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**Original Article**

# Use of Cinnamon, Vitamin D and Starch Capsules to Attenuate Different Types of Dysmenorrhea

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## ABSTRACT

Dysmenorrhea disorder is a significant concern of this era in young girls at the stage of the menarche or near menstrual period. Primary dysmenorrhea is prevailing all around the world. **Objectives:** To evaluate reducing effects of Cinnamon, vitamin D and starch capsules in patients suffering from dysmenorrhea. **Methods:** The 30 candidates for each group were selected following the minimum sample size rule. The questionnaire and numeric pain rating scale were the main tools for assessing dysmenorrhea severity, reduction in dysmenorrhea, quality of life and other variables in patients. **Results:** The demographic data showed that the maximum participants belonged to middle-class families, well-educated and living in their own homes. The results depicted that Cinnamon reduced pain severity, bleeding and physical pain and improved physical activity, leisure activities, life satisfaction, health services, meaningful life and body appearance among most participants. Likewise, vitamin D also exhibited a significant reduction in dysmenorrhea symptoms and increased the quality of life among most patients. However, the effects of starch capsules were observed to be less effective than the cinnamon tea and vitamin D. **Conclusions:** The study concluded that cinnamon tea and vitamin D were the best therapy for reducing dysmenorrhea symptoms.

## INTRODUCTION

Menarche and menstrual period are a hallmark of female puberty growth [1]. According to the reported data, almost 75% of young girls face various menstrual issues, i.e., painful, abnormal, delayed, and severe menstrual bleeding [2]. Among these menstrual issues, dysmenorrhea's increasing prevalence rate is a significant threat to the health of the female population, especially young girls (school-going teenagers) who are at the stage of their initial menstrual periods. In this disease, spasmodic pain and frequent and severe cramping start in the inferior part of the abdomen. Dysmenorrhea disease arises in adolescence at the start or after 0.5-2 years of

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menstruation [3]. Dysmenorrhea is categorized into organic (uterine myoma and endometriosis leading the severe pelvic pain during the Menarche period) and functional (Ovarian disorders) depending on pathogenesis [4]. The dysmenorrhea prevalence rate is 16-91% at reproductive age leading to morbidity. Multiple factors such as general health, diet, lifestyle, working conditions, daily activities, the physical environment, and leisure activities have a significant role in the administration of menstrual symptoms. Research investigations suggest that lifestyle plays a vital role in managing anxiety, mental stress due to dysmenorrhea and triggering pressure [5]. Various therapies for dysmenorrhea and dysmenorrhea-linked diseases have been reported, but each therapy has some side effects. Among these types of treatments, herbs and wild vegetation have a miracle role in treating several diseases, especially dysmenorrhea [6]. The herbs and various spices, i.e. roses, Cinnamon, ginger and fennel, used in daily life are at the top due to their therapeutic potential and play a vital role in the management of various chronic and acute diseases and have significant potential in dysmenorrhea management [7]. Cinnamon is considered a widely used spice in ancient times. Cinnamon was several therapeutic potentials in reducing low-density lipoprotein cholesterols (LDLs-C), sugar levels in the blood, cardiovascular diseases and other cancers fighting sites and cells [8, 9]. Moreover, it is depicted to have miracle effects in medication of pain-related disordered, i.e., pelvic pain, menstrual cramps and other dysmenorrheal symptoms in young females [10]. Many in-vitro and in-vivo studies showed that Cinnamon contained higher concentrations of bioactive compounds, i.e. coumarins, diterpenoids, polyphenols, cinnamaldehyde and cinnamic acid use in pharmaceutical treatments such as anti-inflammatory attributes, i.e., analgesic, cholesterol, fat-lowering, antioxidant, antihypertensive, anti-diabetic, anti-cardiovascular, antiulcer, anticancer and antifungal [11]. Cinnamaldehyde in Cinnamon has considerable effects on various diseases, i.e., allergies, various kinds of pains, especially menstrual pain. Along with Cinnamon, Vitamin D plays a vital role as the vitamin D receptors are present in the placenta, deciduas, fallopian tube (epithelial cells), endometrium and ovarian tissue. Moreover, vitamin D's significant effects in lowering the prostaglandin output have also been observed [12]. It is created (80-90%) through the contact of predominant skin to the sunlight, and reaming is taken from diet nutrients and supplementation [13]. It also plays a considerable critical role in dysmenorrhea management. Vitamin D increases the bioavailability of calcium and maintains its homeostasis linked to pain reduction during dysmenorrhea [14]. The current study is planned to explore and evaluate the proportional impact of vitamin D and Cinnamon among females of different ages suffering from dysmenorrhea. Furthermore, vitamin D and Cinnamon's effect in reducing menstruation bleeding, pain severity and various factors affect the quality of life of females suffering from dysmenorrhea.

