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The Impact of Oral Vitamin D Supplementation on Dysmenorrhea in Adolescents and Young Adults: Results of a Randomized, Double-blind, Placebo Controlled

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Abstract:

Objectives: The purpose of the current study was to look at how vitamin D affected the degree of dysmenorrhea and menstrual blood loss.

Patients and Methods: Fifty single female college students, ranging in age from seventeen to twenty-five, participated in this double-blind, placebo-controlled, randomised trial. Students who had vitamin D deficiency in addition to primary dysmenorrhea were divided into two groups: the experimental group (n = 25) and the control group (n = 25). Five days before to the expected start of their next menstrual cycle, the experimental group received 300,000 IU of vitamin D (50,000 IU, two tablets every eight hours), whereas the control group received a placebo. The effects of the supplement on the severity of dysmenorrhea and menstrual blood loss were measured one cycle prior and over the course of two subsequent cycles.

Results:The intervention resulted in a significant ($p<0.05$) decrease in the experimental group's mean scores on the visual analogue scale (VAS) and verbal multidimensional scoring system (VMS) during the first and second menstrual cycles, but not in the means score on the pictorial blood assessment chart (PBLAC).

Conclusion: The results imply that vitamin D supplementation may reduce the severity of primary dysmenorrhea and the need for pain medication. However, there was no appreciable effect of vitamin D supplementation on blood loss associated with menstruation.

Keywords: *vitamin D; dysmenorrhea; adolescents.*

1. INTRODUCTION

Approximately 50% of women who are of reproductive age suffer from primary dysmenorrhea, a common gynaecological condition [1]. According to a population-based study, younger women reported more discomfort [2], and the prevalence of moderate and severe dysmenorrhea was found to be 28% and 22%, respectively.

Primary dysmenorrhea is associated with the regular menstrual cycle. Although its exact aetiology is unknown, endometrial prostaglandins' activity can account for the majority of its symptoms. It is comparable to labour pain in that it frequently comes with backache, radiating pain to the thigh, and suprapubic cramps. There have been significant positive correlations shown to exist between the degree of dysmenorrhea and abnormal [4] and protracted [3] uterine haemorrhage.

Among the issues linked to dysmenorrhea that have been identified include decreased health-related quality of life [5], absenteeism from work or school [6], difficulty concentrating [7], and restriction of other daily activities [8].

Dysmenorrhea is treated using a variety of techniques. The most popular medication, non-steroidal anti-inflammatory medicines (NSAIDs), can cause side effects include skin allergies, hepatic and renal problems, and peptic ulcers [8]. Another class of successful treatment options includes hormonal contraceptives. But some women have religious or cultural objections to using contraceptives, and some

do not want to use them for pain relief [9]. As a result, many women turn to alternative therapies for dysmenorrhea, such as herbal medicines and vitamin and mineral supplements [10].

Research indicates that the development and management of menstruation problems may be significantly influenced by vitamin and mineral metabolism and absorption [10]. Calcium functions as a stabiliser by controlling the capacity of muscle cells to respond to nerve inputs. Muscle contraction and spasm may be brought on by low calcium [11]. The active form of vitamin D, calciferol, has the ability to control prostaglandin levels [12].

Dairy products supply more than 70% of the calcium in the diet [13], which led researchers to investigate the association between the amount of dairy products consumed and the severity of dysmenorrhea in observational studies. They came to conflicting conclusions, with notable positive [14] and negative [15] correlations found between the variables.

We showed in a prior clinical research that calcium-magnesium and calcium-alone supplements can lessen the length and severity of menstrual discomfort in students with primary dysmenorrhea [16]. Additionally, a few studies have demonstrated the impact of vitamin D supplementation in lessening the severity of dysmenorrhea [17, 18].

It is plausible that calcium and vitamin D supplements could lessen the severity of dysmenorrhea given the high prevalence of inadequate calcium intake [19], vitamin D deficiency, particularly among Middle Eastern women, and moderate to severe deficiency in Iran [20, 21], with a subsequent temporary loss of ionised calcium [22].

We set out to ascertain the effects of vitamin D on pain severity and menstrual blood loss in women with primary dysmenorrhea due to the paucity of studies in this field that have produced inconsistent results.

