

Carbohydrate Rich Supplements or Diet and Protein in Relation to Premenstrual Syndrome.

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Abstract: Premenstrual syndrome is one of the most common disorder in women in reproductive age. this paper assess the effect of carbohydrate-rich supplements and diet on it. **Methods:** The study has done in two sections. First stage was cross sectional investigation about the frequency and distinguish of PMS. next stage that was cross over study ,was finding students who were confirmed according to the APA criteria.80 persons were chosen for clinical trial , but ,finally information was completed for 76 participants. so offering contributors concume high carbohydrate diet, protein and carbohydrate supplements and filled up Premenstrual Daily Syndrome Dairy questionnaires for 3 months. **Results:** Study results revealed that PMS and its symptom's intensity (mood, behavioral and physical)decrease significantly by using carbohydrate –rich supplements and diets ($p= 0.00$), but supplement was more effective ($p=0.00$). both had same effect on anger, depression and appetite. **Conclusion:** Accordingly, the consumption of this substance(diet or supplements) is recommended. The positive effect of protein supplement is another important point, so further study on this case is suggested.

Key words: premenstrual syndrome, carbohydrate,diet,supplement

INTRODUCTION

Premenstrual Syndrome (PMS) is one of the most common disorders in women at reproductive age with in addition to dysmenorrhea could significantly interfere with daily life(Ryan, 1999). Between 5-95% of women at reproductive age may suffer from PMS symptoms during their life (Willson, 1991). According to the American Psychiatric Association (APA), in 2-3% of cases, the symptoms are severe enough to interfere with daily life, and require serious treatments. In such cases, the disorder can also be called Premenstrual Dysphoric Disorder (PMDD) (Breslin, 2003). In this study, in order to identify the persons who suffer from PMS symptoms and to measure the frequency of PMS, participants received a questionnaire to record their daily symptoms for 2 months. 78/43% reported PMS symptoms and of these, 2% of them reported severe symptoms. However, it should be noted that only 50% of persons who received the questionnaire returned it.

The miscellaneous signs and symptoms for PMS are reported. The most common are feelings of anger without cause, anxiety and irritability, depression or sadness, overeating & food cravings, fatigue, problems with concentration, and loneliness (Breslin, 2003; Shahpoorian, 2005; Kazery, 1993). The majority of these symptoms affect women's mood and can affect social and physical interactions. Mood disorder not only affects a woman's own emotions and her interpersonal relationships but it also causes stress, diet disorders, obesity, etc. Depression is one of the most common problems in persons who suffer from PMS. They experience reduction in physical activity and function, sadness, uncontrolled anger, depression, emotional cognitive, behavioral disorders. Suicide attempts are higher among them.

Consequently, during this period symptoms such as uncontrolled anger and aggressiveness are risk factors for divorce, crime and quarrel are greater in comparison to other periods. (Kazery, 1993). Stress and its outcome is another problem. Stress is also a known contributing factor to cardiovascular disease, mood

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disorders including depression and unusual behaviours. In addition, it can lead to harmful and destructive behaviours such as alcohol and drug abuse. Furthermore, stress can decrease normal concentration ability, thereby interfering with decision-making during a crisis (Breslin, 2003). Sleep disorders is one of others that effect on social –economical situation that it has essential and important role in healthy and social behaviours performance. Sleep disturbance is known to be the primary criteria of mood and physiological disorders. This also could act as a contributing factor to experiencing depression, impatience and so on at home and in society (Ryan, 1999).

One of the greatest challenges of diagnosing PMS is that the main cause is still unknown, and it could be due to a combination of different factors (Dickerson, 2003). One of the common factors is patophysiology, that considered more recently, is “serotonin”, a neurotransmitter, that interferes with physiological behaviours and mood activity. It makes fullness and decrease eaten food, controls psychiatric status and improve mood, regulates body temperature and cardiovascular function and has effects on sexual behavioural. Its deficiency in the brain is recognized as an important factor for PMS (Rasgon, 2000; Casacchia, 1998; Rinomhota, 2000).

This neurotransmitter is unable to cross the Blood-Brain Barrier (BBB) and all of them are synthesized locally in the brain. Serotonin is mainly synthesized in the brain using an amino acid called “tryptophan. (Wurtman, 1995).

