Examination of the Factors Related to Pelvic Floor Muscles Strength (PFMS) in Middle-Aged Women in Ahvaz

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ABSTRACT

Background Purpose: Pelvic Floor Dysfunction (PFD) includes urinary incontinence, fecal incontinence, pelvic organs prolapse and subsequent sexual problems, which are among common complaints of the patients referring to women's clinic. The purpose of this study was to specify the factors related to PFMS in middle-aged women admitted to women clinic of Imam Khomeini Hospital of Ahvaz.
Materials and methods: The present study was cross-sectional done on 200 women admitted to Imam Khomeini Hospital. First, demographic information questionnaire was completed and PFMS was measured in lithotomy position using peritronTM9300v. Finally, the data were analyzed using spss22.
Results: People with pelvic floor muscle prolapse formed 77.5% of the population. The strength of pelvic floor muscles had a positive and significant relationship with age (p<0.001 and R=-0.565), the time past from the last delivery (R=0.144 and P = 0.042), the frequency of sexual relationship (P<0.001 and R=-0.517) and education (P=0.001, R = 0.274).
However, the time past from marriage up to examination (R=-0.425 and P<0.001), the number of pregnancies (R=-0.487 and P<0.001), and the number of deliveries (R=-0.517 and P <0.00) had a significant negative correlation with PFMS. The number of abortions, type of delivery, occupation, economic status and history of hysterectomy showed no significant correlation with muscle strength.
Conclusion: The age, the time past from the last delivery, the number of deliveries, the frequency of sex per month, and body mass index (BMI) were correlated with PFMS. Age was the most effective factor in PFMS and education, the time past from marriage, and the number of pregnancies had the least effect on muscle strength.

Key Words: PFMS, Perineometer, Pelvic Floor Muscle Prolapse

INTRODUCTION

PFD includes urinary incontinence, fecal incontinence, pelvic organs prolapse as the complaints of the patients referring to women's clinic. In the United States, 50% of women with delivery experience a degree of pelvic floor prolapse, of which 10-20% become symptomatic and 11% need pelvic floor repair operation during their life [1]. In a study in Iran, the prevalence of at least one type of PFD

was reported to be 68.6% [2]. In another study in Iran, Dirkovand Moghadam reported the prevalence of various degrees of prolapse with intensity of 1 in women as 80% [3]. In McLennan's study in Australia, the prevalence of prolapse in women aged 15-90 was 35.3 [4].

The main cause of PFD is unknown, but it seems that several factors are involved in it. Former epidemiological studies have proposed several predisposing factors for PFD, some of which are natural birth, aging, increased deliveries, previous hysterectomy and obesity [5]. Although mortality associated with pelvic floor muscle prolapse (PFMP) is not significant, this disorder creates significant complications in these women and can disrupt everyday activities of these women with effects on gastrointestinal system and sexual function, thereby reducing quality of life [6].

In a study in America, Tola et al. (2013) showed that PFD is more prevalent in older adults, whereas sexual function in both groups with and without PFD was not significantly different [7].

Liver et al. (2010) showed that the age and number of deliveries did not differ significantly between the two groups with and without PFMP [8]. Afshari et al. (2016) showed that PFMS was not significantly related to the type of delivery [9]. Nonetheless, Rortveit et al. showed that cesarean delivery can protect women from urinary disorders [10]. A study in 2002 in America concluded that one of the factors affecting PFD is race and African-American women have the lowest risk of prolapse [1] and Spanish women have the highest probability of prolapse [11].

Hence, as the studies related to the frequency of PFMP are few in Iran, the purpose of this study was to determine the relationship between muscle strength and different variables with the frequency of PFMP in Iranian society.

METHODS

The present study was cross-sectional done on 200 women admitted to Imam Khomeini Hospital. After obtaining permission from research deputy and obtaining the code of ethics and obtaining permission from health deputy, we referred to the selected health centers for sampling and the eligible subjects of the samples were selected from among the subjects. After explaining the research purpose to the subjects, they completed the informed consent form and then they filled the demographic questionnaire. The demographic information questionnaire included age, marriage age, marriage duration, date of the last delivery, the number of pregnancies, number of births, BMI, education, occupation, type of delivery, economic status, and the frequency of sex per month. The inclusion criterion was having literacy.

Exclusion criteria were known spouse-disabilities, women with abnormal hemorrhage, having known mental illness, known medical conditions, drug addiction, alcohol, smoking, using systemic or topical hormones, having genital infections, lack of pelvic cancers and vagina atrophy. After completing the demographic questionnaire, PFMS was measured at lithotomy position. Then, the pelvic floor muscle contraction was taught to them by the finger. Thus, the volunteers were to catch the examiner's finger using perineal finger muscles and lift it up, so that the examiner ensured that the volunteer knew the muscles in question and contracts them by repetition. To determine PFMS, we covered peritronTM9300v using condom cover to prevent the transfer of contamination and place in the vaginal cavity of the volunteer. The subjects were then asked to take a few deep breaths and contract perineum upon hearing the number 3 uttered by the examiner, which was repeated three times. The maximum number possible was read from the device and recorded in the checklist of the person. To determine the reliability of perineometer device, the sampling was repeated after 10 samples. Individuals with a score of less than 28 in perineometer had PFMP and the frequency of PFMP in the population was calculated. Data analysis was performed using spss22.

