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Association Between Premenstrual Tension Syndrome and Menstruation Distress with Physical Activity

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Abstract:

This study explores the association between physical and recreational activities, length of menstrual flow and interpersonal bonds with premenstrual tension symptoms and correlation of stress with physical activity levels among women. Analytical study was conducted on 71 Premenstrual Tension Syndrome (PMTS) women with a history of dysmenorrhea and stress presented at least 1-2 weeks premenstrual; reported at least for two consecutive menstrual cycles excluding women with tumors, gynecological and endocrinological disorders. The study was conducted from (May to October 2022) at Basic Health Unit (Vario, Sialkot). A Modified Moos Menstrual Distress questionnaire (MDQ) and a self-designed questionnaire were used to collect the data. Results were analyzed using SPSS software 22 version. Mean age was 24.01±4.062 years (N=53, 74.6%) of participants were unmarried whereas (N=18, 25.44%) were married. Length of menstrual flow days was reported as 3 to 5 days (N= 33, 46.5%). Participants (N=41, 57.7%) had severe PMTS with (N=47, 66.2%) preferring to isolate themselves as interference of the symptoms, (N= 43, 60.6%) had stress eating. Chi-square test was observed for the PMTS symptom of pain with recreational and levels of physical activity (p=0.003≤0.05); (p=0.00), Impaired concentration (p=0.001≤0.05); (p=0.012) and negative effects (p=0.034≤0.05); (p=0.02) whereas no significant association was found for behavior, autonomic reactions and water retention symptoms. Length of menstrual flow (p=0.009) and working activities (p=0.025) were correlated (p-value ≤0.05) with physical activity. However, Spear's man correlation between physical activity level and PMTS-induced stress had a weak correlation (p=0.036). Recreational and active levels of physical activity effectively reduce the severity of premenstrual tension symptoms.

***Keywords**: Stress, Recreational, Dysmenorrhea, Premenstrual tension syndrome*

Introduction

Premenstrual tension syndrome (PMTS) also classifies as tension in the nervous system which clustered with Premenstrual Syndrome (PMS) adversely affects 90% of women with the prevalent complaint of at least one symptom associated with PMS; psychological, behavioural, physical, emotional, and cognitive effects, and changes in the autonomic reaction (Metwally & Abdelrahman, 2021). In lower socioeconomic classes 33% of women did not seek any medical treatment and severe symptoms (16.13%) associated with PMS had a significant but reversal effect on the work-related quality of life (Mahmood et al., 2022) and social communications (Fatemi et al., 2019); globally impacting the post-pubescent age of women (47.8%) (Nascimento et al., 2020).

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Hormonal fluctuations during the menstrual cycle reach a peak in the luteal phase. The surge of estrogen-serotonin drive, the drop in progesterone levels, and the decline in acetylcholine and dopamine lead to uncertain aetiology of PMS and menstrual distress symptoms which eventually get lower in the follicular phase (Bu et al., 2019). Women in their premenstrual tension periodic phase were stress sensitive and more emotionally reactive to psychological distresses (Liu et al., 2017). Stress exacerbates the symptoms of PMS tension; fatigue and irritability as the most frequent due to alteration in the neuropeptide function and high cortisol levels (Jafarnejad et al., 2013).

Lifestyle factors including unhealthy dietary habits, lack of physical activity, stress and disturbed sleep patterns served as modifiable risk factors treated with combating therapies (nutritional management, cognitive behavioural therapy, practising physically active lifestyle with different forms of cardiopulmonary fitness regimes) to lower mild menstrual distress as the mild symptoms of PMS did not affect the daily activities of the women; had a less significant impact and subsides at their own with the regular menstrual flow whereas pharmacological treatments were preferred more to manage the moderate to severe signs and symptoms of PMS tension as this phase may interrupt the daily activities of the women with pronounced effects which creates the need of medical attention periodically (Saglam & Orsal, 2020).

Literature supports that physical activity works as a stress-preventive strategy as it maintains aerobic fitness decreasing the severity of PMS distress (Sabaei et al., 2015) biologically managing the negative psychological reactions, feeling of hatred, loneliness and shame stigmatization which was very common in adolescent age group (Ventegodt et al., 2004). The release of endorphins and decreased adrenal cortisol levels omit positive feedback related to mood perceptions in the brain (Kollipaka et al., 2013) however dissension in literature research findings exists as such effects were lacking in research for recreational (any strenuous physical activity; exercise, jogging or walking being on daily basis) and specific intensity levels of physical activity (Kroll, 2010) in women with PMS tension and menstruation distress subjected to stress and anxiety levels (Granda et al., 2021). The current study focused to correlate PMS tension and menstruation level of distress which are also marked as research frontiers (Gao et al., 2021) with recreational and various levels of physical activity in the reproductive health of women.

