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Original Research Article

Augmented Core Breathing Pelvic Floor Muscle Training for Patients with Genitourinary Syndrome in Different Phases of Menopause

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ABSTRACT

Pelvic floor muscle has a role in core breathing for twenty-four hours and offers an influence to modulate the lumbar spine and pelvic floor. Several studies reported on pelvic floor muscle strength. Women with genitourinary syndrome do not seek care for their condition and are dismayed to speak with the health care provider about the condition. In the present work, we evaluated the efficiency of augmented core breathing in the genitourinary syndrome of menopause for pelvic floor muscle strength. We tested the role of augmented core breathing efficacy using pelvic floor muscle training in patients with the genitourinary syndrome. Our data revealed significant beneficial effects of core breathing with pelvic floor muscle training and Kegel's exercise in patients with genitourinary syndrome in different phase of menopause.

KEY WORDS: genitourinary syndrome; menopause; pelvic exerciser; pelvic floor muscle training; Utian quality of life scale.

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INTRODUCTION

The genitourinary urinary syndrome is the novel term for vulvovaginal atrophy. The vulvovaginal atrophy and atrophic vaginitis are unreliable to explain, climacteric symptoms are associated with physical changes in the vulva, vagina, and lower urinary tract associated (with estrogen insufficiency) [1]. Many women with genitourinary syndrome do not try to find care for their situation and are embarrassed to converse with the health concern provider about their condition [2]. Pelvic floor muscle functions in breathing for twenty-four hours, and there is much protocol for genitourinary syndrome [3]. To date, no studies available on the effectiveness of augmented (core breathing) in the genitourinary syndrome of menopause. Climacteric related genitourinary symptoms affect up to 50-percent of mid-life and older women [4]. That becomes chronic/ recurrent and unlikely to worsen over time. In early perimenopause, the incidence was a 4-percent rouse to 25-percent, one year after menopause and 47-percent, three years after

menopause [5]. The frequency of vulvovaginal symptoms varies from moderate to weak, not only limited to sexually active women [6]. While genitourinary symptoms can affect up to half of the post-climacteric women [7], many are unaware that the symptoms result directly from the decrease in menopause-related estrogen and that treatment is available.

Physiological developments in the menopause-related vagina are directly related to decreased circulating estrogen levels and aging [8]. The high concentration of estrogen receptors in the bladder's vagina, vestibule, and trigone modulate cell proliferation and maturation [9].

Physiological changes result in reduced vaginal blood flow, reduced lube, reduced vaginal vault stretchability as well as flexibility, and increased vaginal pH [10], which induces weakening of vaginal tissue strength, epithelial damage, rupture/prickle sensation, and pain [11, 12]. Regulation of glycogen may induce epithelial cells to reduce the glycogen cells, improves vaginal flora, and inhibits bacteria (lactobacilli) by the increase of pH [13]. Many studies showed that changes in vaginal flora/microbiome in the genitourinary syndrome of menopause influence the microbiome [14].

To date, the studies related to the role of core breathing in pelvic floor muscle strength is unclear. In the present study, we analyzed the augmented core breathing effect using pelvic floor muscle training in the genitourinary syndrome of peri- and post-menopause women. Hence, the present study aimed to find out the role of augmented core breathing effect on pelvic floor muscle training for patients with the genitourinary syndrome in different phases of menopause.

MATERIALS AND METHODS

The experimental study is a pre-type and post-type genitourinary syndrome, carried out at the gynecological department, the sample size was 40 (age 35–55 years) duration of five-weeks. The sampling was excluded from gynecological cancers, hormone replacement therapy, recent spinal surgery, respiratory diseases, chest complications, and urinary tract infections.

All the experimental demographics, clinical characteristics, and rehabilitation procedure details approved by the Ethical Committee (Certificate No. 1652/IEC/2019, dated: 27 February 2019) of the Department of Research, SRM Institute of Science and Technology, Chennai, India.

