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EFFECT OF COMBINED PELVIC FLOOR AND HIP MUSCLE STRENGTHENING ON VAGINAL HEALTH AND QUALITY OF LIFE AMONG WOMEN WITH GENITOURNARY SYNDROME OF MENOPAUSE

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Abstract:

Background: Women with Genitourinary Syndrome of Menopause often face multiple problems such as vaginal dryness, irritation, reduced lubrication, loss of elasticity, pain during intercourse, and urinary symptoms like urgency and frequency. This can lead to discomfort in daily activities, reduced confidence, and poor quality of life. The aim of the study was to find the effect of combined pelvic floor and hip muscle strengthening on vaginal health and quality of life among women with genitourinary syndrome of menopause.

Methodology: It was an experimental study which includes 20 random samples. The subjects were divided into two groups (A and B), with each group consisting of 10 samples. Group A received pelvic floor muscle strengthening along with hip muscle strengthening exercises for 2 sessions per week for 6 weeks. Group B received regular physiotherapy management for 2 sessions per week for 6 weeks.

Outcome measure: Vaginal health was measured using the Vaginal Health Index (VHI), and quality of life was assessed using the Menopause-Specific Quality of Life Questionnaire (MENQOL).

Result: On comparing the mean values of Group-A and Group-B on Vaginal Health Index (VHI) and Menopause Quality of Life (MENQOL), both groups showed a highly significant improvement in the post-test mean values. However, GROUP-A shows higher mean value in VHI (21.45) and MENQOL (56.80), indicating better improvement and is more effective than GROUP-B (13.30, 99.90) at $P \leq 0.001$. Hence, the null hypothesis is rejected**.**

Conclusion: The present study concludes that both GROUP-A and GROUP-B showed improvement in Vaginal Health Index (VHI) and Menopause Quality of Life (MENQOL). However, Group-A showed greater improvement compared to Group-B. Thus, combined pelvic floor and hip muscle strengthening is more effective.

KEYWORDS: Menopause, pelvic floor muscle, hip muscle, quality of life, Vaginal health

I. INTRODUCTION

Genitourinary Syndrome of Menopause (GSM) is a chronic and progressive condition that commonly affects women after menopause due to a decline in estrogen and other sex hormones. Estrogen plays a vital role in maintaining the structure, elasticity, lubrication, and vascularization of the tissues of the vulva, vagina, urethra, and bladder. When estrogen levels decline during menopause, several structural and functional changes occur in the genitourinary tract. These changes can lead to a variety of symptoms that affect the genital, urinary, and sexual health of postmenopausal women. GSM is considered one of the most common conditions associated with menopause and significantly impacts the quality of life of affected women (1).

Menopause is defined as the permanent cessation of menstruation resulting from the loss of ovarian follicular activity. It is clinically diagnosed after twelve consecutive months of amenorrhea without any other pathological cause. The average age of menopause worldwide is around 45–55 years. During this stage, estrogen production from the ovaries decreases significantly, leading to various systemic and local physiological changes in the female body. One of the most important systems affected by estrogen deficiency is the genitourinary system. The tissues of the vagina, urethra, bladder, and pelvic floor contain numerous estrogen receptors, making them highly sensitive to hormonal changes (2).

The term Genitourinary Syndrome of Menopause (GSM) was introduced by the International Society for the Study of Women's Sexual Health and the North American Menopause Society to describe the collection of symptoms and physical changes associated with decreased estrogen levels affecting the genital and urinary systems. Previously, the condition was commonly referred to as vulvovaginal atrophy; however, this term did not adequately represent the urinary symptoms and sexual dysfunction associated with menopause. Therefore, the broader term GSM is now widely used in clinical practice and research (3).

The pathophysiology of GSM mainly involves estrogen deficiency leading to thinning of the vaginal epithelium, decreased collagen production, reduced blood flow, and loss of elasticity in the vaginal tissues. The vaginal mucosa becomes thin, dry, and less elastic, resulting in decreased lubrication and increased susceptibility to irritation and trauma. Additionally, estrogen deficiency leads to a reduction in glycogen production in the vaginal epithelium, which alters the vaginal microbiome and reduces the number of protective lactobacilli.