Descriptive statistics (mean, standard deviation and frequency) were used in this study. We used Spearman and Pearson correlation and independent t-test to determine the relationship between dependent and independent variables.

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Finally, using linear regression model, all the variables with significant correlation to PFMS were included in the model and the prediction equation was extracted (Sig., p<0.005).

RESULTS

The results showed that the people with PFMP form 77.5% of the population and the subjects without PFMP formed 22.5% of the population (Table 1).

The mean and standard deviation of the age of the women participating in the study were 51.28 ± 5.90, and statistically PFMS was significantly correlated with age (p<0.001 R= -0.565).

The average duration of the last delivery was 24.6 ± 0.26 years, which has a direct and significant relation with PFMS (R = 0.144 and P = 0.042).

The frequency of sexual relationship (R=-0.517 and P<0.001), and education (R = 0.274 and P<0.001) had a direct and significant correlation with PFMS. The study of the results showed that the duration of marriage up to review time (R = -0.425 and P<0.001), the number of pregnancies (R=-0.487 and P<0.001), and the number of deliveries (R=-0.517 and P<0.001) were inversely correlated with PFMS. The number of abortions, type of delivery, occupation, economic status and history of hysterectomy showed no significant correlation with muscle strength (Table 2 and 3).

In this study, dependent variable, PFMS, was a quantitative variable calculated based on cm of water. We used linear stepwise regression model. We placed all variables that had a significant relationship, as univarite variables, with PFMS in the model, which showed that with advance in age, the likelihood of PFMP increases. The longer the time past from the last delivery, the better the muscle strength will be. The higher the number of deliveries, the greater the PFMP, the higher the number of sex per month, the better the muscle strength, and the higher the BMI, the weaker PFMS they will have. Finally, education, the time past from marriage and the number of pregnancies, despite having a significant relationship with pelvic muscle strength, were excluded from the model and the model and prediction equation was extracted as is seen in Table 4.

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Table 1. Frequency of pelvic muscle strength

		Frequency	Percent
PFMS	Weak	155	77.5%
	Strong	45	22.5%
	Total	200	100.0%

Table 2. The relationship of some of the factors related to muscle strength (According to Pearson & Spearman's test)

Independent Variables	Age	Marriage age	The time past from the last pregnancy	The time past from marriage	The number of sex per month	The number of pregnancies	The number of deliveries	The number of abortions	BMI	Education	Economic status
Dependent variable of muscle strength	R=-0.565 P<0.001	R=0.153 P=0.030	R=0.144 P=0.042	R=-0.425 P<0.001	R=0.409 P<0.001	R=-0.487 P<0.001	R=-0.517 P<0.001	R=-0.060 P=0.403	R=-0.294 P<0.001	R=0.274 P<0.001	R=-0.028 P=0.689

Table 3. Relationship of some of the factors related to muscle strength (based on independent T-test)

Variable / Muscle strength		Frequency	Mean (SD)	P-value
Type of delivery	Vaginal	172	25.6657 (5.243)	0.248
	Cesarean section	28	24.1526 (6.579)	
Occupation	Employed	44	25.1009 (6.633)	0.390
	Unemployed	156	24.1567 (6.364)	
Surgical history	Yes	45	24.8727 (6.512)	0.548
	No	155	24.2168 (6.406)	

Table 4. Linear regression and specific and significant coefficients in the model

Model	Coefficients	Sig.
Constant	51.996	P<0.001
Age	-0.557	P<0.001
The time past from the last delivery	0.455	P<0.001
The number of deliveries	-1.502	P<0.001
The number of sex per month	0.321	0.011
BMI	-0.223	0.036

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Prediction equation

PFMS = 51.996 - 0.557 Age +0.455 time past from the last delivery - 1.502 the number of deliveries + 0.321 sex per month -0.223 Body mass index

DISCUSSION

This study examines the relationship between PFMS and factors related to it and studies the frequency of PFMP. PFMP results in pelvic organs prolapse, urinary and fecal disorders, painful intercourse, and dysfunction and sexual satisfaction [2].

In this study, people with PFMP formed 77.5% of the population. In the study by Akhlaghi et al., which evaluated the prevalence of PFD in women over 15 years of age, 89% of women experienced at least one type of PFD, including urinary incontinence, gas or fecal incontinence, current symptoms of pelvic floor prolapse or previous repairs in the past and present, at least two types of PFD in 74% and three or more types in 54% of the women [12]. In the study by Teymouri 68.6% of women with mean age of 38 years experienced at least one type of PFD, PFMP symptoms or previous repairs [2].

