

ORIGINAL RESEARCH

Effectiveness of Pelvic Floor Muscle Training and Yoga on the Quality of Life in Perimenopausal Women with Urinary Incontinence



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Abstract

Background: Urinary incontinence is a symptom of genitourinary disease in perimenopausal women that can seriously affect both physical and mental health and quality of life (QOL). Pelvic floor muscle training (PFMT) and yoga are the exercises that have been applied to treat urinary incontinence. Research that compares the effect of PFMT and yoga on improving the quality of life of women with urinary incontinence is necessary.

Purpose: This study aimed to compare the effectiveness of PFMT and yoga to improve the QOL in perimenopausal women with urinary incontinence.

Methods: A quasi-experimental study with a nonequivalent control group design involving 48 perimenopausal women with all types of urinary incontinence was conducted. The participants were selected by consecutive sampling and equally divided into two groups. Each group was given the PFMT intervention and yoga exercise three times a week for eight weeks. The QOL was assessed using the incontinence impact questionnaire short form (IIQ-7). The data were analyzed by the Mann-Whitney U test, Wilcoxon signed rank test, and paired sample t-test.

Results: The mean (standard deviation) score of total IIQ-7 in the PFMT group were lower (3.58 [2.57]) than that in the yoga group (5.17 [2.14]; $p=0.061$). There were differences in IIQ-7 score in the domains of physical activity ($p<0.001$), social relationships ($p<0.001$), and traveling ($p<0.001$) in the PFMT group. In contrast, in the yoga group, differences were found only in the emotional health domain ($p=0.039$). The IIQ-7 score was better in the PFMT group than in the yoga group.

Conclusion: PFMT was as effective as yoga exercise to improve the QOL. PFMT and yoga should be taught to perimenopausal women with urinary incontinence.

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1. Introduction

Perimenopause is known as the transition period. It is the time before and after menopause begins when a woman's body adjusts to new circumstances. Perimenopausal women experience changes in themselves, especially the endocrine system and other related systems, to varying degrees (Liu et al., 2018). A symptom of genitourinary disease in perimenopausal women is urinary incontinence (Ramalho et al., 2016). The prevalence of urinary incontinence varies between 16.2–81.9% (Kwon et al., 2010) and increases with age (Aoki et al., 2017). Urinary incontinence is defined as a complaint about unconscious urine release (Abrams et al., 2002). Urinary incontinence is not a disease but a symptom due to damage to the bladder, sphincter mechanism, or pelvic floor muscles (Aoki et al., 2017; Kwon et al., 2010).

Urinary incontinence can seriously affect both physical and mental health and the quality of life (QOL) of perimenopausal women (Liu et al., 2018; Waetjen et al., 2009). The severity of urinary incontinence was reported as a risk factor for poor QOL and had other negative effects on various dimensions of QOL, mental health, social, and other daily activities (Aoki et al., 2017). Urinary incontinence has an effect on women's life from mild to severe (Mishra et al., 2010). The World Health Organization (1997) defines the QOL as "an individual's perception of his position in the context of life and the value system in which they live and in their goals, hopes, standards, and concerns." It is a broad concept that combines a person's physical health, psychological state, level of independence, quality of life, social relationships, personal beliefs, and relationship to the environment. QOL is the primary goal of health care, which is an important factor in individual

health and is used to plan and administer health care programs (World Health Organization, 1997).

