

Effectiveness of Home-Based Pelvic Floor Muscle Training on Stress Urinary Incontinence and Quality of Life in Multiparous Women

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ABSTRACT

Aim: This study aims to determine the effectiveness of home-based pelvic floor muscle training on decreasing the symptoms of stress urinary incontinence and improving the quality of life among multiparous women

Methods: Women who were diagnosed with Stress Urinary Incontinence were invited to take part in this study. These subjects were randomly allocated to either an intervention group or a control group. A 6-week assessment of both groups were carried out for the pelvic floor muscle strength using the modified oxford grading system, for the severity of Incontinence, the ICIQ- short form was used, & for the Quality of Life, Incontinence QoL Scale was used.

Results: A total of 60 subjects were included in the study. At the baseline, both the groups were similar in terms of PFM strength, ICIQ score & Incontinence QoL Scale. At the end of 6 weeks of assessment, there was a significant difference ($p < 0.001$) between the control & the intervention group in terms of MOGS, ICIQ score and Incontinence QoL Scale score.

Conclusion: The home-based pelvic floor muscle training was found as a safe and effective intervention in decreasing the severity of symptoms and improving the quality of life in multiparous women with SUI.

Keywords: pelvic floor, stress urinary incontinence, quality of life, multiparous women, home-based pelvic floor muscle training

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INTRODUCTION

Urinary Incontinence is defined by the International Continence Society as “the complaint of any involuntary loss of urine and which is a social or hygienic problem.”¹ UI can be due to the loss of coordination between the pelvic floor muscles (PFM), fascial tissues and nerve supply.² Based on aetiology and pathophysiology, Stress UI, urge UI & mixed UI are the three types of incontinences.³ Stress UI can be defined as involuntary leakage of urine during effort or exertion, or when sneezing, coughing, or laughing.⁴ There is an increase in abdominal pressure due to physical exertion which puts stress on the bladder, resulting in the leakage of urine.⁴ In women worldwide, stress UI is considered the most common type of UI. In a recent study conducted in Oman, this finding has been confirmed.

Urinary Incontinence is found to be a worldwide problem.⁵ One of the major risk factors of SUI is pregnancy.⁶ During the 3rd trimester of pregnancy, women may experience SUI due to hormonal changes, increased abdominal pressure, and hypotonicity of the urethral wall and also due to the stretching of pelvic floor components.⁶ Vaginal delivery may damage the pelvic floor muscles, thus, jeopardizing the urethral closure mechanism. According to the relevant literature, 31% of women after vaginal delivery experience SUI during the first 3 months.⁷ Other risk factors may include increasing age, high body mass index (BMI), cough or constipation and vaginal or assisted vaginal delivery during the last birth.⁸ Pelvic floor structure changes during pregnancy are seen more in multiparous women than in nulliparous women, says a trans perineal ultrasound assessment study.⁹

In addition to these symptoms, SUI also has a psychological impact on the patient’s Quality of life. Due to SUI, patients often experience discomfort, low self-esteem, mood deterioration, and feeling of helplessness, thus, reducing the QOL.¹⁰ QOL aspects such as interference with social activities such as shopping and driving, feelings of embarrassment during sexual activities, & anxiety are also included in the detrimental consequences of SUI.¹⁰ Patients are forced to change their lifestyles due to the fear that others may find out about their helpless condition. Thus, it has a negative impact on socializing, which further comes up with alienation, social isolation and even depression or anxiety disorder.¹¹

In rural areas, SUI is underreported by the patients due to a lack of education, economic hardships or social stigma.^{11, 12} There are several diagnostic procedures to detect UI. UI can be diagnosed with the help of ultrasound.¹³ A Urodynamic study is a key test for identifying the exact type of urinary incontinence.¹³ In this, a catheter is inserted into the urethra and bladder. The catheter is used to fill the bladder with water. As the bladder fills, the pressure within it is recorded and in incontinence, the bladder goes in-

to spasm as it fills. A Bladder diary is also maintained to check for the number of drinks, time of urination, amount of urine, urge to urinate & number of episodes. Urine analysis is done to check signs of infection, traces of blood or other abnormalities. Stress test-examination of loss of urine during coughing is one of the diagnostic measures.¹⁴ Another method of assessing UI is Post Void Residual Measurement (PVR).¹⁴ It consists of urinating into a funnel-like container to measure urine output, then checking the amount of residual urine in the bladder using a catheter to drain the remaining urine. A large amount of residual urine shows urinary tract obstruction with bladder nerves or muscles.¹⁴

