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Does Dark Chocolate Relieve Menstrual Pain in Adult Women?: A Study Among Indian Population

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Abstract

Introduction: Premenstrual pain (PMS) and Dysmenorrhea or painful menstruation is defined as a severe, painful, cramping sensation in the lower abdomen that is often accompanied by other symptoms, such as sweating, headaches, nausea, etc all occurring just before or during the menses[1]. A variety of drugs, predominantly non steroidal anti-inflammatory drugs (NSAIDS) are used to provide analgesia during the period. The present study was undertaken to evaluate the claims of Dark chocolate as an alternative to NSAIDS.

Methodology: 90 selected students were divided into 3groups and were provided 120gms/day of dark chocolate, milk chocolate and no chocolate based on their group. Numeric Rate Scale (NRS) was used to measure pain before and after intervention.

Result: Pre menstrual pain and menstrual pain was significantly reduced after the consumption of Dark chocolate.

Keywords: *Premenstrual pain, non steroidal anti-inflammatory drugs, Numeric Rate Scale.*

Introduction

Adolescence in girls has been recognized as a special period which signifies the transition from girlhood to womanhood and is marked with the onset of menarche, an important milestone which is often associated with problems of irregular menstruation, excessive bleeding and dysmenorrhoea.[3,4] Dysmenorrhea or painful menstruation is defined as a severe, painful, cramping sensation in the lower abdomen that is often accompanied by other symptoms, such as sweating, headaches, nausea, vomiting, diarrhoea, and tremulousness, all occurring just before or during the menses. [1] Dysmenorrhea may be categorized into two types as primary and secondary. Primary dysmenorrhea is defined as painful menses among females with normal pelvic anatomy, frequently beginning during adolescence. It is observed only in ovulatory cycles, frequently emerging within 6 to 12 months after menarche with no pathology or organic basis. Secondary dysmenorrhea is a menstrual pain associated with underlying pathology and its onset might be years after menarche. [5]The cause of primary dysmenorrhea is not well established. However, the responsible cause has been identified on the hyper-production of uterine prostaglandins, particularly of PGF 2α and PGE 2, thus resulting in increased uterine tone and high-amplitude contractions.[6]

Women with dysmenorrhea have higher levels of prostaglandins, during the first two days of menses. [7] under the control by progesterone while immediately prior to menstruation, prostaglandin levels increase. [6, 8]

The levels of prostaglandin F2α are especially high during the first two days of menstruation in women with severe primary dysmenorrhea [9] who are treated by use of NSAIDs such as aspirin, ibuprofen and naproxen, or by use of Prostaglandin inhibitors which though being better in pain relief cause GI disturbances and have a propensity for severe side effects on long term use. [1, 10, 11]

There is some evidence supporting the role of some dietary supplements, including Omega-3 fatty acids, such as fish oil, vitamin B1, vitamin B6, vitamin D, vitamin E, magnesium and vitamin B6, on menstrual

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pain relief. [12, 13, 14]. Disruption of calcium regulation has been proposed as an underling factor for increasing incidence and severity of menstrual pain [15, 16]

Chocolate is rich in vitamin A, B1, C, D, and vitamin E. In addition, chocolate also contains anti-oxidants of phenol and flavonoids, rich in minerals such as calcium, potassium, iron, a little omega 3 and 6, and high magnesium[17] which can reduce menstrual pain and premenstrual occurrence in women. Because of the mentioned benefits of dark chocolate, this study was undertaken to examine the effect of dark chocolate on menstrual pain in adolescent women.

Materials & Method

Study Design: This was experimental study with randomized testing with control group design.

The study was conducted on medical students at DY Patil Medical College Navi Mumbai. 90 samples were recruited by random sampling technique. The students who had given the history of severe primary dysmenorrhea were selected for the present study.

Inclusion criteria:

(a) Single, Young woman aged 18-21 years

(b) Experiencing severe pre menstrual and menstrual pain in the last 6months

(c) Regular menstrual cycle

(d) Not taking analgesic medication in last 24 hours

Exclusion criteria: Students with history of any chronic illnesses, or those using any contraceptive pills or any vitamin supplements

Intervention: 90 students that were selected were divided into 3 groups of 30 students each.

Group 1: Received 120gms/day of dark chocolate for 3 days.