Various efforts have been made to improve the QOL of perimenopausal women with urinary incontinence, including pelvic floor muscle training (PFMT) and yoga (Kim et al., 2015). PFMT aims to improve pelvic floor muscle function through selective repetition of contraction and relaxation of voluntary, specific pelvic floor muscles (Aoki et al., 2017). The combination of pelvic muscle exercises and yoga intervention programs positively correlated to improvement in urinary incontinence symptoms and improved the QOL related to urinary incontinence (Kim et al., 2015). Research by Shahali et al. (2010) in Iran reported that PFMT carried out for 12 weeks was successful in improving the QOL of middle-aged women with stress urinary incontinence. A systematic review indicates that PFMT is an effective therapy for overcoming urinary incontinence and improving the women's QOL (Radzimińska et al., 2018). Dumoulin et al. (2014) reported that all interventions with PFMT showed changes in urinary incontinence and improved the QOL. Pelvic floor muscle exercises can heal or improve urinary incontinence and improve the QOL (Cacciari et al., 2019). Most of studies on PFMT have observed the effect of PFMT on improving the QOL of women with urinary incontinence complaints. Different things were found in research by Haakstad et al. (2020), which found that adherence to PFMT for 12 months did not show a correlation with urinary incontinence, including the QOL.

Yoga exercise increases the tone and integrity of the pelvic floor muscles through strength in various components of the muscles and pelvic floor ligaments (Rathore et al., 2014). Various yoga postures can increase the patients' muscle awareness and help them learn to correct themselves. Pelvic floor yogic exercise is designed to maintain the balance of the main muscles that affect the structure of the pelvis and lower back (Ripoll & Mahowald, 2002). Regarding specific yoga postures, the frog pose, fish pose, locust pose, plank pose, sitting forward bend, and seated twist may be beneficial for urinary incontinence (Pang et al., 2017). Research by Huang et al. (2014) found that yoga exercises carried out on middle-aged and older women with urinary incontinence were able to improve the QOL. Nayak et al. (2014) reported that yoga exercise reduced the frequency of urination and involuntary urination in perimenopausal women. A case study in India about the feasibility of integrating yoga therapy in the management of urinary incontinence in older women has been reported by Vinchurkar and Arankalle (2015). In this case study, yoga exercises successfully overcame urinary incontinence in older women, thereby improving their QOL (Vinchurkar & Arankalle, 2015). The previous research by Jayabharathi and Judie (2014) also found that yoga interventions in menopausal women were effective in improving the quality of life in physical, psychological, social, and environmental domains (Jayabharathi & Judie, 2014). A systematic review by Nguyen et al. (2020) showed different results from previous studies. Nguyen et al. (2020) affirmed that there was no convincing relationship between yoga and the QOL in women with menopausal symptoms. However, there were positive effects of yoga on physical complaints, psychological, sexual, and vasomotor with many different effects.

Yoga activities take longer than PFMT. In previous studies, yoga interventions were carried out at varying times between 20-40 minutes per day at home and 70-90 minutes under instructor supervision for 8-18 weeks (Jayabharathi & Judie, 2014; Kim et al., 2015; Reed et al., 2014). Meanwhile, PFMT is carried out for 30-40 minutes for 8-12 weeks (Fitz et al., 2017; Haakstad et al., 2020; Kim et al., 2015; Liu et al., 2018). PFMT could be done at any time without providing a specific time; it could be done in a short time. So far, both interventions give good results against urinary incontinence primarily to improve the QOL in perimenopausal women, although other researchers have found different results (Haakstad et al., 2020; Nguyen et al., 2020). To date, little research has been conducted on the effectiveness of PFMT and yoga on the QOL. Therefore, further research is needed to compare PFMT and yoga to improve the QOL among perimenopausal women. This study aimed to compare the effectiveness of PFMT and yoga to improve the QOL in perimenopausal women with urinary incontinence.

2. Methods

2.1 Research design

A quasi-experimental study with a nonequivalent control group design was conducted to compare the effectiveness of PFMT and yoga to improve the QOL in perimenopausal women with urinary incontinence.

