

The Effect of Pelvic Floor Muscles Exercises for Improving Urinary Incontinence among Women

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Abstract:

Background: Urinary incontinence is one of the most common lower urinary tract disorders in women, resulting from failure of voluntary vesicle and urethral sphincter control, which results in involuntary passage of urine. Pelvic floor muscles exercises is the most common physical therapy for women with urinary incontinence.

The aim of the study: was to evaluate the effect of pelvic floor muscles exercises for improving urinary incontinence among women.

It is hypothesized: that woman with urinary incontinence who participates in pelvic floor muscles exercises program will have better improvement and will reduce signs of urinary incontinence than who don't.

Design: Quasi-experimental design was utilized to fulfill the aim of this study.

Sample: (100) incontinent women were recruited in the study.

Settings: urology & gynecology outpatient clinics at Benha University Hospital.

Tools: Structured interviewing questionnaire sheet, assessment sheet, follow up & evaluation sheet.

Results: revealed that the mean age of study & control groups (49.12 ± 12.76) (46.46 ± 12.38 years) respectively. There were highly significant improvements ($p < 0.001$) after a combination of pelvic floor muscles exercises and medical treatment, and showed highly significant decrease in urine loss during stress provocation test ($p < 0.001$) in the study group.

Conclusion: Pelvic floor muscles exercises are the best physical therapy in the treatment of mild and moderate urinary incontinence. PFME methods have highly efficacy both subjectively and objectively in the improvement of urinary incontinence. The study

Recommended: that pelvic floor muscles exercises should be made available in gynecology and urology outpatient clinic and offered routinely as options for first-line treatment of urinary incontinence. In-service training program should be carried out for nurses working in obstetric department to up-grade their knowledge and skills in relation to intra and postpartum care. Further researches are recommended in the field of treatment of urinary incontinence by combination of different modalities, such as pelvic floor muscles exercises together with medication therapy.

Keywords: Urinary incontinence and pelvic floor muscles exercises

I. Introduction

Urinary incontinence means involuntary leakage of urine and inability of the bladder to hold it because the voluntary control in the urinary sphincter is either weakened or lost. It is not a disease but a symptom; these symptoms vary according to types of urinary incontinence. Some women may lose a few drops of urine while running, coughing or even laughing. Others may feel a strong sudden urge to urinate just before losing a large amount of urine. Recent advances in the understanding of prevalence and pathophysiology of this condition have served to enhance public awareness and improve treatment options *Sacco, et al., (2012)*.

Urgency just before urination becomes so unpleasant that the person tries to suppress it by contraction of the stratified pelvic floor muscles. This is a normal voluntary or involuntary mechanism which produces marked variations in intra-urethral pressure without any change in the bladder pressure. It has been called the "unstable urethra", but when it becomes so greater than urination cannot be prevented, urination is started by decrease in intra urethral pressure and association with relaxation of stratified muscle followed a few seconds later by moderate or slow increase in bladder pressure. This produce a maximum intra-urethral pressure less than the bladder pressure and urine escapes. This indicates that the pelvic floor muscle cease to support the urethra and this process facilitates falling of the bladder outlet *Demaagd, G and Davenport T, (2012)*.

The evaluation of the woman with established urinary incontinence involves medical history, performing physical examinations and also various simple laboratory tests are required. Women with severe incontinence or unclear etiology are occasionally needed more elaborate tests, including urodynamic to determine the type of present incontinence, but usually invasive and expensive urodynamic tests are not necessary before treatment by pelvic floor rehabilitation. Pelvic floor muscles exercises have been successfully used since 1948 by

encouraging women to voluntarily contract their pelvic floor muscles. It is the most commonly recommended treatment for them with mixed incontinence & stress leakage of urine but less commonly for urge incontinence **Huda, et al., (2013)**.

Ideally, health promotion and prevention should be the priority for practical nurses that practice in primary care setting suggested that there are many opportunities during women life. The nurse introduces health education and preventive care to avoid incontinence through describes strategies during childhood e.g., keeping toilet facilities clean, during adolescence e.g., incorporating urinary incontinence into sex education talks, during pregnancy & childbirth, menopause, and old age e.g., teaching pelvic floor muscles exercise, avoiding un healthy habits **Castro D.,(2013)**.

The nurse can assess onset and severity of the condition through history; is the most important part of the incontinence evaluation by asking the woman about number of leaking episode per week resulting from cough , laugh or sneeze, how many years duration of each, the number of pads that requires to protecting her clothing , the degree of activity impairment associated with this disorder, all of those will help her to determine which type of urinary incontinence , dietary habits, and health problems that causing the most significant problem **American Geriatrics Society,(2012)**.

Also, the nurse plays a vital role in educate the incontinent women through focusing on the modification their lifestyle of certain dietary habits especially fluid intake. It is important to tell them that adequate fluid intake is necessary to prevent urinary incontinence. The recommended daily intake 1500 ml. because dehydration can potentiate constipation, concentrate the urine, increase the irrelative effects of dietary substance, and teach them about different physical methods for improving their condition **National Research Council, Food and Nutrition Board, (2014)**.

Moreover, the nurse can describe anatomy of pelvic muscles and demonstrate how these muscles provide support to the bladder, vagina and the uterus. Keeping these muscles strong can prevent urine from leaking from the bladder. If it weakness, it cannot support these organs, and their position change which may cause problems with normal function **Lowdermilk, etal. (2012)**. In addition to, she learns her bladder training exercises to prevent the urinary incontinence, encourage her to empty the bladder more completely by double voiding urinating, then waiting a few minutes & trying again, and how to control urgency, when feeling the urge to urinate, may try to relax breathe slowly and deeply or to distract herself with an activity **Lipp A, et al., (2011)**.