Materials & Methods

An analytical study was conducted at the government Basic Health Unit. The research data was collected from May 2022 to October 2022. The research was ethically approved by the Hospital review committee (BHU dispatch No-44), ensuring all medical and ethical considerations under the Helsinki declaration for medical research by General Assembly of the World Medical Association in 2014. The sample was raised using a convenient sampling technique.

The sample size was calculated using epi-tool (assumed population standard deviation, S.D= 8.54, Confidence level, CI= 0.95, acceptable error =2) N=71 (Vaghela et al., 2019). Inclusion criteria were set on the medical history of the patients who presented with a confirmed

diagnosis of PMTS (stress, dysmenorrhea, mood irritability which at least being complaint for the last two consecutive menstrual cycles; the symptoms appearing 1-2 weeks in the luteal phase of the monthly cycle and disappeared by the 4-5th day of the menstrual flow) (Rapkin, 2003), aged between (18 to 45 years), had a regular cycle of 24 to 35 days and women using non-hormonal preparation for contraception whereas women experiencing their menopause, uterus tumours, women using intra-uterine devices, pregnancy, gynaecological and endocrinological disorders were excluded from the study (Vaghela et al., 2019). The medical record of the patients was reviewed to retrieve research data related to the history and severity of symptoms with permission. Written and informed consent was taken prior from the patient ensuring the confidentiality of the data and they were well informed that they can abort the study at any stage. Questionnaires were self-documented.

The questionnaire comprises two sections; one unfolds the subject characteristics including the demographics, recreational and levels of physical activity (baseline: $\geq$ 150 minutes/week moderate-vigorous physical activity; physically active, slightly active, active but sedentary, extremely sedentary (Cristi-Montero, 2018) whereas the second section was based on a modified form of Moos Menstrual distress questionnaire (MDQ). Modified MDQ (Form-T) was a reliable and valid tool (Ross et al., 2003) which measures the 46 symptoms of menstruation distress, this questionnaire has a therapeutic indication in premenstrual syndrome. We used six sections to denote symptoms of dysmenorrhea (a) pain and PMTS (b) negative effects, (c) impaired concentration, (d) behaviour change, (e) autonomic reaction and (f) water retention. The results were reported as the frequency of the symptoms after that statistical analysis of the data (Table 1).

The data were analyzed using SPSS software 22 version. The normality of the data was assessed using Shapiro- Wilk test. The Chi-square test was used to analyze the associations between the variables taken as menstruation distress ratings of the symptoms with recreational and levels of physical activity. Spear's man correlation was used to find the statistical significance between physical activity levels and stress levels. Results were presented in the form of frequency and significance (p-values) tables and figures.

Results

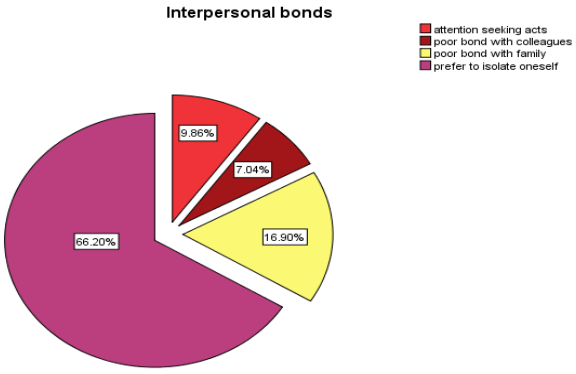
The normality of the data was assessed by Shapiro-Wilk Test, the results ($P=0.000<0.05$) rejected the null hypothesis hence the retrieved data was not normally distributed. The mean ages of the recruited participants were 24.01±4.062 (N=71), Median=23 years. Among them (N=67, 94.4%) of participants were aged 18-30 years, (N=3, 4.2%) aged 31-40 years, (N=1,1.4%) aged 41years and above respectively. A total (N=53, 74.6%) of the participants were unmarried whereas (N=18, 25.44%) were married women; among the married women (N=12, 66.7%) used non-hormonal contraception's whereas responses of (N=6, 33.3%) married women did not use non-hormonal contraception's.