Group 2: Received 120gms/day of milk chocolate for 3days

Group 3: With severe dysmenorrhea who did not receive any chocolate.

Doses given from onset of PMS till Second day of menses.

Instrument: Numeric Rate Scale (NRS)[2] was used to measure pain. The 10-point numeric scale ranges from '0' representing one pain extreme (e. g. "no pain") to '10' representing the other pain extreme Pain was measured before and after intervention.

Institutional ethical committee clearence was obtained prior to commencement of the study. No data of identification apart from weight, hieght were taken on the subject information sheet. The data of intervention pain scales were tabulated on MS Excel data sheet and compiled. The statistical analysis was done using SPSS software version 16.

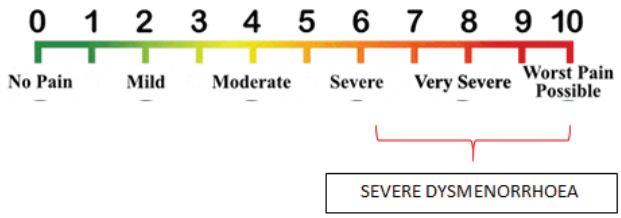


Fig 01: Pain Scale Index

Observations

The present study comprised of 90 subjects, females of 18 to 21 years of age, with the mean age being 19 years and 3 months. No statistically significant differences were found in the age and BMI of the selected subjects. The group I consisted of individuals who were given dark chocolate during their study period. The details of group I are as follows (Table 1)

Table 1: Dark Chocolate Group (Group I)

Subjects	Mean Age (Years)	Mean PSI (Pre)	Mean PSI (Post)	Mean BMI
30	19.3	8.36	7.02	23.05

The subjects showed a improvement in their pain scales with dark chocolate. Paired T Test (two tailed) was conducted to ascertain the significance, which revealed P value is less than 0.0001 By conventional criteria, this difference is considered to be extremely statistically significant at 95% confidence interval.

Group II comprised of 30 subjects, who were administered milk chocolate as a part of intervention to assess its effects on pain scale index during menstrual pain. (table 02)

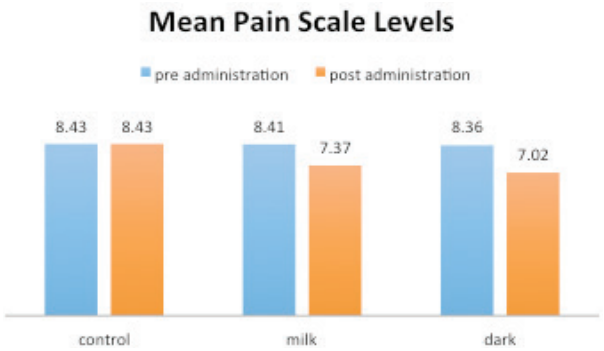
Table 2: Milk Chocolate Group (Group II)

Subjects	Mean Age (Years)	Mean PSI (Pre)	Mean PSI (Post)	Mean BMI
30	19.6	8.41	7.37	22.52

In terms of pain, the subjects showed a mild improvement with administration of milk chocolate. Paired T Test (two tailed) was conducted to ascertain the significance, which revealed that the P value < 0.0001 By conventional criteria, this difference is considered to be statistically significant at a confidence interval of 95%.

Table:3 Control Group (Group I)

Subjects	Mean Age (Years)	Mean PSI	Mean BMI
30	19.3	8.43	22.71



One way ANOVA analysis was conducted to ascertain the variance among the three groups which revealed that the f-ratio value is 5.15115. The p-value is.007687. The result is significant at 95 % confidence interval indicating that a variance exists between all three groups with dark chocolate showing highest mean difference in reduction of pain levels (1.34) as compared to other two groups.

In Summary, the study revealed that pain levels among adolescent females experiencing dysmenorrhea was reduced on consumption of dark chocolate, in comparison with milk chocolate and no chocolate.

Discussion

This study was conducted to compare the effects of administration of dark chocolate and milk chocolate on primary dysmenorrhea. The results showed that obtained efficacy in pain reduction was higher with taking dark chocolate and moderate with taking milk chocolate.