In Dirkvand Moghadam (2012), the prevalence of prolapse with intensity of 1 and higher, based on POPQ system, was reported in 80.1% of women [3]. However, in Swift (2000), the prevalence of prolapse in women was 50% [13]; in the study by Kepenekci et al., 4004 women aged 15-86 were examined and the prevalence of pelvic organ prolapse in the studied population was 67.5%. The reason for the difference in the results of the studies about the prevalence of PFD is the population and more important the measurement method used [14].

Given the results obtained, the mean age of women was 51.28. Statistically speaking, age is an important and effective factor in muscle strength. In this study by Ayati et al. the relationship between this factor and PFMP has been proven [15].

Different studies have proven the effect of aging on the probability of PFMP. The possible cause of this is the general weakness of all tissues, including the muscles and the type of tissue in the pelvic floor. Moreover, over time, the cumulative effect of different elements on the pelvic floor muscles increases. With increasing age and prolongation of the status of estrogen deficiency, osteoporosis occurs, and changes in the backbone of the vertebrae caused by osteoporosis cause the pelvic opening to move to the horizontal position. This change in the pelvic inlet causes the abdominal contents to be squeezed directly on the pelvic floor muscles [16].

One of the causes of the effect of labor on the prevalence of PFD is the long-term effect of pregnancy hormones on connective tissue and pelvic floor muscle performance. In this study, there was a significant relationship between the increase in the number of pregnancies and labor with pelvic floor muscle, which is consistent with the results of the study by Teimuri in Iran [17].

The lifestyle plays a role in the development of prolapse, and lifting heavy objects that require Valsalva maneuver or holding breath can cause physical stress to the pelvic floor muscles. In this study, people were divided into employed and housewives to study the lifestyle, where the relationship between occupation and muscle strength was not significant. Thus, in our study, occupation was not one of the effective factors in PFMS. In various studies, different results have been obtained regarding occupation and prolapse of pelvic floor [16]. A study of uterine prolapse in Germany reported its prevalence in women with a history of heavy work 40% compared to 17% for the control women. In our study, job categorization was based

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on social categories and no information is available of the level of physical activity of the subjects [18].

In a study in 2004, Walter showed no relationship between education, occupation, life style and history of hysterectomy with PFMP [19].

Our study showed that the history of hysterectomy is not effective in creating PFMP. However, in the study of Karasick and Style, it was found that previous hysterectomy was associated with a significant increase in fecal incontinence and PFMP [20].

According to this study, education was effective in creating PFMP. In Ayati et al., education was effective in PFMP, which is consistent with our study [15]. However, in a study by Suzan L Hendrix et al. no significant relationship was obtained between the level of education, occupation and the lifestyle of people with the probability of prolapse. Perhaps the difference in our study is more due to the increase in social status of the educated people [18].

The study of BMI showed that with the increase in BMI, PFMS decreases, which is consistent with the results of Moalli and Menefee [1,18]. In the review study of Jin and Parson (2011) that examined the effect of obesity on pelvic floor muscles, they found that the prevalence of PFD has increased with obesity, and obesity causes increased intra-abdominal pressure, and damage to muscles and pelvic floor nerves [21].

In this study, the frequency of sex per month was significantly and directly correlated with the strength of pelvic floor muscles. Kanter et al. (2015) concluded that the greater the power of the pelvic floor, the more sexual activity would be [22].

In a study by Rortveit et al. entitled "Urinary incontinence after normal delivery or cesarean section," the incidence of incontinence in the group of women with no child was 10%, in the group under cesarean section 15.9% and in the group with vaginal delivery 21%. It was also shown that elective cesarean section only reduced the likelihood of prolapse very little, and it was revealed that cesarean had similar effects on pelvic organs during labor.

In the study of Afshari et al. for comparing the type of delivery with PFMS using a perineometer, it was concluded that the mean pelvic floor muscle power in women with vaginal delivery was significantly lower than those of nolipar women and women who had cesarean delivery. However, with the distinction between vaginal delivery with and without episiotomy and average muscle strength among the groups, it was concluded that vaginal delivery without unnecessary interferences, especially episiotomy, not only does not decrease PFMS but also the mean power of PFMS in this group was higher than those with cesarean delivery [9].

This study is a first study on the relationship between different variables with PFMS using a perineometer device among Iranian middle-aged women.

In general agreement studies, there is no agreement in the degree of PFMP to be considered as a risk factor for suffering from it, which can be a limitation of our study. In this study, people were with PFMP score of 28 or less in perineometer. The score of 28 or less was obtained using the studies of Afshari and Adriana and the study by Ties Rock [9, 23, 24].

This study has proven the effects of age, duration of the last delivery, number of deliveries, number of sex per month and BMI among factors affecting muscle strength. Hence, these studies and the finding of factors affecting PFMP are critical for acquiring preventive strategies. Most of the factors affecting PFMP can be prevented and by preventing increase in weight and reducing the number of deliveries, one can prevent this. Moreover, cesarean section has no effects on prevention of this complication, so this method should not be used under the pretext of reducing pelvic floor prolapse in the future.

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