Patients were divided into two groups, namely Group-A and Group-B. Each group consists of 20 sample size, group-A consist of A1 (perimenopausal women) and group-A2 (postmenopausal women). Both A1 and A2 were treated with augmented (core breathing) pelvic floor muscle training exercise and Kegel's exercises. The group-B further categorized to B1 (perimenopausal women) and B2 (postmenopausal women). The group-B studied for Kegel's exercise. Before initiating the protocol patients were allowed to sit in the Swiss ball and trained to support the balance on the Swiss ball and to gain the confidence level. Once the confidence level is gained, the treatment protocol was initiated for the patients [15] **(Figure 1)**.

Core Breathing: Core Breathing exercise involves sitting on a Swiss ball that is stabilized by the physiotherapist. The patient sits in the Swiss ball and bounces on the ball (up and down, right and left) to support the pelvis in a neutral position with multifidus muscle support, for instance, one hand on the upper abdomen just below the sternum and the other at the side of the chest on the lower part of the ribcage [16]. The patients performed breath and brace by inhalation (through the nose) and exhalation (through the mouth, while exhalation holds all the muscles). In normal breathing pattern while inspiration, thoracic cage as well as abdomen as to pump out and at the same time patient has to feel the pressure on perineum occurs through the Swiss ball while sitting. While doing expiration through the mouth all the three muscles had to squeeze in, three-sets (per day), 1 set (10 repetitions), and 10-sec rest between each repetition, alternate days for five-weeks [15, 17].

Kegel's exercise: Crooklying positioned patients were asked to contract the pelvic floor

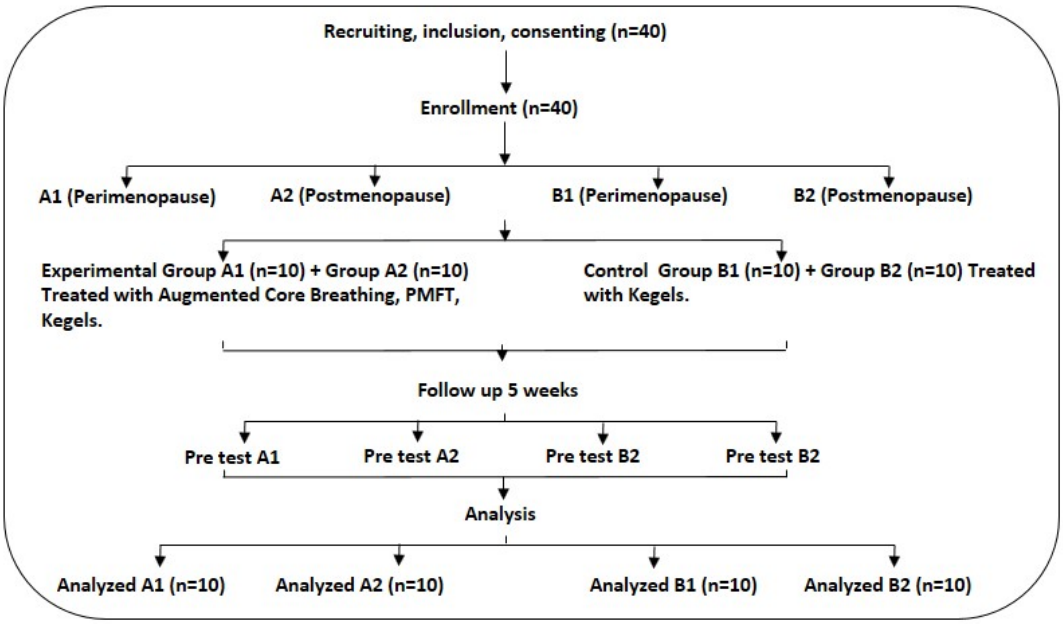

Fig. 1: Showing the flow of patients through the phases of the study (No discontinuation of the patient).

Fig. 2: A. pelvic exerciser; B. performing pelvic tilt on Swiss ball; C. performing core breathing exercise; D. performing core breathing exercise (lateral view).

muscle for 10-sec contractions and 10-sec relaxations, repeated five-times with 1 min breaks between the five sets and five days a week for a cumulative total duration of the session was about 15 min.