2.2 Setting and samples

The study was conducted in a village in Pematangsiantar, North Sumatera, Indonesia, between June and August 2017. The perimenopausal women aged 40–55 diagnosed with all types of urinary incontinence and competent in reading and writing Indonesian were recruited. The sample size was determined based on the formula for calculating the sample size using two proportions, namely 48 participants (each group consisted of 24 subjects). Sampling was performed using the consecutive sampling technique. The sample size was determined using the calculation formula of the two independent populations (Lemeshow et al., 1990). The standard deviation of both groups was 1.49 based on a study by Nayak et al. (2014). In addition, the desired clinical difference (determined by the researcher), $Z\alpha$, and $Z\beta$ were 1.2, 1.96, and 0.842, respectively. Each group consisted of 24 women. Thus, the total sample size was 48 subjects that were divided into two groups of PFMT ($n=24$) and yoga ($n=24$).

2.3 Intervention

Participants were divided into two groups (PFMT and yoga group). The division of groups was carried out by the researcher in sequence to each group (PFMT and Yoga) according to the inclusion criteria. Before the intervention, the participants were requested to complete the IIQ-7 questionnaires by themselves or accompanied by the researcher. Next, each group received their intervention, either PFMT or yoga exercise (*Ashwini mudra* and *Sahajoli mudra*) (Ripoll & Mahowald, 2002) three times a week, for eight weeks (on Monday, Wednesday, and Friday in the gymnastics studios guided by an instructor). Both PFMT and yoga exercises were performed for 60 minutes. Participants were asked to repeat the same exercise at home on the days in between the intervention days. Participants were given leaflets about yoga and PFMT so that they could use them as a practice guide at home. The researcher evaluated and reminded the intervention every day by telephone. All participants complied with this procedure. During the study, no participants dropped out. After eight weeks of intervention, all participants were asked to answer the IIQ-7 questionnaires again. The participants completed the questionnaires by themselves or accompanied by the researcher.

2.4 Measurement and data collection

In this study, the urinary incontinence was assessed using the urinary distress inventory short form (UDI-6) questionnaire with six questions, and the QOL measurement was performed using the incontinence impact questionnaire short form (IIQ-7) with seven questions. The UDI-6 and IIQ-7 questionnaires had been translated into the Indonesian language and used in previous research with internal consistency (Cronbach's alpha) of 0.84 and convergent validity of 0.18 ($p=0.048$) (Tendean, 2007). In addition, the IIQ-7 assessment covers four domains, namely, physical activity, social relations, traveling, and emotional health. The validity of the UDI-6 and IIQ-7 has been tested in various countries (Momenimovahed et al., 2018; Nusee et al., 2016). The assessment of the UDI-6 and IIQ-7 used the scale that started with 0 (not at all), 1 (slightly), 2 (moderately), and 3 (greatly). A high score indicates that urinary incontinence has a negative impact on QOL (Radzimińska et al., 2018).

Based on the preliminary study, it was found that there were one hundred and forty-five perimenopausal women in the specified village. They were then selected based on the eligibility of seventy respondents. Of these seventy respondents, twenty-two were excluded as they did not meet the inclusion criteria (eighteen respondents) and refused to participate (four respondents). Furthermore, there were forty-eighth respondents who participated in the study to completion. The recruitment of participants was carried out in collaboration with the responsible midwife and the health volunteers of the village. Next, the midwife gave a list of names of the residents (women) identified at the perimenopausal age. The researcher invited potential participants to come to the head office of the village by the help of health volunteers. When potential participants

arrived, the researcher explained the purpose of the research to be conducted. Subsequently, potential participants were asked to fill in the UDI-6 questionnaire by themselves or accompanied by the researcher for the initial screening of urinary incontinence. The potential participants identified to have urinary incontinence were offered to participate in the study.

2.5 Data analysis

The data analysis was performed using the SPSS version 21 (IBM Corp., USA) with a 95% confidence interval ($\alpha=0.05$; $\beta=80\%$). A p -value was used to determine statistical significance, with $p \leq 0.05$ indicating significance. Data normality was determined by the Shapiro–Wilk test. The means and standard deviations (SDs) of numerical data with a normal distribution were calculated, whereas the frequencies of categorical data were calculated. The difference between and intern the two groups was analyzed by Mann–Whitney U test, Wilcoxon signed rank test, paired sample t-test, and linear regression for subgroup analysis.