In humans, serotonin levels are affected by diet. An increase in the ratio of tryptophan to other amino acids will increase serotonin levels but tryptophan is usually present only in small amounts in nutrient diets. For example, consuming protein-rich diets provides a supply of many amino acids, but not tryptophan. Thus, the amount of tryptophan in the blood and the brain decreases and it causes serotonin levels to decrease too. Over hand consuming carbohydrate rich diets via insulin action that increase the absorption of amino acids by muscles except of tryptophan so it in blood increase and because of that it transference to brain and serotonin synthesize increase (Wurtman, 1995;Pracad, 1998; Wurtman, 1998; Newell, 2000; Fischer, 2002;). Carbohydrates are divided into two types: simple and complex. The classification is based on the glucosery index because glucose is determines insulin release and insulin has important roles in the synthesis of serotonin (Wurtman, 1995). Glucose can be used in supplement form because in many cases ,using it is easier than nutrient diet. Our study was based on it and the role of additive carbohydrates on PMS. Enriching the diet with carbohydrate was done in two ways: through supplements and rich diets. We wanted to answer the following question: Do additive carbohydrates in two types have an effect on PMS? And this hypothesis : similarity effect of that also is tested.

MATERIALS AND METHOD

Undergraduate students in nursing - midwifery, and management, and medical information faculty of IUMS in 2004- 2005 recorded their symptoms in premenstrual Daily syndrome Dairy questionnaires (PDS) for 2 months. According to the American Psychiatric Association (APA) were stricken ,chosen. APA criteria include: presence of at least five of the following symptoms, one of which must be one of the first four symptoms.

1. Mood swings like tearfulness
2. Nervousness, anger
3. Anxiety, tension
4. Depression, feelings of hopelessness
5. Lack of concern for usual activities
6. Fatigue , lack of energy
7. Concentration difficulties
8. Change in appetite, overeating
9. Insomnia
10. Somatic symptoms like: breast tenderness, headache, edema, muscle pain, and overweight

In addition, symptoms must markedly interfere with the person’s daily activities and interpersonal relationships and be related to the menstrual cycle, not to any psychiatric disorder. Furthermore, syptoms must be remedied upon onset of menstruation or some days afterward.

In order to administer the PDS reliably ,we evaluated it on 15 students in the Nursing-Midwifery Faculty of Shahid Beheshti University. They completed questionnaires for one month and at the end of the month, questionnaires were collected and tested with α cronbach test ($\alpha=0/83$).

The exclusion criteria for participants were:

1. Psychiatric disturbances

2. Use of oral contraceptives or any medications that relieve PMS symptoms
3. Smoking or addiction
4. Chronic diseases
5. Irregular menses
6. Pregnancy or breastfeeding
7. Family emergency such as unexpected death
8. Don't use supplements or diet

Based on the above criteria, 80 females became eligible for this study. The study was approved by the Ethical committee at the Nursing –Midwifery faculty and Nursing Care Research Center of IUMS (commonly). Students who wanted to participate in this study provided written consent to do so . This study was done in two sections. The first stage was a cross-sectional investigation of the frequent occurrence of the PMS symptoms and the second stage was a cross-over study that identified the eligible participants according to the APA criteria. 80 women were chosen as a part of this study but finally informations were completed by 76 persons. Participants were then divided into three different groups and they received three types of intervention: 1- carbohydrate supplement 2- carbohydrate –rich diet 3- protein supplement (placebo) figure1.

Supplements were provided by Poyan Food Company and packaged with two labels: A and B. The interventions were done in three -Blind Placebo-Controlled Trials, as students ,researcher and analyser didn't know about supplement types.

Each carbohydrate-rich supplement package was supplied in a powder form weighing 50 grams with orange flavouring and a combination of dextrose,fructose and malt-dextrin. Each package was composed of 98% carbohydrate(205 calories).

Protein-rich supplements (Placebo) were also prepared in 50-gram packages containing orange flavouring and 11.5% carbohydrates, 3% fat, and 84% protein, (205 Calorie). Each package must be solved in one glass of water before consumption.

Carbohydrate rich diets were available in two forms. Participants chose the form they wanted 1) 200ml of organic fruit juice + two crème cookies+ one Date= (213 Calorie); or 2) 200 ml of organic fruit juice +30 grams honey+ one Date = (210 Calorie).

Participants didn't have any psychosomatic problems and more importantly they had a normal Body Mass Index(BMI)(18.5-26 Kg/m²). Thus adding 200 calories to their daily diet didn't create any problems for them. Participants were advised to consume the supplements or supplement diet that were given to them with their daily diet seven days prior to their menstruation and to complete the PDSD questionnaire. Therefore, there was a three-week relapse every month between taking the supplements or diet. This time was enough to remedy before intervention effects.