Home exercises advised to patients to follow thighs abducted place (used armrest chair) the protocol explained and the essential materials such as balloon sachets (5 balloons/day) also provided.

Blowing up a balloon was instructed to subjects for maintaining the spine erect and inhale through the nose and exhale (hold all the muscles) slowly into the balloon. During the exercises, the patient's neck and cheeks were maintained in relaxed positions, and each week five days for a total of five weeks, each session of 30 minutes. All the subjects measured for Utian quality of life scale and pelvic exerciser [18, 19] (**Figure 2**).

Data analysis: The outcomes data analyzed using SPSS (IBM, version 20.0) for paired t-test and student-independent test of the Utian quality of life scale and pelvic exerciser values.

RESULTS

Baseline characteristics of pre-test and post-test in group-A subjects (Core Breathing): Group-A (A1) subjects showed an increase in Utian quality of life scale value from 58.4–69.4 between pre-test and post-test subjects. Pelvic exerciser increase in mean value from 10.1–12.3 between pre-test and post-test. The A2 showed a Utian quality of life scale increase in mean value from 63.7–79.4 between pre-test and post-test. Pelvic exerciser increase in mean value from 9.3–13.0 between pre-test and post-test. The table infers a significant improvement in the Utian quality of life scale and pelvic exerciser value between pre-test and post-test at $p<0.05$ level **(Table 1)**.

Table 1. Baseline characteristics of pre-test and post-test in group-A subjects (Core Breathing).

		Pre-test		Post-test		t-test	Sig.
		Mean	SD	Mean	SD		
Group-A Perimenopausal Women	Utian Quality of Life Scale (A1) (N= 10)	58.4	3.62	69.4	5.18	-9.68	0
	Pelvic Exerciser (A1) (N= 10)	10.1	1.85	12.3	2.05	-11	0
Group-A Postmenopausal Women	Utian Quality of Life Scale (A2) (N= 10)	63.7	5.2	79.4	4.57	-10	0
	Pelvic Exerciser (A2) (N= 10)	9.3	0.82	13	1.33	-10	0

Table 2: Pre-test and post-test in Group-B subjects (Kegel's exercises).

		Pre-test		Post-test		t-test	Sig.
		Mean	SD	Mean	SD		
Group-B Perimenopausal Women	Utian Quality of Life Scale (B1) (N= 10)	57	4.73	65.9	6.17	-6.4	0
	Pelvic Exerciser (B1) (N= 10)	10	1.88	11.2	1.75	-6	0
Group-B Postmenopausal Women	Utian Quality of Life Scale (B1) (N= 10)	63.1	5.44	71.3	5.37	-5.5	0
	Pelvic Exerciser (B2) (N= 10)	9.3	0.82	11.3	0.82	-9.4	0

Table 3: Comparison of post-test difference between groups A and B.

		Post-test A1 versus B1 (Perimenopause)		t-test	Sig
		Mean	SD		
Comparison of groups A and B (Core Breathing versus Kegel's)	Utian Quality of Life Scale (N= 10)	69.4	5.18	1.37	0.187
	Utian Quality of Life Scale (N= 10)	65.9	6.17		
	Pelvic Exerciser (N= 10)	12.3	2.05	1.28	0.214
	Pelvic Exerciser (N= 10)	11.2	1.75		

Table 4: Comparison of post-test difference between group A and B.

		Post Test A2 versus B2 (Postmenopause)		t-test	Sig
		Mean	SD		
Comparison of group A and B	Utian Quality of Life Scale (N= 10)	79.4	4.57	3.62	0.002
	Utian Quality of Life Scale (N= 10)	71.3	5.37		
	Pelvic Exerciser (N= 10)	0.13	1.33	3.43	0.003
	Pelvic Exerciser (N= 10)	11.3	0.82		

Table 5: Comparison of Post-test between the group A1 and A2 (Perimenopause and Postmenopause).

