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ORIGINAL ARTICLE

AN IMMEDIATE EFFECT OF BRISK WALKING WITH OR WITHOUT MUSIC THERAPY IN REDUCING MENSTRUAL PAIN AMONG YOUTH WITH PRIMARY DYSMENORRHEA

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ABSTRACT

Background: Dysmenorrhea divides into two type's primary dysmenorrhea (PD) and secondary dysmenorrhea (SD). Dysmenorrhea with absence of pelvic abnormality is termed primary dysmenorrhea (PD) and is likely experience among young women population aged between 15 to 25 years. Despite the effectiveness of the exercise on managing PD, the immediate result of the intervention towards pain was not signified. The study aimed to evaluate the immediate effect of Brisk Walking (BW) with or without Music Therapy (MT) in reducing menstrual pain among youth with primary dysmenorrhea. **Material and methods:** This experimental study involving 102 female subjects with primary dysmenorrhea aged between 18 to 25 years were divided into two equal groups: a Brisk Walking group (n=51), and Brisk Walking with Music Therapy group (n=51). The menstrual pain was assessed using the Numeric Rating Scale (NRS) for pre and post-test taken within 2 menstrual cycle period. The Maximum Heart Rate of each subject were calculated prior Brisk Walking and exercise was conducted within 60 -70% of the individual's Maximum Heart Rate for 20 minutes. The Music Therapy was completed in their home with music provided by researcher for 20 minutes duration. **Results:** The data was assessed using the Paired T-test and Independent T-test. The result within the group showed significant value with $p<0.05$ in both groups. Comparison between groups also showed significant difference $p<0.05$. **Conclusion**: A greater improvement was seen in the Brisk Walking with Music Therapy intervention group in managing primary dysmenorrhea. In specific, it is also proven that both study groups, Brisk Walking and Brisk Walking with Music Therapy promote pain reduction.

Keywords: Dysmenorrhea, Menstrual Pain, Exercise, Aerobics, Brisk walking, Music therapy

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INTRODUCTION

The maturation of the female's reproductive system is marked through the Onset of menstruation. The physiological reason for dysmenorrhea is due to excessive production of prostaglandins (PGs) during menstruation which cause abnormal uterine activity that leads to uterine hypoxia and ischemia (X. Liu et al., 2010). Hence, it leads to symptoms such as pain and cramps [1-3].

The initial onset of PD is usually six to 12 months after menarche (Proctor, 2006) with presentable symptoms such as cramp in the lower abdomen that may radiate to the medial thighs (Vaziri et al., 2015). Other mechanisms involved increased level of circulatory vasopressin which induces uterine contractions during menses are reported in women with primary dysmenorrhea.

The pain initiates few hours before or during the menstrual flow, with symptoms last for 48 to 72 hours (Mahvash, Eidy, Mehdi, Mehdizadeh Toorzani Zahra, & Shahla, 2012) with intense pain on the first two days of menstruation (Kannan, Chapple, et al., 2015). Other additional symptoms experienced include low back pain, diarrhea, nausea, vomiting, headache, loss of appetite, sleeplessness, depression and anxiety (Trybulec & Wyżycka, 2016). SD on the other hand, occurs at any time after menarche and arises as a new symptom in women within the 30's or 40's. Information on the onset, location, duration, and nature of pain plus the aggravating or relieving factors are beneficial in differentiating the two conditions (Proctor, 2006) [4-6].

Across all ethnicities and nationalities, the prevalence of adolescents with primary dysmenorrhea was estimated to be up to 90% (Yu, 2014). The high prevalence of primary dysmenorrhea were due to lack of attention in seeking medical treatment along with the perception that pain was a part of women's experience during menses not knowing that symptoms can be relieved and poor family support (L. P. Wong & Khoo, 2010). The consequences of improper management of the symptoms has become the primary cause of short-term absenteeism from school (Kannan, Claydon, Miller, & Chapple, 2015) [8-11].

Approached used in treating PD among Malaysian youth were massage with ointment, painkillers, herbal/traditional remedies, hot pad, medication prescribed by general practitioner, or some even endure the pain without any treatment (L. P. Wong & Khoo, 2010). Main reasons behind the selection of these approached were due to strong influenced from family and lack of education on the importance of seeking treatment [12,13].

