Effectiveness of Hypopressive Exercise on Stress Urinary Incontinence and Pelvic Floor Muscle Activation among Multiparous Women

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Abstract

Background: Hypopressive exercise has gained attention as a non-invasive approach and is indicated to treat stress urinary incontinence and pelvic floor muscle weakness. **Aim:** this study aimed to evaluate the effect of hypopressive exercise on stress urinary incontinence and pelvic floor muscle activation among multiparous women. **Method:** A quasi-experimental research design was used in this study at Gynecological Outpatient Clinic of New Obstetric & Gynecological hospital and Obstetric & Gynecological inpatient wards at Mansoura University Hospital, Egypt. A purposive sample of 120 multiparous women was divided into two groups: the control group who got conventional care and the intervention group who received hypopressive exercise in addition to conventional care. Data was collected using three tools; a structured interview schedule, pelvic floor muscle assessment tool and the International Consultation on Incontinence Questionnaire–Urinary Incontinence Short Form. **Results:** There were no significant differences between the studied women in terms of pelvic floor muscle strength, pelvic floor distress, pelvic floor impact, or the severity of urinary incontinence symptoms at baseline. However, 4 and 8 weeks after exercise, pelvic floor muscle strength and severity of stress urinary incontinence symptoms were significantly improved in the intervention group compared to the control group (3.85±0.74 vs.3.20±0.65, p =0.002) and (4.06±0.70 vs. 3.33±0.64, p <0.001) / (11.8±5.27 vs. 15.9±4.01, p<0.001) and (9.97±4.25 vs. 15.12±4.15, p<0.001), respectively. **Conclusion**: Hypopressive exercise is an effective non-invasive technique that enhances pelvic floor muscle strength, alleviates pelvic floor dysfunction and stress urinary incontinence symptoms. **Recommendation**: Hypopressive exercise should be integrated into routine care for postnatal women.

Keywords: Hypopressive Exercise, Multiparous Women, Pelvic Floor Muscle, Stress Urinary Incontinence.

Introduction

Stress urinary incontinence (SUI) is a common gynecological urinary condition characterized by the inadvertent release of urine from the urethral external aperture with increased abdominal pressure, such as sneezing, coughing, laughing, or exercising **(Moreno-Munoz , Hita-Contreras , Estudillo-Martínez, 2021).** Weakness of the pelvic floor muscles and pelvic connective tissues, that support the bladder and urethra, results in SUI. This weakness causes bladder's "neck," to descend which occurs during periods of vigorous physical activity. As a result, this fall prevents the urethra from managing the flow of urine as it should. Also, weakening of the sphincter muscle, which controls the urethra, is another cause that contributes to SUI. This weak muscle doesn't prevent urine from flowing under normal conditions or when abdominal pressure increases. The reasons behind this weakening in the muscles might be related to pregnancy, delivery, ageing, or past pelvic procedures. Furthermore, smoking, obesity, and persistent coughing or straining is

known to be risk factors for SUI **(Yang, Wang, Gao, Li , Lin , Wang et al, 2023).**

Women who had delivered via a C-section or vaginal delivery are far more likely to develop SUI than women who have never given birth. Furthermore, because of the combined effects of pregnancy and vaginal birth on the pelvic floor muscles, multiparous women are more prone to have pelvic floor dysfunction. Frequent straining and stretching of these muscles can result in decreased support, increasing the risk of pelvic organ prolapse (POP), stress urinary incontinence, and other related problems **(Duran, Zelus, Burnett, Christman, and Alperin, 2025).** SUI is one of the most often recognized health issues in multipara women, and it has a significant impact on physical health psychological well-being, and social functioning **(Elmorsey, Ramadan, Ibrahim, El-Refay, El-Aty, & Mostafa, 2024).**

For the treatment of SUI, pharmacological and non-pharmacological approaches are available. The primary focus of pharmacological therapies is on sphincter function and bladder innervation. Non-pharmacological techniques, on the other hand, primarily focus on raising pelvic floor muscles strength and altering bladder function-affecting behaviors, such as changing lifestyle, training the bladder, using bladder supports (like pessaries), electrical stimulation, biofeedback, vaginal cones, and pelvic floor muscle exercises, also known as hypopressive exercise **(Abd elglil, & Mahmoud, 2023).**

Hypopressive Exercise (HE) refers to a group of exercises and breathing techniques that include lowering the pressure in the pelvic, thoracic, and abdominal cavities. These exercises are commonly used to strengthen the pelvic floor muscles and get a more toned and appealingly abdomen. Expiratory apnea is frequently accompanied with a strong voluntary contraction of the deeper and superficial abdominal muscles. During apnea, the strong contraction causes the pelvic floor muscles to tighten instinctively. It not only triggers the reflex response that causes the pelvic floor muscles to tighten, but it also strengthens the abdominal muscles **(Moreno-Munoz et al, 2021).**

Due to its ability to strengthen and tighten abdominal muscles, reduce stress and anxiety, speed up postpartum recovery, reduce back pain, prevent urine and fecal incontinence, improve body posture, correct genital prolapse, and improve bowel function, hypopressive exercise has become increasingly popular after childbirth **(Oliveira & Bruce, 2023)**. However, nurses may considerably affect the care of women with SUI and pelvic floor muscle weakness by their participation in continuing evaluation and inspection of these conditions. They can support these women in candidly sharing their incontinence-related worries, anxieties, and embarrassment. Nurses also can encourage incontinent women to learn more about their particular disease so they may better manage and adjust to it. Additionally, they seek to improve the quality of life for these women by educating them about bladder training, lifestyle changes and pelvic floor muscle exercises as hypopressive exercise which is safe and efficient **(National Health Service, 2023).**

Significance of the study

Urinary incontinence (UI) affects a significant percentage of women worldwide, with SUI accounting for 12.6% of all cases **(Mostafaei et al, 2020).** In Egypt, 14.8% of women experience SUI, and many don't seek medical treatment due to a lack of knowledge regarding the treatability of UI **(El-Azab & Moeen, 2013).** SUI has a wide-ranging impact on a woman's life, encompassing physical, psychological, sexual, social, and vocational elements. Pelvic floor muscle exercises are advised because they enhance pelvic floor strength.

