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Modeling the Relationship between Physical Activity and Quality of Life in Menopausal-aged Women: A Cross-Sectional Study

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ABSTRACT

Background: The purpose of the present study was (a) to assess the relationship between physical activity and the intensity and duration of menopausal symptoms, (b) to investigate the relationship between physical activity and the four domains of health-related quality of life (HRQOL) and (c) to assess the relationship between physical activity and chronic diseases.

Methods: This descriptive-analytical study that was conducted in Tabriz City, Iran. Data were collected in 2012 by personal home-based interviews, using structured questionnaires. All participants (n= 273), who were middle-aged (age range of 40-60 yr) were recruited from two of the 25 urban health service centers' clients, by clustered random sampling allocation.

Results: There was a positive significant relationship between Psychological, Social, and Environmental domains of HRQOL with physical activity ($P<0.001$). In addition, a negative significant relation was found between somatic complaints including sexual problems ($P<0.017$) and vaginal dryness ($P<0.030$) as well as joint-muscular discomfort ($P<0.018$), and the level of physical activity. Diabetic ($P<0.047$) and women with history of heart disease ($P<0.040$) performed 2.670 and 3.548 hours more than who were not.

Conclusions: Regular physical activity would be effective in decreasing menopausal symptoms as well as improving healthy aging and also physical activity promotion as a part of healthy life style promotion programs needs to be improved in communities where women are physically inactive. In addition, women need to be informed about importance of physical activity on their life which it leads to feel healthy aging and pre and post- menopausal stages.

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Introduction

Menopause is an inevitable stage of biological changes in every woman's life¹. Since the population of women is progressively and slowly increasing worldwide and due to the ascending trend of life expectancy, women are expected to spend an average of three decades of their lives or more beyond menopause^{1,2}. Transition from reproductive life to menopausal stage is characterized by increased reporting of psychological and physical symptoms³. The intensity of menopause-related complaints ranges from mild to severe in 96% of the women, affecting health-related quality of life (HRQOL) at physical, psychological and social levels⁴ and numerous evidences have reported that HRQOL scores of middle-aged women are usually lower than those of middle-aged men, young adults and elderly

women^{4,5}. Although the menopausal transition is known as a part of the normal aging process, the hormonal changes in this stage of women's life alter their health-risk profile; vasomotor symptoms such as hot flashes and some urogenital symptoms are common manifestations of menopause⁶.

Performing daily physical activity (defined as exercising at least three times per week for 20 min at moderate intensity or higher) might be the best recommendation for women in middle ages to protect their health status⁷. Regular physical activity improves wellbeing of women by reducing menopausal symptoms as well as improving the quality of life of postmenopausal women^{8,9}. In Italy, severe vasomotor symptoms were significantly more

common in those reporting lower levels of regular physical activity¹⁰. Women in menopausal ages who were physically active had a better postural stability than those who were not, with a reduced risk of falls and fractures¹¹. Several RCTs of middle-aged/menopausal-aged women have found that aerobic exercise can cause significant improvements in several common menopause related symptoms (e.g. mood, health-related QOL and insomnia)^{8,9}.

In Western countries, menopausal symptoms such as hot flushes and vaginal dryness are considered as the main climacteric complaints⁶. In other cultures, especially in Islamic and Asian countries, these symptoms differ from those observed in Western women¹². The most prevalent symptoms reported in Bangladesh¹³ include feeling tired, headache, joint and muscular discomfort, physical and mental exhaustion, and in Malaysia¹⁴ joint and muscular discomfort, physical and mental exhaustion and sleeping problems are the most prevalent symptoms. In addition, tiredness, headache, hot flushes, skin wrinkles and decreased sexual desire were common manifestations of menopause in Egypt¹⁵. Regarding Iranian women, hot flushes, mood swings, vaginal dryness and sleep problems were the most common symptoms associated with menopause¹⁶. In northern regions of Iran, irritabilities, joint pains, backache, hot flushes and headache were reported as the most prevalent symptoms¹⁷.