This results in an increase in vaginal pH, making the vaginal environment more susceptible to infections and inflammation (4).

In addition to vaginal changes, estrogen deficiency also affects the urinary tract. This may contribute to urinary symptoms such as urgency, frequency, dysuria, and recurrent urinary tract infections. These urinary symptoms often coexist with vaginal symptoms and together form the clinical presentation of GSM (5).

The causes of GSM are primarily associated with estrogen deficiency following natural menopause. However, other factors may also contribute to the development of GSM. Surgical menopause, which occurs after bilateral oophorectomy, can cause a sudden drop in estrogen levels and may lead to more severe symptoms of GSM. Similarly, cancer treatments, Lifestyle factors such as smoking, lack of sexual activity, and poor pelvic muscle strength may also worsen the symptoms of GSM (6).

The clinical features of GSM can be classified into three main categories: genital symptoms, sexual symptoms, and urinary symptoms. Genital symptoms include vaginal dryness, itching, irritation, burning sensation, and decreased lubrication. Sexual symptoms include dyspareunia (pain during sexual intercourse), decreased sexual desire, and reduced sexual satisfaction. Urinary symptoms may include urgency, frequency, nocturia, dysuria, and recurrent urinary tract infections. In some cases, women may also experience urinary incontinence. These symptoms may gradually worsen over time if left untreated (7).

The prevalence of GSM among postmenopausal women is relatively high. Studies indicate that approximately 50–70% of postmenopausal women experience at least one symptom associated with GSM. However, only a small proportion of women seek medical care because many consider these symptoms to be a normal part of aging. Cultural factors, embarrassment, and lack of awareness may also prevent women from discussing these symptoms with healthcare providers. As a result, GSM remains an underdiagnosed and undertreated condition despite its high prevalence (8).

The symptoms of GSM can significantly affect the quality of life of postmenopausal women. Vaginal dryness and dyspareunia may lead to avoidance of sexual activity and decreased intimacy with partners. In addition, chronic discomfort and pain may lead to psychological distress, anxiety, and reduced self-confidence. Therefore, early identification and management of GSM are important for improving the overall well-being of affected women (9).

Various treatment options are available for the management of GSM. Hormonal therapies such as local estrogen therapy are considered the gold standard treatment for moderate to severe symptoms. Non-hormonal options such as vaginal moisturizers and lubricants may also help relieve symptoms of vaginal dryness and discomfort. However, these treatments may not address the underlying muscular and functional changes associated with menopause. Therefore, physiotherapy interventions such as pelvic floor muscle strengthening and hip muscle strengthening have gained increasing attention as non-pharmacological approaches for improving pelvic health in postmenopausal women (10).

Pelvic floor muscle strengthening refers to exercises designed to improve the strength, endurance, and coordination of the pelvic floor muscles. Pelvic floor muscle training, commonly known as Kegel exercises, is widely used in physiotherapy to improve pelvic floor function. Regular training may increase muscle strength, enhance blood circulation in the pelvic region, and improve neuromuscular control (2).

Improved blood circulation in the pelvic region may help maintain the health of vaginal tissues and reduce symptoms associated with GSM. Pelvic floor muscle strengthening may also improve sexual function by enhancing vaginal tone and increasing sensitivity during sexual activity. Several studies have suggested that pelvic floor muscle training can improve urinary symptoms such as urgency and incontinence in postmenopausal women, thereby contributing to better management of GSM symptoms. Research suggests that combined pelvic floor exercises may improve pelvic stability and contribute to better functional outcomes in women with pelvic floor dysfunction (3).

In addition to pelvic floor muscles, the muscles surrounding the hip joint also play a vital role in maintaining pelvic stability. Hip muscle strengthening involves exercises that target muscles such as the gluteus maximus, gluteus medius, gluteus minimus, and other hip stabilizers. These muscles are functionally connected with the pelvic floor muscles through fascial and biomechanical relationships. Strengthening the hip muscles can improve pelvic alignment and stability, which may enhance the activation and coordination of the pelvic floor muscles. The interaction between hip muscles and pelvic floor muscles forms part of the lumbopelvic stabilization system, which is essential for maintaining proper posture and pelvic control during daily activities (4).