It is important to take into account the physical, mental and social well-being of the patient while assessing for the treatment part.¹⁵ Nowadays, Physiotherapists are getting increasing attention to the conservative methods of treating SUI.¹⁵ After the introduction of Kegel’s exercises in 1948, the efficacy of PFMT in the management of SUI has been supported by multiple randomized controlled studies and systemic reviews.¹⁵ PFMT has been proven 50-69% effective in reducing episodes of urine loss in women with SUI.¹⁵ The gold standard treatment for SUI is pelvic floor muscle training (PFMT), which also indirectly improves the QOL.¹⁶ PFMT is a group of exercises improving the strength, power, and endurance of the pelvic floor muscles. The pelvic floor muscles work to support the pelvic organs and enhance the urethral sphincter closure.¹⁶ Electrical stimulation, extracorporeal magnetic innervation (EXMI)¹⁷, biofeedback, and magneto therapy are also included as important physiotherapeutic treatments.¹⁷ In the management of SUI, poor exercise adherence is recognized as a serious threat to long-term success. The Physical Therapist needs to consider the burden of exercise placed on the patients when prescribing PFMT.¹⁷

METHODOLOGY

Study design: This is a randomized, experimental, two-parallel group study of before and after home-based PFMT. The study was conducted at Karad. The duration of study was about 3 months.

Inclusion & exclusion criteria:

The inclusion criteria included - Multiparous women who were diagnosed with SUI, aged between 40 and 55 years were specifically targeted. Subjects who showed symptoms based on International Consultation on Incontinence Questionnaire (ICIQ) were chosen, which have been mentioned later in the methods.

The exclusion criteria were as follows: Women with other types of incontinence other than stress incontinence were excluded. Women with other bladder problems and those with pelvic organ prolapse were also excluded.

Sample size: The sample size was calculated using the nMaster 2.0 software. The required sample size in each group was 30 subjects. Thus, the total sample size being 60.¹⁸

Treatment protocol: All the subjects of the intervention group were invited to a lecture on the first day of treatment. They were educated about the anatomy and physiology of the pelvic floor, along with the incontinence mechanism and the significance of PFMT in the treatment of incontinence. Also, they were assessed for their PFM strength, Incontinence score and QoL score (which have been mentioned in the methods). They were given a schedule of exercises followed for 6 weeks and were trained for the same. The home-based PFMT included exercising to relax abdominal muscles as well as strengthen the pelvic floor muscles.¹⁹ Exercises such as hip bridge, contracting the pelvic floor while sitting at the edge of a chair, pelvic floor contractions while doing household work, etc. were prescribed.²⁰ Subjects were asked to perform these exercises 3-4 times a day with 5 repetitions each, with contracting the muscles for about 5 seconds, followed by relaxation for 5 seconds. Abdominal exercises helped in reducing the abdominal pressure which, in turn, helped in reducing symptoms of SUI.²¹ For these exercises, resources available at home, such as mats, cushions, balls, chairs, tables, etc. were used. Every week, all the subjects were again invited for further intervention, and to monitor their progress. Correct techniques to perform all the exercises were monitored individually for each subject. Also, a vaginal examination was done to ensure a correct way of contracting the pelvic floor muscles.

The participants in the control group were also educated about the anatomy of the pelvic floor, the incontinence mechanism and the significance of PFMT in its management. These subjects were asked to perform abdominal tucks, and PFM contractions in hip bridging and squatting positions 3 times per day with 5 repetitions each, with contracting the muscles for about 3-4 seconds, followed by a relaxation of 3-4 seconds. Participants in this group were not assessed or trained every week.