2.6 Ethical considerations

This study was approved by the Health Research Ethics Committee of Poltekkes Kemenkes Medan (Reference number 013/KEPK/Poltekkes Kemenkes Medan/2017) and the health office of Pematangsiantar city. Before conducting the study, the researcher explained the purpose of the study, the procedures for data collection, and the benefits of participation to the potential subjects. Before administering the pretest to the potential participants, the researcher informed them that their participation was voluntary. Also, participants were offered an opportunity to ask any questions, and they were assured that they could withdraw from the study at any time. All participants signed a written informed consent form to participate in the study.

3. Results

3.1 Characteristics of participants

The characteristics of the participants are shown in Table 1. There were differences in the age groups of the participants. Participants in the yoga group were older than the PFMT group [51.83(2.37) vs. 48.58 (3.89)]. There were no differences in the BMI, parity, education level, maternity history, and family planning history between the groups. There were differences in the IIQ-7 scores in the baseline data, but we did not find the effect of age, BMI, and parity variables on the baseline IIQ-7 scores based on subgroup analysis (see Table 2 and Table 3).

Table 1. Characteristics of the participants in the two groups

Variable	PFMT (n=24)		Yoga (n=24)		<i>p</i>
	Mean (SD)	n (%)	Mean (SD)	n (%)	
Age (years)	48.58 (3.89)		51.83 (2.37)		0.004
BMI (kg/m ²)	24.68 (3.15)		25.05 (3.81)		0.715
Parity	3.46 (0.98)		3.21 (1.25)		0.401
Education level					
Low (elementary & junior high school)		15 (63)		10 (42)	0.248
High (senior high school & academy/university)		9 (37)		14 (58)	
Maternity history					
Abortus		1 (4)		1 (4)	0.837
Normal		22 (92)		21 (88)	
Cesarean section		1 (4)		2 (8)	
History of family planning					
Never		7 (29)		10 (42)	0.156
Nonhormonal		1 (4)		4 (16)	
Hormonal		16 (67)		10 (42)	
IIQ-7 baseline score	11.79 (1.77)		6.04 (2.39)		< 0.001

Notes. PFMT=pelvic floor muscle training; SD=standard deviation; BMI=body mass index; IIQ-7=incontinence impact questionnaire short form.

Table 2. Effect of age, BMI, and parity on the baseline IIQ-7 short form score in the PFMT group

Model	Variable	Coefficients	Correlate coefficients	p-value
1	Age	0.095	0.209	0.386
	BMI	0.016	0.028	0.898
	Parity	-0.313	-0.173	0.472
	Constant	7.870		0.182
2	Age	0.095	0.209	0.374
	Parity	-0.310	-0.171	0.465
	Constant	8.252		0.097
3	Age	0.066	0.145	0.499
	Constant	8.591		0.080
4	Constant	11.792		0.000

BMI=body mass index

Table 3. Effect of age, BMI, and parity on the baseline IIQ-7 score in the yoga group

Model	Variable	Coefficients	Correlate coefficients	p-value
1	Age	0.261	0.259	0.254
	BMI	0.030	0.048	0.827
	Parity	0.129	0.068	0.762
	Constant	-8.651		0.483
2	Age	0.256	0.254	0.249
	Parity	0.139	0.073	0.738
	Constant	-7.672		0.460
3	Age	0.272	0.270	0.202
	Constant	-8.052		0.460
4	Constant	6.042		0.000

BMI=body mass index; IIQ-7=incontinence impact questionnaire short form.

3.2 Effect of PFMT and yoga exercise on the QOL

The results of the effect of PFMT and yoga on the total QOL are presented in Table 4. The IIQ-7 mean (SD) score in the PFMT group after the intervention was lower [3.58(2.57)] than the yoga exercise group [5.17(2.14)]. However, there was no statistical difference between the groups ($p=0.061$). There were differences in the IIQ-7 score within groups. The effect size in the PFMT group was higher than that in the yoga group (8.21 vs. 0.87).