1- Significance of the study:

Urinary incontinence is one of major problems that have a negative impact on the women's daily life physically, socially, psychologically, sexually, and economically; it's also one of the threatening factors that can cause withdrawal from social situations and reduced quality of life. It is more common among women than men. It can have profound effects on 15:50 % of women in the world during their lifespan. While in Egypt the prevalence rates are higher when compared to other reports, **Mohamed, etal., (2010)**, reported the prevalence of urinary incontinence in community studies in Alexandria, Egypt was estimated to be 49.6% during the year 2010. In addition, **El-Azab, (2010)**, reported that the prevalence of urinary incontinence among Egyptian women is 54.8%. Despite this high prevalence rate, it is widely under-diagnosed and under-reported because of them have embarrassment for seeking help, so this study could contributes for improving urinary incontinence and decreasing its prevalence rate through proper training women's with urinary incontinence about the pelvic floor muscles exercises by the investigator.

2- Aim: To evaluate the effects of pelvic floor muscles exercises for improving urinary incontinence among women. This aim was attained through; subjective & objective assessment of urinary incontinence symptoms to assess the degree of urinary incontinence, assessing the pelvic floor muscles strength and by using stress provocation test before the program, designing, implementing and evaluating the outcome of the pelvic floor muscles exercises program.

3- Hypotheses: Women who will participating in pelvic floor muscles exercise program will have a strong pelvic floor muscles that help in voluntary control of voiding and will decrease the symptoms of urinary incontinence than those who don't.

4- Subjects and Methods:

1.1 Research design: Quasi-experimental design (pre and post intervention) was utilized to fulfil the aim of this study.

1.2 Setting: This study was conducted at two settings; urologic and gynecological outpatient clinic at Benha University Hospital.

1.3 Sample: 1.1.3 Type: Purposive sample.

1.2.3 Size: A total of (100) incontinent woman was included in the current study according to the following inclusion criteria:

- Women with age ranged from (20 - 50 year).
- All women have the symptoms of UI with an average of at least 3 stress incontinence episodes a week.

- All women who's free from any chronic diseases.

1.3.3 Sample technique: The sample was divided randomly into two equal groups.

* **Study group:** included (50) women who were treated with medical treatment and participating in pelvic floor muscles exercise program.

* **Control group:** included (50) women who were subjected to medical treatment.

1.4 Tools of data collection: - Three tools used for collecting data:

1.1.4 Structured interviewing questionnaire sheet:

It was designed by the researcher after reviewing related literature. It was written in Arabic language in the form of closed questions.

It comprises three major parts:

1- Socio- demographic characteristics, such as age, level of education, residence, occupation, and marital statusetc.

2- Anthropometric measurements: it involved measurements of weight (measured in kilograms) and height (measured in centimeters) which were converted into Body Mass Index. The international classification of adult weight into normal weight, underweight, overweight and obese according to BMI **WHO., (2011)** was used.

Under 18.50 kg/m ²	Under weight
18.50 - 24.99 kg/m ²	Normal range
25.00 - 29.99 kg/m ²	Overweight / Pre-obese
30.00 - 34.99 kg/m ²	Obese class I
35.00 - 39.99 kg/m ²	Obese class II
≥ 40.00 kg/m ²	Obese class III

3- Daily habits such as, tea or coffee > 2 cups / day, fluid intake /day, smoking, and medication intake.

1.2.4 Assessment sheet: -

- Objective assessment of urinary incontinence symptoms through asking the women about number of voiding / day, number of voiding / night and number of leakage of urine/ day which assesses the degree of urinary incontinence according to **(Eric, 2001)**.

Degree of urinary incontinence			
Daily measures	Mild incontinence	Moderate incontinence	Sever incontinence
Number of voiding during the day	5 – 8	9 - 12	> 12
Number of voiding at the night	1 – 3	4 - 5	> 5
Number of leakage of urine	1 – 3	4 - 6	> 6

1.3.4. Pelvic floor muscles strength test or palpation test (according to (Hahn, et al, 2009).

At initial visit, pelvic floor muscles strength was tested by vaginal palpation which is done by the physician; a woman was asked to squeeze around physician finger with keeping the muscle of thighs, abdomen, and gluteal relax, this test re demonstration during the evaluation phase. The degree of muscle strength was evaluated according to the duration and repetition of muscles contraction. The score from 0 - 3 described the degree of muscles strength as following:

Score	Pelvic floor muscles strength test
Score (0)	No contraction done by the women
Score (1)	Poor contraction (slight pressure).
Score (2)	Good contraction (medium hard pressure for 5-6 seconds).
Score (3)	Powerful contraction (powerful pressure for 5-6 seconds).

1.4.4 Stress provocation test According to Hahn, et al, (2009).

This test was performed when the women bladder was full with urine. At the initial visit the woman was not permitted to void for 1 to 2 hours prior to start of the test, which was performed in standing or in supine position, and then ask her to cough vigorously 5 times, finally asking her about the amount of urine loss if present. This test was also performed during and after treatment program, a leakage was estimated as:

Score	Stress provocation test
Score (0)	No leakage.
Score (1)	Slight leakage (a few drops of urine).
Score (2)	Moderate leakage during approximately half of the test.
Score (3)	Severe leakage during the whole test.