Menopause and aging are associated with increased risk for many chronic conditions including cardiovascular diseases, osteoporosis and stroke¹². On the other hand, low exercise participation rates have been reported for menopausal-aged women⁸ which may increase their risk of diseases in later life. In other words, postmenopausal women are more prone to sedentary habits and loss of fitness in comparison with premenopausal women¹⁵. This sedentary lifestyle leads to deterioration of health and lower quality of life¹⁵.

In accordance with the above-mentioned background, the purposes of the present study were (a) to assess the relationship between physical activity (PA) and the intensity and duration of menopausal symptoms, (b) to investigate the relationship between PA and the four domains of HRQOL, and (c) to assess the relationship between PA and chronic disease.

Methods

Design and Participants

This descriptive-analytical study was conducted in Tabriz City, Iran. Data were collected between March 2012 and May 2012 by personal home-based interviews, using a structured questionnaire which had been approved by Ethical Committee, Tabriz University of Medical Sciences, Tabriz, Iran. Informed consent was obtained from all study participants before the project began.

All participants (n= 273), who were middle-aged women (age range of 40-60 yr) were selected from among two of the 25 urban health service centers' clients, by clustered random sampling allocation. Next, all women in each cluster who reported irregularity in menstrual cycle or experienced no menstrual periods were recruited. Estimates for the number of women to be selected at each health services centre were calculated in proportion to the size of the population, each health care delivery centre covered.

For gathering data, a series of questionnaires were applied through face to face interviews. In addition, anthropometric indices, height and weight, were measured through tape and headboard, and analog scale (Camry) with minimal clothes and without shoes, respectively.

Demographics

This included measurement of sociodemographic factors including age, BMI, employment, education, marriage status, miscarriage, age at menarche, self-reported menopausal status, self-reported irregularity status, use of hormone replacement therapy (HRT), use of contraceptive pills, history of chronic disease, smoking and exercise pattern.

Menopausal status and HRT use

Menopausal status was determined by menstrual characteristics including: (a) surgical: representing menses blocked as a consequence of hysterectomy and/or Oophorectomy; (b) postmenopausal: indicating menses blocked naturally for at least 12 months; (c) peri-menopausal: representing menses had occurred over the past 12 months.

Irregularity status was recognized by menstrual characteristics including: (a) heavy menses or accompanied by blood clots; (b) menses lasting several days longer than usual and (c) menses occurring closer together. Hormone replacement therapy (HRT) use was assessed and categorized as: a) used in the past, b) current and c) never.

Menopausal symptoms

Menopause Rating Scale (MRS) was used as a basis for assessing menopausal symptoms which is a self-reported instrument that has been widely used and validated in many clinical and epidemiological studies as well as in research on the etiology of menopausal symptoms, to assess the severity of the symptoms^{13,14}. The MRS includes 11 items and is separated into three subscales: (a) somatic symptoms: hot flushes, heart discomfort/palpitation, sleeping problems and muscle and joint problems; (b) psychological symptoms: depressive mood, irritability, anxiety and physical and mental exhaustion; (c) urogenital symptoms: sexual problems, bladder problems and dryness of the vagina. Each of the eleven symptoms is scored from "0" (without symptom) to "4" (very severe symptoms)¹⁴. For the present study, the Eng-

lish version of MRS was translated into Persian and then was translated to English by another expert in English language for ensuring that the same and true content was attained after translation. Next, the Persian version was assessed by an expert panel (n=11) out of which, 8 experts (73%) confirmed the content of the scale. The estimated reliability coefficients for MRS was (alpha Cronbach) 0.92 which demonstrated high internal consistency. In addition, duration (per month) of feeling each of the menopausal symptoms was added to the questionnaire.

Physical activity

It was assessed by the short version of the International Physical Activity Questionnaire (IPAQ)¹⁸ which had been translated to Persian by Bagianimogadam et al.¹⁹. This scale provides information on the time spent on low, moderate and high activities on the basis of METs (Metabolic equivalents)-min/week's scores or the frequency of activities at week days and time spent on each activity. Validity and reliability of the instrument have been assessed and reported by many studies^{16,19}. The calculations of MET's scores and PA classifications are revealed in the Guidelines and other studies¹⁸.