2 Patients and Methods

The participants were female college students in good health who were single. Ages 18 to 25 years old, a BMI of no more than 30 (kg/m2), regular menstrual cycles lasting between 21 and 35 days, with a menstrual period lasting between 3 and 7 days, at least four painful periods in the previous six months that began just before or right after the onset of bleeding, and a vitamin D deficiency (25[OH]D serum level ≤ 15 ng/mL) were among the inclusion criteria. The following conditions weren't present in any of the research participants: a history of an underlying illness (such as endometriosis or adenomyosis) that is causing secondary dysmenorrhea; regular exercise; exposure to recent stressful events (within the last three months); use of oral contraceptives and/or hormonal drugs (within the last three months); use of any medications containing or interacting with calcium and/or vitamin D (within the last six months); special diet (such as vegetarianism); smoking; or alcohol consumption. Individuals who did not experience menstruation during the intervention period, used oral contraceptives and/or other hormonal drugs in conjunction with non-pharmacological methods or pain relief supplements, smoked or drank alcohol during the intervention period, puked two hours after taking supplements, or expressed a desire to discontinue the study were all excluded.

2.1 Study Instruments

Menstrual pain was measured using the VAS. The adjectives on this horizontal scale are 0 for no pain and 10 for the greatest conceivable discomfort.

Students' perceptions of the intensity of their menstrual pain and how it affected their daily activities were also evaluated using the VMS. A four-point Likert scale, with no symptoms to severe symptoms, was used to assess the items (i.e., none, mild, moderate, and severe).

The quantity of menstrual bleeding was measured using the PBLAC.

2.2 Intervention and Outcomes

The participants who satisfied the inclusion criteria were given an explanation of the process. Written informed permission was signed by each participant. The serum concentrations of calcium and 25(OH)D were then measured using 5 millilitres of venous blood. The experimental group took 300,000 IU of vitamin D (six pills of 50,000 IU) five days before the supposed start of their next menstrual cycle, whereas the control group took six oral doses of a placebo.

Participants were given a checklist to complete following the intervention period, which included symptoms including anorexia, lethargy, nausea, and vomiting that are linked to low vitamin D levels. Serum 25(OH)D and calcium levels were reassessed in the individuals one month after they were given the medicine and placebo. The verbal multidimensional scoring system (VMS), the pictorial blood assessment chart (PBLAC), and the

visual analogue scale (VAS) were completed by participants in the first and second cycles following the intervention, as well as during the menstrual period preceding it.

2.*3 Statistics Analysis*

The data analysis was conducted using SPSS version 16, and a p-value of less than 0.05 was deemed statistically significant.

3 Results

The results revealed no discernible variation in the menstrual and sociodemographic characteristics of the two groups (Table 1). During the first two months of the intervention period, there was a substantial decrease in the experimental group's mean score of the VAS and VMS when compared to the control group; however, the mean score of the PBLAC did not show this same trend (Table 2). Serum 25(OH)D levels in the experimental group were much higher than in the control group one month following the intervention period. Serum calcium levels showed no discernible variation (Table 3).

Table 1 Menstrual patterns and sociodemographic information in the two groups.

Parameter	Group I	Group II	P value
Age	22.3±1.6	22.9 ± 1.1	> 0.05
BMI	21.7±0.3	21.4±0.8	> 0.05
Skin color (light)	18/25	19/25	> 0.05
Duration of exposure to sun <1 hour > 1 hour	 17/25 8/25	 16/25 9/25	> 0.05
Age of menarche (y)	11.4 ± 1.5	11.3 ± 1.7	> 0.05
Duration of menses (days)	5.3 ± 1.2	5.1 ± 1.6	> 0.05
Menstraul cycle duration (days)	26.2 ± 1.9	26.7 ± 1.4	> 0.05
Dysmenorrhea duration (days)	2.6 ± 1.3	2.7 ± 1.8	> 0.05
Mean vit D level	10.3 ± 0.9	10.1± 0.6	> 0.05

Table 2 The VAS, VMS, and PBLAC mean scores for each of the two groups

Parameter	Group I	Group II	P value
VAS Before vit D After 1st month After 2nd month	 7.1± 0.1 4.2 ± 0.3 3.8 ±0.6	 7.2 ±0.2 7.1 ± 0.6 7.1 ± 0.5	 > 0.05 < 0.05 < 0.05
VMS Before vit D After 1st month After 2nd month	 2.1±0.8 1.3 ± 0.4 1.2 ± 0.5	 2.2±0.7 2.3 ± 0.2 2.1 ± 0.8	 > 0.05 < 0.05 <0.05
PBLAC Before vit D (cc) After 1st month (cc) After 2nd month (cc)	 88.7 ± 71.3 79.1 ± 72.2 80.8 ± 75.6	 89.1 ± 72.4 81.3 ± 74.2 85.2 ± 78.9	 > 0.05

Table 3 Serum calcium and vitamin D levels in the two groups both prior to and one month following the intervention.