However, newer approaches such as HE have grown in popularity due to reported benefits such as PFM strength and deep trunk muscle activation **(Juez, Nunez-Cordoba, Couso, Auba, Alcazar, Minguez, 2019).** This method is associated with a decrease in intra-abdominal pressure in the thoracic, abdominal, and perineal regions and may play an important role in activating striated muscle fibers of the pelvic floor and deep trunk muscles, as well as reducing urinary incontinence **(Moreno-Munoz et al, 2021).** Despite the widespread use HE as a therapeutic method for training the

PFM, there is still controversy regarding their clinical usefulness in the treatment of pelvic floor dysfunction and SUI. This has prompted researchers to study the effectiveness of hypopressive exercise on stress urinary incontinence and pelvic floor muscle activation among multiparous women.

Aim of the study:

This study aimed to evaluate the effectiveness of hypopressive exercise on stress urinary incontinence and pelvic floor muscle activation among multiparous women.

Hypotheses of the study:

- Multiparous women who practice hypopressive exercise are less likely to suffer from stress urinary incontinence than those who do not.
- Multiparous women who practice hypopressive exercise have stronger pelvic floor muscles than those who do not.

Method

Study design:

This study employed a quasi-experimental study approach, including control and intervention groups. This study assessed how the independent variable (hypopressive exercise) affected the dependent variable (stress urinary incontinence and pelvic floor muscle activation).

Study setting:

This study was conducted at the Gynecology Outpatient Clinic of the New Obstetrics & Gynecology Hospital and the Obstetrics & Gynecology Inpatient Unit of Mansoura University Hospital, Egypt. Both health sittings provide diagnostic and therapeutic services to women during pregnancy, childbirth, and postpartum period, as well as to women suffering from gynecological health problems.

Study subjects:

A purposive sample of 120 multiparous women were recruited from the aforementioned setting in line with the following criteria:

Inclusion criteria:

- Age : 30 - 55 Yrs.,
- Vaginal delivery method.
- Involuntary urine flow while coughing, laughing, or straining.
- Have been diagnosed with stress urine incontinence for at least two months.
- Reported at least one incidence of uncontrollable urine loss per week.
- No abdominal or pelvic surgeries during the last 6 months.

Exclusion criteria:

- Presence of genital prolapse, urinary tract infection, arterial hypertension, cardiovascular illness, abdominal herniation, musculoskeletal diseases and neurological disorders or sensory changes in the perineum.
- Women who have previously practiced pelvic floor muscle training.

Sample size calculation:

Based on the literature data of **Mitova et al. (2022)**, assessed the effectiveness of hypopressive gymnastics in women with pelvic floor dysfunction- assuming a 5% level of significance and 80% study power, the sample size required was calculated using the following formula:

$$n = ((Z\alpha/2 + Z\beta)^2 \times 2(SD)^2) / d^2$$

Where:

- **SD** is the standard deviation from the previous study,
- $\mathbf{Z\alpha/2}$ = 1.96 (for a 5% significance level),
- $\mathbf{Z\beta}$ = 0.84 (for 80% power), and
- **d** is the expected difference between groups.

Substituting the values:

$$n = ((1.96 + 0.84)^2 \times 2(2.061)^2) / (1.14)^2 = 60$$

Thus, the calculated sample size was 60 women for each group.

Recruitment of the study sample:

The study involved approximately 120 eligible multiparous women; they were divided into two groups, a control group and a hypopressive exercise group, with 60 participants each. Data collection was initially

conducted in the control group and then in the intervention group until the target sample size for both groups was reached. During the study period, ten participants in the hypopressive exercise group dropped out due to non-adherence to the exercise regimen, and eleven participants in the control group were lost to follow-up. These participants were replaced with new eligible participants to maintain the required sample size. Finally, statistical analysis was conducted using 120 participants, as shown in the flow chart in Figure I.

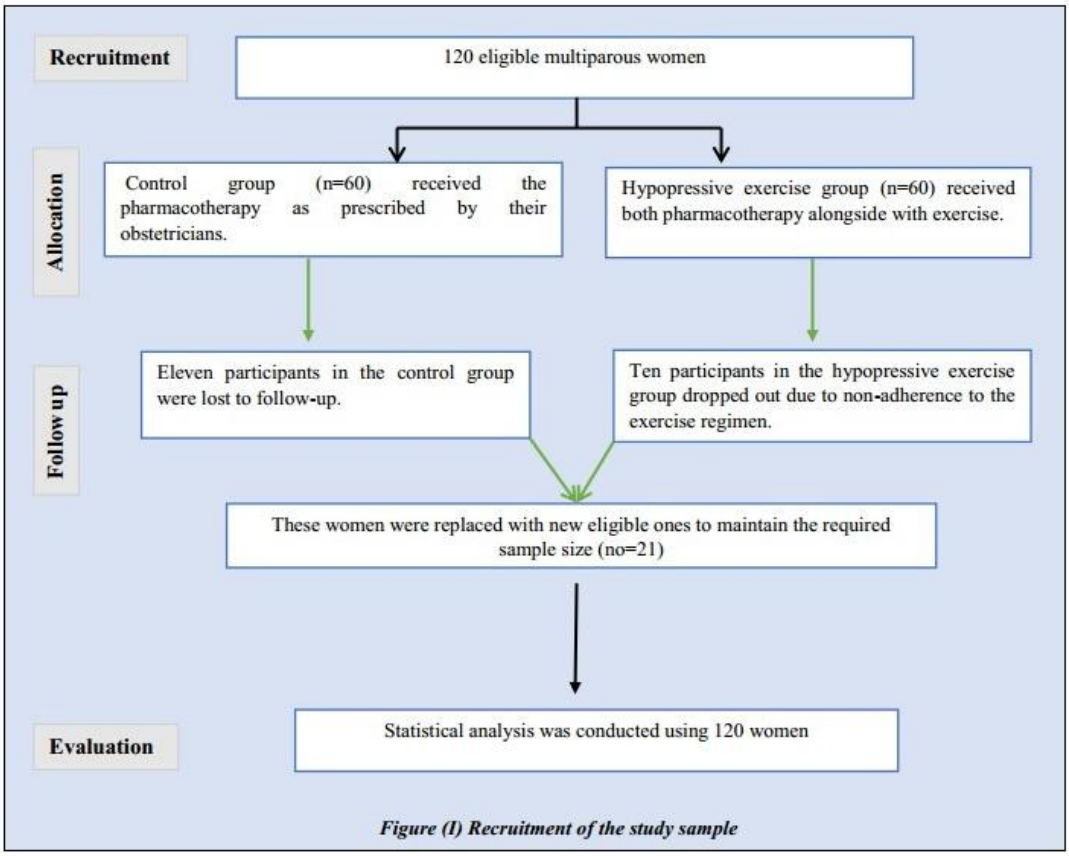

Figure (I) Recruitment of the study sample

Data Collection tools:

Three tools were used to collect the data:

Tool I: A Structured interview schedule:

It consists of three parts

Part (1): General characteristics of the participants: as age, education level, occupation, place of residence, weight, height and BMI.