Music therapy is an inexpensive nature of intervention recommended as an aid or substitute to pharmacological pain-relieving method. This therapy allows a certain distraction that is able to divert a person's concentration till pain reduction is noticeable (Memmott, 2002). Ranges of studies had proven the effectiveness of music therapy in reducing pain. Those studies included reducing pain in palliative care (Gutgsell et al., 2013), post-operative pain among total knee replacement patient (Lp, My, & Damrudi, 2015) and music therapy on patients receiving burn dressing changes (Tan, Yowler, Super, & Fratianne, 2010). Furthermore, music is a powerful noninvasive medium with unique outcomes to aid in reducing anxiety, heart rate and systolic blood pressure (Y. Liu & Petrini, 2015). Exercise had been advocated as a non-pharmacological intervention that relieves frequency and/or severity of PD symptoms (Daley, 2009). Recent systematic review had showed evidence on exercise therapy in reducing menstrual discomfort (Abaraogu, Tabansi-Ochiogu, & Igwe, 2016). The mechanism of exercise that induced the release of beta-endorphins that act as systemic analgesic, vasodilatation, suppression of prostaglandins, stress reduction, and elevation

of mood that decreases pain which helps in relieving menstrual discomfort (Kannan, Chapple, et al., 2015) [14-17].

The American College of Sports Medicine (ACSM 1978) had formed the guidelines needed for exercise prescription. According to it, vigorous intensity aerobic exercise is 60%–90% of maximum heart rate (MHR) completed 3–5 times per week in bouts of 15–60 min per session (Perri et al., 2002). Those activities included brisk walking, jogging and running (Haskell, Lee, & Pate, 2007) [17].

Researches addressing the immediate relationship between brisk walking on dysmenorrhea are not yet explored and less research examine the relationship between music therapy and menstrual pain. The various high prevalence's reported in different studies conducted locally since the year 2006 till 2016 on adolescence leads to the selection of PD condition as the focused population in present study. The availability and evident on brisk walking and sedative music effectiveness, thus the study aims to investigate the effectiveness of these two interventions in managing symptoms of primary dysmenorrhea immediately within the first menstrual cycle. Assumptions that exercise such as brisk walking can reduce stress level and subsequently reduce apparent pain; this study aims to examine if music therapy allows a more reduction in pain level than brisk walking alone [18-22].

MATERIAL & METHODS

This study consisted of two groups for a total N of 102: a brisk walking group without music therapy (n=51) and a brisk walking with music therapy group (n=51). The following variables were used in the present study, pain intensity was measured using the numeric rating scale (NRS), brisk walking (BW) and music therapy (MT). The BW and MT were categorized into independent variables and the NRS was considered as the dependent variable of the study.

The study focused on student population as it was believed that the target population could easily be presented and monitored. Subjects were confirmed with primary dysmenorrhea based from the review listed in (Proctor, 2006) on diagnosis and management of dysmenorrhea (i.e. lower pelvic or abdominal pain, headaches, back pain, diarrhea, nausea, and vomiting). Subjects were subdivided into two groups equally by performing lottery method using index cards [23-27].

Procedure: An appointment for eligibility screening was given to participants and set prior intervention. Screening involves completing a self-reported questionnaire on age and menstrual detail, pain history, general medical history, gynaecological and menstrual history, and participation in exercise. Participants were provided with NRS and return envelopes and asked to mark the NRS on the day of maximum pain during their first menstrual cycle before the start of intervention. Those early results of NRS were used as pre-test measure of the study. Besides the NRS, participants also had to record the date of menses duringthe first menstrual cycle prior intervention.

Those records were guidelines for the researcher to identify the following menstrual cycle in order to set the date for the intervention to be carried out. For the first session, the subjects were given briefing and demonstration about brisk walking. The individual's maximum heart rate (MHR) was calculated using the formula developed by (Gulati et al., 2010) for estimating the peak heart rate for healthy women. Subjects underwent aerobic training at 60% - 70% of their MHR for 20 minutes. The brisk walking exercise was initiated by warm-up exercises for 10 minutes and ends with a cool down for another 10 minutes. The pulse oxymeter was used to monitor the individual's heart rate

during brisk walking to ensure it does not exceed the intensity of 70% of age-adjusted MHR [28].

