



RESULTS:

- There was a significant difference (P<0.05) after the comparison of the pre and post values in the group after the 12 weeks of intervention.
- The mean value of one minute sit up score before the test was 4.68 (SD ±2.30) and after the test was 8.28 (SD±2.42), which indicate that 1 minute sit up score was increased after the treatment.
- The mean value of PFDI score before and after the test was 16.88 (SD±3.99) and 11.86 (SD ±2.03) respectively, indicating that the mean PFDI score has decreased after the treatment.

DISCUSSION:

The purpose of the study was to know the impact of core and pelvic floor muscles strengthening among Diabetic Peripheral Neuropathyobese postmenopausal women. Dr. Ratisharamachandrapatel[2017] found that the dynamic and static PNF exercises are effective in improving the core strength in healthy females within a short term program of 4 weeks(9). PNF stimulates the proprioceptors within the muscles and tendons, thereby improving functions and increasing muscle strength, flexibility and balance. PNF patterns are effective in improving core stability and pelvic floor muscles strength.

PNF integration pattern stimulate the proprioceptors with in the muscles and tendon to enhance the performance, flexibility and balance (4). Post menopausal women often havehormonal and metabolic changes and, as a consequence, increase the risk of chronic diseases (1).This problem significantly affects the quality of life of affected women. Urinary

incontinence negatively affects many aspects of life, significantly reducing the daily functioning associated with work, physical activity or the intimate sphere. Urinary incontinence is the main symptom of genitourinary syndrome of menopause (GSM) and is often associated with sexual dysfunctions. Menopausal urinary tract occurs in over 50% of menopausal women.

Numerous scientific reports indicate efficacy of physiotherapy in the treatment of UI. Most recent reports indicate that a physiotherapy procedure gives a positive result in up to 80% of patients with stage I or SUI and mixed form, and in 50% of patients with stage II SUI. Physical activity has been recommended as an important non-pharmacological therapeutic strategy for the management of T2DM by some major international organizations in this field. Exercise-based pelvic floor rehabilitation is associated with superior outcomes, for urinary incontinence symptoms and hypertrophy of the urethral sphincter. Exercise-based pelvic floor rehabilitation is associated with superior outcomes, for urinary incontinence symptoms and hypertrophy of the urethral sphincter

The physiological mechanism of PNF for increasing the ROM and strength may be due to autogenic inhibition, reciprocal inhibition and stress relaxation (i.e.) rhythmic stabilization, strengthening the week muscles and improving the control on trunk (8). PNF increases the Co – ordination with exercise which reacts to the stimulation in muscular strength and flexibility(9). In the present study, both exercises technique- rhythmic stabilization (RST) with Isometric exercises involve muscle work at significantly intensity levels results in muscle strength improvement. These PNF exercise programs were based on the performance of static and dynamic muscle action, respectively. The principles of training theory would suggest that muscle adaptations are specific to the type of exercise applied(5).

CONCLUSION:

Thus, this study concludes that obese postmenopausal women with Diabetic Peripheral Neuropathy can be beneficial using PNF techniques with isometric exercises. Thereby their quality of life improves which has been proved in this study using 1 minute sit – up score and reduction in PFDI score within the group.

Conflict of Interest :

Authors declare no conflicts of interest

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