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KNACK MANEUVER VS HYPOPRESSIVE EXERCISES IN STRESS URINARY INCONTINENCE AFTER HYSTERECTOMY

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ABSTRACT

AIM AND OBJECTIVE: This study aims to investigate the effectiveness of the Knack maneuver and hypopressive exercises in treating stress urinary incontinence following hysterectomy.

METHOD: A study involving 40 subjects with Stress Urinary Incontinence post-hysterectomy divided them into two groups: Group A received Knack maneuvers, and Group B underwent Hypopressive exercises. Both groups performed interventions five days a week for five weeks. Pre- and post-intervention assessments included pelvic floor muscle strength/endurance via perineometer and quality of life using ICIQ-UI-SF questionnaire.

RESULT: Data from participants receiving Knack maneuvers (Group A) and Hypopressive exercises (Group B) were analyzed using SPSS 26.0. Descriptive statistics determined mean and standard deviation. Normality was assessed with Shapiro-Wilkinson test. Inferential statistics between groups were calculated using Mann-Whitney U, and within-group analysis was conducted using Wilcoxon Matched Pair Test. Significance was set at $p<0.05$.

CONCLUSION: The study concludes that both Hypopressive exercises and the Knack maneuver effectively improve pelvic floor muscle strength, endurance, and overall quality of life in individuals with stress urinary incontinence post-hysterectomy. However, Hypopressive exercises were found to be more effective than the Knack maneuver in enhancing these outcomes.

Keywords: Hysterectomy, Stress Urinary Incontinence, Pelvic floor muscles, Hypopressive exercises, Knack maneuver, Perineometer

INTRODUCTION

Hysterectomy is the subsequent most frequent procedure for surgery carried out worldwide, behind C- sections. During a hysterectomy, the uterus or portions of the uterus are removed. It is removed by the abdominal route (TAH), the vaginal route (VH), laproscopically, with the use of a robot, or a combination of these approaches **[1]**. According to estimates, one out of every nine females will undergo a hysterectomy over the course of her life with around 600,000 surgeries performed each year in US **[2]**. In India, incidence of hysterectomy procedures amongst female of 15-49 years of age was 3.2%. The primary reasons for undergoing a hysterectomy commonly include: Unusual bleeding from the uterus, Cancerous or precancerous conditions, Benign tumors in uterus, Fibroid uterus, Benign ovarian mass, Adenomyosis, Endometriosis, Pelvic organ descent, discomfort, inflammation **[3]**.

Hysterectomy can disrupt pelvic nerve pathways and ligaments, impacting bladder function and increasing the risk of stress urinary incontinence (SUI). Damage to pelvic plexus during surgery, particularly during cardinal ligament splitting, can sever nerve fibers, leading to detrusor dysfunctions and SUI **[4]**. Additionally, excision of vaginal tissue or parametrium can reduce bladder neck support, while disruption to the pelvis and pudendal nerve can decrease periurethral tone, contributing to SUI. Pre-existing bladder weakness, aging, and menopause further exacerbate postoperative urinary incontinence **[5]**.

Stress urinary incontinence (SUI) is a prevalent form of urinary incontinence characterized by involuntary urine leakage during activities such as sneezing, coughing, or physical exertion. In healthy women, an automatic pelvic floor muscle contraction occurs before or during these activities, maintaining urethral pressure higher than intravesical pressure **[6]**. However, this response may be absent in women with SUI. SUI affects 15 to 40% of women globally, significantly impacting daily functions, social interactions, sexuality, and psychological well-being. Therefore, SUI is

increasingly being recognized as a global health concern **[7]**.

SUI is one of the most reported health dilemmas of women suffering from Lower Urinary Tract Symptoms. Lower urinary tract dysfunction is a common finding (70-85% prevalence) after hysterectomy, and its most frequent long term sequel is Stress Urinary Incontinence (70% of cases) and its management is complex and challenging. Conservative and surgical treatment stand out amongst the therapeutic options for SUI. The interest in a conservative approach has increased because it is less invasive and is associated with a lower risk of adverse complications compared to the high cost and risks of surgery **[7]**.