1.5.4. Follow up and evaluation sheet

- Pelvic muscles strength was assessed by the same format of tools used before the program implementation.
- Stress provocation test was assessed by the same format of tools used before the program implementation.
- Subjective evaluation: the women were asked about her condition after treatment. Women assessed the results as cured, improved, and unchanged or worse.
- Objective assessment of urinary incontinence symptoms through asking women about number of voiding during the day, number of voiding at the night and number of leakage of urine/ day which assesses the degree of improvement.

Degree of improvement scale according to (Eric, 2001) as the following:

Degree of improvement	High	Moderate	Not improved
Daily measure			
Number of voiding during the day	3 - 5	5 - 8	> 12
Number of voiding at the night	1 - 2	2 - 3	> 3
Number of leakage of urine	0	1 - 2	> 2

1.5. Pilot study:

The pilot study was carried out during January, 2015. It involved ten percent of the total sample (10 women) to test the clarity and applicability of the study tools as well as estimation of the time needed to fill the questionnaire. Required modifications were done in the form of adding or omission of some questions. Women involved in the pilot were excluded from the study.

1.6. Ethical consideration:

- An oral and written consent was obtained from each woman before starting the data collection.
- Each woman was informed about the purposes, benefits and time of the study at the beginning of interview.
- Confidentiality was ensured throughout the study process, where personal data were not disclosed, and the women were assured that all data was used only for research purpose.
- Each woman was informed that participation is voluntary and her withdrawal will not affect her care.

1.7. Procedure:

To fulfill the aim of the current study, the following phases were adopted: Assessment phase, planning phase, implementation phase, follow up and evaluation phase. These phases were carried out from the beginning of May, 2015 and completed at the end of April, 2016 covering twelve months. Official approvals and letters to conduct this study were obtained from the Dean of Faculty of Nursing to Director of Benha University Hospital. The researcher visited the previously mentioned settings three days/week, (Sunday , Monday and Tuesday) from 9.00 Am to 1.00 Pm.

1.1.7. Assessment Phase:

This phase encompassed interviewing women to collect baseline data as well as measurement of weight, height, and calculation of body mass index. At the beginning of interview the researcher greeted the women, introduced herself to each women included in the study, explained the purpose of the study and provided the women with all information about the study (purpose, duration, and activities) and taken oral consent. Data were collected by the researcher through dissemination of the tools to each woman at outpatient clinic where, the educated women filled the tools by themselves, while the researcher filled the tools for the illiterate women after explaining the questionnaires to them.

The researcher collected socio demographic data and anthropometric measurements through; **Measurement of weight**; was measured with both scale, which was calibrated "0" with the woman wearing her clothes and without shoes. **Measurement of height**; was determined by using a measuring tape under the following precautions; without shoes, feet were placed together with heels against the wall and women stood with head in the Frankfort position. Then, **Body mass index** was calculated for each woman using the following formula: $BMI = weight \text{ (in kilograms)} / (Height \text{ in meters})^2$ Average times for the completion of each interview was around (35 - 40 minutes).

1.2.7. Planning phase:

Based on baseline data obtained from pre-program assessment about the studied women condition and degree of urinary incontinence and relevant review of literature, the exercise program was developed, sessions number and its contents, different methods of teaching, and instructional media were determined accordingly. Program' objectives were constructed and included the following:

- **General objective:**

By the end of the pelvic floor muscles exercises program, the women with urinary incontinence acquired knowledge and desired health practices toward urinary incontinence to promote their optimum quality of life.

- **Specific objectives:**

By the end of this program, all women in the study group will be able to:

- Enumerate components of urinary system.
- Identify physiology of urination.
- Define urinary incontinence.
- List types of urinary incontinence.
- Enumerate symptoms of urinary incontinence.
- Mention factors and causes related to urinary incontinence.
- Identify methods of treating of urinary incontinence.
- Define pelvic floor muscles and pelvic floor muscles exercises.
- Discuss correct methods for doing pelvic floor muscles exercises.
- Explain the dietary management for urinary incontinence.
- Discuss lifestyle modification related to urinary incontinence.

1.3.7. Implementation phase:

Implementation of the pelvic floor muscles exercises was carried out at the previously mentioned setting. The program sessions are five sessions, the duration of each session ranged from 30- 45 minutes. At the beginning of the first session the women were oriented with the program contents. Each woman was informed about the time of the next sessions at the end of session. The subsequent session started by a feedback about the previous session and the objectives of the new session, using simple Arabic language to suit women' level of understanding. At the end of each session, women's questions were discussed to correct any misunderstanding.

Different methods of teaching were used such as discussion, demonstration and re demonstration. Instructional media included colored posters and pelvic floor muscles exercises booklet was constructed by the researcher in a simple Arabic language after reviewing the related literatures which based on women' knowledge and practice deficit about urinary incontinence and its management, it was covered general information about urinary incontinence including its definition, types, causes, treatment of urinary incontinence, definition of pelvic floor muscles and pelvic muscles exercises. Pelvic muscles exercises booklet distributed to all recruited women in the study group to achieve its objectives.

1.4.7. Follow up and evaluation phase:

During this phase, the effect of pelvic muscles exercises program was evaluated by using the same format of tools which used before the program implementation. In addition to **Subjective evaluation**: the woman asked about her condition after treatment, the results as cured, improved, and unchanged or worse, and by using **degree of improvement scale** which mentioned before, the evaluation was conducted after three month of the program implementation to evaluate the strength of pelvic floor muscles in relation to improvement in urinary incontinence; Pelvic floor muscles exercises group were followed weekly by telephone and monthly by interviewing. While the medication group evaluated after three months only.