		Post-test A1 versus A2		t-test	Sig
		Mean	SD		
Comparison of group A1 and A2 (Core Breathing)	Utian Quality of Life Scale (N= 10)	69.4	5.18	-4.571	0
	Utian Quality of Life Scale (N= 10)	79.4	4.57		
	Pelvic Exerciser (N= 10)	12.3	2.05	-0.903	0.379
	Pelvic Exerciser (N= 10)	13	1.33		

The data showed the mean, standard deviation test, and p-value of Utian quality of life scale and pelvic exerciser in comparison of the pre-test and post-test values in Group-A. The group-A (A1) showed the Utian quality of life scale increase in mean value from 58.4–69.4 between pre-test and post-test. Pelvic exerciser increase in mean value from 10.1–12.3 between pre-test and post-test. The (A2) values showed a Utian quality of life scale increase in mean value from 63.7–79.4 between pre-test and post-test. Pelvic exerciser increase in mean value from 9.30–13.0 between pre-test and post-test. The above data infer a significant improvement in Utian quality of life scale and pelvic exerciser value between pre-test and post-test at p<0.05 level.

Utian quality of life scale and pelvic exerciser in comparison of the pre-test and post-test: Group-B (B1) subjects showed an increase in Utian quality of life scale value from 57.0–65.9 compared to pre-test and post-test subjects. Pelvic exerciser increase in mean value from 10.0–11.2 between pre-test and post-test, and (B2) showed a Utian quality of life scale increase in mean value from 63.1–71.3 between pre-test and post-test. Pelvic exerciser increase in mean value from 9.3–11.3 between pre-test and post-test. The table infers a significant improvement in the Utian quality of life scale and pelvic exerciser value between pre-test and post-test at p<0.05 level **(Table 2)**.

The above data showed the mean, standard deviation-test, and p-value of Utian quality of life scale and pelvic exerciser in comparison of the pre-test and post-test values in Group-B. The data infers a significant increase in Utian quality of life scale and pelvic exerciser value between pre-test and post-test at p<0.05 level.

Utian quality of life scale and pelvic exerciser mean value in both groups A and B: The groups A1, and B1 showed an increase in Utian quality of life scale and pelvic exerciser values in both groups A and B subjects. The data infers not a significant improvement in Utian quality of life scale and pelvic exerciser value between group A and B at p<0.05 level **(Table 3)**.

The table 3 data showed an increase in Utian quality of life scale and pelvic exerciser mean value in both groups i.e., A and B. The table infers not a significant improvement in the Utian quality of life scale and pelvic exerciser value between group A and B at p<0.05 level.

Comparison of post-test difference between groups A and B: The groups B2, and A2 showed an increase in Utian quality of life scale and pelvic exerciser values in both groups A and B subjects. The table infers a significant improvement in the Utian quality of life scale and pelvic exerciser value between groups A and B at p<0.05 level.

The above data showed an increase in Utian quality of life scale and pelvic exerciser mean value in both groups A and B.

Comparison of Post-test between-group A1 and A2 (Perimenopause and Postmenopause): The increase in the Utian quality of life scale and pelvic exerciser values was observed in both groups A1 and A2 subjects. Table 5 data infer no significant increase in Utian quality of life scale and pelvic exerciser value between-group A1 and A2 at p<0.05 level. Table 5 infers an improvement in Utian quality of life scale and pelvic exerciser value between group A and B at p<0.05 level **(Table 5)**.

The data showed an increase in Utian quality of life scale and pelvic exerciser mean value in both groups A1 and A2. Overall, the data infers not significantly increase Utian quality of life scale and pelvic exerciser value between group A and B at p<0.05 level.

Utian quality of life post-test of the third week: A1 and A2 subjects showed a weekly analysis of Utian quality of life and pelvic exerciser. The Utian quality of life values showed that the post-test of the third week denotes 58.4–69.4 in group A1 and 63.7–70.2 in A2, and the fifth-week of post-test showed 58.4–69.4 in group A1 and 63.7–79.4 in group A2. Pelvic exerciser showed that the post-test of the third week showed 10.1–11in A1 and 9.3–10 in A2. Where the fifth week of post-test showed 10–12.3 in A1 and 9.3–13 in A2 **(Figure 3)**.