In Figure 1, documenting the length of menstrual flow days, most of the participants reported 3 to 5 days (N=33, 46.5%), 5 to 7 days (N= 25, 35.2%), less than 3 days (N=11, 15.5%) and 7 to 10 days (N=2, 2.8%) respectively. A total of (N=43, 60.6%) had stress eating in their

premenstrual period where as (N=28, 39.4%) maintained their balanced diet. The review of medical reports and documentation of history profiles rating of PMS related tension symptoms were classified as severe (N=12, 66.7%), moderate (N=4, 22.2%) and mild (N=2, 11%) among married women whereas level of PMTS severity among un-married women were severe (N=29, 54.71%), moderate (N=16, 30.18%) and mild (N=8, 15.09%) respectively. Participants reported their stress levels as moderate (N=33, 46.5%), much (N=22, 31%) and less but tolerating (N=16, 22.5%) about their menstruation distress. The effect of PMS tension on working activities among women greatly manifests as decreased energy (N=39, 54.9%), lack of concentration (N=21, 29.6%) and lack of motivation (N= 11, 15.5%).

Figure 1

PMTS affecting interpersonal bonds among women



A total of (N=47, 66.2%) prefer to opt for isolation, (N=12, 16.9%) reported poor bonding with family, (N=7, 9.9%) deal with attention-seeking acts and (N=5, 7.0%) had poor bonding with colleagues affecting their interpersonal bonds. Participants reported (N=49, 69%) were involved in recreational physical activity whereas (N=22, 31%) were physically inactive. A total of (N=44, 61.97%) had sufficient physical activity level, (N=13, 18.31%) were slightly active, (N=9,12.68%) was extremely sedentary and (N=5, 7.04%) had active but sedentary physical activity level respectively.

MDQ 'level of menstruation distress profile' (Table 1) showed lower abdominal pain (N=40, 56.3%) as the most frequent complaint in dysmenorrhea, participants reported difficulty concentrating (N=44, 62.0%), (N=25, 35.2%) avoid social activities, participants reported most had complaint of change in appetite (N=21, 29.6%), (N=38.5, 53.5%) participants reported swelling; water retention as a more frequent complaint. A total of N=26, 36.6% of participants had mood swings and (N= 19, 26.8%) had anger; irritability as negative effects of PMTS respectively.

Table 1

Menstrual distress profile (MDQ)

Menstruation distress Items	Categories	Participants			Frequency (N=71)	Percentage (%)
		18-30 yrs (N=67)	31-40 yrs (N=3)	41 yrs and above (N=1)		
Dysmenorrhea / Pain	Lower abdominal Pain	39, 97.5%	1,2.5%	-	40	56.3%
	Backaches	7,77.7%	2,22.2%	-	9	12.7%
	Headaches	8,88.8%	-	1,11.1%	9	12.7%
	Muscle stiffness	5,100%	-	-	5	7.0%
	General aches and pains	8,100%	-	-	8	11.3%
Impaired concentration	Difficulty concentrating	42,95.45%	2,4.54%	-	44	62.0%
	Insomnia	22,95.6%	1,4.34%	-	23	32.4%
	Accidents	3,75%	-	1,25%	4	5.6%
Behaviour change	Avoid social activities	25,100%	-	-	25	35.2%
	Take naps; stay in bed	26,96.29%	1,3.7%	-	27	38.02%
	Decreased efficiency	16,84.21%	2,10.5%	1,5.26%	19	26.8%
Autonomic reaction	Nausea, vomiting	7,100%	-	-	7	9.9%
	Cold sweats	1,100%	-	-	1	1.4%
	Constipation, diarrhoea	8,100%	-	-	8	11.3%
	Dizziness, faintness	10,100%	-	-	10	14.1%
	Change in appetite	19,90.47%	2,9.52%	-	21	29.6%
	Urinary frequency	7,100%	-	-	7	9.9%
	Fatigue	5,100%	-	-	5	7.0%
	Numbness, tingling	4,80%	1,20%	-	5	7.0%
	Sensitiveness	6,85.71%	-	1,14.28%	7	9.9%%
Water retention	Painful breasts	33,100%	-	-	33	46.5%
	Swelling	34,89.47%	3,7.89%	1,2.63%	38	53.5%
PMTS / Negative affect	Depression	4,100%	-	-	4	5.6%
	Nervous	3,100%	-	-	3	4.2%
	Anxiety	4,80%	-	1,20%	5	7.0%
	Mood swings	24,92.30%	2,7.69%	-	26	36.6%
	Decreased energy	14,100%	-	-	14	19.7%
	Anger or irritability	18,94.73%	1,5.26%	-	19	26.8%