Health-related quality of life (HRQOL)

For assessing life quality, short form (26 items) of WHO on Quality of Life WHOQOL questionnaire which consists of four domains: physical, psychological, social and environmental, was used. This questionnaire is known as one of the generic versions of measuring QOL which is appropriate for people living in diverse conditions and cultures. The Persian version is available with a good reliability and validity²⁰. The estimated reliability coefficients for WHOQOL was (alpha Cronbach) 0.80 and demonstrated high internal consistency. The scores were calculated according to the standard methods²¹.

Data analysis

All analyses were performed using SPSS 11.5 (SPSS Inc, Chicago, IL, USA). Data were presented as frequency (Percentage) for qualitative variables and as mean (SD) for quantitative variables. The normality of the distribution of response variables was tested and confirmed by One-Sample Kolmogorov-Smirnov Test. A series of univariate general linear models were used to assess the relationship between physical activity and individual menopausal symptoms in addition to the stages of change and history of chronic disease. In these analyses unadjusted regression coefficients and their 95% confidence intervals (CI) were presented as effect size of interest. In addition, a multivariate general linear model was used to assess the relationship between physical activity and above mentioned characteristics to estimate adjusted regression coefficients and their 95% CIs. Qualitative variables were entered in the models as indicators. $P < 0.05$ was considered as significant.

Results

The mean age of participants was 49.8 (SD=5.3) years, ranging from 40 to 60 year. The mean height was 155.9 (SD=6.5) cm which ranged between 137 and 179 and the mean weight of participants was 72.7 (SD=11) kg (ranging between 45 and 128 kg). In addition, the mean age of menopause was 46.9 (SD=5.8) years; 120 (44%) women had a natural menopause, 143 (52.3%) were in peri-menopausal stage and 10 (3.7%) reported history of hysterectomy. None of the participants had history of HRT and smoking.

Demographic characteristics of participants and some of their health indicating variables are presented in Table 1. Four (1.5%) participants were underweight, 23 (8.9%) had normal weight, 113 (43.6%) were overweight and 119 (45.9%) women were obese, based on their BMI. Most of them were married (235 (86.1%)), had low literacy (185 (67.85%)) and were housewife (262 (96%)). Frequency and percent of regular habitual and total PA are presented in Table 1.

Table 1: Demographic and physical activity information

Variables	Frequency	Percent
Age (yr)		
40-44	49	17.9
45-50	101	37.0
51-55	77	28.2
56-60	46	16.9
Body Mass Index (kg/m²)		
Underweight	4	1.6
Normal weight	23	8.9
Overweight	113	43.6
Obese	119	45.9
Employment		
Housewife	262	96.0
Employed	11	4.0
Literacy		
Illiteracy	54	19.8
Primary school	131	48.0
Secondary & High school	88	32.2
Marriage status		
Married	235	86.1
Divorced	38	13.9
Total physical activity^a		
Low (<600)	50	18.3
Moderate (600-3000)	169	61.9
Severe (>3000)	54	19.8
Total physical activity (hours/week)		
Inactive	12	4.4
<2.5	29	10.6
≥2.5	232	85.0
Regular physical activity (hours/week)		
Inactive	140	51.4
<2.5	73	26.7
≥2.5 (aerobic + swimming)	12	4.4
≥2.5 (walking)	48	17.5
Habitual physical activity (hours/week)		
Inactive	18	6.5
<2.5	31	11.4
≥2.5	224	82.1

^a METs (Metabolic equivalents)-min/week

Table 2 shows the results of univariate analyses for the relationship between PA and individual menopausal symptoms. There were positive significant relationships

between the lower intensity and shorter duration of physical-mental exhaustion and increased PA.

