Research Article

Relationship Between Physical Activity and Cyclic Mastalgia in Iranian Women

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Abstract

Background: Mastalgia is the most common breast problem.

Objectives: This study aimed to assess the relationship between physical activity and cyclic mastalgia in women.

Methods: This study was a cross-sectional study that was conducted on 322 healthy women 45 - 18 years old referred to health centers of Tabriz, Iran through purposeful sampling. Questionnaires including socio-demographic characteristics, nominal day breast pain (NDBP) and International Physical Activity questionnaire (IPAQ) were applied to collect the data. Analysis of covariance test was used to determine the impact of the independent variables (physical activity and socio-demographic characteristics) on the dependent variable (severity and duration of breast pain).

Results: According to the Pearson correlation test, a statistically significant association was observed between mastalgia severity and length of physical activity (P < 0.001). Based on analysis of covariance test, physical activity was a predictor of severity and duration of mastalgia.

Conclusions: According to the results of this study, physical activity is an effective factor on cyclic mastalgia. Therefore, a regular exercise program should be included in the treatment protocol of women with cyclic mastalgia.

Keywords: Mastalgia, Physical Activity, Women

1. Background

Mastalgia is one of the most common problems in women who refer to breast clinics to consult with a midwife or a doctor to receive primary health cares for breast pain (1). Approximately, 60% - 70% of women experience some degrees of breast pain during their lives. Mastalgia is often mild; it needs no specific treatment, and educating and reassuring the patient are helpful (2).

Mastalgia is classified into non-cyclic form without association with menstrual cycle and cyclic form associated with menstrual cycle, which occurs at the proliferative phase of the menstrual period and the pain is removed or reduced when menstruation begins (3). Cyclic pain is usually common in the third and forth decades of life (4). Cyclic mastalgia involves breast congestion, breast pain, breast heaviness, and tenderness (3). Cyclic breast pain in 10% - 20% of cases is intense, disrupts social, work and school activities, and requires drug therapy and frequent examinations (5). However, the concern of most patients about this symptom is important, in which it causes anxiety, reduces their quality of life, affects economic indices,

decreases productivity of individuals, and leads to their lack of presence in workplace (6).

Causes of breast pain have not been discovered completely; however, hormonal and non-hormonal causes, increased estrogen levels, decreased progesterone, and estrogen-progesterone ratio imbalances are discussed in this regard (3, 4). Some researchers believe that physical activities can affect mastalgia intensity (7). Impaired lipid metabolism also causes mastalgia (8). Mastalgia may be seen in obese individuals due to impaired lipid metabolism. Increased estrogen levels raises aldosterone levels, leads to water and salt retention in body and causes pain (9). Through reducing serum estradiol, exercise can reduce breast cyclic pain (10).

Studies show that the relationship between physical activity and menstrual period is ambiguous (11). Regarding the lack of studies on the etiology of breast cyclic mastalgia, there is no similar study in this area based on research done by the researcher and regarding the prevalence of breast pain and its effects on life, and considering that lifestyle modification is one of the principles of treatment in this area (11).

2. Objectives

Therefore, considering the importance of this issue, the present study was designed to investigate the correlation between physical activity and breast pain.

3. Methods

3.1. Study Design and Participants

The present study is a descriptive-analytical cross-sectional study that was conducted in 2015 on 322 women with breast pain referred to health centers of Tabriz Iran.

Based on the results of the Burnett et al. (12) study regarding correlation between breast pain with physical activity (r = 0.144) and taking into account a power of 80% and α = 0.05, the sample size was determined to be 297 by G-Power software and considering the probable attrition, the final sample size was determined equal with 322 participants.

The eligibility criteria included: aged 18 - 45 years, complaint of breast cyclic pain, not pregnant and breastfeeding, not currently using contraceptive hormones, having regular menstrual cycles (22 to 35-day cycles) over the past 6 months, having a contact number for follow up, willingness to participate in the study, having ability to read and write, the absence of wound or lesions in breast and abnormal breast examinations, absence of cancer history, not using anti-depressant drugs and absence of chronic diseases (hypertension, diabetes, etc.).