Individuals assigned to the brisk walking and music therapy group met the researcher. Initially the researcher also engaged the participant in a brief run-through of the brisk walking exercise and music therapy in order to minimize or omit incorrect intervention technique by the participants. Music was provided by the researcher to regularise the intervention in all participants of group 2. A soft, instrumental sedative music without lyrics, of 60 to 80 beats per minute song (Shum et al., 2014) was emailed individually to the involved participants of group 2 on their first session. The success of downloading the music was confirmed by researcher on the first day itself to avoid faultiness during the day of intervention [29].

The participants in group 2 were instructed to find a quiet and comfortable place in their home to complete the music therapy for duration of 20 minutes. The song will be played on the first three days of menstruation. Immediately after the exercise was completed, the participants were instructed to complete the NRS on the following menstrual cycle for group 1 whereas, group 2 were required to complete the NRS after completing the music therapy for three continuous days.The participants were then asked to return the NRS with the return envelope [30].

Data Analysis: All statistical calculations were performed using the SPSS program (version 25.0, IBM SPSS Inc., Chicago, USA), the value of $p < 0.05$was considered statistically significant. All data were summarized using descriptive statistics methods. The normality of data was tested using the Kolmogorov-Smirnov test.The normally distributed variables in this study were analysed using parametric Independent t-test to compare the effects between two involving groups in the present study.

RESULTS

Participants recruited in this study are between the ages of 18-25 years old, with a mean age of 21.66 years (n = 102). The mean age for the brisk walking-only group was 21.65, and the mean age for the brisk walking with music therapy group was 21.67 (Table 4.1).

Group	N	Minimum	Maximum	Mean(SD)	
BW	51	18	25	21.65	2.124
BW with MT	51	18	25	21.67	2.132

Table 1 Age mean in BW and BW with MT groups.
BW: brisk walking BW with MT: brisk walking with music therapy

Descriptive Analysis for pain

The pain was measured using Numeric Rating Scale (NRS). This tool has the capability to measure pain using a segmented numeric version that reflects the intensity of the pain. The descriptive data for NRS are listed in Table 4.2 and Table 4.3. The data consist of four readings such as (1) Pre BW (2) Post BW (3) Pre BW with MT and (4) Post BW with MT, with the readings tabulated as mean, standard deviation, minimum and maximum range.

NRS	N	Minimum	Maximum	Mean	SD
Pre BW	51	4	8	6.22	1.172
Post BW	51	0	8	5.16	1.782

Table 2 Descriptive data for NRS in BW.

NRS	N	Minimum	Maximum	Mean	SD
Pre BW with MT	51	4	8	6.18	1.212
Post BW with MT	51	0	9	3.94	1.654

Table 3 Descriptive data for NRS in BW with MT
NRS: numeric rating scale, BW: brisk walking, BW with MT: brisk walking with music therapy

Table 4.2 shows the descriptive data for NRS pre-value and post-value for BW intervention. The Pre BW reading ranged between 8 to 4 with mean 6.22 and (SD) 1.172. The Post BW reading was documented between 8 to 0 with mean 5.16 and (SD) 1.782. From the result, it can be interpreted that for NRS reading shows reduction in the post value reading.

The NRS descriptive data of Pre BW with MT and Post BW with MT are shown in Table 4.3. The Pre BW with MT reading ranged between 8 to 4 with mean 6.18 and (SD) 1.212. Similarly, the reading of Post BW with MT ranged between 9 to 0 with mean 3.94 and (SD) 1.654. From the output, it can be interpreted that the reading for post value shows greatest difference compare with the pre value reading.

Normality test was carried out to assess the distribution of the following data's using Kolmogorov-Smirnov test as the number of subjects was more than fifty. A non-significant result with $p>0.05$ indicates normality. In Table 4.4, shows the normality test for the pre NRS of both groups using Kolmogorov-Smirnov. The NRS results showed significant value of less than 0.05 in both BW and BW with MT group which indicates that the data's are normally distributed.

Kolmogorov-Smirnova			
NRS	**Statistic**	**Df**	**p-value**
Pre BW and BW with MT	.226	102	.000

Table 4 Normality test for all variables
NRS: numeric rating scale BW with MT: brisk walking with music therapy

Pre and post intervention of BW

The result of dependent T-test to evaluate the pre and post effect of BW on menstrual pain showed significant decrease in pain before (Mean = 6.22, SD = 1.172) and after (Mean = 5.16, SD = 1.782) within group with ($p < 0.00$) and 95% CI of mean difference (0.63,1.50). The mean NRS was lower in post intervention where it reduced by 1.10 post intervention. Current study was 95% sure that the mean

difference of NRS lies between 0.63, 1.50. Therefore, it can be concluded that participants experience less menstrual pain after BW (Table 4.5).