Chi-square testing between recreational physical activity and menstruation distress level of pain (p=0.003≤0.05), Impaired concentration (p=0.001≤0.05), and negative effects (p=0.034≤0.05) showed significant association among women. Furthermore, a significant association has also been shown with physical activity levels; pain (p=0.00), impaired concentration (p=0.012) and negative effects (p=0.02) respectively. Moreover, Menstrual flow was also significantly improved with recreational physical activity (p=0.009≤ 0.05) and working activities (p= 0.025≤ 0.05) respectively. However, there was no association was reported for change in behavior, autonomic reactions and water retention (Table 2).

Table 2

Association between recreational physical activity, physical activity levels and menstrual distress profile (MDQ)

	Items	**Recreational Physical activity (P-values)**	**Physical activity levels (P-values)**
Dysmenorrhea/ PMS	Pain	0.003≤0.05	0.00≤0.05
	Impaired concentration	0.001≤0.05	0.012≤0.05
	Behavior Changes	0.632	0.70
	Autonomic reactions	0.389	0.50
	Water retention	0.690	0.57
Pre-menstrual tension syndrome	Negative effects	0.034≤0.05	0.02≤0.05

Spearman's correlation (Sig.2-tailed) between physical activity levels and PMS-induced stress levels was found as (p=0.036) at 0.05 level which was statistically not significant computing that a weak correlation exists between these two variables (Table 3).

Table 3

Spearman's Correlation between physical activity levels and stress level among PMTS women

			Physical activity levels	**Stress level**
Spearman's Rho	Physical activity levels	Correlation Coefficient	1.000	.249
		Sig. (2-tailed)	.	.036
		N	71	71
	Stress level	Correlation Coefficient	.249	1.000
		Sig. (2-tailed)	.036	.
		N	71	71

Discussion

In this study two adaptations of physical activity were evaluated with the variations of the symptoms; stress levels, working activities and interpersonal relationships affecting the women with premenstrual tension syndrome. The positive effects were found to be associated with regulating the pain, impaired concentration and negative effects of PMS tension. The current study showed participants had lower abdominal pain, difficulty concentrating, change in appetite, swelling, mood swings and avoiding social activities as the most frequent complaint of PMS tension with a less energetic performance in working activities and an urge to isolate oneself in terms of their interpersonal relationships.

The current study found that pain ($p=0.03$) showed improvement with recreational physical activity, similar results were reported in the study by Jacqueline et.al, who found the effects of exercise as a recreational and moderate level of physical activity that reduces premenstrual distress and the steroid type hormones produced by the ovaries. Twenty minutes of moderate exercise regime following women had lower pain symptoms, water retention, loneliness, crying and levels of urinary estrone glucuronide as compared to women with a sedentary regime. This study also specified to a moderate-intensity program of daily exercise showed benefits in progesterone-associated pre-menstrual distress (Stoddard et al., 2007).

Another study documented by Vaghela et al. (2019) reported that 72 participants (mean aged 28 years) with symptoms of pre-menstrual syndrome were compared for modified physical activities (aerobic exercise and yoga) followed for 40 minutes, 3 times weekly in span of 1 month. Their study concluded that both were effective in managing PMS symptoms among women but yoga appeared to more significant. Their study also documented that exercise induced release of natural endorphins, suppresses pain provoking neurotransmitters and compatibility of stress reduction with psychological well-being reduces inflammatory cascades undergoing in the body making PMS period comfortable for women (Vaghela et al., 2019).