3.2. Sampling

Sampling was started after approving of study protocol by ethics committee of Tabriz University of Medical Sciences (ethical code: 468). Sampling was conducted in 6 health centers by observing different cultural, social, and economic levels. The sampling method was purposeful. For sampling, the researcher referred to the selected health centers of Tabriz and extracted a list of women 18 to 45 years old. The women were contacted by telephone calls and the eligible women were asked to participate in the study after explaining the aims and methods of study. Then a face to face meeting was held in the center and the participants were ensured about the confidentiality of their data. Afterwards, all the participants were examined to detect any mass or any abnormal problem in breasts. In case the examinations were normal and they were willing to participate in the study, a signed informed written consent was obtained from them and the study questionnaires including socio-demographic characteristics questionnaire and the International Physical Activity questionnaire (IPAQ) were completed through interview with participants as well as Cardiff nominal daily pain chart (NDPP)

along with statements for filling them out. They were asked to fill out the chart during their next menstrual cycle and return them to the researcher for analysis.

3.3. Data Collection

Data collection tools included the socio-demographic characteristics questionnaire, NDPP and IPAQ.

3.4. Sociodemographic Characteristics

The researcher-designed socio-demographic questionnaire included items on age, menarche age gravida number, body mass index (kg/m^2), sufficiency of income for expenses, marriage status, education, job, and contraceptive method.

3.5. Cardiff Chart

The Cardiff chart is a standard table of 31 columns for each day of the month. The participants filled out according to given explanations the cells with regard to intensity of pain. Pain severity score was calculated using NDBP (nominal day breast pain) score. This score is calculated as [(number of days of mild or moderate pain $\times$ 1) + (number of days of severe pain $\times$ 2)] $\times$ 28 $\div$ total number of days in cycle that pain is recorded. According to the calculation results, a score below 7 represents a mild pain while a score between 7 and 14 indicates moderate pain and a score above 14 represents severe pain (13). Correlation coefficient of Cardiff chart was reported above 0.8 in previous studies. In addition, it is a reliable tool (14).

3.6. IPAQ (International Physical Activity Questionnaire)

The IPAQ measures the amount of physical activity over the past 7 days, which was considered in three periods of less than 10 minutes, 20 minutes, and more than 20 minutes. The scoring method is that the activities such as volleyball, badminton, room cleaning, and walking, which need 3 - 6 calories per minute, are called moderate physical activities and the activities such as aerobics, mountain climbing, high-speed cycling, and basketball, which need more than 6 calories per minute, are called intense physical activities. Meanwhile, any activity performed less than 10 minutes will be deleted. The energy intensity of all the activities within the past 7 days will be calculated as per IPAQ instruction. The hours of the physical activity per week are calculated based on the total physical activity of an individual per MET-minutes/week unit in the previous week. MET (Metabolic Equivalence test) is a unit to estimate the energy consumption of physical activity. Value 1 MET is approximately equal to the rate of energy consumption when an individual is resting. In this questionnaire

walking is considered 3.3 METs, the average physical activity 4 METs and the severe physical activity 8 METs. To calculate the overall rate of physical activity in a week, walking with moderate physical activity and intense physical activity in the previous week should be added. For instance, the overall physical activity of an individual who walked for 30 minutes, 30 minutes of mild physical activity, and 30 minutes of intense physical activity for 5 days in a previous week is calculated as follows:

$(5 \times 30 \times 3.3) + (5 \times 30 \times 4) + (5 \times 30 \times 8) = 2295$ (MET)-minute/week

Those with the physical activity lower than 600 kcal per hour, between 3000 - 6000 kcal, and over 3000 kcal per hour are categorized as low physical activity, moderate physical activity, and intense physical activity, respectively (15). The IPAQ is a reliable tool for measuring the rate of physical activity in adults, and this questionnaire has been standardized in Iran and its validity has been confirmed (16).