The effects of PFMT and yoga on the IIQ-7 domain can be seen in Table 5. In the PFMT group, there were differences in the domains of physical activity, social relationships, and traveling after the intervention. In contrast, in the yoga group, only the emotional health domain was different after the intervention.

Table 4. Effects of PFMT and yoga exercise on the total QOL in the two groups

IIQ-7 score	PFMT (n=24)	Yoga (n=24)	p-value [#]
	Mean (SD)	Mean (SD)	
Pre	11.79 (1.77)	6.04 (2.39)	
Post	3.58 (2.57)	5.17 (2.14)	0.061
p value	<0.001*	0.002**	
Effect size	8.21	0.87	

IIQ-7=incontinence impact questionnaire short form; PFMT=Pelvic floor muscle training; SD=standard deviation; *Wilcoxon Signed Rank Test; ** Paired sample t-test, #Mann-Whitney U test

4. Discussion

This study aimed to compare pelvic floor muscle training (PFMT) with yoga to improve the quality of life (QOL) in perimenopausal women with urinary incontinence. Urinary incontinence disrupts the QOL of women. Senra and Pereira (2015) have reported that women with urinary incontinence had a lower QOL. Various studies have reported that high IIQ-7 scores indicate poor QOL (Lin et al., 2018; Mallah et al., 2014)

Table 5. Effect of PFMT and yoga exercise on the domain of quality of life in the two groups

Domain of IIQ-7	PFMT (n=24)		<i>p-value</i>	Yoga (n=24)		<i>p-value</i>
	Mean (SD)			Mean (SD)		
	Pre	Post		Pre	Post	
Physical activity	4.75 (0.79)	1.33 (1.00)	< 0.001*	1.75 (1.26)	1.75 (1.26)	1.000
Social relation	5.83 (0.92)	0.75 (0.79)	< 0.001*	1.04 (0.75)	0.88 (0.68)	0.102
Traveling	4.67 (0.81)	1.29 (0.99)	< 0.001*	2.42 (1.31)	2.04 (1.23)	0.107
Emotional health	0.54 (0.88)	0.21 (0.58)	0.107	0.83 (0.96)	0.5 (0.59)	0.039*

IIQ-7=incontinence impact questionnaire short form; PFMT=Pelvic floor muscle training; SD=standard deviation; *significant

In this study, there was no difference in the QOL between the PFMT and yoga groups ($p=0.061$) after the intervention. However, in the analysis of each group, there was a difference in the QOL after the intervention, with the largest mean difference in the PFMT group. The result of this study found that the analysis within the PFMT group showed a significant decrease in the IIQ-7 scores. This can be seen based on the differences in three of the four IIQ-7 domains after the intervention of physical activity, social relationships, and traveling. Overall, the same results have been reported by Topuz and Seviř who found that PFMT had a positive impact on urinary incontinence (Topuz & Seviř, 2016). Shahali et al. (2010) also showed improvement in the quality of life outcomes in women with stress urinary incontinence after PFMT for 12 weeks. A study by Radzimińska et al. (2018) reported that PFMT alone or other physical exercises were an effective technique to reduce urinary symptoms in older women with urinary incontinence. PFMT significantly improved the QOL of women with urinary incontinence. Hence, PFMT was recommended as a first-line conservative treatment.