Part (2): Obstetric history including gravidity, parity, numbers of abortions, presence of previous multiple pregnancies, occurrence of previous pregnancies complications, occurrence of previous deliveries complications.

Part (3): Urinary incontinence history as performance of urodynamic study, family history and duration of SUI complains.

Tool II: Pelvic Floor Muscle Assessment:

It consists of three parts

Part (1): Modified Oxford Scale (MOS):

PFM strength and function were assessed through digital palpation using the scale developed by Newman and Laycock (2008). This scale has a range from 0 to 5 and the following scoring criteria:

- 0: No contraction
- 1: Minimal contraction with no movement
- 2: Mild contraction with some movement (weak)

- 3: Moderate contraction, noticeable intravaginal pressure, digital pressure and slight vaginal wall elevation (moderate)
- 4: Strong contraction against resistance (good)
- 5: Contraction against maximal and sustained resistance (strong)

Part (2): Pelvic Floor Distress Inventory (PFDI-20)

It was developed by Barber et al. (2005) to assess the level of discomfort associated with pelvic floor dysfunction (PFD) symptoms. It includes a total of 20 items divided into three symptom-specific subscales: items 1–6 assess genital prolapse-related symptoms (Pelvic Organ Prolapse Disorder Inventory – POPDI), items 7–14 assess anal and colorectal symptoms (Colorectal-Anal Disorder Inventory – CRADI), and items 15–20 assess urinary tract symptoms (Urinary Tract Disorder Inventory – UDI). Each item is rated on a 5-point Likert scale from 0 (not at all) to 4 (quite a bit).

Part (3): Pelvic Floor Impact Questionnaire (PFIQ-7)

It was adopted from the work of Barber et al. (2005) and contains 7 items assessing the impact of urinary tract (UIQ), colorectal (CRAIQ) and genital prolapse (POPIQ) symptoms on activities, relationships and feelings. Ratings on a 4-point Likert scale range from 0 (not at all) to 3 (quite a lot).

Tool III: International Consultation Questionnaire on Urinary Incontinence – Urinary Incontinence Short Form (ICIQ-UI SF)

This tool was developed by Klovning et al. (2009) for assessing the severity of urinary incontinence (UI) symptoms and their impact on health-related quality of life. It consists of three items assessing the frequency and volume of leakage and the extent to which UI interferes with daily life, each rated on a Likert scale. A total score of 0 indicates no leakage or negative impact on quality of life.

- Question 1 assesses the frequency of leakage on a scale from 0 (never) to 5 (all the time).
- Question 2 assesses the amount of urine leaked, from 0 (no leakage) to 6 (a lot).
- Question 3 measures the extent to which UI interferes with daily activities, from 0 (not at all) to 10 (a lot).

The total score ranges from 0 to 21, and any score above 0 indicates the presence of UI.

Tools validity:

Before being sent to multiparous women, the generated questionnaire's content was assessed and validated by five experts in maternity nursing and obstetrics. The validation was made to ensure that the questions presented asked consistently and had the intended meaning. No changes were recommended.

Tools reliability:

The internal consistency and reliability coefficient (Cronbach's alpha) of the data collecting tool's components were calculated using SPSS software version 22. The Modified Oxford Scale's internal consistency was 0.933, the Pelvic Floor Distress Inventory was 0.901, and the Pelvic Floor Impact Questionnaire was 0.886, all suggesting high reliability.

Pilot study:

Prior to data collection, a pilot study was conducted on 10 percent (12 multiparous women) of the total sample size using the inclusion criteria to test the clarity, effectiveness, and applicability of the tools, as well as to determine the time required to implement the study and identify any necessary modifications. Participants in the pilot experiment were excluded from the study.

Ethical considerations:

Ethical approval was granted by the Research Ethics Committee of the Faculty of Nursing, Mansoura University (IRP 0616). After each participant was informed about the purpose and procedures of the study, they gave verbal consent. The researcher confirmed the confidentiality and uniqueness of the data obtained in this study, emphasizing that participation is completely voluntary and that participants can withdraw their participation at any time.

Field work:

This research took place from early August 2024 to end of December 2024. Researchers interviewed study participants three days a week (Sunday, Tuesday, and Wednesday) in the previously specified study setting. The study was completed in three phases: preparatory, implementation, and evaluation.

1. Preparatory phase:

The researchers reviewed the literature on hypopressive exercise for SUI and pelvic floor muscle activation. They developed data collection tools, educational materials, and videos, and provided a quiet, private room in which to conduct the study.

2. Implementation phase

This phase involved both assessment and actual intervention work with multiparous women;

A. Assessment:

- The researchers interviewed multiparas to confirm their eligibility, clarify the study's purpose, and get their oral consent for participation in the study. Following that, each participant's demographic data, an obstetric history, and a history of urine incontinence were collected. .
- PFM strength and function were assessed through digital palpation using MOS by the physician and the researchers assessed discomfort level caused by symptoms of PFD and pelvic floor impact utilizing tool (II), also evaluated stress urinary incontinence utilizing tool (III) for both groups prior to engaging in hypopressive exercise.

B. Intervention:

Control group

The participants in the control group received pharmacotherapy according to the instructions of gynecologists.

Intervention group

- The intervention group received pharmacotherapy and HE educational sessions. The session was conducted in 10 groups of six participants each and lasted 20:60 minutes.
- The researchers instructed female participants to voluntary empty their bladders, remove restrictive clothes, and relax.
- The researchers began explaining and demonstrating the approach of engaging in HE using a PowerPoint presentation, video materials, and live demonstrations of this exercise, all while the researchers closely observed.