3.7. Statistical Analysis

The data were analyzed in SPSS ver. 21. The skewness and kurtosis tests were used to examine the normality of quantitative variables. The mean score of physical activity had an abnormal distribution. Thus, conversion was made using log of 10 and the normality was measured again, and it was normal. Descriptive statistics including mean, SD, frequency, and percentage were used for describing socio-demographic characteristics, physical activity status and mastalgia features. Pearson's test was used for determining the relationship between physical activity and mastalgia severity and duration. Independent t and one-way ANOVA tests were used to determine the association between physical activity severity and socio-demographic characteristics with mastalgia severity score and duration. To adjust confounding variables and to estimate the effect of independent variables (physical activity and socio-demographic characteristics) on the dependent variable (mastalgia severity and duration), the variables with $P < 0.2$ based on bivariate tests were entered in the univariate general linear model (GLM).

4. Results

In this study, 485 females who referred to the health center underwent breast examination and they were trained on how to examine breasts (breast self-examination). After examining the eligibility criteria, 322 of the eligible individuals were included in the study.

The mean age of participants was 32.8 (SD = 6.8) years. The mean age of participants at menarche was 12.7 (SD = 1.5)

years. The mean BMI of the women was 26.5 (SD = 3.3) kg/m² (Table 1).

Table 1. Socio-Demographic Characteristics of the Participants[a]

Characteristics of Socio-Demographic	Values
Age, y	32.8 ± 6.8
Menarche age, y	12.7 ± 1.5
Gravida number	2.0 ± 1.2
Body mass index, kg/m²	26.5 ± 3.3
18.5 - 24.9	105 (32.6)
25 - 29.9	166 (51.6)
≥ 30	51 (15.8)
Sufficiency of income for expenses	
Completely sufficient	21 (6.5)
Somewhat sufficient	230 (71.4)
Insufficient	71 (22.0)
Education	
Primary school	47 (14.6)
Secondary school	119 (37.0)
High school	64 (19.9)
Diploma	72 (22.4)
University	20 (6.2)
Married status	
Single	7 (2.2)
Married	309 (96.0)
Widowed	6 (1.9)
Job	
Housewife	275 (84.5)
Employed	47 (14.6)
Contraceptive method	
No	14 (4.3)
Condom	101 (31.4)
Withdrawal	120 (37.3)
Vasectomy or tubectomy	27 (8.4)
IUD	60 (18.6)

[a]Values are expressed as No. (%) or mean ± SD.

In the present study, the mean physical activity score was 1783.9 (SD = 1718.61). Also, the mean mastalgia severity score was 5.4 (SD = 3.4) with a range of 0.9-16.8 and the mean duration of mastalgia was 3.8 (SD = 0.2) days with a range of 1 - 10 days (Table 2).

The results obtained from the bivariate tests (Pearson's, one-way ANOVA and independent *t*-test) showed a relationship between mastalgia severity score and physical

Table 2. Status of Severity and Duration of Mastalgia and Physical Activity in the Participants (N = 322)

Variable	Mean ± SD	Median (25 - 75)	Score Range
Mastalgia duration, d	3.8 ± 2.0	3.0 (2.0 - 5.0)	1 - 10
Mastalgia severity	5.4 ± 3.4	4.3 (3.1 - 7.3)	0.9 - 16.8
Physical activity	1783.9 ± 1718.61	1440.0 (720.0 - 2160.0)	120 - 16632

activity (P < 0.001), BMI (P < 0.001), and sufficiency of income for expenses (P = 0.029). Also, there was a relationship between the duration of mastalgia and physical activity (P < 0.001) and BMI (P < 0.001) (Table 3). The variables of physical activity, BMI, sufficiency of income for expenses, education and age that had relationship with mastalgia severity and duration with P < 0.2 were entered into the GLM. The results of GLM showed that the variables of physical activity, BMI and sufficiency of income for expenses had a relationship with mastalgia severity and duration and explained 35.4% and 26.2% of mastalgia severity and duration, respectively (Table 4).