The Knack maneuver, involving voluntary contraction of pelvic floor muscles (PFM) during activities like coughing or physical exertion, aims to prevent urine leakage in women with stress urinary incontinence (SUI) **[8]**. It operates on anatomical and biomechanical principles, increasing urethral stiffness and pressure to reduce urine loss. Studies demonstrate significant reductions in leakage during coughing, with reductions of 98.2% and 73.3% during moderate and deep coughing, respectively. Additionally, the maneuver stabilizes bladder neck descent, reducing bladder neck mobility during activities that raise intra-abdominal pressure **[9]**.

Caufriez proposed Hypopressive Exercises (HEs) to activate pelvic floor muscles (PFMs) through changes in posture and breathing. These exercises consist of a series of thirty-three consecutive postures performed in different body positions, combined with a hypopressive maneuver involving expiratory apnea while drawing in the abdomen and opening the rib cage **[10]**. The aim is to decrease intra-abdominal pressure while increasing the basal tone of PFMs and deep abdominal muscles without voluntary activation **[11]**.

MATERIALS AND METHOD

A comparative study was conducted at Eva Women's Hospital and multiple other centers, using a convenient sampling technique to recruit 40 women aged between 30-70 years post-hysterectomy, voluntarily participating with self-reported signs of mild to moderate stress urinary incontinence (SUI). Exclusion criteria included the presence of spinal tumors, bowel and bladder dysfunction, prior participation in pelvic re-education programs, pelvic organ prolapse at stage 2 or beyond, and urge faecal incontinence **[9, 10]**.

Materials utilized comprised consent forms, perineometers, data collection sheets, the ICIQ-UI-SF form, and stationary items.

Following ethical approval, the 40 selected subjects were randomly divided into two groups: Group A (n=20) received Knack maneuver for 5 days weekly over 5

weeks, while Group B (n=20) received Hypopressive exercises over the same duration. The intervention duration for both groups was five days per week for five weeks.

The outcome measures used were Perineometer strength and endurance, ICIQ-UI-SF Questionnaire, through which the subjects were assessed pre and post-intervention period, and final results were analyzed.

Group A – Knack Maneuver

In the Knack maneuver training participants in the first and second weeks focused on understanding the pelvic floor muscles (PFMs) and stress urinary incontinence mechanisms, with exercises conducted in a side-lying position. Fast contractions were likened to a "tap on-off," while slow contractions were compared to an elevator ascending and descending. Ten repetitions were performed for both types of contractions across five sessions **[8]**. In the subsequent weeks, participants progressed to sitting or standing positions, engaging all three pelvic openings (urethra, vagina, and anus) before coughing, sneezing, or lifting. They were guided to contract and maintain muscle tension during coughing, gradually incorporating more forceful coughs and repetitions. This regimen aimed to enhance pelvic floor muscle control through ten repetitions across seven sessions, with an 8-second rest interval between contractions **[8, 9]**.

Group B- Hypopressive Exercise

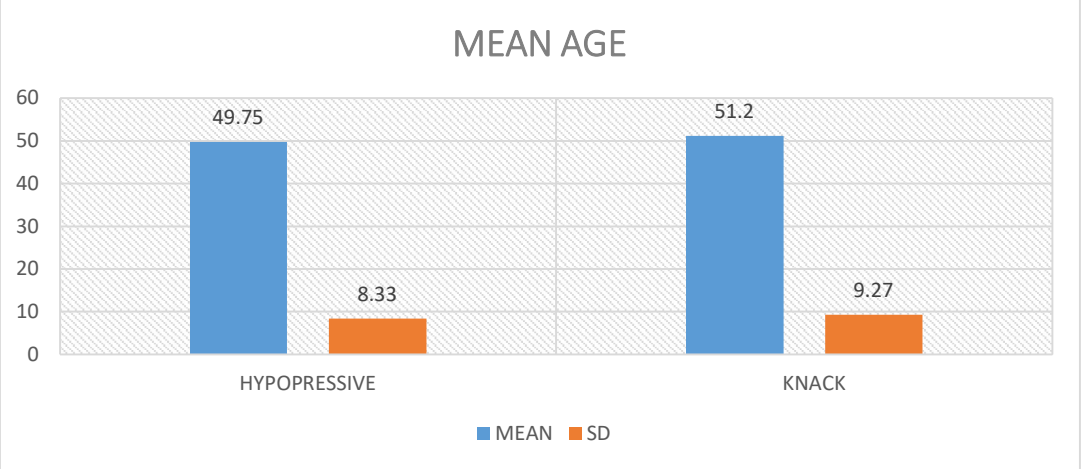
In Hypopressive Exercises (HE) participants adopted two postures: a supine position and a standing orthostatic posture. In the supine position, participants maintained specific body alignments, including internally rotated shoulders, flexed elbows, extended wrists and fingers in contact with iliac crests, and one leg raised while the other remained supported on a plinth. Three hypopressive maneuvers were executed with deep breaths, focusing on lateral costal expansion and abdomen elevation without engaging abdominal muscles, with no specific instructions regarding pelvic floor muscle activation. In the standing posture, participants leaned forward with knees slightly flexed and internally rotated shoulders, maintaining the same breath-focused maneuvers **[10]**. Three repetitions were performed in each position, with two full breath cycles allowed for recovery between trials, aiming to enhance pelvic floor muscle control and improve urinary continence **[11]**.