Steps of hypopressive exercise (*Figure II):*

Instruct the woman to:

- Close her eyes, focus on a spot front of her, clear her mind, and focus on her breathing during the exercise.
- Inhale regularly and exhale fully until the abdomen contracts.
- Contract the abdominal muscles to shrink the abdomen and bring it inside towards the spine.
- Start with a contraction that lasts 5 to 10 seconds, then gradually increase the duration over time. Hold this posture for as long as possible, without breathing.
- Inhale deeply, fill lungs with vitalizing air, and relax. Return to normal breathing rhythm.
- Begin this pattern lying down, then advance to sitting, leaning forward, and lastly kneeling on the floor.
- In a lying position, reclining on the ventral side of the body, with lower limbs flexed and upper limbs aligned parallel to the torso, adhere to the aforementioned guidelines. Begin by performing three sets of this physical activity.
- In a sitting position, assume a seated position on a chair with soles of the feet firmly planted on the floor. Alternatively, sit on the floor with knees flexed for beginners and stretched legs for experts. Exhale all of the air from lungs and then tense abdominal muscles to the maximum degree possible, exhaling for as long as she can.
- In a standing position, tilt the body anteriorly and slightly flex her knees. Inhale deeply, then exhale while inwardly constricting the

abdominal area and the muscles that surround the pelvic floor, allowing the breath to last as long as possible.

- Kneel on the floor in a quadruped position, with hands and knees on the floor. Exhale completely, retract the abdomen area as far as possible, and hold the breath for as long as possible.
- After the explanation, each female participant was asked to repeat the method until the researchers ensured that each participant could demonstrate the exercise independently.
- Each participant should perform a series of HE in various postures because it is common for an individual to be able to sustain a contraction for a longer period of time in one position than another. The most effective way to determine which posture can sustain the contraction for the longest length of time is to evaluate each unique position.
- Over a 12-week period, participants should conduct HE for 20 minutes to an hour, three to five times each week.
- The researchers monitored participants in both groups by phone and WhatsApp to address any issues that arose throughout the duration of monitoring procedure.

Figure (II). Hypopressive exercise poses (Rial & Pinsach, 2017)

3. Outcome evaluation phase:

The researchers reassessed PFM strength and function, discomfort level caused by symptoms of PFD and pelvic floor impact utilizing tool (II), stress urinary incontinence utilizing tool (III) for both groups. The evaluation was performed at two separate occasions; the initial follow-up occurred after four weeks followed by subsequent evaluation at the 8th week after engaging in HE.

Statistical analysis

All statistical analyses were performed using SPSS version 20.0 (SPSS, Chicago, IL). Continuous data following normal distribution were expressed as mean ± standard deviation (SD), while categorical data were presented as frequencies and percentages. One-way analysis of variance was used to compare more than two groups based on continuous data, and Student's t-test was used to compare two groups. Chi-square test was used to analyze categorical variables. Internal consistency (reliability) of the questionnaires was also assessed. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1 shows the mean ±SD age of intervention group 41.4±7.9 compared to 42.45±8.11of control group and there was no statistical significant difference in relation to the age of participants, educational level, occupation, residence and BMI among both groups (P >0.05).

Table 2 shows the mean ±SD gravidity and parity of intervention group was 1.63±0.49, 1.68±0.47 respectively compared to 1.77±0.43, 1.72±0.45 of the control group respectively. No statistical significant difference was found in relation to the studied women' gravidity, parity, abortion, multiple pregnancies, previous pregnancies and deliveries complications (P >0.05).

Table 3 clarifies no statistical significant difference between the studied women related to participants' history of urinary incontinence. The mean ±SD ages at diagnosis of stress urinary incontinence in intervention and control groups were 36.28±7.32 and 35.15±6.72, respectively. About 35% of intervention group had family history of stress urinary incontinence compared to 31.7% of control group.

Figure 1 displays the average pelvic floor muscle strength of the studied women. The initial assessment indicated no statistically significant difference related to PFM strength score in both groups. However, 4 weeks after the exercise PFM strength was significantly higher in the intervention group than in the control group (3.85±0.74 vs. 3.20±0.65, p=0.002). Moreover, 8 weeks after exercise, there was more improvement in intervention group than control group (4.06±0.70 vs. 3.33±0.64, p<0.001).

Figure 2 illustrates the average pelvic floor distress of the studied women. The initial assessment showed no statistically significant difference related to pelvic floor distress (PFD) in both groups. However, 4 and 8 weeks after exercise, PFD was significantly improved in the intervention group compared to the control group (146.82±27.39 vs. 167.05±40.59 p<0.001) and (129.98±20.4 vs. 166.47±41.04 p<0.001), respectively.

Figure 3 presents Pelvic floor impact of the studied women. The initial assessment revealed no statistically significant difference related to PFI in both groups. However, 4 and 8 weeks after exercise, PFI symptoms were significantly reduced in the intervention group compared to the control group (174.35±52.43 vs. 199.09±42.48, p=0.005) and (159.13±51.21 vs. 194.57±44.36, p=0.001), respectively.

Figure 4 shows the studied women distribution according to their rating of the severity of their urinary incontinence symptoms. At the baseline assessment, there was no statistically significant difference related to the severity of urinary incontinence symptoms in both groups. However, 4 and 8 weeks after exercise, urinary incontinence symptoms was significantly reduced in the intervention group compared to the control group (11.8±5.27 vs. 15.9±4.01, p=0.001) and (9.97±4.25 vs. 15.12±4.15, p<0.001), respectively.

Table 1: General characteristics of the studied women

Variable	Intervention group		Control group		Test of significance	
	N=60	%	N=60	%	X^2	P
Age						
30- 35 years	4	6.7	8	13.3	3.278	0.194
>35-45 years	24	40.0	29	48.3		
>45-55 years	32	53.3	23	38.3		
Mean ±SD	41.4±7.9		42.45±8.11		0.719	0.474
Educational level:						
Unable to read and write	11	18.3	14	23.3	1.262	0.532
Middle education	38	63.3	39	65.0		
High education	11	18.3	7	11.7		
Occupation:						
House wife	32	53.3	33	55.0	0.034	0.855
Working	28	46.7	27	45.0		
Residence:						
Rural	41	68.3	32	53.3	2.833	0.092
Urban	19	31.7	28	46.7		
BMI						
Underweight	4	6.7	6	10.0	3.370	0.185
Normal	25	41.6	26	43.3		
Overweight	31	51.7	28	46.7		

X^2= Chi-Square test

Table 2: Obstetric history of the studied women

Variable	Intervention group		Control group		Test of significance	
	N=60	%	N=60	%	X^2	P
Gravidity						
Two	22	36.7	14	23.3	2.540	0.136
Three or more	38	63.3	46	76.7		
Mean ±SD	1.63±0.49		1.77±0.43			
Parity						
Two	19	31.7	17	28.3	0.159	0.690
Three or more	41	68.3	43	71.7		
Mean ±SD	1.68±0.47		1.72±0.45			
Number of abortions						
None	39	65.0	44	73.3	0.977	0.323
One or more	21	35.0	16	26.7		
Presence of previous multiple pregnancy						
Yes	13	21.7	19	31.7	1.534	0.215
No	47	78.3	41	68.3		
Occurrence of previous pregnancies complications						
Yes	13	21.7	19	31.7	1.534	0.215
No	47	78.3	41	68.3		
Occurrence of previous deliveries complications						
Yes	9	15.0	15	25.0	1.875	0.171
No	51	85.0	45	75.0		

