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Original Research Article

The impact of kapalabhati on menopausal women's pelvic floor muscle strength

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ABSTRACT

The menopause is reached by females between the ages of 40 and 60. Menopause causes the body to go through a lot of changes. It frequently goes along with changes in how the female pelvic floor functions. The distresses associated with menopause are minimized by altering the routine and adopting a healthier diet and exercise regimen. Yoga may have an impact on the heart and core muscles, according to the evidence. The study's objective was to determine how yoga affected the strength of the pelvic floor muscles (PFMs) in women who had reached menopause by utilising the perineometer. Seventy menopausal females between the ages of 40 and 60 were the subjects of a study. On the first day, participants received instruction to perform Kapalbhati and were urged to practise for five weeks. PFM strength was the primary outcome measure, measured using a perineometer. In results, Kapalbhati was found useful in treating stress urinary incontinence in post-menopausal women.

1. Introduction

Incontinent urination is a problem that affects many adults around the world. Micturition control is a difficult physiological and anatomic process that frequently fails in females. Urinary incontinence is a condition that affects over 200 million individuals worldwide and affects women three times more frequently than males.[1] A very unpleasant and upsetting issue is having trouble controlling urine. Despite not being fatal, it causes significant morbidity owing to social isolation and psychological stress, and many women are too ashamed to talk about it. Some even think that western countries cannot treat it.[2] Currently, incontinence is the main issue. Incontinence may be brought on by weak pelvic floor muscles (PFMs), prolapse, bladder elasticity loss, oestrogen decline, or obesity, all of which are associated with menopause.[2,3]

Studies conducted on urinary incontinence and other similar topics have been conducted in the western and affluent countries and are therefore not a good representation of the conditions and practices prevalent in India or other developing and underdeveloped countries.[3] There is a lack of information on its prevalence in India, among women or those with lower socioeconomic standing. As UI may be under-reported by patients in this demographic, which may be brought on by social stigma, lack of education, or financial or other difficulties, the prevalence of UI may be high. Due to the humiliation and culturally sensitive nature of the condition, many women are reluctant to seek care or disclose symptoms to medical professionals, which results in underreporting of the condition.[4] Numerous muscles and ligaments support the bladder and uterus in females. Any procedure on a woman's reproductive system, such as removing the uterus, may harm the muscles that support the pelvic floor, which can cause incontinence.[5]

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A drop in oestrogen production during the menopause stage of the life cycle causes a number of physical changes, notably urogenital symptoms.[6] The primary symptoms are brought on by the vaginal and periurethral tissues deteriorating and atrophying, which may be accompanied by involuntary pee loss, effort, and enhanced urinary frequency.[7] Menopausal incontinence symptoms include leakage of urine while coughing, sneezing, or exercising; difficulty to hold pee for an extended period of time; waking up more than twice during the night to urinate; and recurring urinary tract infections.[7,8]

The word Kapalbhati is a conjunction of two different words. Kapal i.e. skull consists of all the underlying organs and Bhati means shining or illuminating. Kapalbhati is one of the rapid breathing techniques, known as autonomic inhalation technique. During forceful exhalation, the air is forced out of the lungs since the diaphragm is moved in upwardly direction by increase in pressure inside abdomen through co-operative act of muscles of pelvic floor and abdomen.[8] Kapalabhati is one of the oldest known form of breathing control exercises which with recent studies has proven to be effective in tackling diseases like hypertension, respiratory diseases, diabetes mellitus, constipation and digestive distress etc.[9] With the recent advances we now know that kapalabhati has implications on the pelvic floor muscle activities and micturition19. Electromyography evidence linking respiratory cycle of inspiration and expiration to pelvic floor muscle activity provides the basic notion for the use of breathing intervention in stress urinary incontinence.26Evidence suggests the use of expiratory breathing exercises may improve pelvic floor muscle contraction, in turn improving SUI outcomes.[10] Thus, the study is an effort to highlight the effect of kapalabhati on stress urinary incontinence in women.

2. Materials and Methods

2.1. Design

A total of 70 women without a history of incontinence were enlisted for this prospective cross-sectional investigation.

2.2. Participants

Total of 70 women between the ages of 40 and 60 volunteered to participate in the study. The age characteristics of the participants are shown in Figure 1. Every aspect of the investigation was completed by every participant. The study comprised participants who had been diagnosed with SUI (using the 3 IQ assessment) and had at least grade 3 pelvic floor muscular strength. Written informed consent was taken from all the participants. Ladies having urinary tract infection, prolapse, incontinence, cancer of the cervix, unstable hypertension, or diabetes were excluded from the study. Participants were first evaluated and then taken into the study. Total patients screened were 70, participants were eligible. Baseline parameters were assessed. Pre- and post-assessment protocol was done. Privacy was maintained for each participant.