Parameter	Group I	Group II	P value
Vit D (ng/ml) Before vit D After 1st month	 10.3 ± 0.9 14.2 ± 1.5	 10.1± 0.6 10.3 ± 0.5	 >0.05 <0.05
Calcium (mg/dl)			

Before vit D	9.1 ± 0.2	9.3± 0.1	>0.05
After 1st month	9.4± 0.5	9.2 ± 0.2	>0.05

4 Discussion

In the current study, supplementing with 300,000 IU of vitamin D (50,000 IU, two tablets every eight hours) five days before to the anticipated start of their next menstrual cycle for two cycles significantly decreased the degree of menstrual discomfort. When compared to the placebo group, the decrease was statistically significant. When comparing vitamin D to a placebo, there was no discernible difference in how vitamin D affected PBLAC or menstrual blood loss.

In one research, students who ate three or four servings of dairy products each day experienced dysmenorrhea far less frequently than those who did not [15].

Those with very severe dysmenorrheal pain in the other trial reported consuming considerably less dairy products than those with severe dysmenorrheal discomfort [23]. Considering that dairy products supply over 70% of the dietary calcium, the findings from the aforementioned research seem to support the findings of the current study about the role of calcium in lowering pain intensity. On the other hand, a positive correlation between the severity of dysmenorrhea and dairy product intake was found in another cross-sectional investigation [24]. This discrepancy might be due to observational studies' recollection bias or lack of control over potential confounding variables.

The calcium-vitamin D group in this experiment experienced mean pain intensity that was lower than the placebo group, but the difference was not statistically significant. There isn't a single study that evaluates the impact of using a combination calcium and vitamin D supplement on dysmenorrhea. The severity of severe dysmenorrhea was significantly reduced when a single dose of 300 000 units of oral cholecalciferol was administered five days prior to the onset of menstrual bleeding, according to the results of two trials [25, 26]. However, this effect was not significant when the pain intensity was moderate (less than 7).

The study's sample size and power are insufficient to assess if these active therapies are equivalent. We may infer from the findings of our study that the vitamin D supplement reduces pain intensity.

A review of the literature found no research on the impact of vitamin supplements, either medicinal or dietary, on the quality of life for women who have dysmenorrhea. Those who experience significant menstruation pain report lower levels of life satisfaction than persons who do not experience such discomfort.

Primary dysmenorrhea patients' quality of life in terms of their health is impacted by this discomfort. Treatments aimed at lessening the intensity of dysmenorrhea appear to improve quality of life. Home exercise helped women with dysmenorrhea significantly reduce their menstrual discomfort and improve their quality of life, according to a clinical investigation [27].

The number of participants and length of the intervention in this trial were insufficient to make any conclusions on the adverse effects, even though the study did not uncover any notable side effects of this treatment regimen.

Because of this, this study should only be viewed as a pilot study in this field; larger sample sizes are required in trials to determine whether or not this approach is preferable. Nonetheless, it appears from the findings of this study that women who have dysmenorrhea have a strong case for supplementing with vitamin D.

One of the study's strengths is that it takes several measures to prevent bias, such blinding participants and those engaged in recruiting and/or data collecting. Other aspects of this trial include measuring menstrual pain intensity and bleeding prospectively throughout the one-cycle run-in phase, following up with participants one cycle after the intervention to gauge the effect of the intervention's persistence, and documenting side effects in the diary.

We lacked a laboratory evaluation of additional biochemical parameters due to budgetary constraints. This may be viewed as a drawback of the study, particularly with regard to its generalizability, as the baseline levels of calcium and vitamin D may have an impact on the intervention results. However, when the amount of sun exposure was questioned in this study, it was found that a substantial percentage of the study group had insufficient intake of calcium and vitamin D. As a consequence, it's possible that

the study's findings cannot be applied to people that consume enough calcium and vitamin D. Given the limitations of living in a dorm with regard to exercise, diet, and other factors, further research on other female populations is necessary to ensure the generalizability of the findings.

5 Conclusion

The subgrouping analysis revealed that the degree of pain/distress in primary dysmenorrhea may be successfully relieved with a dosage of 300,000 IU vitamin D administered five days before to the menstrual cycle.

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