Utian quality of life showed that post-test of the third week denotes 57–61 in group B1and 63.1–66.6 in B2, figure 3 (B1 and B2) showed a weekly analysis of Utian quality of life and

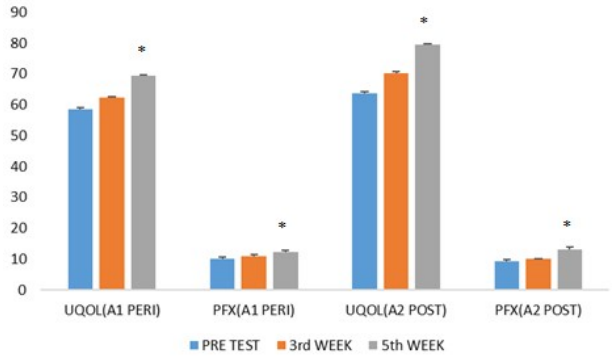

Fig. 3: Utian quality of life post-test of the third week in groups A1 and A2.

pelvic exerciser. The fifth week of post-test denotes 57–65.9 in group B1 and 63.1–71.3 in B2. Pelvic exerciser showed that the post-test of the third week showed 10–10 (no difference) in group A1 and 9.3–9.5 in A2, and the fifth week of post-test denotes 10–11.2 in group B1 and 9.3–11.3 in B2 **(Figure 4)**.

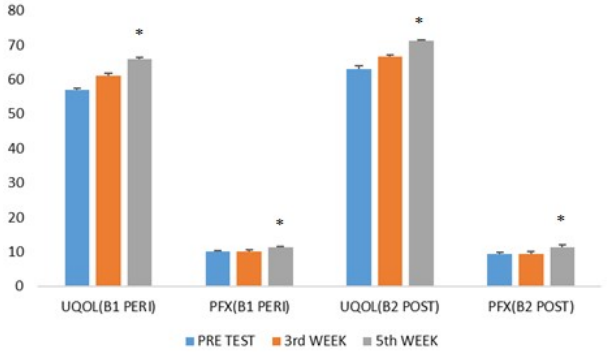

Fig. 4: Utian quality of life post-test of the third week in groups B1 and B2.

DISCUSSION

Vulvovaginal atrophy is a common condition that affects 39–63% of postmenopausal women [20]. It results from reduced estrogen levels in vulvovaginal tissues, leading to reduced blood flow and collagen, and elastin fibers degeneration, as well as changes in pH and epithelium cells [20]. Such changes result in reduced lube and sebaceous gland secretions, loss of vulvovaginal tissue elasticity, and an area that is more vulnerable to pathogenic bacteria colonization. Excitability in pelvic floor muscle tone may also be found in patients with symptomatic vulvovaginal atrophy due to a defensive response caused by pain and discomfort [21]. Perimenopause show fewer symptoms of vaginal atrophy in comparison to postmenopause [22]. Vulvovaginal atrophy results in vaginal dryness, pruritus, dyspareunia, urinary incontinence (UI), and increased vaginitis and urinary tract infection [23]. Low levels of circulating estrogen after menopause result in physiological, biochemical, and clinical manifestations in urogenital tissues [24].

Anatomical modifications include reduced collagen content and hyalinization, decreased elastin, epithelium thinning, altered muscle cell structure and function, increased connective tissue density, and fewer blood vessels. The labia minora thin and reg ress, the introitus retracts, and the hymenal carunculae involute and lose elasticity, which often contributes to serious dyspareunia in the vaginal pathway [11].

The Canadian Society of Obstetricians and Gynecologists and the North American Climacteric Society, however, some of these procedures may not be appropriate for some patients for a variety of reasons such as the risk of developing endometrial, breast cancer, and allergies and associated with vaginal irritation, vaginal bleeding, breast pain, and nausea.