The relationship between the hip muscles and pelvic floor muscles is an important component of the lumbopelvic stability system. When hip muscles become stronger, they help stabilize the pelvis and reduce excessive strain on the pelvic floor muscles. This coordinated activity between hip muscles and pelvic floor muscles may improve overall pelvic function. Therefore, strengthening both muscle groups may provide better support for the pelvic organs and help reduce symptoms associated with GSM (5).

Recent research has highlighted the association between pelvic floor muscle strengthening and hip muscle strengthening in the management of GSM. Pelvic floor muscle exercises improve muscle tone, pelvic support, and blood circulation in the pelvic region. These improvements may help reduce vaginal dryness, improve sexual function, and decrease urinary symptoms associated with GSM. Similarly, hip muscle strengthening contributes to pelvic stability and enhances the activation of pelvic floor muscles, thereby supporting overall pelvic health (6).

Combining pelvic floor muscle strengthening and hip muscle strengthening exercises may provide a comprehensive rehabilitation approach for women with GSM. These exercises are non-invasive, cost-effective, and easy to perform, making them suitable for long-term management of menopausal symptoms. Physiotherapy-based interventions focusing on muscle strengthening may therefore play an important role in improving the quality of life of postmenopausal women affected by GSM (7).

MATERIALS AND METHODS:

This experimental study was conducted on 20 subjects diagnosed with Genitourinary Syndrome of Menopause who fulfilled the inclusion and exclusion criteria. Postmenopausal women aged 45–65 years diagnosed with Genitourinary Syndrome of Menopause, experiencing vaginal dryness, irritation, or urinary symptoms related to menopause were included for the study. The subjects were divided into two groups, with 10 subjects in Group A and 10 subjects in Group B. The subjects were explained about the study procedure. Informed consent was obtained from all participants prior to the commencement of the study.

The total duration of the study was 6 weeks, and the intervention was carried out for 2 sessions per week, making a total of 12 sessions. In addition to supervised sessions, participants were instructed to perform a home exercise program regularly.

- Group A- Pelvic floor muscle strengthening with hip muscle strengthening
- Group B- Regular physiotherapy

GROUP A (PELVIC FLOOR MUSCLE STRENGTHENING + HIP MUSCLE STRENGTHENING)

The subjects were instructed to perform pelvic floor muscle strengthening combined with hip muscle strengthening exercises for **2 sessions per week for 6 weeks**. The exercise program was given in a progressive manner with gradual increase in intensity and functional integration.

The subjects were instructed and supervised to perform the following exercises:

FOR 1-3 WEEKS

- Kegels exercise
- Pelvic bridging exercise
- Hip adductor strengthening
- Hip abductor strengthening

FOR 4-5 WEEKS

- Kegels exercise
- Pelvic bridging exercise
- Hip adductor strengthening
- Hip abductor strengthening

FOR 1-3 WEEKS

1. Kegel Exercise: The participant was instructed to contract the pelvic floor muscles by trying to stop the flow of urine. Care was taken to avoid contraction of the abdominal muscles, gluteal muscles, or hip muscles. The contraction was held for 5 seconds, followed by relaxation for 5 seconds. Normal breathing was maintained throughout the exercise. Rest period of 30 seconds between sets. Repeat for 10 repetition and 2 sets.

2. Pelvic bridging exercise: The participant was instructed to lift the pelvis slowly upward by contracting the gluteal muscles, forming a straight line between the shoulders, hips, and knees. The movement was performed without arching the lower back excessively. The position was held for 5–10 seconds, followed by a slow return to the starting position. Normal breathing was maintained throughout the exercise. A rest period of 30 seconds was given between sets. The exercise was repeated for 10 repetitions and 2 sets.

3. Hip Adductor Strengthening: The participant was instructed to slowly lift the lower leg upward toward the midline of the body, performing hip adduction. The knee was kept straight throughout the movement. The leg was lifted to a comfortable height, and the contraction was maintained for the prescribed duration. After the hold period, the leg was slowly lowered back to the starting position. The participant was instructed to avoid trunk rotation and pelvic tilting during the exercise. The participant was instructed to lift the lower leg upward toward the midline of the body, performing hip adduction while keeping the knee straight. Hold contraction for 5 seconds. Repeat for 10 reps and 2 sets.