At the end of the 6-weeks of study, all the participants of both the control and the intervention group were requested to come for the follow-up and were again assessed for the PFM strength, Incontinence score and the score.

Assessment: All subjects were taken consent and were asked to fill out the three questionnaires.

The first questionnaire consisted of demographic information and relevant risk factors such as age, marital status, no. of pregnancies, occupation, smoking status, history of chronic cough, etc.

The second questionnaire was the ICIQ-SF for the Incontinence severity.²² Subjects were asked to fill this form at the baseline and again at the end of the 6th week. This ICIQ-SF included the amount of urine

leakage, frequency, time, and severity of the interference with daily activities. Range of total score was between 0-21. A score of 0 indicates no leakage of urine whereas a score of 21 indicates severe incontinence.¹⁹

The third questionnaire Incontinence QoL Scale, was taken to assess the quality of life of multiparous women due to SUI.²³ It included 21 questions regarding interference in day-to-day life. The following options were marked from 1-5 score, for all the questions included in the questionnaire- 1. extremely, 2. quite a bit, 3. moderately, 4. a little, and 5. not at all.

Assessment of PFM Strength: The strength of the muscles of the pelvic floor was assessed using vaginal palpation of the PFM and was graded using Modified Oxford Grading System (MOGS).²⁴ MOGS is a 6-point and is graded as - 0= no contraction, 1= flicker, 2 =weak, 3 =moderate, 4 = good, 5 =strong. To assess the strength, the subjects were positioned in a supine position with hips and knees flexed. The examiner introduced two fingers up to one-third of the vagina and the subject was asked to lift and squeeze the PFM as hard as possible. Thus, the strength was assessed. There are no any side effects relating the strength training program and thus, it ensures safety to the participants.

Statistical analysis: At the baseline, the two groups were compared for similarities with the independent samples *t*-test or the Mann-Whitney U test as convenient. The severity of incontinence based on the ICIQ score (total score-21) at baseline and 6-week assessment was categorized as mild UI (1-5), moderate (6-12), and severe (>13). The Incontinence QoL Scale was assessed at baseline and also after 6-weeks of treatment. The data was entered using instat software and analyzed. A P value of 5% was considered statistically significant.

Ethical approval for this study was obtained from the Institutional Ethics Committee, Krishna Vishwa Vidyapeeth Deemed to be University, Karad, Maharashtra on 17th January, 2023. Approval letter number is 315/2022-2023. Written informed consent forms were obtained from all the participants included in this study.

RESULTS

A total of 60 participants were invited for this study, among which half of them were randomized to the control group (n=30) and the other half to the intervention group (n=30). Both the groups were evaluated at baseline and after 6 weeks of pelvic floor training. The baseline characteristics of the subjects in control as well as intervention groups were all same in terms of baseline assessments of MOGS score, ICIQ score and Incontinence QoL scale scores.

The mean age of participants in the control group was 43.6333 ±2.036, whereas the intervention group was 45.4333 ±2.201 (table 1).

Table 1: Variables of control & intervention group

Variables	Control group (Mean ± SD) (n=30)	Intervention group (Mean ± SD) (n=30)	p value
Age (in years)	43.63 ± 2.036	45.43 ± 2.201	0.0017
Number of pregnancies	02.40 ± 0.202	02.33 ± 0.172	0.2205

Table 2a: Characteristics of control and intervention group at baseline

Domains	Control (Mean ± SD)	Intervention (Mean ± SD)	Mean difference	t value	p value
PFM strength	01.73 ± 0.229	02 ± 0.230	0.266	1.610	0.1128
Incontinence	12.27 ± 1.083	12.17 ± 1.178	-0.100	0.122	0.9029
QoL	62.10 ± 4.167	57.70 ± 4.176	-4.400	1.462	0.1492

Table 2b: Characteristics of control and intervention group at 6-weeks assessment

Domains	Control (Mean ± SD)	Intervention (Mean ± SD)	Mean difference	t value	p value
PFM strength	02.30 ± 0.213	02.80 ± 0.272	0.500	2.833	0.0063
Incontinence	10.63 ± 0.937	09.37 ± 1.433	-1.267	1.450	0.1525
QoL	66.67 ± 4.108	72.63 ± 4.146	6.033	2.026	0.0474

**Figure 1: Comparison of the control and the intervention group based on the improvements in the PFM strength (MOGS score), Incontinence (ICIQ score) and the Quality of Life (Incontinence QoL score) from baseline**

The mean number of pregnancies of the intervention group was 2.3333 ± 0.172 and that of the control group was 2.3333 ± 0.172 (table 2).