5. Discussion

This study showed an inverse relationship between the severity and duration of mastalgia and physical activity. The severity and duration of mastalgia reduced with the increase of physical activity and physical activity was a predictor of severity and duration of mastalgia based on GLM.

It has been discussed that exercise may reduce cyclic breast pain by reducing serum estradiol. Lack of physical activity increases serum estradiol. Increased estrogen level is one of the hormonal causes discussed in breast pain exacerbation (10). Therefore, the individuals with further physical activity will have the lower breast pain and the results of the present study confirmed this hypothesis.

Although no study has been conducted on the effect of physical activity on mastalgia, some studies have investigated the effect of exercise on premenstrual syndrome and the results of these studies were different in terms of the effect of physical activity on PMS symptoms (17, 18). In the study of Karimiyan et al. (19) aiming at the effect of exercise on PMS, 35 females with PMS were participated in a regular exercise program for 2 months (30 minutes walking and 3 times exercise in a day). After 2 months, the score of all PMS symptoms including breast pain reduced considerably as compared with the period before intervention. In a study by Fotokian and Ghaffari (20), the effect of a regular exercise program on PMS was assessed. In this study, 80 females were assigned randomly to two groups of in-

tervention and control. The participants in the intervention group exercised three days a week for half an hour for eight weeks. At the end of the intervention, the mean score of PMS in the intervention group was considerably lower than the control group. In this study, exercise could reduce PMS symptoms in the intervention group. As cyclic breast pain is one of the symptoms that occur before menstrual bleeding (21), regular exercise and activity may be one of the ways to relieve and improve mastalgia symptoms. The present study proved that those who had further exercise and physical activity had less severity and duration of mastalgia than those with little physical activity.

5.1. Limitations

One of limitations of this study is due to its cross-sectional nature in which the relationships between physical activity and mastalgia severity and duration do not necessarily indicate a causal relationship. Therefore, it is suggested to conduct some studies with more robust design, such as a clinical trial, to confirm this relationship.

5.2. Conclusions

The conclusion of this study shows that physical activity is an effective factor in the severity and duration of mastalgia. With respect to the lack of women's interest in taking medications, physical activity should be included in the treatment protocol of cyclic mastalgia. It is possible to improve physical and mental health of individuals through taking measures such as training and encouraging women to exercise and increasing physical activity to reduce and relieve the stress caused by mastalgia. Therefore, it is recommended that further studies be conducted in this regard to confirm the findings of the present study.

Footnotes

Authors' Contribution: Mojgan Mirghafourvand, Parivash Ahmadpour, and Pari Rahi designed the study. Mojgan Mirghafourvand, Parivash Ahmadpour, and Pari Rahi conducted literature research. Parivash Ahmadpour was responsible for data acquisition. Mojgan Mirghafourvand and Parivash Ahmadpour were involved in data analysis.

Table 3. Relationship Between Socio-Demographic Characteristics and Physical Activity with Mastalgia Severity and Duration[a]