Table 2: Univariate linear regression analysis for relationship between physical activity and menopausal symptoms

Variables	Coefficient	95% CI		P value
Physical - mental exhaustion				
None	3.434	0.781	6.088	0.017
Mild	-0.900	-3.857	2.057	0.549
Moderate	2.676	-0.129	5.481	0.061
Severe	1.321	-1.373	4.015	0.335
Very severe	1.00	-	-	-
Duration of physical and mental exhaustion (yr)				
None	3.249	0.099	6.399	0.043
<1	0.646	-2.446	3.739	0.681
1-5	1.163	-1.793	4.119	0.439
≥6	1.00	-	-	-
Sexual problems				
None	-2.622	-4.776	-0.468	0.017
Mild	-4.156	-8.272	-0.040	0.048
Moderate	-2.348	-5.471	0.775	0.140
Severe	-3.721	-6.369	-1.073	0.006
Very severe	1.00	-	-	-
Dryness of vagina				
None	-3.011	-5.724	-0.298	0.030
Mild	0.694	-3.837	5.224	0.763
Moderate	-1.030	-5.172	3.111	0.625
Severe	-3.231	-7.012	0.550	0.094
Very severe	1.00	-	-	-
Duration of dryness of vagina (yr)				
None	-0.361	-4.041	3.320	0.847
<1	3.847	-0.606	8.299	0.090
1-5	1.088	-3.013	5.189	0.602
≥6	1.00	-	-	-
Joint -muscular discomfort				
None	-1.672	-4.021	0.677	0.162
Mild	0.750	-2.626	4.127	0.662
Moderate	-3.515	-6.432	-0.598	0.018
Severe	-1.463	-4.055	1.128	0.267
Very severe	1.00	-	-	-
Duration of Joint -muscular discomfort				
None	2.886	-0339	6.111	0.079
<1	4.565	1.245	7.885	0.007
1-5	3.839	0.677	7.001	0.018
≥6	1.00	-	-	-

Women who had no signs of physical-mental exhaustion ($P<0.017$) and those with moderate signs ($P=0.061$), had performed 3.434 and 2.676 hours more physical activity compared to those who had very severe physical and mental exhaustion, respectively. Moreover, women who did not have any signs of physical-mental exhaustion, compared to those who had more than 6 years of physical-mental exhaustion, had been performing 3.249 hours more physical activity ($P=0.043$).

In addition, there was negative and significant relation between sexual problems and joint-muscular discomfort symptoms and the level of physical activity. Concerning sexual problems (change in sexual desire, in sexual activity and satisfaction), women who had no signs of sexual problems ($P<0.017$), had mild signs of sexual problems ($P<0.048$) and those who had severe history of sexual problems ($P<0.006$), reported 2.622, 4.156 and 3.721 hours less physical activity in comparison with women who had very severe sexual problems, respective-

ly. In addition, women with no sign of vaginal dryness reported 3.011 hours less physical activity ($P=0.030$) in comparison with women who had very severe dryness of vagina and also participants who had less than a year of vaginal dryness, had a history of 3.847 hours more physical activity compared to women who reported more than 6 years history of vaginal dryness ($P=0.090$).

Joint-muscular discomfort was another symptom assessed and women who had moderate signs of joint-muscular discomfort when compared to those who had very severe Joint- muscular discomfort, reported 3.515 hours less physical activity ($P=0.018$). Additionally, women with less than one year history of joint and muscular discomfort reported 4.565 hours more physical activity ($P=0.007$) in comparison with those who reported a history of joint-muscular discomfort since 6 years ago (Table 2).

Results revealed a positive relation between HRQOL and physical activity. As shown in Table 3, psychological

domain of HRQOL increased 1 unit as daily physical activity increased 0.524 hour ($P<0.001$). This was the case for the level of social domain as well ($P<0.001$). In addition, each 0.333 hour increase in physical activity level was associated with 1 unit increase in environment domain ($P<0.014$). Women with history of diabetes and heart disease reported 2.670 and 3.548 hours more physical activity respectively compared to those who did not have these diseases ($P=0.047$). No significant relation was found between physical activity and history of hypercholesterolemia and blood pressure (Table 3).

Table 4 shows the multivariate analysis (adjusted) between physical activity and related factors (qualitative variables re-entered into model as indicators). Participants who had moderate signs of physical-mental exhaustion, compared to women who had very severe physical-mental exhaustion did 4.158 hours more physical activity ($P=0.006$) and also those who had severe signs of physical-mental exhaustion, when compared to women who had very severe physical-mental exhaustion, showed to have performed 2.818 hours more physical activity ($P=0.052$). Moreover, women with history of heart disease reported 3.728 hours more physical activity ($P=0.065$) in comparison with participants who did not have the disorder. Finally, an association was found between 0.436 hour increase in physical activity and an increase of 1 unit in psychological domain ($P=0.006$).