5- Statistical analysis:

Data were verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 20.0) was used for that purpose, followed by data analysis and tabulation. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Test of significance (paired t-test) was applied to test the study hypothesis. A significant level value was considered when $p \leq 0.05$, and a highly significant level value was considered when $p \leq 0.001$.

6- Limitation for the study:

- Difficulties in collecting the data because the sensitivity of topic, during data collection (10 women refused to complete the questionnaire & were excluded from the study but the sample were completed by others) to complete the designed sample.
- Sometimes the sessions were protracted due to noise and other individuals' interruption.

II. Results

Table (1): shows that, the mean age in study group and control group was (49.12 ± 12.76) and (46.46 ± 12.38) years respectively. The majority of women (80.0%) live in rural area, more than half of them (64%, 66%) are house wives, 88%, 90% are married and (56% , 54%) have positive family history of incontinence in the study

and control group respectively. No statistically significant differences could be detected between the two groups regarding the previous variables ($p > 0.05$).

Table (2): displays that, no statistically significance differences are detected between the two groups as regards weight, height & BMI (p value > 0.05).

Table (3): illustrates that less than half of women in the two groups (45.0%) had fluid intake less than 1 liter/ day followed by eating spicy food (39.0%) as well as tea and coffee > 2 cup / day represented by (75.0%). Only (5.0%) of them were smoking, while (22.0%) of them had taking medications as treatment from chronic disease.

Table (4): represents that, the majority of women had the signs of urinary incontinence (urgency, frequency, incontinence before reaching bath room & cough or laughing or sneezing causing incontinence it represented by (over 90.0%), as well as more than three quarters (76.0%) of them had pain during urination, only (3.0%) of them had blood associated with urine. There were no statistical significant differences among the two groups ($p > 0.05$) as regards signs of urinary incontinence.

Table (5): reflects that there were statistically significant differences in the improvement between the two studied groups ($p < 0.05$)

Table (6): shows that there were highly statistically significant differences between two studied groups ($p < 0.001$) in the degree of improvement, degree of urinary incontinence, duration of incontinence and body mass index.

Table (7): demonstrates that there were highly statistically significant improvements ($p < 0.001$) in all grades of urinary incontinence in the study group. More than three quarters (78.0%) in study group had good and powerful contraction after a combination of pelvic floor muscles exercises and medical treatment, as well as about one quarter (32.0%) in control group had good and powerful contraction after treatment by medication only.

Table (8): demonstrates that there were statistically significant improvements ($p < 0.001$) in the study group. Less than three quarters (72.0%) of study group had no leakage & slight leakage of urine, about one half (52.0%) of control group had no leakage & slight leakage of urine.

Table (9): shows that there was highly significant improvement in sings of urinary incontinence. Mean score in study group before and after 3 months of PFME program ($p < 0.001$) as compared to control group there were significant improvement in grades of urinary incontinence mean score ($p < 0.05$).

Figure (1): shows that about one third of study and control groups (36%, 34%) had university degree, while (12.0%, 14.0%) were illiterate.

Figure (2): shows that less than half (48%, 42%) of the study and control groups had obesity class (1) respectively.

Figure (3): represents that, about one third (30%, 37%) of study group & control groups had incontinence for 1-2 years respectively.

Figure (4): explores that about one half (50.0%, 54.0%) of the two groups had moderate degree of urinary incontinence respectively.

Figure (5): shows that, (42.0%) in the study group felt complete cure compared to (30.0%) in the control group. Also (46.0%) of study group were improved compared to (10.0%) in control group.

Table (1): Distribution of the subjects according to socio-demographic characteristics

Items	Study group		Control group		Total		X ² & p value
	n = 50		n = 50		n = 100		
	No	%	No	%	No	%	
*Age/ years							
20 - 29	5	10.0	5	10.0	10	10.0	
30 -39	16	32.0	17	34.0	33	33.0	
40 - 50	29	58.0	28	56.0	57	57.0	
X ± SD	49.12 ± 12.76		46.46 ± 12.38		47.79 ± 12.58		
* Residence							
-Urban	12	24.0	8	16.0	20	20.0	36.0 >0.05
- Rural	38	76.0	42	84.0	80	80.0	
*Occupation							
- Working	18	36.0	17	34.0	35	35.0	9.0 >0.05
-House wife	32	64.0	33	66.0	65	65.0	
*Marital status							
- Married	44	88.0	45	90.0	89	89.0	13.8 >0.05
- Divorced	2	4.0	1	2.0	3	3.0	
- Widowed	4	8.0	4	8.0	8	8.0	
*Family history of incontinence							
- Positive	28	56.0	27	54.0	55	55.0	3.24 >0.05
- Negative	22	44.0	23	46.0	45	45.0	