Pre-intervention Mean (SD)	Post-intervention Mean (SD)	Mean difference (95% CI)	t-statistic (df)	p-value
6.22 (1.17)	5.16 (1.78)	1.10 (0.63,1.50)	4.91 (50)	.000

Table 5 Comparison of pre and post NRS data for BW

Pre and post intervention of BW with MT

The result of dependent T-test to evaluate the pre and post effect of BW with MT on menstrual pain showed significant decrease in pain before (Mean = 6.18, SD = 1.212) and after (Mean = 3.14, SD = 1.654) within group with ($p < 0.00$) and 95% CI of mean difference (1.81,2.66). The mean NRS was lower in post intervention where it reduced by 2.24 post intervention. Current study was 95% sure that the mean difference of NRS lies between 1.81, 2.66. Therefore, it can be concluded that participants experience less menstrual pain after BW with MT (Table-4.6).

	Pre-intervention Mean (SD)	Post-intervention Mean (SD)	Mean difference (95% CI)	t-statistic (df)	p-value
BW with MT	6.18 (2.98)	3.94 (1.65)	2.24 (1.81, 2.66)	10.61 (50)	.000

Table 6 Comparison of pre and post NRS data for BW with MT

	BW (SD)	BW with MT (SD)	Mean difference (95% CI)	t-statistic (df)	p-value
NRS	5.16 (1.78)	3.94 (1.65)	1.22 (0.54, 1.89)	3.57 (100)	0.00

Table 7 Comparison for post NRS between BW and BW with MT groups

The result of independent t-test for post-value NRS was carried out for analysing the independent variables and dependent variable revealed that the mean weight between BW and BW with MT was significantly different ($p = 0.001$), 95% CI of mean difference (0.54, 1.89). The mean weight between BW and BW with MT was not similar. Present study is 95% sure that the mean difference of NRS in population lies between 0.54, 1.89. Therefore, it can be concluded that BW and MT reduces menstrual pain more than BW alone.

Numerical Rating Scale Post value between Groups

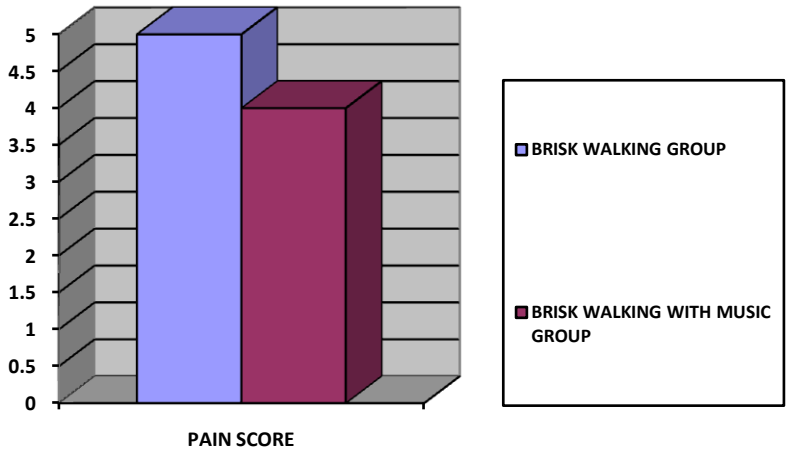

Figure 1: Mean difference of post NRS between groups

The result of the study supports the effect of BW and BW with MT on menstrual pain. The choice of interventions was found to be significantly related in reducing menstrual pain. The result of this study has interesting points for discussion and analysis.

DISCUSSION

Based on current study results, it was suggested that BW exercise promotes immediate effects in reducing PD. The prescription of moderate intensity of 60%-70% with minimal frequency of 3 continuous days for one week of BW resulted an important note of minor statistically significant difference with a dropped off one point between the pre and post-test. In the literature review, no studies were found on the immediate effect of BW on the intensity of dysmenorrhea and it seems that this work was the first one in this regard.

Previous study by (Onur, 2012) had examined the effect of home exercises, on PD and quality of life of 40 women. The aerobic exercises of walking were done for 20 minutes every day for three months. The results indicated the intensity of dysmenorrhea decreases. In contrast to the positive feedbacks of the above studies, (Blakey et al., 2009) examined 594 students using a questionnaire and found no relationships between exercises and dysmenorrhea.