Comparing both the groups, it was seen that ICIQ score (in terms of frequencies and amount of urine leakage) was non-significant between intervention and control group even after 6-weeks of intervention (table 2a and 2b).

In the control group, many of the subjects reported no or low improvement in the Quality of Life, whereas the majority of the subjects belonging to the intervention group showed better improvement in the Incontinence QoL scores (figure 1).

Comparing pre and post treatment, we found that there was about 11% improvement in pelvic floor strength of participants in control group, while par-

ticipants of intervention group showed about 16% of improvement in the strength of pelvic floor muscles.

There was significant improvement ($p < 0.0001$) in the pelvic floor muscle strength in the intervention group compared to the control group at the end of the 6 weeks (figure 1).

DISCUSSION

The study "Effectiveness of Home-Based Pelvic Floor Muscle Training on Stress Urinary Incontinence and Quality of Life in Multiparous Women" was conducted to determine the effectiveness of home-based PFMT on symptoms of Stress Incontinence and Quality of Life in women with multiple pregnancies. Symptoms of Incontinence in multiparous women were found common in these women. Involuntary urine leakages, embarrassment and social isolation were some of the main problems experienced. Physiotherapy plays an important role in the prevention, early detection and treatment of complications of Stress Incontinence and in improving the Quality of Life.²⁵ Physiotherapy in the treatment of Incontinence allowed a significant improvement in these symptoms. This PFMT increased the strength of the pelvic floor muscles and also reduced the abdominal pressure, thus, decreasing Incontinence. Before the exercises for PFM were taught, all the subjects were made aware of the feeling of invisible PFM contractions by the palpation method. This palpating and feeling of a contraction led to the awareness of these muscles and the intensity of the contraction. Also, home-based exercises were given to the subjects so that they can continue their training for the pelvic floor at their respective homes itself with the available resources such as cushions, chairs, balls, etc. A manual assessment of the strength of the pelvic floor muscles was done with the use of the Modified Oxford Grading System.

The findings of this study are congruous with the previous studies conducted in different areas around

the world. Studies showed that the prevalence rate of SUI in grand multipara was about 29.4%.²⁶ A study of PFMT conducted in Oman, containing a sample size of total of 73 subjects showed significant improvement (47%) in symptoms of SUI in women aged 20 to 50 years. Similarly, it also showed improvement in the QoL affected due to SUI. The duration of this study was about 3 months. Another study conducted at Nicolaus Copernicus University, Poland, demonstrated that PFMT was an effective treatment for UI in women. It also stated that PFMT significantly improves the QoL of these women.

The findings of this study revealed significant improvement in the symptoms of SUI of subjects included in terms of the amount & frequency of urine leakage. These subjects were randomly included in the intervention group. As compared to the baseline assessment, the 6-week assessment after the PFMT program there was found significant improvement in the ICIQ-SF scores in the majority of the patients in the intervention group as compared to the control group. In addition, its cost-effectiveness and safety make it a more convenient and affordable method in the overall treatment of SUI. There are no any side-effects or complications related to exercising the pelvic floor muscle.²⁷

Some limitations must be taken into consideration while interpreting the results of the study. One of the limitations of the study was that this study was conducted at a single institution; therefore, generalization of the result may be limited. There was inadequate time for conducting the study. Another limitation of our study was the lesser number of sample size.

CONCLUSION

This study stated that home-based pelvic floor muscle training is a safe and effective intervention in decreasing the severity of symptoms and improving the quality of life in multiparous women with SUI. Moreover, its acceptability could make this home-based training of pelvic floor an attractive method of treatment for women suffering from Urinary Incontinence.

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