Table 3: Univariate linear regression analysis for relationship between physical activity with quality of life (QOL) and chronic disease

Variables	Coefficient	95% CI	P value
Psychological domain	0.524	0.296 0.753	0.001
Social domain	0.571	0.234 0.909	0.001
Environment domain	0.333	0.068 0.597	0.014
Somatic domain	0.314	-0.162 0.791	0.195
History of chronic disease			
Diabetes			
Present	1.00	- -	-
Absent	-2.670	-5.307 -0.033	0.047
Heart disease			
Present	1.00	- -	-
Absent	-3.548	-6.930 -0.166	0.040

Discussion

The main aim of this study was to investigate the relation between PA and the intensity and duration of menopausal symptoms, and influence of PA on four domains of HRQOL as well as chronic diseases. When the total menopause symptoms score was examined by domain, having history of physical activity was not associated with specific symptoms of menopause (vasomotor and sexual) and general symptoms of menopause (psychologically and physically); these findings were in agreement with those of Mirzaiinjmaadi et al.²² and McAndrew et al.⁸ on vasomotor and sexual symptoms of menopause, and those of Sternfeld et al.²³ regarding general symp-

toms attributed to menopause. However, when some menopausal symptoms including dryness of vagina, sexual problems, physical-mental exhaustion and Joint-muscular discomfort were assessed, a significant relationship was found between these symptoms and PA. Numerous studies have discussed relationship between PA and somatic, psychological, vasomotor or urogenital symptoms as the main domains of MRS^{8,24,25} but a few studies reported relationship between PA and a variety of menopausal symptoms including irritability, headaches, feeling tired or lacking energy^{22,26}.

Our findings indicated that women who had more PA reported lower intensity and duration of physical-mental exhaustion which was similar to those of Mirzaiinjmaadi et al.²². Participants, who had history of more PA, reported more sexual problems and vaginal dryness as well as joint-muscular discomfort symptoms which were not found in other consistent studies^{8,24,25}. These three symptoms are usually experienced and categorized as somatic complaints. It would be assumed that women who have very severe complaints engage more in PA programs to control or alleviate their problems. These types of behaviors would be adaptable with avoidance approach rather than health promotion approach illustrated in the Pender's health promotion model. Pender declared that sources of health behavior motivation are ranged from predominantly health promotion or approach-oriented motives to avoidance-oriented or protective motives²⁷. Inversely, participants who reported vaginal dryness and joint-muscular discomfort symptoms during last 6 years had less PA than women without these symptoms. It indicates that long duration of the problem causes more compatibility with estrogen hormone decreases and subsequent relapse and return in pre contemplation stage.

In addition, a negative relation between performing PA and sexual problems would probably be attributable to cultural context of the study. Apparently, Women who have severe sexual problems, try to engage more in PA programs as an alternative behavior. Blazquez (2008) reported that satisfaction, avoidance, sensuality from sexual activity have inverse relation with the intensity of fatigue among women²⁸. Severe physical activity can actually decrease testosterone levels which can lead to decreased sexual desire²⁹⁻³¹. More studies are warranted to show the influence of PA on sexual activity among women.

Performing more PA among women who had history of cardiovascular disease and diabetes mellitus may indicate that many of the participants were motivated or guided to engage in PA for preventing the consequences of their diseases, which is consistent with avoidance approach. Numerous studies confirmed that there are evidences that show effectiveness of regular physical activity in controlling and improvement of cardiovascular disease, diabetes, cancer, hypertension, obesity, depression, and osteoporosis^{32,33}.