Variable	Mastalgia Severity		Mastalgia Duration	
	Values	P	Values	P
Age, y[b]	0.075	0.182[c]	0.107	0.056[c]
Menarche age, y[b]	-0.038	0.502[c]	0.006	0.915[c]
Gravida number[b]	-0.43	0.443[c]	-0.025	0.660[c]
Body mass index, kg/m²		< 0.001[d]		< 0.001[d]
18.5 - 24.9	4.6 ± 3.1		3.2 ± 1.6	
25 - 29.9	5.5 ± 3.3		3.9 ± 2.0	
≥ 30	6.5 ± 3.1		4.6 ± 2.3	
Sufficiency of income for expenses		0.029[d]		0.074[d]
Completely sufficient	3.7 ± 2.4		2.8 ± 1.4	
Somewhat sufficient	5.6 ± 3.5		3.8 ± 1.9	
Insufficient	5.1 ± 3.3		3.8 ± 2.3	
Education		0.068[d]		0.177[d]
Primary school	6.1 ± 4.1		3.9 ± 2.0	
Secondary school	5.7 ± 3.4		4.0 ± 2.2	
High school	4.9 ± 3.0		3.5 ± 1.8	
Diploma	4.7 ± 3.1		3.4 ± 1.8	
University	6.1 ± 2.9		4.2 ± 1.7	
Married status		0.745[d]		0.941[d]
Single	6.1 ± 4.8		3.8 ± 2.5	
Married	5.4 ± 3.4		3.8 ± 2.0	
Widowed	4.6 ± 3.5		3.5 ± 2.5	
Job		0.281[e]		0.263[e]
Housewife	5.3 ± 3.4		3.7 ± 2.0	
Employed	6.1 ± 4.1		4.2 ± 2.3	
Contraceptive method		0.323[d]		0.414[d]
No	5.3 ± 4.8		3.5 ± 2.6	
Condom	5.5 ± 3.5		3.9 ± 2.0	
Withdrawal	4.9 ± 3.0		3.5 ± 1.9	
Vasectomy or tubectomy	6.0 ± 3.1		4.1 ± 1.9	
IUD	6.0 ± 3.7		4.0 ± 2.0	
Physical activity		< 0.001[d]		< 0.001[d]
Mild	8.7 ± 4.1		5.0 ± 2.1	
Moderate	5.1 ± 2.6		3.8 ± 1.8	
Severe	2.5 ± 1.4		2.0 ± 1.2	

[a] Values are expressed as mean ± SD.
[b] The results were reported as correlation coefficient (r) and P.
[c] Pearson correlation test.
[d] One-way ANOVA.
[e] Independent *t*-test.

Mojgan Mirghafourvand, Parivash Ahmadpour, and Pari Rahi were involved in writing the manuscript. All authors were responsible for the manuscript drafting and have read and approved the final version.

Table 4. Predictors of Severity and Duration of Mastalgia Based on General Linear Model (N = 322)[a]

Variable	Mastalgia Severity Score		Mastalgia Duration	
	B (CI 95%)[b]	P	B (CI 95%)[b]	P
Physical activity (reference: severe)				
Mild	3.0 (2.03 - 3.6)	< 0.001	6.2 (5.1 to 7.2)	< 0.001
Moderate	1.8 (1.2 - 2.3)	< 0.001	2.5 (1.6 - 3.3)	< 0.001
Age, y	0.0 (-0.01 - 0.05)	0.163	0.0 (-0.0 - 0.1)	0.066
Body mass index, kg/m² (reference: ≤ 30)				
18.5 - 24.9	-1.1 (-1.7 - 0.5)	< 0.001	-1.2 (-2.1 - 0.3)	0.012
25 - 29.9	0.2 (-0.8 - 0.4)	0.458	-0.0 (-0.9 - 0.9)	0.998
Education (reference: university)				
Primary school	-0.8 (-1.7 - 0.2)	0.106	-0.9 (-2.4 - 0.5)	0.201
Secondary school	0.3 (-1.1 - 0.5)	0.466	-0.5 (-1.9 - 0.8)	0.414
High school	-0.6 (-1.5 - 0.3)	0.167	-0.9 (-2.3 - 0.5)	0.193
Diploma	-0.8 (-1.6 - 0.1)	0.076	-1.5 (-2.8 - -0.1)	0.041
Sufficiency of income for expenses (reference: insufficient)				
Completely sufficient	-1.5 (1.5 - 4.2)	< 0.001	-2.2 (-3.6 - -0.9)	0.001
Somewhat sufficient	-0.4 (-2.4 - -0.7)	0.067	-0.2 (-0.9 - 0.6)	0.621

[a] Adjusted R^2 for mastalgia severity score: 0.354; Adjusted R^2 for mastalgia duration: 0.262.
[b] Confidence Interval.

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