X^2= Chi-Square test

Table 3: Urinary incontinence history of the studied women

Variable	Intervention group		Control group		Test of significance	
	N=60	%	N=60	%	X^2	P
Performed urodynamic study						
Yes	32	53.3	36	60.0	0.543	0.461
No	28	46.7	24	40.0		
Age at diagnosis of stress urinary incontinence						
Mean ±SD	36.28±7.32		35.15±6.72			
Family history of stress urinary incontinence						
Yes	21	35.0	19	31.7	0.150	0.699
No	39	65.0	41	68.3		
Duration of complain of urinary incontinence (Years)						
< 5 years	26	43.3	19	31.7	2.827	0.243
5-10 years	31	51.7	34	56.7		
> 10 years	3	5.0	7	11.7		

X^2= Chi-Square test

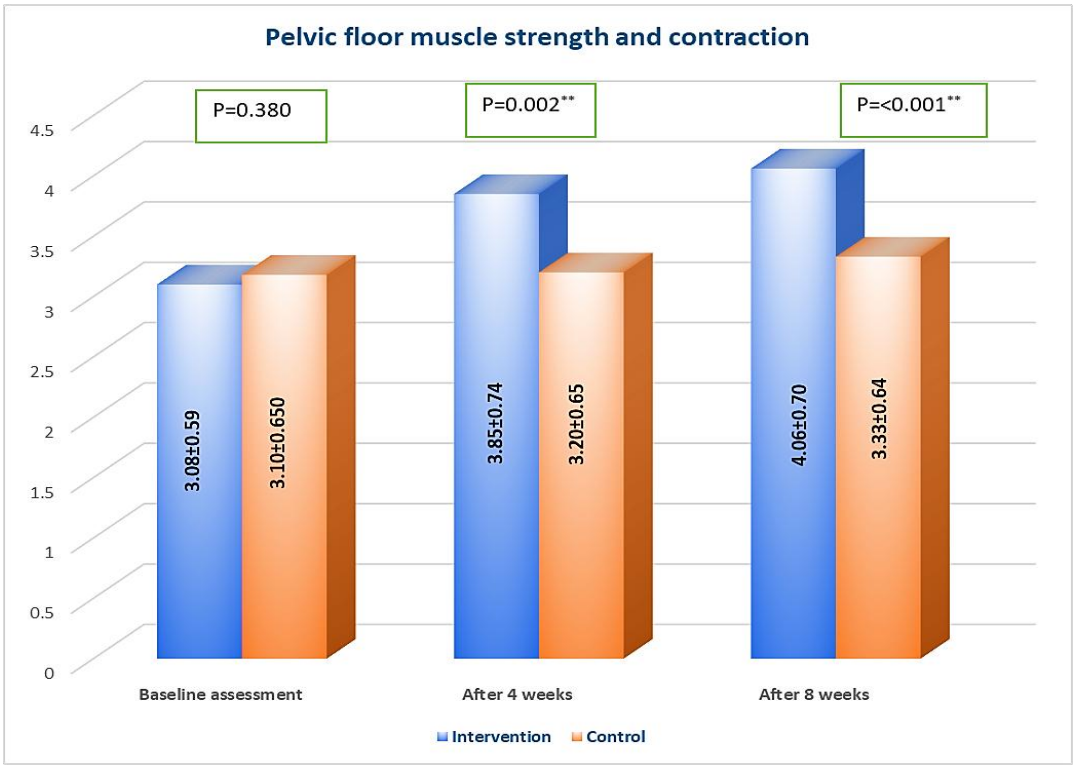

Figure 1 Pelvic floor muscle strength of the studied women

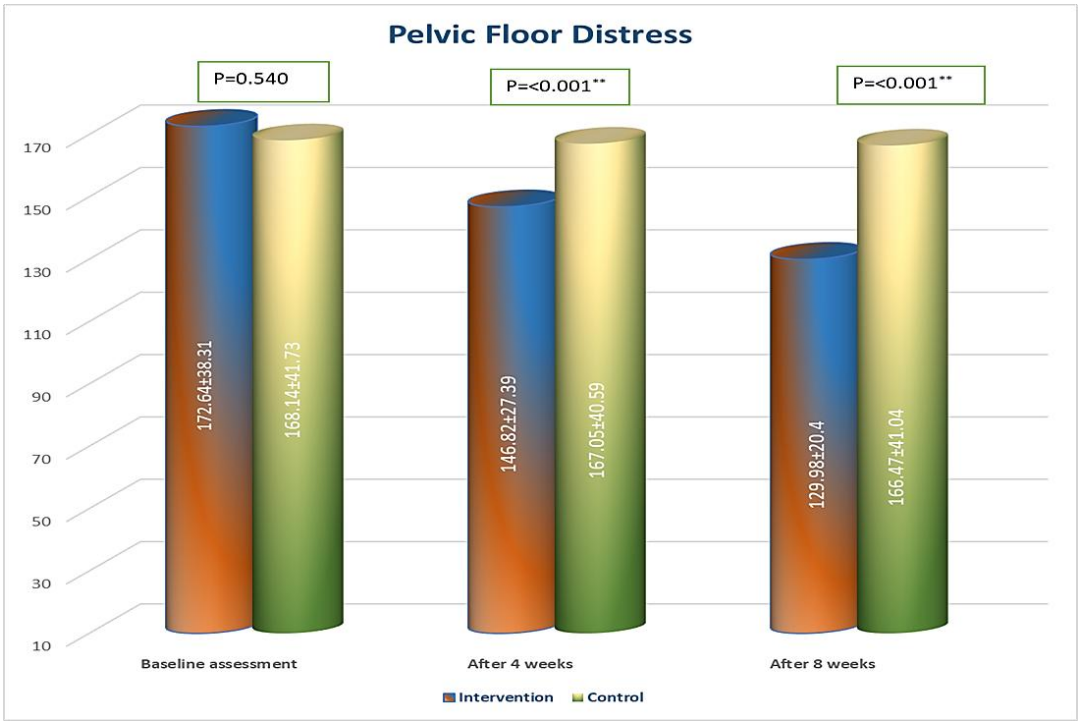

Figure 2 Pelvic floor distress of the studied women

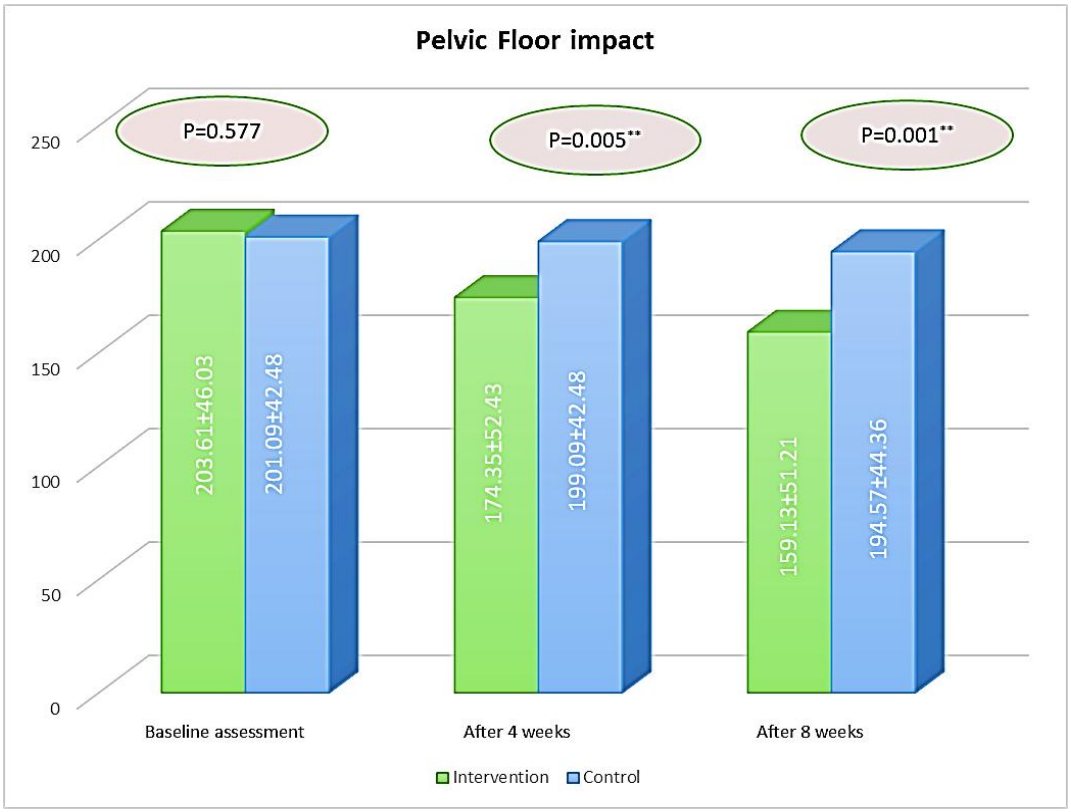

Figure 3 Pelvic Floor Impact of the studied women

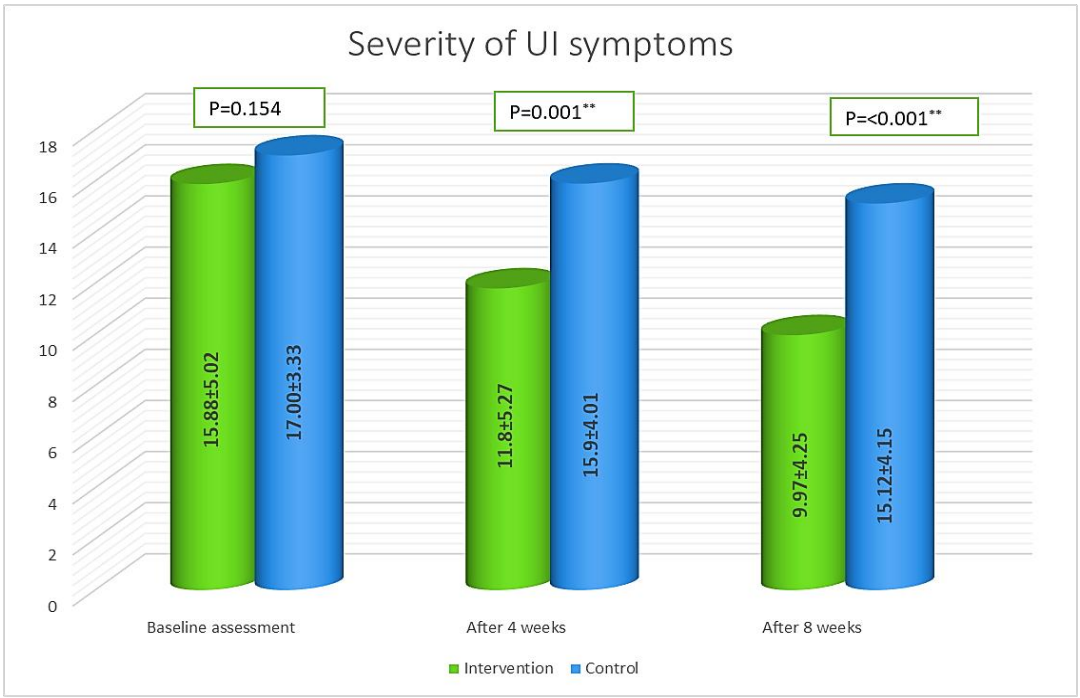

Figure 4 severity urinary incontinence symptoms among the studied women

Discussion

The aim of this study was to evaluate the effectiveness of hypopressive exercise on stress urinary incontinence and pelvic floor muscle activation among multiparous women. This aim was achieved by the results of this study, which showed a significant reduction in symptoms of stress urinary incontinence and a significant improvement in pelvic floor muscle strength. Consequently, the study hypotheses were accepted "Multiparous women who practice hypopressive exercise are less likely to suffer from stress urinary incontinence and have stronger pelvic floor muscles than those who do not." The present study found no statistically significant differences between the intervention and control groups in terms of general characteristics, obstetric history, and history of urinary incontinence. Most participants were between thirty-five and fifty-five years old, had nearly similar levels of education, and were mostly housewives from rural areas. Additionally, the distribution of body mass index, history of abortion, and duration of SUI complaints were comparable between the groups, enhancing the internal validity of the study and suggesting that any observed effects of the intervention can be attributed to its impact rather than pre-existing differences.