4. Hip Abductor Strengthening: The participant was instructed to slowly lift the upper leg away from the midline of the body, performing hip abduction. The knee was kept extended during the movement. The leg was lifted to a comfortable height, and the contraction was maintained for the prescribed duration. After the hold period, the leg was slowly lowered back to the starting position. Care was taken to avoid pelvic rotation during the exercise. Hold contraction for 5 seconds. Repeat for 10 reps and 2 sets.

FOR 4-6 WEEKS: Exercise progression was made with increase in reps and sets of exercise.

GROUP B (control group): Participants allocated to Group B received conventional physiotherapy management (regular physiotherapy) throughout the study period.

RESULT

In Table 1, on comparing the mean values of Vaginal Health Index (VHI) between pre-test and post-test in GROUP-A and GROUP-B shows a highly significant improvement in post-test mean values. GROUP-A shows higher mean value (21.50) when compared to GROUP-B (13.40) at $p \leq 0.0001$. Hence, GROUP-A is more effective than GROUP-B and the null hypothesis is rejected.

In Table 2, on comparing the post-test mean values of Vaginal Health Index (VHI) between GROUP-A and GROUP-B shows a highly significant difference. GROUP-A shows higher mean value (21.45) than GROUP-B (13.30) at $p \leq 0.0001$. Hence, GROUP-A is more effective than GROUP-B and the null hypothesis is rejected.

In Table 3, on comparing the mean values of Menopause Quality of Life (MENQOL) between pre-test and post-test in GROUP-A and GROUP-B shows a highly significant reduction in post-test mean values. GROUP-A shows lower mean value (56.80) when compared to GROUP-B (99.90) at $p \leq 0.001$. Hence, GROUP-A is more effective than GROUP-B and the null hypothesis is rejected.

In Table 4, on comparing the post-test mean values of Menopause Quality of Life (MENQOL) between GROUP-A and GROUP-B shows a highly significant difference. GROUP-A shows lower mean value (56.80) than GROUP-B (99.90) at $p \leq 0.001$. Hence, GROUP-A is more effective than GROUP-B and the null hypothesis is rejected.

DISCUSSION

The purpose of the present study is to compare the combined effect of pelvic floor muscle training and hip muscle strengthening exercises with regular physiotherapy in improving vaginal health and quality of life among women with genitourinary syndrome of menopause (GSM). The major goal of this study is to enhance pelvic floor strength, reduce GSM symptoms, and improve overall quality of life. Similar objectives were reported by **Kingsberg et al. (2017),** who highlighted that GSM significantly affects vaginal health and quality of life among postmenopausal women.

This study supports the hypothesis that combined pelvic floor and hip muscle strengthening exercises produce greater improvement in vaginal health and quality of life compared to regular physiotherapy alone. The improvement may be attributed to the synergistic activation of pelvic floor muscles along with hip stabilizers, which play an important role in pelvic support and function. In comparison with previous studies on pelvic floor rehabilitation, the present study shows notable improvement within a short duration of intervention. Strengthening both pelvic floor and hip muscles may enhance blood circulation, neuromuscular coordination, and tissue support in the pelvic region, thereby reducing symptoms such as vaginal dryness, discomfort, and urinary complaints.

There were non-significant variations in the mean age between Group A and Group B. Hence, age is unlikely to influence the outcome of the study. Participants in both groups were homogeneous at baseline, ensuring the reliability of the results, similar to the methodology adopted by **Labrie et al. (2016)** in GSM-related studies. On comparing mean values of GROUP-A and GROUP-B on vaginal health and quality of life shows highly significant improvement in the post-test mean, but GROUP-A shows higher mean value, indicating that combined pelvic floor and hip strengthening exercises are more effective than regular physiotherapy at $P \leq 0.001$. On comparing mean values between pre-test and post-test within Group A and Group B shows highly significant difference at $P \leq 0.001$, indicating that both interventions were effective, but Group A demonstrated superior outcomes.

The samples fulfilling the inclusion criteria were recruited for the study. A total of 20 participants were selected, out of which 10 were allocated to Group A (combined pelvic floor and hip strengthening exercises) and 10 to Group B (regular physiotherapy). Informed consent was obtained from all participants prior to the intervention. Pre-intervention assessment of vaginal health and quality of life was documented using standardized outcome measures.