The explanation for the superior effect of BW exercise on PD would be based from several physiological factors. Firstly, it is known to be caused by the release of endorphins during exercise that raise the pain threshold (Kannan, Chapple, et al., 2015). Endorphins interact with the opiate receptors in the brain in order to reduce the pain perception. Following from the release of beta-endorphin, the prostaglandin are supress which prevents endometrial vasoconstriction. Hence, prevents ischemia and less myometrium contractions (X. Liu et al.,

2010). At a 20 minutes exercise duration, oxygen-rich blood are supplied to the muscles (Power & Edward T. Howley, 2009). The reaction of endometrial vasodilatation allows good oxygenation to the area and therefore, avoids ischemia. Secondly, referring to the physiology of exercise, an increase of oxygen demand to the involving skeletal muscle leads to the redistribution of blood flow to less active organs (Power & Edward T. Howley, 2009). A similar study that was quoted by (Kannan, Chapple, et al., 2015) had proposed that exercise allow less congestion of blood flow in the pelvic area during the menstrual phase which therefore reduces the myometrium contraction activity. Thus, the pain associated with PD is able to be overcome[30-33].

The exercise selection was base from the preference of local youth female in Malaysia. BW is a suitable form of exercise for sedentary person, with a frequency of 3-4 times/week and 70% of MHR (Power & Edward T. Howley, 2009). A study finding in 2005 that was quoted by (Mastura, S, Bahaman, & Somchit, 2012), had indicated that the given maximal heart rate of 60% to 70% demonstrated cardiovascular and metabolic rate benefits which increases the maximal oxygen consumption (VO2max), improve aerobic endurance capacity, and increase energy production via the mitochondrial respiration system[34].

However, this study suggested that BW with MT promotes immediate effects in reducing PD. The involvement of music into the study resulted an important note of statistically significant difference with a dropped off two points between the pre and post-test. However no literature was found on the effectiveness of MT on PD as well as the combination effects of BW with MT. It seems that this study was considering the first one [35].

The explanation for the great effect of MT on PD would be based from psychological and physiological perspective. From the psychological means, two theoretical explanations for music's effecting pain; firstly the distraction of attention. The cognitive component of distraction proposes an outside task that limits the thought towards pain. Besides that, emotional engagement captures the attention of listeners through the melody and rhythm. The second mechanism behind audioanalgesia is the eeling of control over pain through a technique of avoidance of the experience (Mitchell et al., 2008). In general, the benefits obtain in BW exercise combine with MT may greatly reduce the pain associated with PD [36].

Based on present study result, both BW-only and BW with MT intervention affected the dysmenorrhoea symptoms of the study participants. The present study reported that the pain measures in BW with MT dramatically improved the post-test NRS when compared to BW-only. The readings suggested that the intervention was effective in reducing the NRS which is influence by the physiological and psychological reaction during the intervention [37].

CONCLUSIONS

As conclusion, a greater improvement was seen in the BW with MT intervention group in managing PD. In specific, it is also proven that both study group, BW and BW with MT promotes pain reduction. In general the objective of this study was achieved and BW exercise with MT was proven to possess

marked immediate changes in reducing pain associated with PD. From the study, we have a better understanding of the immediate effect of the BW exercise and MT towards the body system.

The strength that overwhelmed present study is the study design chose that has not been conducted previously in Malaysia. The experimental study was conducted in filling the limitation of the studies found locally and providing additional management from the common approaches to overcome the problem among young women population with PD. Besides that, current study was also able to provide fruitful information on the immediate effects of these two interventions as previous study on brisk walking had run the investigation in a much longer duration and music therapy had shown to be non-beneficial in treating PD.

The study focus on immediate effects allows procedure to be carried in a short period duration per subjects which allows researcher to monitor easily during data collection period. The assumptions on effect size and recruitment made for the development, evaluation, and implementation of interventions in current study were achievable with less number of drop outs which did not affect the study findings. Furthermore, the samples selected based from the inclusion criteria had represent the population of PD that indicates the study outcome is beneficial in managing symptoms associated with PD.

The data collected in this study was easily analysed as pain was focused as the main variable and the selection of using numeric rating scale in assessing pain was easily comprehends and completed by each subjects.

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