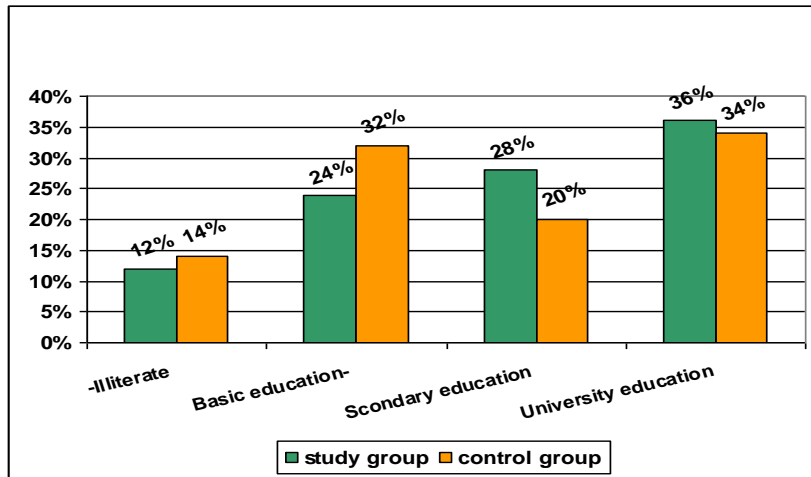


Fig. (1): Distribution of subjects according to the educational level

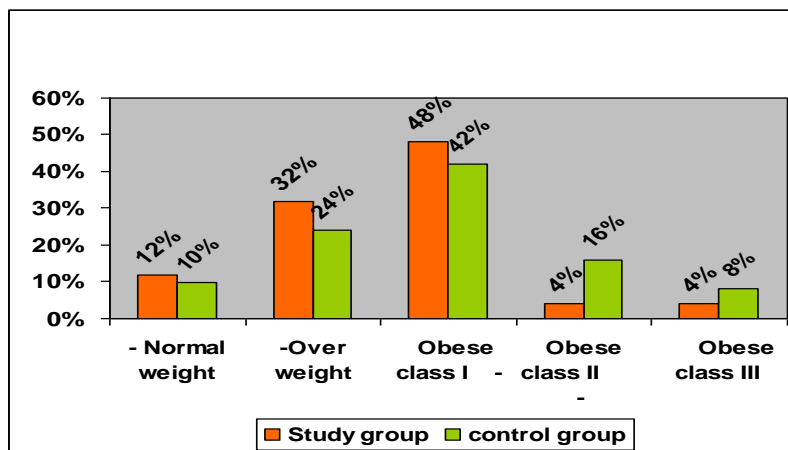


Fig. (2): Distribution of body mass index of the study and control group.

Table (2): Anthropometric measurements of the study and control group

Items	Study group		Control group		p value
	—	X ± SD	—	X ± SD	
Weight	.990	79.62 ± 1	80.6	± 9.93	> 0.05
Height	164.48	± 4.40	163.44	± 3.38	> 0.05
Body mass index	31.50	± 0.89	0.99	± 33.99	> 0.05

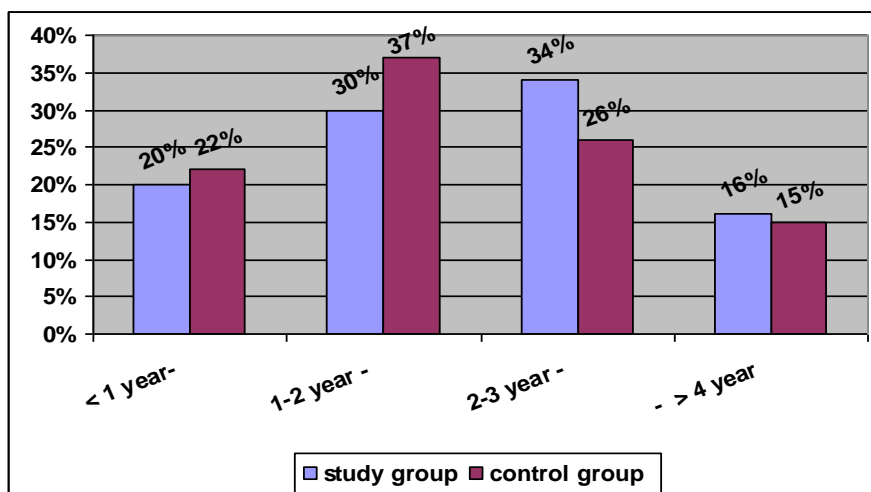


Fig. (3): Subjects distribution according to duration of incontinence / years

Table (3): Distribution of the subjects according to daily habits

Item	Study group		Control group		Total		X ²	p value
	n = 50		n = 50		n = 100			
	No	%	No	%	No	%		
- Drinking tea or coffee >2 cup / day	34	68.0	41	82.0	75	75.0	33.2	>0.05
- Drinking fluids ≤ 2 Liter /day	24	48.0	21	42.0	45	45.0	1.00	>0.05
- Drinking fluids ≥ 2 Liter /day	6	12.0	5	10.0	11	11.0	60.84	>0.05
- Drinking of cola substance	12	24.0	10	20.0	22	22.0	13.7	>0.05
-Eating spicy food	18	36.0	21	42.0	39	39.0	33.6	>0.05
- Smoking	2	4.0	3	6.0	5	5.0	81.0	>0.05
- Medication for chronic disease	10	20.0	12	24.0	22	22.0	25.0	>0.05