RESULT

Table 1: Mean age

		HYPOPRESSIVE	KNACK	Z VALUE	P VALUE (MANN WHITNEY U TEST)
AGE	MEAN	49.75	51.2	0.52	0.60
	SD	8.33	9.27		

Graph 1: Mean age in two groups

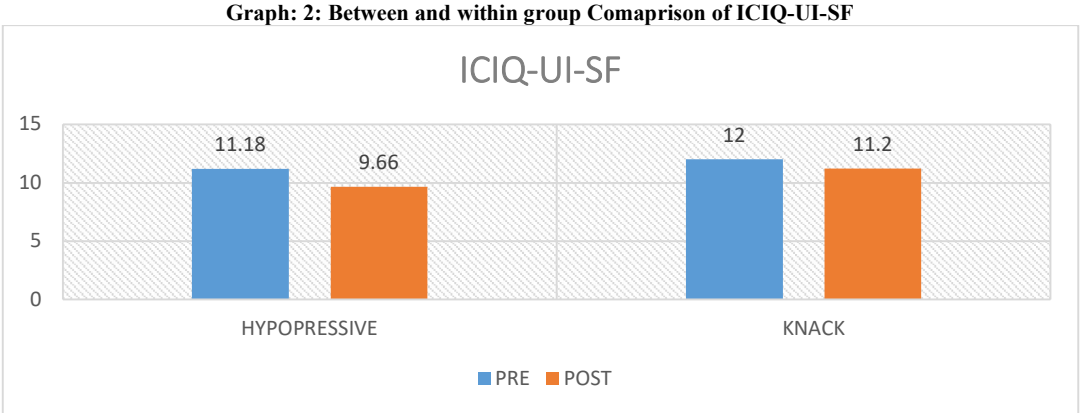


Mann Whitney U test did not report statistically significant difference in mean age between the groups (p>0.05)

Table 2: Between and within group comparison of ICIQ-UI-SF

		HYPOPRESSIVE	KNACK	Z VALUE	P VALUE (MANN WHITNEY U TEST)
ICIQ-UI-SF	PRE	11.18±2.54	12±2.23	1.04	0.29
	POST	9.66±2.32	11.2±1.80	2.58	0.01*
Z VALUE		1.94	1.10		
P VALUE (WILCOXON SIGN RANK TEST)		0.04*	0.27		
DIFFERENCE		1.52±2.41	0.8±2.04		