According to a systematic review, one study comparing estradiol ring treatment as a form of general hormonal therapy (HT) showed 31% of females experienced vaginal dryness [25].

These complications have negative impacts on sexual life and day to day activities. Regional HT, systemic HT, vaginal moisturizer application, and vaginal lubricants are the most-popular vulvovaginal atrophy therapies.

Furthermore, dyspareunia also tended to occur in some women treated with local estrogen therapy (ET): in two studies comparing estrogen tablets with placebo, 20–31% of women still had dyspareunia, therefore a great need to explore alternative therapies which are safe, reliable and low-cost.

Pelvic floor muscle training refers to an exercise program that targets the pelvic floor muscle in particular. It is usually taught and supervised by a health professional such as a women's health physiotherapist. Pelvic floor muscle preparation has proved to be an effective treatment for UI genital prolapse, and dyspareunia. It is generally recommended as a first-line treatment because it has been

associated with low-cost and limited adverse effects.

Pelvic floor muscle preparation could help alleviate vulvovaginal atrophy symptoms and signs [26]. Indeed, some women with vulvovaginal atrophy reported improvement of their vulvovaginal atrophy symptoms after surgery so for these patients' pelvic floor muscle training which in turn showed positive results. Core enhancement has become a well-established phenomenon that has started to extend into the field of medicine.

Popular fitness programs include Pilates, Yoga, and Tai chi follow core principles of strengthening [27]. This exercise showed evidence on the benefits of core reinforcement with relevant anatomy, and outline core exercise principles for stabilization. The core is represented as a muscle box with the abdominals in the front, paraspinal and gluteus in the back, diaphragm as a roof, and the pelvic floor at the bottom. Core stability exercise seems particularly important in cases of muscle weakness in the pelvic floor [27].

Pelvic floor muscles belong to the deep core muscles. The deep core muscles form the abdominal cylinder in which pelvic floor muscle acts as a floor and functions synergistically at all times [17].

These deep core muscles play a crucial role in stabilizing lumbopelvic structures. The contraction of the diaphragm increases the intra-abdominal pressure and thus the musculature of the pelvic floor is co-activated with transverse abdominal contraction to add spinal stability [28].

People with the impaired diaphragm and pelvic floor can be treated with diaphragmatic breathing techniques, and pelvic floor contraction plays an important role in the core strengthening program. The main objective of the study was to find out the efficiency of augmented (core breathing) pelvic floor muscle training in different phases of menopause.

Similarly, Kegel's exercise for weak pelvic floor muscle changed the scenario of management of UI, Kegel's exercise was effective in training weak pelvic floor muscles, preventing and controlling UI [18]. In this study, we found that role of augmented core breathing pelvic floor muscle training proved to be effective on pelvic floor muscle strength and thereby the quality of life among patients with the genitourinary syndrome in different phases of menopause.

The comparison of post-intervention scores of Utian quality of life scale group A1(69.4) and A2(79.40). Similarly, group B1(69.50) and B2(71.30) similarly the comparison of post-intervention scores of pelvic exerciser group A1(12.30) and A2(13.0) showed significant difference ($p<0.05$). In this study both the groups showed significant improvement in both the outcome measures (Quality of life and pelvic exerciser). At the end of every week, a post-test was taken, among two outcomes Utian quality of life and pelvic exerciser doesn't show remarkable changes up to the third week but showed remarkable changes from the fifth week.

CONCLUSION

The results suggest that there is an outstanding effect of augmented core breathing with pelvic floor muscle training and Kegel's exercise in patients with genitourinary syndrome in a different phase of menopause. We observed a significant improvement in pelvic floor muscle strength and betterment in patients' quality of life. The core breathing exercise can prevent a variety of gynecological problems in adolescent girls. Other gynecological issues that affect pelvic floor muscle training can be treated with augmented core breathing exercises. Future studies with a broad dimension, long follow-up, and use of other outcomes are needed to explore the efficacy of augmented core breathing exercises for better quality of life.

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Conflict of interest The authors declare no conflict of interest.

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