Regarding pelvic floor muscle strength, the study results show that HE had a positive effect on the intervention group. Although there were no significant differences in MOS scores between the study groups at baseline assessment, later on, there was a significant increase in muscle strength in the intervention group after 4 and 8 weeks of exercise compared to the control group. Progressive increment in MOS scores implies HE is effective for pelvic floor muscle function among these women over time. The statistically significant differences seen at both follow-up assessments lend further support to this exercise being incorporated as a non-invasive means for PFM strengthening. It also marks an improvement between groups which would thus highlight HE relative to usual care as a valuable therapeutic strategy.

Recent studies have highlighted the efficacy of hypopressive exercises (HE) in improving pelvic floor muscle strength in women with pelvic organ prolapse and stress urinary incontinence. Parle, Shahmalak, and Irkar

(2021) found that a 6-week intervention significantly increased muscle strength in women with stage I and II POP and concluded that hypopressive exercises demonstrated improvements in pelvic floor muscle strength. Similarly, Mitova, Avramova, & Gramatikova (2022) demonstrated that a combination of hypopressive techniques and Kegel exercises improved abdominal muscle strength in middle-aged women with stress incontinence. Their results demonstrate that HE leads to the strength of the abdominal musculature for the groups where was applied. Furthermore, a systematic review by Katz & Barbosa (2024) further supports these findings, indicating that HE effectively strengthens pelvic floor and abdominal muscles while alleviating symptoms of pelvic floor dysfunction.

Regarding pelvic floor distress, the results show a significant reduction in pelvic floor distress among women in the intervention group, as measured by the PFDI. At baseline, there were no significant differences in PFDI scores between the intervention and control groups, indicating that both groups experienced comparable levels of discomfort related to pelvic floor dysfunction. However, after 4 weeks, there was a significant improvement in discomfort levels in the intervention group compared to the control group. This improvement was even more pronounced after 8 weeks, as PFDI scores continued to decrease in the intervention group, while they remained virtually unchanged in the control group.

These results imply that HE are effective non-invasive method of reducing pelvic floor dysfunction symptoms, most likely as a result of its effects on enhanced neuromuscular synchronization, deep core muscle activation, and intra-abdominal pressure reduction. The sustained reduction in pelvic distress scores over time reinforces the long-term benefits of these exercises in improving pelvic health and quality of life. This finding is consistent with a previous study by Navarro-Brazales et al. (2020), compared the effects of an eight-week HE program with the effects of a specifically designed pelvic floor muscle training program, as well as a combination of both programs, immediately after treatment and at follow-up assessments at 3, 6, and 12 months in women with PFD. The authors reported that HE significantly reduced PFD symptoms, improved quality of life, and improved pelvic floor muscle strength and baseline tone in both the short and long term.

At baseline, there were no statistically significant differences in PFIQ scores between study groups, indicating similar levels of pelvic floor discomfort among the studied women. However, after four weeks of HE, PFIQ scores were significantly lower in the intervention group compared to the control group. This improvement was maintained and increased during the eight-week follow-up period, and the proportion of women in the intervention group who experienced severe pelvic floor impact decreased significantly.

These results indicate that HE is effective in reducing the negative impact of pelvic floor dysfunction on daily activities and emotional well-being. The progressive decline in PFIQ scores over time underscores the potential benefits of HE in enhancing pelvic floor health. This effect is likely due to improved strength, stability and support of the pelvic muscles. In contrast, the lack of significant changes in the control group highlights the importance of targeted pelvic floor muscle exercises for symptom control and improving quality of life in women with pelvic floor muscle dysfunction. These findings are consistent with established research. Sreevinishaa et al. (2024) compared “the effectiveness of HE and Kegel exercises for POP among women who had undergone spontaneous vaginal delivery”, reporting that HE was more effective than Kegel exercises. Similarly, Herena-Funes et al. (2024) analyzed the effectiveness of an eight-week supervised HE program and found improvements in pelvic floor function, ventilator mechanics, and overall quality of life.

The results of the current study revealed a significant reduction in SUI symptom severity among women in the intervention group. At baseline, both the intervention and control groups had comparable ICIQ-UI SF scores. However, after four weeks of HE, there was a clear shift in the intervention group, with fewer women reporting severe symptoms and more experiencing mild or moderate symptoms. This positive trend continued at the eighth week of

follow-up, with the intervention group showing a further reduction in symptom severity, while the control group showed little improvement.

These results suggest that HE could be an effective, non-invasive method for managing SUI by reducing symptoms severity and improving quality of life, likely through improved pelvic floor muscle strength and bladder control. Supporting the effectiveness of HE in reducing SUI symptoms. Molina-Torres et al. (2023) who evaluated an eight-week supervised HE training program in women with pelvic floor dysfunction and noted significant improvements in pelvic floor muscle strength and urinary incontinence symptoms. Similarly, Berríos-Contreras et al. (2024) examined the impact of a four-week HE program on women for gynecological cancer and suggested that HE provide reduction of urinary incontinence symptoms by increasing neuromuscular activation of the pelvic floor muscles.

In conclusion, the results of the current study showed that hypopressive exercise is an effective non-invasive technique that maternity nurses can use as one of the nursing strategies to treat pelvic floor dysfunction, improve pelvic floor muscle strength and relieve stress urinary incontinence symptoms.

Conclusion

Hypopressive exercise combined with pharmacotherapy has been shown to be effective in multiparous women with stress urinary incontinence and better than pharmacotherapy alone. This approach significantly improves pelvic floor muscle strength and function while simultaneously reversing pelvic floor dysfunction and reducing stress urinary incontinence symptoms.

Recommendations

- Hypopressive exercise should be included in the routine care of women in the postpartum period as a standard approach to the treatment of pelvic floor dysfunction and stress urinary incontinence.
- Awareness of maternity nurses about hypopressive exercise should be raised to be implemented into practice.
- Developing an educational booklet with simple instructions and illustrations to be used in health sittings as an educational tool for women suffering from stress urinary incontinence.
- Additional studies should explore long-term adherence, effectiveness across different populations, and the potential benefits of integrating hypopressive exercises with other therapeutic modalities.

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Conflicts of interest:

There is no conflict of interest during the research and publication of the manuscript.

References

Abd elglil, A.A., & Mahmoud, N. S. A. (2023). Effect of hypopressive exercises versus pelvic floor muscle exercises on stress urinary incontinence among multiparous women. Assiut Scientific Nursing Journal, 11(40), 162-174.