Graph: 2: Between and within group Comaprison of ICIQ-UI-SF

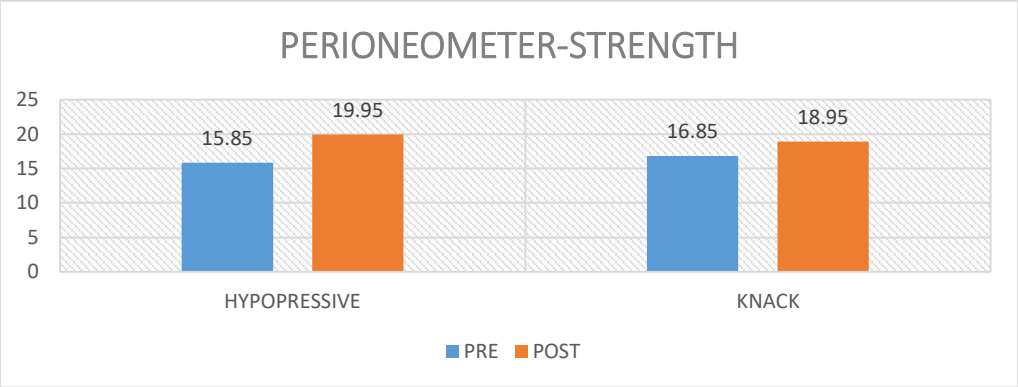


Non-normal data led to non-parametric tests. Mann-Whitney U test found significant inter-group differences in ICIQ-UI-SF post-interval. Wilcoxon Signed Rank test showed Hypopressive group superiority over Knack (p<0.05), with greater mean difference (1.52>0.8)

Table 3: Between and within group comparison of Perineometer-Strength

		HYPOPRESSIVE	KNACK	Z VALUE	P VALUE (MANN WHITNEY U TEST)
STRENGTH	PRE	15.85±6.76	16.85±6.85	0.26	0.77
	POST	19.95±5.99	18.95±7.15	0.21	0.79
T VALUE		2.06	0.95		
P VALUE (WILCOXON SIGN RANK TEST)		0.04*	0.34		
DIFFERENCE		4.1±6.25	2.1±6.69		

Graph: 3: Between and Within group comparison of Perineometer-Strength

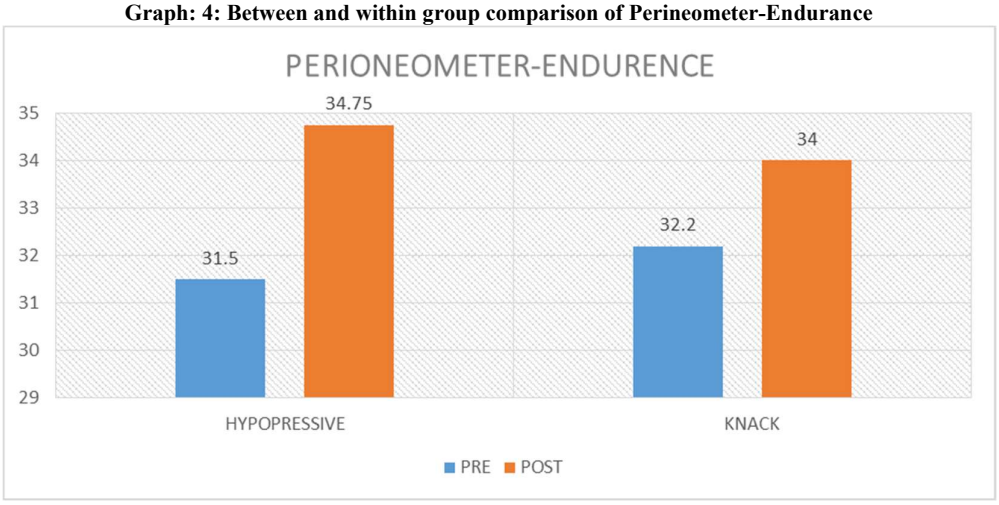


Non-normal data necessitated non-parametric tests. Mann-Whitney U test showed no significant inter-group difference in Perionometer-Strength pre/post interval. Wilcoxon Signed Rank test revealed within-group superiority of Hypopressive over Knack ($p<0.05$), with greater mean difference (4.1>2.1).

Table 4: Between and within group comparison of Perineometer-Endurance

		HYPOPRESSIVE	KNACK	Z VALUE	P VALUE (MANN WHITNEY U TEST)
ENDURENCE	PRE	31.5±3.05	32.2±3.26	0.13	0.82
	POST	34.75±3.43	34±4.94	0.10	0.91
Z VALUE		2.93	1.37		
P VALUE (WILCOXON SIGN RANK TEST)		0.005*	0.17		
DIFFERENCE		3.25±3.03	1.8±3.86		
DIFFERENCE		3.25±3.03	1.8±3.86		

Graph: 4: Between and within group comparison of Perineometer-Endurance



Non-parametric tests were employed due to non-normal data distribution. Mann-Whitney U test found no significant inter-group difference in Perionometer-Endurance pre/post interval. Wilcoxon Signed Rank test revealed significant within-group superiority of Hypopressive over Knack ($p<0.05$), with greater mean difference (3.25>1.8).