Enhanced release of PGs, allegedly from disintegrating cells during endometrial sloughing, is believed to cause myometrial hyper contractility, resulting in ischemia and hypoxia of the uterine muscle, and, ultimately, pain. [18, 19]

All women have increased levels of PGs during the luteal phase compared with the follicular phase of ovulatory cycles. However, compared with eumenorrheic women, dysmenorrheic women have higher levels of PGs, as measured in luteal phase endometrial biopsies, jet washings and menstrual fluids. [20, 21] Higher circulating levels of PGs (PGF2α and PGE2) have been reported in women with dysmenorrhea compared with asymptomatic women during menstruation, and these PG levels are highest during the first 48 h of menses, when symptoms peak. [18, 22, 23, 24] Further, the severity of menstrual pain and associated symptoms of dysmenorrhea are directly proportional to the amount of PGs released. [21, 25] In addition, clinical administration of exogenous PGs results in uterine contraction and often also produces the same systemic symptoms that frequently accompany dysmenorrhea. [24, 26]

Magnesium influences the contractility, tone and relaxation of the uterine smooth muscle; and may inhibit the synthesis of prostaglandin based on inhibition of biosynthesis of prostaglandin. Studies have revealed that menstrual pain is relieved by good diet. [27, 28, 29, 30] Paath, (2004) stated adolescent women need to maintain a good nutritional status, with a balanced way of eating at the time of menstruation. [31]

It has been reported that plasma levels of calcium in premenstrual period is lower in people suffering from premenstrual syndrome. [32, 33] Di Cintio et al reported a relationship between calcium intake in food and reducing the severity of primary dysmenorrhea. Also, a small randomized trial showed that increasing dietary calcium intake reduce mood and pain symptoms associated with menstruation [34, 35]

Repeated monthly painful episodes may lead to the development of central sensitivity to pain. [36, 37] Central sensitization is defined as an abnormal augmentation of pain by mechanisms within the central nervous system (CNS), and therefore represents a state where the response to normal peripheral inputs is greatly enhanced. [38, 39] Primary dysmenorrhea has been classified as a member of the central sensitivity syndromes together with several other clinical conditions including fibromyalgia and tension-type headaches. [36, 37] These syndromes are characterized by pain hypersensitivity in the absence of tissue injury, inflammation, or a lesion to the nervous system. [36, 39]

In a previous study examining the benefits of dark chocolate to reduce menstrual pain stated that the chocolate content of GABA (Gamma-Amino Butyric acid) is an amino acid that has

a major function as a neurotransmitter in the central nervous system. Gamma aminobutyric acid inhibits nerve transmission in the brain, calming nervous activity. The 5-HT creates a sense of comfort and increase serotonin levels. L-taurine gives rise to body-wide relaxation. L-glutamine can be utilized directly by the brain for energy production in brain cells. Thus it can improve brain function and facilitate the utilization of GABA and S-HTP. In theory, magnesium has a direct effect on vascular pressure and can regulate the entry of calcium into the smooth muscle cells of the uterus, so magnesium affects contraction and relaxation of smooth muscle of the uterus. [41]

Magnesium can also suppress inflammation by inhibiting the formation of prostaglandins. So in the group treated with dark chocolate states menstrual pain is reduced significantly. [41]

Copper is a cofactor for a number of enzymes and is required for iron transport and other process. [43, 44] Dark chocolate provides 31% whereas milk chocolate provides 10% of the U. S. RDA for copper per 100-kcal serving, dark chocolate provides 25% of the RDA (1.90 mg) and Milk chocolate contains 5% of the RDA for iron. [42] A study in 2005 stated, dark chocolate contains complex carbohydrates, antioxidants (flavonoid polyphenols), vitamin B6, unsaturated fatty acids (omega 3 and omega 6) and minerals (magnesium, calcium, iron) that influence and regulate menstrual cycle by balancing the levels of the sex hormones in the blood during the luteal phase of the cycle. [44]

Conclusion: The study concluded that in the selected study group, the pain levels during dysmenorrhoea was significantly reduced by administration of dark chocolate as compared to no administration. The use of a natural substitute is a viable option to NSAIDS as it carries none of the side effects associated with the drugs. The study is limited by the small sample size and lack of variability in the age group of the subjects. A wider study is needed to effectively apply this in the entire population.

Conflict of Interest: None

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