Table (4): Subjects distribution according to signs of urinary incontinence

Items	Study group		Control group		Total		X ²	p value
	n= 50		n= 50		n= 100			
	No	%	No	%	No	%		
- Emergency desire for urination								
-Always	49	98.0	47	94.0	96	96.0	92.16	>0.05
-Sometime	1	2.0	3	6.0	4	4.0		
-Number of voiding /day (8 time or more)								
-Always	48	96.0	49	98.0	97	97.0	88.3	>0.05
-Sometime	2	4.0	1	2.0	3	3.0		
-Emergency desire to void at night (causes wakeup >2 times)								
- Always	44	88.0	47	94.0	91	91.0	67.24	>0.05
- Sometime	6	12.0	3	6.0	9	9.0		
-Leakage before reaching the bath room								
- Always	42	84.0	44	88.0	86	86.0	51.8	>0.05
- Sometime	8	16.0	6	12.0	14	14.0		
-Pain or burning during urination								
- Always	14	28.0	10	20.0	24	24.0	27.0	>0.05
- Sometime	36	72.0	40	80.0	76	76.0		
-Complete evacuation of bladder after urination								
-Always	11	22.0	8	16.0	19	19.0	38.44	>0.05
- Sometime	39	78.0	42	84.0	81	81.0		
Cough or laughing or sneezing causing incontinence								
- Always	48	96.0	49	98.0	97	97.0	88.3	>0.05
- Sometime	2	4.0	1	2.0	3	3.0		
-Amount of urine leak each time								
-Drops	16	32.0	14	28.0	30	30.0	10.64	>0.05
- Small splashes	24	48.0	24	48.0	48	48.0		
- More	10	20.0	12	24.0	22	22.0		
-Blood associated with urine								
-Yes	1	2.0	2	4.0	3	3.0	88.3	>0.05
-No	44	88.0	45	90.0	89	89.0		
-Sometime	5	10.0	3	6.0	8	8.0		

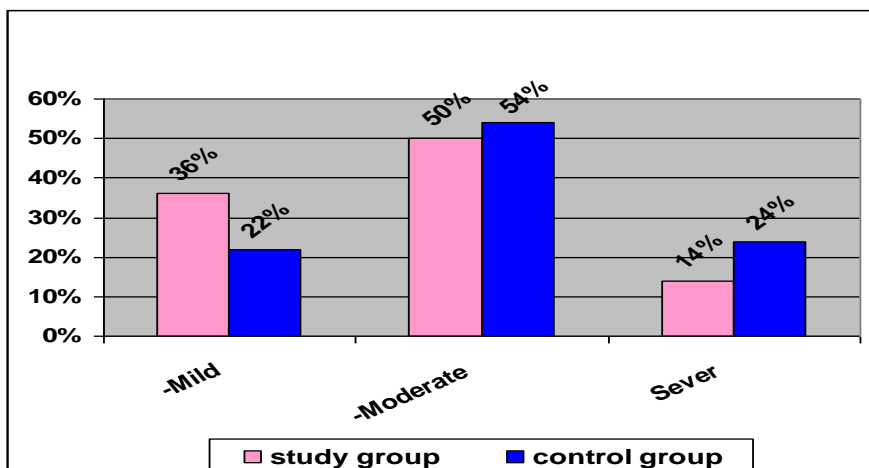


Fig (4): Degree of urinary incontinence between study and control group.

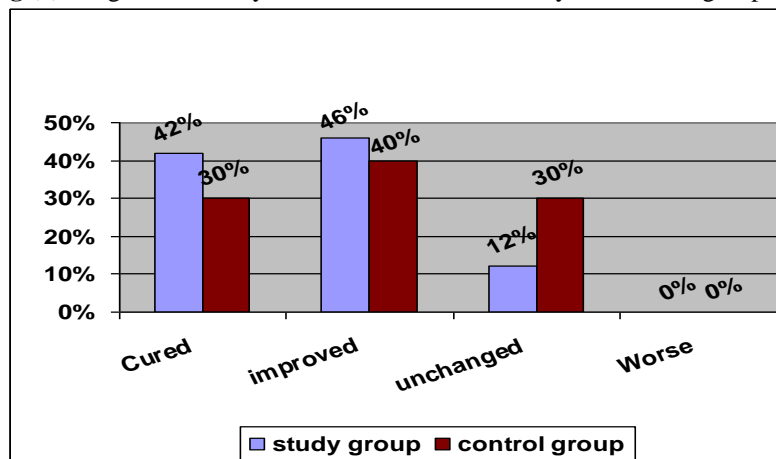


Fig (5): Subjective patient evaluation of the results after the pelvic floor muscles exercises.

Table (5): Subjects Distribution according to degree of improvement after the treatment by pelvic floor muscles exercise and medical treatment

Degree of improvement	Study group n= 50		Control group n= 50		Total n= 100		X ² & p value
	%	No	%	No	%	No	
- High	28	56.0	19	38.0	47	47.0	38.78 < 0.05
-Moderate	21	42.0	28	56.0	49	49.0	
-Not improved	1	2.0	3	6.0	4	4.0	

NB: - Significant relation at a level of ≤ 0.005

Table (6): Relationship between degree of improvement, degree of urinary incontinence, duration of incontinence and body mass index

Items	Degree of improvement						X ²	p value
	High N=47		Moderate N=49		Not improved N=4			
	No	%	No	%	No	%		
Degree of urinary incontinence							65.5	<0.001
- Mild	29	61.7	30	61.2	0	0.0		
- Moderate	16	34.1	15	30.6	0	0.0		
- Sever	2	4.2	4	8.2	4	100.0		
Duration of incontinence							32.0	<0.001
- Less than one year	23	48.9	23	46.9	2	50.0		
- 1-2 year	13	27.6	14	28.5	2	50.0		
- 2-3 year	9	19.2	6	12.3	0	0.0		
- Four years or more	2	4.3	6	12.3	0	0.0		
BMI							5.75	<0.001
- Normal weight	21	44.7	20	40.8	0	0.0		
- Over weight	12	25.5	18	36.7	0	0.0		
- Obese class I	7	14.9	5	10.2	0	0.0		
- Obese class II	5	10.6	3	6.1	0	0.0		
- Obese class III	2	4.3	3	6.1	4	100.0		