Barber M, Walters M, Bump R. (2005). Short forms of two conditionspecifc quality-of-life questionnaires for women with pelvic foor disorders (PFDI-20 and PFIQ-7). Am J Obstet Gynecol.;193(1):103–13.

Berríos-Contreras, L., Lorca, L. A., Arias Avila, M., Ortega, F., & Leao Ribeiro, I. (2024). Effects of hypopressive exercise associated with aerobic and muscle strength training on the treatment of fatigue, urinary incontinence symptoms, sexual function, and quality of life in women treated for gynecologic cancer: A randomized clinical trial protocol. Medwave, 24(7), e2906. https://doi. org/10. 5867/ medwave. 2024.07.2906

Duran, P., Zelus, E. I., Burnett, L. A., Christman, K. L., & Alperin, M. (2025). Repeated birth injuries lead to long-term pelvic floor muscle dysfunction in the preclinical rat model. American

journal of obstetrics and gynecology, 232(2), 198.e1–198.e23. https://doi. org/ 10. 1016/ j.ajog.2024.08.036

El-Azab, A., & Moeen, A. (2013). The satisfaction of patients with refractory idiopathic overactive bladder with onabotulinumtoxinA and augmentation cystoplasty. Arab Journal of Urology, 11(4): 344-349. Doi:/ 10. 1016/ j. aju. 2013. 07.003.

Elmorsey, A. M., Ramadan, S. A. E. S., Ibrahim, S. S., El-Refay, W. E. S., El-Aty, A., & Mostafa, E. (2024). Assessment of Stress Urinary Incontinence and Health Related Quality of Life among Women in Port Said City. Port Said Scientific Journal of Nursing, 11(1), 121-142.

Herena-Funes, M. D. C., Correia de Alencar, C., Velázquez-Torres, D. M., Marrero García, E., Castellote-Caballero, Y., León-Morillas, F., ... & Cruz-Díaz, D. (2024). Effects of Hypopressive Abdominal Training on Ventilatory Capacity and Quality of Life: A Randomized Controlled Trial. In Healthcare (Vol. 12, No. 9, p. 893). MDPI.

Juez L, Núñez-Córdoba JM, Couso N, Aubá M, Alcázar JL, Mínguez JÁ.(2019). Hypopressive technique versus pelvic floor muscle training for postpartum pelvic floor rehabilitation: a prospective cohort study. Neurourol Urodyn.;38(7):

Katz, C. M. S., & Barbosa, C. P. (2024). Effects of hypopressive exercises on pelvic floor and abdominal muscles in adult women: A systematic review of randomized clinical trials. Journal of Bodywork and Movement Therapies, 37, 38-45.

Klovning A, Avery K, Sandvik H, Hunskaar S. (2009). Comparison of two questionnaires for assessing the severity of urinary incontinence: The ICIQ-UI SF versus the incontinence severity index. Neurourol Urodyn.; 28(5):411–5. https://doi.org/10.1002/nau.20674 PMID: 19214996

Mitova S, Avramova M, Gramatikova M. (2022). Effectiveness of hypopressive gymnastics in women with pelvic floor dysfunction. Journal of Physical Education and Sport, 22 (2); 416 - 422, online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 – 8051.

Molina-Torres, G., Moreno-Muñoz, M., Rebullido, T. R., Castellote-Caballero, Y., Bergamin, M., Gobbo, S., Hita-Contreras, F., & Cruz-Diaz, D. (2023). The effects of an 8-week hypopressive exercise training program on urinary incontinence and pelvic floor muscle activation: A randomized controlled trial. Neurourology and urodynamics, 42(2), 500–509. https://doi. org/ 10. 1002/ nau. 25110.

Moreno- Munoz MM, Hita-Contreras F, Estudillo- Martínez MD. (2021). The effects of abdominal hypopressive training on postural control and deep trunk muscle activation: a randomized controlled trial. Int J Environ Res Public Health;18(5):2741. doi: 10.3390/ ijerph 18052741.

Mostafaei, H., Sadeghi-Bazargani, H., Hajebrahimi, S., Salehi-Pourmehr, H., Ghojazadeh, M., Onur, R., Al Mousa, R., & Oelke, M. (2020): Prevalence of female urinary incontinence in the developing world: A systematic review and meta-analysis-A Report from the Developing World Committee of the International Continence Society and Iranian Research Center for Evidence Based Medicine. Neurourology and Urodynamics, 39(4): 1063-1086. Doi:/ 10. 1002/ nau.24342.

National Health Service [NHS]. (2023): Urinary incontinence. London: NHS. Available from: https:// www. nhs. uk/ conditions/urinary-incontinence/. [Accessed in: June 8, 2024]

Navarro-Brazalez B, Prieto-Gomez V, Prieto-Merino D, Sanchez-Sanchez B, Lclean L Torres-Lacomba M. (2020)., Effectivness of Hypopressive Exercise in Women with Pelvic floor Dysfunction: A

randomized Controlled Trial. J. Clin. Med. 9, 1149; Doi: 10.3390/jcm9041149.

Newman, D. K., & Laycock, J. (2008). Clinical Evaluation of the Pelvic Floor Muscles. Springer EBooks, 91–104. https://doi.org/10.1007/978-1-84628-505-9_9

Oliveira, D., & Bruce, C. (2023): Hypopressive Exercises 101: Step-by-Step Instructions. Available at: https://www.tuasaude.com/en/hypopressive-exercises/. (Accessed June 8 , 2024).

Parle, J., Shahmalak, S., & Irkar, D. (2021). Effect of Hypopressive exercise in women with Pelvic Organ Prolapse. Nepal Journal of Obstetrics and Gynaecology, 16(1), 47-51.

Rial T. Pinsach P. (2017). Practical manual low pressure fitness level 1. International Hypopressive & Physical Therapy Institute; Vigo, Spain.. https://www. mdpi. com/ 2227-9032/12/9/893

Sreevinishaa, Jothilingam, M., Buvanesh, A., & Kandasamy, G. (2024). Comparing the Effects of Hypopressive" Exercise" and Kegels Exercise for Pelvic Organ Prolapse among" Patients with" Spontaneous Vaginal Delivery. Indian Journal of Physiotherapy & Occupational Therapy, 18.

Yang X, Wang X, Gao Z, Li L, Lin H, Wang H, et al. (2023). The Anatomical Pathogenesis of Stress Urinary Incontinence in Women. Medicina (Kaunas). 20;59(1) 1-11.