DISCUSSION

This study assessed the effectiveness of the Knack maneuver and Hypopressive exercises in treating stress urinary incontinence (SUI) post-hysterectomy. Forty participants were divided into two groups: Group A (Knack maneuver) and Group B (Hypopressive exercises). Each group consisted of 20 women aged 30 to 70 years. The interventions were administered five days a week for five weeks. Perineometer strength, endurance, and ICIQ-UI-SF were measured before and after the intervention to evaluate outcomes.

The Knack maneuver was administered to subjects in Group A lasting 5 days per week for period of five weeks. Pre- and post-intervention assessments were conducted for perineometer strength and endurance, as well as for ICIQ-UI-SF. According to the result, there is significant difference of 0.8±2.04 for ICIQ-UI-SF, 2.1±6.69 for Perineometer strength and 1.8±3.86 for Perineometer endurance. Data therefore shows that strength and endurance of PFMs and quality of has significantly increased by the Knack maneuver.

The Knack maneuver, complemented by pre-contractions of pelvic floor muscles (PFM), is a valuable approach for alleviating stress urinary incontinence in women. It operates on motor relearning principles for PFMs, stabilizing the bladder neck during activities like coughing. Studies demonstrate significant reductions in urine flow during coughing with the Knack maneuver, improving SUI symptom management **[12]**. Integration of the Knack maneuver into pelvic floor muscle training programs has shown promising results for mild to moderate SUI, with notable enhancements in symptom severity **[12, 13]**. Incorporating the Knack maneuver with PFMT effectively treats SUI, yielding significant reductions in urine flow during coughing within one week of training. This underscores the potential of the Knack maneuver to augment traditional exercises for managing SUI, leading to better outcomes and patient satisfaction **[12]**.

Subjects in Group B received Hypopressive exercises for five days per week over period of five weeks. Pre- and post-intervention assessments were conducted for perineometer strength and endurance, as well as for the ICIQ-UI-SF. According to the result, there is significant difference of 1.52±2.41 for ICIQ-UI-SF, 4.1±6.25 for Perineometer strength and 3.25±3.03 for Perineometer endurance. These findings indicate that Hypopressive exercises have successfully increased the strength and endurance of PFMs, leading to enhanced standard of living and reduction with symptoms of SUI.

Caufriez introduced hypopressive exercises (HEs) as an alternative method for pelvic floor muscle training, focusing on

spontaneous and tonic stimulation to reduce intra-abdominal pressure. These exercises aim to enhance pelvic floor and deep abdominal muscle tone without maximal engagement, promoting muscle-aponeurotic balance, performed in various postures **[10]**. Research shows hypopressive exercises activate pelvic floor, abdominal, and trunk muscles, potentially stabilizing the pelvic floor during activities. Supervised regimens lead to improved pelvic floor strength, reduced urinary incontinence, and better quality of life **[14]**. Randomized controlled trials have demonstrated substantial gains in PFM strength and reduced urinary incontinence symptoms with HE compared to conventional exercise groups. Furthermore, crossover trials and studies comparing hypopressive exercises with pelvic floor muscle training or a combination of both interventions have reported temporary improvements in PFM tone and urinary incontinence, alongside subjective enhancements in well-being **[11]**. This study demonstrates that both the Knack maneuver and Hypopressive exercises are effective in improving stress urinary incontinence. However, Hypopressive exercises were observed to outperform the Knack maneuver in enhancing strength of PFM, overall quality of living after SUI.

CONCLUSION

The study found that Hypopressive exercises in Group B resulted in significantly greater improvement in pelvic floor muscle strength and endurance compared to the Knack maneuver in Group A. While both methods effectively managed stress urinary incontinence and enhanced PFM strength, Hypopressive exercises were deemed more effective, leading to overall betterment in quality of life for individuals with stress urinary incontinence. Future research should expand to cover conditions such as uterine prolapse and post-menopausal urinary incontinence, include male stress urinary incontinence after prostatectomy, and explore methods like manometers and vaginal dynamometers for a better understanding of pelvic floor health.

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