NB: - High significant relation at a level of ≤ 0.001

Table (7): Comparison of palpation test between the study and control groups three months before and after kegel exercises program

Grades	Study groupn = 50				Control grou n = 50			
	Before program		After 3 months		Before program		After 3 months	
	No	%	No	%	No	%	No	%
Grade 0 (No contraction)	3	6.0	1	2.0	5	10.0	4	8.0
Grade I (Poor contraction)	42	84.0	10	20.0	41	82.0	30	60.0
Grade II (Good contraction)	5	10.0	26	52.0	4	8.0	12	24.0
Grade III (Powerful contraction)	0	0.0	13	26.0	0	0.0	4	8.0
X ²	X ² =57.88 P> 0.05		X ² = 25.68 P< 0.001		X ² = 53.32 P> 0.05		X ² =36.08 P< 0.05	

NB: - High significant relation at a level of ≤ 0.001 - Significant relation at a level of ≤ 0.005

Table (8): Comparison of provocation or stress test between the study and control groups three months before and after PFME program

Grades	Study group n= 50				Control group n= 50			
	Before program		After 3 month		Before program		After 3 month	
	No	%	No	%	No	%	No	%
Grade 0 (no leakage)	0	0.0	12	24.0	0	0.0	8	16.0
Grade I (slight leakage)	10	20.0	24	48.0	11	22.0	18	36.0
Grade II (moderate leakage)	32	64.0	10	20.0	29	58.0	17	34.0
Grade III (sever leakage)	8	16.0	4	8.0	10	20.0	7	14.0
X ²	X ² =2.00 P<0.05		X ² =3.92 P>0.001		X ² =3.64 P<0.05		X ² =7.1 P> 0.05	

NB: - High significant relation at a level of ≤0.001 - Significant relation at a level of ≤0.005

Table (9): Comparison between mean score of objective patient assessment before & after three months of PFME program

Variable	Study group				Paired (t)	(p) value	Control group				Paired (t)	(p) value
	Before program		After 3 months				Before program		After 3 months			
	Mean	± SD	Mean	± SD			Mean	± SD	Mean	± SD		
- Number of voiding during the day	9.58	±1.738	4.60±	1.807	15.879	<0.001	10.0	±1.90	± 0.677	7.70	8.618	0.05<
- Number of voiding at the night	4.30 ±0	.909	1.62 ±0.530		11.658	<0.001	4.16 ±	0.997	± 0.606	3.80	2.350	0.05<
- Number of leakage of urine/ day	4.12 ±0.718		1.34 ±	0.823	9.469	<0.001	4.20 ±	0.245	3.52 ±0.504		3.943	0.05<

NB: - High significant relation at a level of ≤0.001- Significant relation at a level of ≤0.005

III. Discussion

This study was carried out to evaluate the effects of pelvic floor muscles exercises on the improvement of urinary incontinence among women. As regards the characteristics of the studied subjects, the results of the present study showed that more than half of women in both groups were 45 or more years old, with a mean age (49.12 ± 12.76 years) in the study group and (46.46 ± 12.38 years) in control group. This result is supported by *Swithinbank, et al., (2010)*, who added that, age is the risk factor for loss of bladder control in the women undergoing pelvic floor muscles exercises, involved age of the bladder muscles leads to decrease in its capacity to store urine and increase overactive bladder symptoms; as women getting older the muscles in the bladder and urethra lose some of their strength due to loss of ovarian function, atrophic changes of urogenital tract and reduce how much the bladder can hold the urine.

The findings of the present study indicated that more than one third of women in the two groups had university education and showed highly statistical significant relation between level of education and women improvement after providing the pelvic floor muscles exercises. High level of education leads to more understanding and more cooperation with any information given to them that leads to increase awareness, open minded and able to read and understand about urinary incontinence, causes, methods of treatment and pelvic floor muscles exercises that solve their problem. The previous findings are in agreement with *Nahid, et al., (2015)*, found that women with high level of education are more likely to seek treatment than women with low level of education.

Regarding the anthropometric measurements, there is no statistical significance difference between the two groups. While body mass index in the results of this study showed that nearly half of the studied women in two groups were obese class (1) with the mean (32.50 ± 0.89) kg/m² in the study group and (33.99 ± 0.99) kg/m² in the control group. This mean that women being overweight suffered from constant and higher pressure on the bladder and surrounding muscles, may lead to its weakening and allowing urine to leakage when coughing or sneezing. This result is nearly similar to *Brown, et al., (2010)*, who concluded that obesity and increased body mass index being a risk and significant factors for urinary incontinence.

As regards duration of incontinence the findings of the current study showed that the onset of urinary incontinence ranged between less than one year and more than 4 years. This result is consistent with *Daan,etal (2012)*, who reported that most of women who suffer from urinary incontinence with variable ages, parity, and level of education; discuss their symptoms within one year. Regarding the dietary risk factors, this study showed that high intake of tea or coffee (more than 2 cups / day) was found in about two thirds of the two groups. High fluid intake (more than 2 liters /day) was found in less than half of women in two groups, but low fluid intake (less than 1 liter/day) was present in only (11.0%) of the two groups. Drinking of cola substance is evidenced by less than one quarter; eating spicy food is represented by less than half of women in the two groups. The findings of the present study agreed with *Newman, (2013)*, who showed that, high caffeine intake, drinking of

cola substance and eating spicy food may lead to both stress and urge incontinence because of its irritancy and diuretic effect. Also excessive fluid intake may contribute to diurnal and nocturnal enuresis, and may lead to stress urinary incontinence and urge incontinence by increasing urinary output.