2.3. Procedure

The lab was visited by the participants just once. Participants filled out a form with information about their demographics, obstetric and gynaecological histories, pelvic floor exercises they were currently doing, and incontinence history when they arrived at the lab. For five weeks, the patients were required to do kapalbhati exercises. Patients were shown how to perform the exercise on day 1 and then instructed to continue at home. They were then instructed to strip off everything below the waist, lie on a plinth with their knees bent to a comfortable position, and remove all of their clothing. A digital vaginal exam was conducted before the pelvic muscle floor performance was evaluated. In order to ensure proper pelvic floor muscle activation during a contraction without using the large outside pelvic muscle groups, such as the abdominal, gluteal, and hip abductor muscles, this assessment was conducted. In order to minimise any impact from the abdominal muscles, participants were also asked not to hold their breath throughout the contractions. Throughout the procedure, the examiner's hands were gloved on both sides. The examiner parted the labia with their left index and middle finger before inserting their right index and middle finger, palm down, directed cephaloposteriorly, into the vagina. The muscles in the pelvic floor were then lightly stretched by separating these two fingers. After the tester was certain that the contraction could be executed correctly, the strength and endurance of the pelvic floor muscles were measured.

2.4. Measurements

The strength of the pelvic floor muscles was evaluated using the Peritron, an available commercially perineometer that provides a quantitative measure of power using pressure fluctuations on an air-filled probe. The Peritron's technical validity has been rated by the manufacturer as having 95% of readings accurate to within 1 cmH2O. It has also been demonstrated that a maximal voluntary contraction, as determined by the Peritron, has extremely good intrarater reliability.[11] Two condoms were placed over the probe, and lubricant was applied to the condoms to make it easier to insert them into the vagina. The probes and tubing were disinfected between participants to prevent cross-contamination. The examiner maintained the probe in this position for 2 cm after it had been introduced into the vagina. The pressure at rest was noted. The probe was inflated to this pressure to establish appropriate contact between the vaginal walls and the probe if the baseline

pressure was less than 50 cmH2O. The Peritron was then zeroed. A maximal voluntary contraction (MVC) of the pelvic floor muscles was demanded of the participants. With a 60-second break in between each repetition to prevent muscular exhaustion, this was repeated three more times. The three attempts' maximum value was noted. A contraction was disregarded and the lady carried out another maximal contraction if there was a clear recruitment of the gluteal, hip abductor, or abdominal muscles. Participants were instructed to tense their pelvic floor muscles as long as they could while keeping the force over 60% of their MVC in order to test their endurance. The Peritron was used to provide visual feedback so that participants could measure the force of their contractions. The time was measured in seconds.

2.5. Statistical analysis

Before and after treatment scores were matched. Paired t-test was used for comparing the data.

3. Results

This polite study was carried out at..... The study was completed with 70 participants with one loss to follow-up. The mean age of patients was 54.70years. The mean body mass index (BMI) of patients was 27.289.

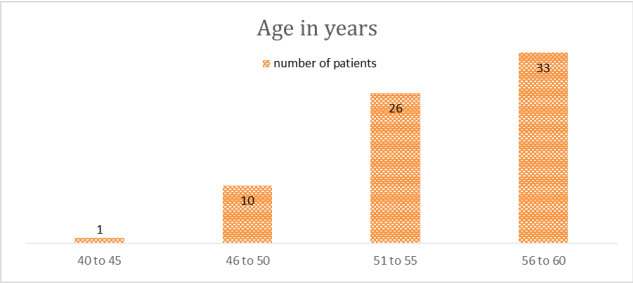

Fig. 1: The age of total subjects in this study was in the range of 40 to 60 years with a mean age of 54.70 ±4.087 years

The outcomes of effect of Kapalabhati on menopausal women's pelvic floor muscle was observed and it statistical data outcomes are represented in Table 1.

The pre and post treatment pelvic floor muscle endurance had a correlation coefficient of 0.910 which means it has a strong linear correlation. The pre and post treatment pelvic floor muscle strength had a correlation coefficient of 0.771 indicating a strong linear correlation. The pre and post treatment incidence of UI had a correlation coefficient of 0.667 which states that there is a moderate linear correlation. The pre and post treatment pad test gave a correlation coefficient of 0.862 which means there is a strong linear correlation.

The paired t test performed on pre-treatment and post treatment endurance of pelvic floor muscles had a mean difference of 3.229±1.364 with a t value of 19.806. The p value was >0.001 indicating highly significant effect was achieved.

The paired t test performed on pre-treatment and post treatment incidence of UI gave a mean difference of 0.400±1.469 with a t value of 2.279. The p value was 0.026 which is > 0.05 indicating moderate significance.

The paired t test performed on pre-treatment and post treatment pad test gave a mean weight difference of 28.029±8.172 g with a t value of 28.696. The p value was less than 0.001 indicating highly significant difference.

The paired t test performed on pre-treatment and post treatment pelvic floor muscle strength had a mean difference of 6.171±2.167 with a t value of 23.830. The p value was less than 0.001 indicating a significant difference.