In our study, the yoga intervention also affected a decrease in the IIQ-7 scores. However, this difference can only be found in the emotional health domain. Overall, the results of this study were in line with Nayak et al. (2014) in India. Nayak et al. (2014) reported that yoga had the most influence on improving the QOL in all domains. Yoga in perimenopausal women can reduce the frequency of urination and uncontrolled urine output. Previous research by Huang et al. (2014) also found that 90 minutes of yoga intervention for six weeks, plus exercise for at least one hour at home, reduced the frequency of total urinary incontinence by 66% from baseline. Vinchurkar and Arankalle (2015) reported the effect of yoga on stress urinary incontinence; it was revealed that yoga exercises performed twice a day for 21 days successfully improved the QOL of women with urinary incontinence. Yoga therapy includes the practice of physical postures (*asanas*), voluntary regulated breathing techniques (*pranayamas*), *Ashwini mudra*, *Sahajoli mudra*, and meditation (*dhyana*). *Ashwini mudra* and *Sahajoli mudra* exercises include the contraction and relaxation of the gluteal muscles, perineum, sphincter, and the entire pelvic floor. Strengthened muscles in *Ashwini mudra* are puboanalis and puborectalis, while *Sahajoli mudra* strengthens pubovaginalis muscles. This posture is known to increase the pelvic region muscle tone and enrich blood circulation in the urogenital area (Rathore et al., 2014).

Yoga can be used as an alternative treatment strategy for women who do not have access to specialists or choose not to use pharmacological or surgical therapy. Yoga is an alternative to urinary incontinence that can be done by both middle-aged (45–59 years) and older (60–74 years) women without complications of urological history and is safe and effective (Huang et al., 2014). Pelvic floor yogic exercises (PFYEs) increase pelvic floor muscle strength and help improve their tone. PFYEs help in three ways: (1) yoga postures isolate and strengthen pelvic floor muscles and stretch and extend them; (2) breathing can release tension and direct healthy and oxygenated blood to the pelvis; and (3) the yoga posture helps in strengthening the core postural muscles, which are directly related to the pelvic floor muscles. A healthy relationship between the core muscle and pelvic muscle is very important for overall pelvic health (Rathore et al., 2014). Based on our study, no adverse events were found due to yoga interventions. Besides, there was an increase in the QOL, especially in the emotional health domain. This shows the effectiveness, safety, and efficacy of yoga.

In our study, there was a difference in the baseline scores of IIQ-7 in the two groups before the intervention. Participants in the yoga group were older than those in the PFMT group. This difference may be due to differences in the age of the two groups of participants. The incidence of

urinary incontinence is usually related to age because of the aging process (Aoki et al., 2017). However, the results of the regression analysis showed no effect of age on IIQ-7 in this study.

5. Implication and limitation

The findings of this study suggest the application of PFMT and yoga exercises for improving the QOL in perimenopausal women with urinary incontinence. This study has limitations. First, there was no differentiated types of urinary incontinence, so that the interventions that were performed could not describe the condition of urinary incontinence. Second, the IIQ-7 baseline data had differences. It was presumably because the researchers did not explore more about the length of urinary incontinence that the participants experienced, so the researcher did not provide a limitation in the inclusion criteria when conducted the initial screening. There should be no difference in the IIQ-7 baseline data so that respondents are actually in the same group of QOL. Third, measurement of pelvic floor muscle strength was not performed objectively to assess changes after the intervention. A long-term follow-up was not conducted in this study, so the benefits of PFMT and yoga cannot be ascertained. Despite the limitations, this study demonstrated preparation to support the feasibility, potency, and security of yoga interventions in the group of perimenopausal women with urinary incontinence. Besides, routine PFMT exercise is a first step to improve urinary incontinence in perimenopausal women.

6. Conclusions

This study showed that there was no difference between PFMT and yoga for improving the QOL in perimenopausal women with urinary incontinence, generally. However, based on the domain of the QOL, we found the difference in the domain of physical activity, traveling, and social relations in the PFMT group. Whereas in the yoga group, the difference was only found in the emotional health domain. In conclusion, PFMT was as effective as yoga for improving the QOL in perimenopausal women with urinary incontinence.

The researchers suggest that the subsequent studies explore the combination of PFMT and yoga intervention in overcoming urinary incontinence, and urinary incontinence restriction is included in the inclusion criteria. Additional high-quality research is warranted to confirm and explore the beneficial effects of yoga in perimenopausal women by paying attention to the things mentioned above.

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Conflict of interest

None

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