All participants took three interventions supplements were name A and B. according to figure1 PMS symptoms and their severity was recorded for three months.

Mean of symptoms severity in 2 mounts before interventions, that for chosen of stricken participants were collected ,considered as a basic severity to compare with intervention results.

groups			
3(25 numbers)	2(26 numbers)	1 (25numbers)	Month
Diet	A	B	first
B	Diet	A	second
A	B	Diet	third

Fig 1: deviation students and replacing them in three months according to cross over study.

The statistical analyses were performed with SPSS10.

Findings:

The age group of the women in this study was between 18-23 years and there were only 2 cases older than 24 years old. 92.11% of the subjects were single and the rest were married .64.47% of participants had dysmenorrhea. Up to 68.4% suffered from mild and 31.6% suffered from moderate PMS symptoms. there wasn't any sever form.

The majority of samples suffered from moderate to severe mood symptoms. Behavioural and physical symptoms followed in rank after mood symptoms.. Two signs ,irritability and depression in mood symptoms, were reported by all subjects (100%). The result of the t-test showed that all three groups of symptoms (Mood

,Behaviour and Physical) significantly decreased after receiving 3 interventions. (table1).

A comparison of the results of 3 interventions with Anova and repeated measure test showed that their effects weren't the same, that carbohydrate supplement were more effective than other interventions in decreasing symptoms, and that protein supplements decreased symptoms more than carbohydrate rich-diet.(table2)

The result of the t-test didn't differ between carbohydrate rich diet and supplements on 3 symptoms: anger ,depression and overeating and in tearfulness and sexual interest, the carbohydrate –rich diet was more effective. but about other signs, carbohydrate supplement was more effective. between effect of carbohydrate and protein supplements weren't differ on six signs ,tearfulness ,loneliness ,insomnia , change in sexual interest, abdominal pain and muscle and joint pain, but in other signs carbohydrate supplements was more effective than it. Carbohydrate –rich diet decreased significantly eight symptoms, bad temper, anger, depression, tearfulness, change in sexual interest, overeating, headache and lower back pain more than protein supplements but in decreasing the other signs, the protein supplement was more effective.

Table 1: The mean and SD PMS symptoms before and after interventions

resoult	After intervention	Before intervention	symptom	intervention
p=0/00	0/78±0/48	1/19±0/52	mood	Carbohydrate- rich diet
p=0/00	0/64±0/38	9/26±0/39	behavior	
p=0/00	0/53±0/32	0/61±0/32	physical	
p=0/00	0/43±0/42	1/19±0/52	mood	Carbohydrate supplement
p=0/00	0/27±0/31	9/26±0/39	behavior	
p=0/00	0/19±0/17	0/61±0/32	physical	
p=0/00	0/60±0/45	1/19±0/52	mood	Protein supplement
p=0/00	0/42±0/36	9/26±0/39	behavior	
p=0/00	0/28±0/24	0/61±0/32	physical	

Table2: Mean and SD deviation of PMS symptoms before and after interventions

Repeated Measure	Protein supplement	Carbohydrate –rich diet	Carbohydrate supplement	symptom
	----- Minus mean &SD	----- Minus mean &SD	----- Minus mean & SD	
p=0/00	-0/58±0/51	-0/40±0/28	-0/75±0/54	mood
p=0/00	-0/50±0/39	-0/27±0/25	-0/65±0/38	behavior
p=0/00	-0/33±0/27	-0/0855±0/20	-0/42±0/29	physical

Discussion:

According research question, our findings confirm that adding carbohydrates into diet either via supplements or a carbohydrate diet has an effect on PMS. Adding carbohydrates in two ways was effective on PMS severity in all of the group symptoms:, Mood, Behaviour and Physical, severity.. However, it didn't support the hypothesis that both types of carbohydrate administration have similar effects; the carbohydrate supplements were shown to be superior to the carbohydrate diet.

Carbohydrate supplements contained 98% pure carbohydrate whereas carbohydrate rich-diets that were combinations of cream cookies, honey, dates and juice (elective) were not pure and contained a little protein and fat as well (according our nutrition expert opinion, this additional protein and fat was insignificant). Based on the existing literature, even a small amount of protein (4-5%)could reduce tryptophan levels and decrease serotonin synthesis in the brain.(Young, 2002; Dye, 1997).