Group A participants underwent structured pelvic floor muscle training along with hip strengthening exercises, while Group B participants received conventional physiotherapy. Post-intervention outcomes were recorded after the treatment period. The improvement observed in Group A may be explained by the activation of pelvic floor muscles and their connection with surrounding musculature. Pelvic floor muscles function in coordination with hip muscles such as abductors, adductors, and gluteal muscles to maintain pelvic stability. Strengthening these muscles enhances support to pelvic organs and improves muscle tone.

Physiologically, pelvic floor muscle training improves muscle strength, endurance, and neuromuscular control. It also enhances blood flow to the pelvic region, which may help in reducing GSM symptoms. Hip muscle strengthening further contributes by improving pelvic alignment and reducing strain on pelvic structures. Some participants initially presented with weak pelvic floor muscles and reduced hip muscle strength, which may contribute to GSM symptoms. Following intervention, significant improvements were observed in muscle strength, symptom reduction, and quality of life.

Both Group A and Group B showed improvement in within-group analysis; however, the combined training group demonstrated greater effectiveness. These findings are consistent with previous studies suggesting that multi-component exercise programs yield better functional outcomes than isolated interventions Therefore, it can be concluded that combined pelvic floor muscle training and hip strengthening exercises are more effective than regular physiotherapy in improving vaginal health and quality of life among women with genitourinary syndrome of menopause.

CONCLUSION

The present study concludes that both Group A (pelvic floor muscle strengthening combined with hip muscle strengthening) and Group B (regular physiotherapy) showed improvement in vaginal health and quality of life among individuals with genitourinary syndrome of menopause. However, more significant improvement was observed in Group A participants who underwent combined pelvic floor and hip muscle strengthening exercises compared to those who received regular physiotherapy alone.

TABLES

TABLE -1: COMPARISON OF VAGINAL HEALTH INDEX BETWEEN GROUP-A AND GROUP-B IN PRE TEST AND POST TEST

VHI	PRE TEST	POST TEST	T- TEST	SIGNIFICANCE
	MEAN	MEAN		
GROUP A	16.90	21.50	11.5000	0.0001
GROUP B	10.30	13.40	7.6189	0.0001

The above table reveals the Mean,t-test and p- values of VHI Score between (Group A) & (Group B) in pretest and post-test.
There is a statically highly significant difference between the pre-test and post-test values of vaginal health index within group A and group B.

TABLE-2: COMPARISON OF POST TEST OF VAGINAL HEALTH INDEX OF GROUP-A AND GROUP-B

VHI	GROUP A		GROUP B		T-TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
POST TEST	21.45	1.04	13.30	0.95	18.7486	0.0001

The above table reveals the Mean, standard deviation,t-test and p- values of VHI Score between (Group A) & (Group B) post-test. There is a statically highly significant difference in post-test values of vaginal health index within group A and group B.

TABLE-3: COMPARISON OF MENOPAUSE-SPECIFIC QUALITY OF LIFE BETWEEN GROUP A AND GROUP B PRE TEST AND POST TEST

MENQOL	PRE TEST	POST TEST	T-TEST	SIGNIFICANCE
	MEAN	MEAN		
GROUP A	129.70	56.80	64.5192	0.001
GROUP B	129.70	99.90	60.8290	0.001

The above table reveals the Mean,t-test and p- values of MENQOL Score between (Group A) & (Group B) in pretest and post-test. There is a statically highly significant difference between the pre-test and post-test values of menopause quality of life within group A and group B.

TABLE-4: COMPARISON OF POST TEST OF MENOPAUSE-SPECIFIC QUALITY OF LIFE OF GROUP A AND GROUP B

MENQOL	GROUP A		GGROUP B		T TEST	SIGNIFICANCE
	MEAN	SD	MEAN	SD		
POST TEST	56.80	3.01	99.90	3.21	30.9529	0.001

The above table reveals the Mean, standard deviation(SD)t-test and p- values of MENQOL Score between (Group A) & (Group B) in post-test. There is a statically highly significant difference between the post-test values of menopause quality of life within group A and group B.

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