4. Discussion

The aim of the study was to find the effect of Kapalabhati on stress urinary incontinence in post-menopausal women. A randomized trial of Iyengar yoga for urinary incontinence has provided promising results in the treatment of SUI and UUI with yoga.[12] It is therefore important to assess whether yoga may be effective as either a primary or adjuvant treatment for urinary incontinence in women. To assess stress urinary incontinence, strength and endurance of pelvic floor muscles, and amount and incidence of urine leakage were considered as the metric factors. According to researcher in a study conducted on SUI, strength and endurance training of PFM was found to be effective.[13] Thus, strength and endurance of PFM has strong correlation with improvement in SUI. Amount and incidence of urine leakage in stress urinary incontinence are the primary measurable factors that show the worsening or improving of the condition. For these reasons, strength and endurance of PFM and amount and incidence of urine leakage were measured in this study to ascertain the effects of Kapalabhati on SUI.

According to a study conducted by Ghaderi F and Oskouei in 2014 breathing pattern influences the effectiveness of other exercise interventions and positions used in treatment of UI.[14] The authors correlate breathing directly with diaphragmatic motion, PFM contraction, and deep abdominal musculature. Kapalabhati is a form of forced expiratory exercise that incorporates the use of abdominal muscles and other accessory breathing muscles along with diaphragm.[11] This form of deep breathing affects the force exerted on the abdominal contents by the diaphragm and the alternate relaxation and compression of abdominal contents stimulates the pelvic organs and thus in turn affects the urinary bladder and sphincters whose malfunctioning cause urine leakage in SUI.[11] Hankyu Park et al, (2015) further proved that breathing certainly has a connection with the movement of pelvic floor muscles and this relation can be proved by two examples: (a) The

Table 1: Tabular representation of statistical data outcomes of pre and post treatment

	Mean	Mean difference	Correlation	T test	P value
Post Treatment PFM Endurance	5.44	3.229±1.364	0.910	19.806	0.000*
Pre-Treatment PFM Endurance	2.21				
Pre-Treatment Incidence of UI	5.74	0.400±1.469	0.667	2.279	0.024
Post Treatment Incidence of UI	5.34				
Pre-Treatment Pad Test	68.21	28.029±8.172	.862	28.696	0.000*
Post Treatment Pad Test	40.19				
Post Treatment PFM Strength	21.83	6.171±2.167	0.771	23.830	0.000*
Pre-Treatment PFM Strength	15.66				

muscles contracted when urine passage has to be restricted or suppressed due to some reasons (b) Urine passage after restricting the same for a longer period.[15] In a study by Raizada et al, (2008), it has been stated that the key role of the pelvic floor muscles includes the continence maintenance and the support of abdominal contents also latest studies have stated supplementary role of pelvic floor muscles in assistance in ventilation.[16]

During a pelvic floor contraction, the perineal structures (anorectal junction, the vagina and urethra) are pulled anteriorly. The organs are lifted forward and in an upward direction whereas the rectum and vagina are compressed. Sapsford et al. link the pelvic floor muscle EMG activation to increase in establishment of abdominal muscles. The resulting rise in the pressure inside the abdomen generates activation of pelvic floor muscles to support the pelvic organs and the abdominal structures.[17] The abdominal circumference remained steady because the diaphragm and pelvic floor muscles limit the contents of abdomen, the abdominal muscle approximated isometric activity and a little hollowing occurred when hollowing of the lower abdomen was tried.[18]

Statistically significant improvement was observed in strength and endurance of PFM using perineometer. Strength of pelvic floor muscle plays a vital role in the rehabilitation of SUI patients. In a study by EJ McGuire, on pathophysiology of urinary incontinence, the author describes strength and function of PFM contributed to the main treatment of urinary incontinence.[18] It can also be observed in this study that as the strength of PFM increased post treatment, the amount and incidence of urine leakage was also reduced.

According to a study conducted by Aoki Y. et al in 2017, non-surgical treatment so urinary incontinence has given positive effects on the incidence of urine leakage in patients.[19] To prevent the stress urinary incontinence episodes actively contracting the pelvic floor before you do a movement that increases your abdominal pressure that leads to leakage can be done. That is before you cough, sneeze, jump or pick up an object.[20] The incidence of urinary leakage improved significantly after kapalabhati of 5 weeks in this study. This improvement can be attributed to the increase in the awareness of the patient and the stimulation of the pelvic floor muscles. This way improvement of strength and endurance of pelvic floor muscles is interlinked with the amount and incidence of urinary leakage in SUI.

Thus, strength and endurance of pelvic floor muscles and incidence and amount of urinary leakage improved in post-menopausal women with stress urinary incontinence in this study. This study was focused primarily on the measurable physical attributes of SUI. But improvements in the patient satisfaction, quality of life of patients and other improvements observed by patients cannot be ignored. Though not documented patient's response to treatment was positive and encouraging.

Correlation coefficient of BMI and Parity with the improvements observed in this study were low and did not yield very useful information. This can be attributed to the individual differences and other factors influencing the patients for example willingness of patient, awareness, psychosocial factors affecting the patient etc.

5. Conclusion

Kapalabhati is effective on stress urinary incontinence in post-menopausal women as it improves the strength and endurance of pelvic floor muscles, and reduces the amount and incidences of urinary leakage.

6. Source of Funding

None.

7. Conflict of Interest

None.

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