According to existing research, protein does not have an effect on increasing tryptophan level and subsequently serotonin synthesis may be decreased (8) but in this study protein supplement decline PMS severity even this way was better than carbohydrate-rich diet.

The only available research that confirmed the effects of protein on PMS was Fisher and colleagues (2002).

They found that immediately after consuming protein, women felt satisfaction and recovery more than they did after consuming carbohydrate or mixed diet. Also they showed that sleep quality and somatic function improved immediately after using a protein diet (Fischer, 2002).

According to the results of this research, supplements with the title Carbocare were produced by Poyan Company and offered in drugstores across the country.

A study by Langhans and Wenk (2002) found that the plasma concentration of glucagon after consumption of foods containing carbohydrates remains unchanged; however, it significantly increases after the consumption of protein-rich foods. Glucagon is a hormone produced by the level of glucose in the blood. Glucagon has the opposite effect of insulin; it causes an increase in the blood glucose level.(14)

The protein rich supplements or placebo that were used in this study were not pure either; they included 11.8% carbohydrates and 3% fat and because they were enhanced to participant's daily diets they may experience a modest relief in their PMS symptoms due to the effect of additional carbohydrates (11.8%). Another important point that needs to be considered is the psychiatric and empathy effect. Participants in this study were unaware of the content of the packages that they received, since both the placebo and carbohydrate rich supplementation had the same colours & flavors.

Carbohydrate-rich diet, via serotonergic pathway, improved symptoms that are controlled by this system, including anger, sleep disorder, concentration difficulty and....(Wurtman, 1995; Wurtman, 1998).

In our study, Mood, Behavioural and Physical symptoms significantly decreased as a result of either supplement or rich-diet. Both forms of administering carbohydrates had equal effects on three symptoms anger, irritability and overeating, but with regard to other symptoms, the carbohydrate supplement was more effective than the rich- diet. Luecha and colleagues (1998) found that consumption of a carbohydrate-rich diet could decrease behavioral, appetite, memory, and mood disturbance symptoms related to PMS.(Fischer, 2002; Young, 2002; Dye, 1997). The superiority of carbohydrate supplements can arise from the fact that consuming pure carbohydrate has double the effect. Yang emphasized the effects of pure carbohydrates (Young, 2002). Luecha, Beneton, Sayegh and others found that carbohydrate beverages are effective at reducing PMS signs and symptoms (Benton, 2002; Luecha, 1998; Sayegh, 1995). Luecha and others found that consuming carbohydrate rich- diets decreases PMS signs like appetite, anger, depression, and insomnia (Wurtman, 1995; Wurtman, 1998; Benton, 2002; Luecha, 1998). Libermans study (2003), in research on military, found that using carbohydrate beverages as supplements, without dietary limitation, could improve physical performance, decrease mood disturbance and have an overall positive effect (Lieberman, 2003).

Beneton and colleagues in their study found that there is a significant association between hypoglycemia and invasive behaviors and mood disturbance. Thus an increase in the glucose level can reduce many disturbances and performance.

Overeating is another common symptom in this study.

Dye and Blundell said that between Mood disturbance and depression with appetite range before menstruation are an close association such as PMS severity in person with overeating is more than others (Dye, 1997). Overeating can cause many problems such as obesity, hypertension, cardiovascular disease, and so on. Therefore, consumption of carbohydrates via decreasing appetite and consuming fat foods can help people enjoy a high quality life and long life (Wurtman, 1998). Overeating decreased equally with the carbohydrate supplement and the rich- diet. The protein supplement was more effective at reducing all but three symptoms: over eating, depression and anger.

Additional studies about the effects of protein rich diet on PMS are warranted.

A limitation of this study could be that we added supplements or rich-diet to regular diet without consideration to the participant's daily diet. Therefore other studies about the effects of carbohydrate with specific diet recommended and laboratory checking for confirming, are suggested too. Furthermore, this study had a time limitation as it was done in only three months. Additional studies with a longer duration are suggested.

Conclusion:

The overall results from our study confirmed that consumption of additional carbohydrates either as supplementation or as a carbohydrate-rich diet is effective in relieving PMS symptoms. If by any means, women should consume more dietary carbohydrates during the PMS period to relieve the unwanted symptoms and if they tend to be easier, can use supplement. We recommend the use of simple carbohydrates such as dates and honey, which would be better alternatives.

ACKNOWLEDGMENTS

We are also grateful to the research volunteers and other assistants that helped us during the study.

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