Table 4: Multivariate linear regression analysis including all variables in the model for relationship between physical activity and menopausal symptoms

Variables	Coefficient	95% CI		P value
Physical - mental exhaustion				
None	3.490	-0.942	7.923	0.122
Mild	-0.153	-3.503	3.197	0.928
Moderate	4.158	1.194	7.122	0.006
Severe	2.818	-0.022	5.658	0.052
Very severe	1.00	-	-	-
Duration of physical and mental exhaustion (yr)				
None	No data	-	-	-
<1	-0.499	-4.718	3.721	0.816
1-5	-0.524	-4.652	3.604	0.803
≥6	1.00	-	-	-
Sexual problems				
None	9.450	-4.593	23.493	0.186
Mild	-2.211	-6.797	2.375	0.343
Moderate	-1.480	-5.012	2.052	0.410
Severe	-1.663	-4.780	1.454	0.294
Very severe	1.00	-	-	-
Dryness of vagina				
None	-0.689	-6.222	4.843	0.806
Mild	2.762	-2.185	7.709	0.272
Moderate	1.791	-2.985	6.566	0.461
Severe	-1.371	-5.580	2.838	0.521
Very severe	1.00	-	-	-
Duration of dryness of vagina (yr)				
None	No data	-	-	-
<1	2.364	-3.583	8.311	0.434
1-5	-1.374	-7.026	4.279	0.632
≥6	1.00	-	-	-
Joint -muscular discomfort				
None	-0.209	-4.634	4.215	0.926
Mild	-1.052	-4.742	2.638	0.575
Moderate	-2.849	-6.041	0.344	0.080
Severe	-2.090	-5.135	0.955	0.177
Very severe	1.00	-	-	-
Duration of Joint -muscular discomfort				
None	No data	-	-	-
<1	3.142	-1.412	7.697	0.175
1-5	2.717	-1.473	6.906	0.202
≥6	1.00	-	-	-
History of chronic disease				
Diabetes				
Absent	-0.316	-3.023	2.391	0.818
Present	1.00	-	-	-
Heart disease				
Absent	-3.728	-7.560	0.104	0.056
Present	1.00	-	-	-
Psychological domain	0.436	0.128	0.744	0.006
Social domain	0.222	-0.184	0.628	0.283
Environment domain	-0.089	-0.389	0.211	0.561
Somatic domain	-0.377	0.248	-1.019	0.264

Some studies have reported an influence of PA on psychological domain of quality of life²⁵. More studies are required on social and environmental domains of quality of life. Our study indicated that women with more PA had better psychological, social and environmental domains of quality of life which is in agreement with the findings of the previous studies²³.

Although in the western countries doing sports is known as a part of women's life, in the Middle East most of the physical activities of women are those related to their daily habitual physical activities such as recreational, housework, and child care. We need to redefine physical activity based on intended PA. In addition, in the

Muslim communities with their own cultural and religiosity context, women face numerous barriers and limitations to engage in PA in public places such as parks and gym salons. As mentioned previously, motivation of people to engage in PA is related to avoidance approach rather than health promotion approach. It is recommended that health professionals apply strategies to motivate women to adopt health promotion approach to improve their menopausal symptoms and HRQOL.

There were several limitations in the present study. As in any epidemiological study, method of data collection was based on self-reported questionnaires, which may be subject to recall and other biases, and were obtained from

a relatively small and homogeneous sample of menopausal women. The cross-sectional nature of the present study precludes an evaluation of the relationship between cause and effect; therefore, randomized controlled trials are necessary to provide stronger evidences in this regard.

Conclusion

Emphasizing on Regular PA would be effective to decrease menopausal symptoms as well as improving healthy aging. Although most women perform PA for reducing consequences of chronic illness or preventing diseases, it would be important to encourage healthy life style promotion approach among women as well as in communities. Physical activity promotion as a part of healthy life style programs needs to be improved in our community where most of women are physically inactive. Women need to be properly informed of the role PA plays in improving quality of life as well as making them feel healthy during aging and pre and postmenopausal stages. As women need to better understand the effect of PA on their health status and delaying aging, health care system professionals must provide persuasive programs at community level to increase regular PA among women specifically in the pre-menopause ages. In addition each community needs to develop PA promotion programs based on its own socio-cultural status which facilitates women's engaging in PA which will in turn ensure a healthy status of women during elderly life.

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Conflict of interest statement

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

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