Regarding smoking as predisposing factors for urinary incontinence, the present study found only (5.0 %) in the two groups had smoking. The findings of the present study agreed with, **Bailey R., (2010)**, who stated that a higher risk for all types of urinary incontinence amongst cigarette smokers (more than a pack a day), and showed that any condition resulting in chronically elevated intra- abdominal pressure is likely to increase the risk of developing urinary incontinence such as smoking. Regarding the signs of urinary incontinence the majority of women among two groups had the signs of urinary incontinence. This agreed with **Figueiredo, et al., (2012)**, who reported that persistent incontinence is classified into seven types according to their symptoms such as: stress, urge; overflow, mixed functional, total and reflex incontinence.

Regarding degree of urinary incontinence the present study revealed that about one half of women had moderate degree in the two groups which confirms the benefits of kegel exercises is significantly increasing the peak pressure of pelvic muscles after 4 weeks and maintaining the same level after 8 weeks. This finding agreed with, **Barnett F., (2013)**, who found that most of women reported moderate degree of urinary incontinence. In the current work, the different types of urinary incontinence were managed by pelvic floor muscles exercises with medical treatment or medical treatment only. The findings of the present study revealed highly significant improvements ($p < 0.001$) in treating UI by PFME with medical treatment, about two thirds of women in study group had good and powerful contraction after a combination of PFME and medical treatment, while around one third of women in control group had good and powerful contraction after treatment by medication only. The findings of the present study agreed with **Gormley E., (2012)**, who found that the quick Pelvic floor muscles contraction can significantly reduce urine leakage during a cough in women with mild to moderate stress UI without increasing strength of pelvic floor muscle.

Regarding stress provocation test the findings of the present study showed highly significant decrease in urine loss during it ($p < 0.001$). About two thirds of women in the study group had slight or no leakage, while about one half of them in the control group had slight or no leakage. The findings of the current study agreed with **Fan, et al., (2013)**, who reported that most of women were improved or cured after conservative treatment by PFME, therefore conservative treatment of urinary incontinence in females is very beneficial such as pelvic floor muscles exercise that may reduce bladder contractility, enhance bladder capacity and urethral resistance by increase the strength of the per urethral and per vaginal muscles. Also it is depends on the active participation of motivated women that can insure accurate and continuous exercises. So, the value of PFME may be limited in individuals with less motivation.

In addition, the findings of the present study were supported by **Nahid, et al., (2015)** who showed that most of females improved in symptoms of urinary stress incontinence follows appropriately performed pelvic floor muscles exercise. This improvement is evident among women performing better with exercises regimens supervised by specialist physiotherapists or continence nurses, as opposed to unsupervised or leaflet-based care.

Concerning the subjective patient responses after the pelvic floor muscles exercises, women in the study group were significantly cured than those in the control group treated by medical treatment only. Similar results were obtained by **Kao, et al., (2015)**, reported that almost patients were cured and improved respectively after treatment with pelvic floor muscles exercise. Also, the pelvic floor muscles exercises with combination of medical treatment are more powerful and effective than medical treatment only.

Regarding the improvement degree of urinary incontinence, the findings of present study found that higher improvement mean score among women with mild degree of urinary incontinence followed by moderate degree and finally sever degree of urinary incontinence. This result agreement with **Vahtera, (2011)**, who reported that increased improvement scores among mild degree of urinary incontinence and the decreased improvement among sever degree. These results were expected because the degree of urinary incontinence is considered a high risk factor which interferes with the prognosis and the improvement.

Regarding the improvement duration of urinary incontinence, the findings of present study revealed that, highly improvement mean score was found among women with lowest duration of urinary incontinence. This findings supported by **Koring, et al., (2012)**, reported that the best results showed among women who had lowest duration of urinary incontinence. This result is very logic because the early detection and intervention of urinary incontinence help in avoiding further harming. Regarding the improvement of body mass index the findings of the present study revealed that, highly improvement score were among women with normal weight followed by overweight. This finding is supported by **Bo K and Hilde, (2013)** who reported that obese women had increased pressure on the bladder and surrounding muscles, compared to women with normal weight, so this weakens of the muscles make it more likely that a leak occurs when the women sneezing or coughing. Moreover, the obesity and increased body mass index is considered a significant and independent factor for urinary incontinence.

IV. Conclusion

Based on the results of the present study and research hypothesis can be concluded that pelvic floor muscles exercises are the best conservative and effective method or physical therapy either subjectively and objectively in the treatment of mild and moderate urinary incontinence (stress and urge urinary incontinence). In addition to women's who participate in pelvic floor muscles exercise program were had better improvement and decrease recurrence of urinary incontinence than those who don't.

V. Recommendations

- Counseling the women about early reporting of urinary incontinence.
- Pelvic floor muscles exercises program should be made routinely in gynecological and urological out-patient clinic as options for first line treatment of urinary incontinence.
- In service training program should be carried out for nurses who are working in obstetric department to upgrade their knowledge and skills in relation to care during intra and postpartum period. **During labor:** teach the women to avoid strains hard before fully dilation of the cervix. **After labour:** reassure that any lacerations in the vagina and perineum probably repaired.
- Further researches are recommended in the field treatment of urinary incontinence by combination of different modalities such as pelvic floor muscles exercise together with medication therapy.

Acknowledgements

The authors express their gratitude and thanks towards all who have directly or indirectly helped them to complete this study and their support in each major step of the study.

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