The current study found that in addition to a decline in the severity of the tension phase of PMS (negative affects $p=0.034$) and the length of menstrual flow was significantly improved with the physical activity ($p=0.009$) marked as 3 to 5 days ($N=33$, 46.5%). The findings were congruent with the study by Cicek (2018) in which normal menstrual flow was maintained ($p < 0.05$) for 2 to 6 days moreover starting an exercise or strenuous physical activity for 3 months triggers the release of endorphins built up the biological connections by reducing cortisol, induced positive thinking thus alleviates depression and irritability (negative affects; p-value <0.01), improves oxygen consumption in muscles which plays a key role in controlling ischemic induced pains by uterine contractions furthermore the study encourages the routine of physical activity preferably aerobic as it boosts up neuromuscular and cardiovascular activities with hormonal regulation. Autonomic reactions had no significant association among the exercising group which was also congruent with the findings of our study (Cicek, 2018; El-Lithy et al., 2015).

This study observed that women with PMTS who were engaged in recreational physical activity had low symptoms affecting their working activities ($p=0.025$), results were congruent

with the research findings (Sut & Mestogullari, 2016). However, stress eating was more prevalent (N=43, 60.6%) with PMS-associated symptoms. Similar results were found by Mayur and Ridhi in their research who correlates lifestyle factors with menstrual problems concluding that consumption of junk food (p=0.03) and dysmenorrhea (14.84%) among the participants (Savsani & Solanki, 2018). In their study Hashim et al. (2019) documented about smoking and high-calorie food choices (fat, sweet, salt) served as strong risk factors in the lifestyle (OR 3.2, 95% CI, 1.4-7.3 and $p< 0.05$) whereas healthy and balanced diet was associated with managing behavioural, physical and emotional symptoms faced by the women with premenstrual fluctuations of hormones in the late luteal phase of the menstrual cycle affecting with at least one sign in a total of 95% participants (aged 20.07 ± 1.53 years) respectively.

Furthermore, as results of this study computed that physical activity level shows a weak association with stress levels induced by the PMTS (spear's man rho= 0.249, p=0.036), stress management strategies, lifestyle changes incorporating modifying dietary habits and more specified interventions were required to work on interpersonal sensitivities. Similar interventional strategies were abstracted in the study findings by Taghizadeh et al. (2013) the study additionally highlighted cognitive behavioural psycho-education as a stress management therapy for psychological symptoms associated with PMS. Another study reported by Shi et al. determined a significant association between physical activity and pre-menstrual syndrome among college students in China. In their study they documented that among 221 participants the prevalence of PMS symptoms was n=148 (67.0%) and moderate to vigorous mode of physical activity was effective in controlling PMS symptoms in contrast to low physical activity level and sedentary lifestyles among females aged (18-30 years), non-smokers. Poor sleep quality was also reported as risk factor to PMS in their respective study (Shi et al., 2023).

The findings of current study supported that recreational and active levels of physical activity could reduce the symptoms as non-pharmacological management of the severity of premenstrual tension syndrome during reproductive ages, contrastingly the study reported by Crowly (2023) documented that reproductive hormonal changes influxes mood swings and anxiety disorders which could be combat with bouts of regular physical activity during these periodical changes of women reproductive life cycles (Crowley, 2023).

Furthermore, American heart association (AHA) also enlisted physical activity, healthy dietary choices, sleep health and normal body mass indices among 8 life's essentials for women health profile (Bucciarelli et al., 2023). The limitations of the study were a significant literature gap with a lack of studies investigating premenstrual tension syndrome as most researchers classify it as a neuronal tension symptom (Abraham, 1983) associated with the PMS whereas Moos classifies negative effects (depression, nervous, anxiety, mood swings, decreased energy and irritability) as PMTS. Moreover, there was no cut-off value exists for moderate to vigorous physical activity levels in the literature to quantify physical activity levels (Cristi-Montero, 2018) for a better understanding of this health issue. Future clinical trials with large sample sizes and longer-duration studies would have recommended exploring the coping strategies and stress management in PMTS.

Conclusion

Women mostly had stress eating and severe PMS tension symptoms with moderate stress levels for the menstruation distress. PMS tension greatly effects working activities among women as their energy level decreases and increased option to isolation affects their interpersonal bonds during the period. Women had lower abdominal pain, difficulty in concentrating, swelling, painful breasts, behavior and appetite changes, mood swings with anger /irritability as frequent complaints of PMTS. Recreational and improved levels of physical activity reduce the severity of PMTS symptoms including pain, impaired concentration and negative effects. Strategies managing stress, lifestyle modification and specified interventions should be implied to manage the interference of symptoms with interpersonal bonds.

Conflicts of interest

No conflict of interest declared by authors.

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