## METHODS

The physical measurements were taken via height, tap, board, and weight scale. The data was collected using different tools such as the participants' quality of life, pretested questionnaire (Demographic profile) and a numeric rating scale. This scale is most useful in pain surveys of the population having increased acute or chronic pain-linked diseases along with healthy people [15]. The scale in the current study was designed as: 0 (no pain), 1-3 (mild pain), 4-6 (moderate pain), and 7-10 (severe pain). The study was planned according to a randomized control trial. Nine months' trial period was designed to evaluate the pain conditions in the dysmenorrhea affected females and healthy women. Following the minimum sample size rule, the minimum number of participants should be 30. However, the calculated sample size was 22 participants for each group [16, 17]. The non-probability purposive sampling technique was utilized in this study. The participants were selected by setting inclusion and exclusion criteria to conduct the current research plan. Cooperative 18-45 years old females suffering dysmenorrhea, 16-30 years old unmarried females and women suffering from initial dysmenorrhea for the last 1-2 years were selected through inclusion criteria. However, women with amenorrhea, known mineral deficiencies, and early osteoporosis suffered from abnormal uterine bleeding in the past. Individuals remained subjects of any other study within the 90 days of this study initiation. The regulations designed by the ethical committee were followed strictly during this research, i.e., consent letters from all participants were collected, collected data and information was kept confidential, participants were guided and informed about the complete study plan, and the privacy of participants was kept in confidentiality etc. The rights of participating individuals were also considered. The adult females suffering from dysmenorrhea (n=30) were selected for the study. These were randomly categorized into control and placebo groups. Initial data on nutrient intake, socioeconomic status, anthropometric measurements and pain severity scores were collected using a numeric rating scale to evaluate the dysmenorrhea on 0-Day. Vitamin D, Cinnamon and placebo were given to the subjects for three days of the menstrual cycle to monitor their compliance. The same data was recorded on the 90th day. The variables were categorized into independent vitamin D capsules and

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cinnamon tea vs starch, supplementation intervals and age and dependent variables, i.e., NRS and questionnaire. NRS was used to measure the pain severity, and quality of life was evaluated through WHO-provided Performa for quality of life. The following treatment plan was followed for dysmenorrhea patients

**Treatment 1:** Cinnamon with dosage 3g5 and serving 200ml tea/day

**Treatment 2:** Vitamin D (sunny D) with dosage 600IU33 and serving 1 tablet/day

**Treatment 3:** Starch Tablets with dosage 250 mg and serving 1 tablet/day

The data was arranged and analyzed using the statistical software SPSS (V 25.0). The data was analyzed by using inferential and descriptive statistics. The quantitative demographic factors, i.e., income, age etc., were evaluated using means, standard deviations and standard errors. Frequencies and percentages were utilized to assess the qualitative variables. The Randomized Completely designed was used to evaluate Cinnamon and Vitamin D's statistical effects on dysmenorrhea ($p \leq 0.05$).

## RESULTS

The demographic characteristics of patients were done by focusing on the patient's education, material status, economic support, hostel residency, income status, socioeconomic status, geographical location and residential status. The detailed data about the patients selected for treating dysmenorrhea by giving different therapies such as cinnamon tea, Vitamin D and starch capsules are shown in Table 1. For each medicine, 30 candidates were selected. The most selected subjects for cinnamon treatment, vitamin D and starch capsules had done their graduation, i.e., numbers of candidates were 18, 20 and 17 in treated groups, respectively. However, the remaining candidates' education was matriculated, intermediate and post-graduation. All selected patients for the study were unmarried females. The patients were chosen for the cinnamon tea, Vitamin D, and starch capsule therapy were self-dependent (17, 9 and 7) and family-dependent (13, 21, 23). The selected patients had categorized depending on their residency, i.e., university (2, 7, and 11), day scholar (13, 12 and 13) and unknown /not applicable (15, 11, and 6). The maximum number of participants belonged to middle-class families with an income of 40,000-60,000 PKR. Geographically, most candidates belonged to urban areas such as 26, 24 and 21 for selected groups, i.e., Cinnamon, Vitamin D, and starch capsule. Maximum participants had their residency, and a few lived in rented houses in all groups.

| | Cinnamon Tea | Vitamin D | Starch Capsules |
|---|---|---|---|
| **Patient's Education** | | | |
| Matriculation | 2 | 0 | 2 |
| Intermediate | 6 | 3 | 6 |
| Graduation | 18 | 20 | 17 |
| Post-graduation | 4 | 7 | 5 |
| Total | 30 | 30 | 30 |
| **Marital Status** | | | |
| Married | 0 | 0 | 0 |
| Not married | 30 | 30 | 30 |
| Total | 30 | 30 | 30 |
| **Economic Support** | | | |
| Self | 17 | 9 | 7 |
| Family | 13 | 21 | 23 |
| Husband | 0 | 0 | 0 |
| Total | 30 | 30 | 30 |
| **University** | | | |
| Residency | 2 | 7 | 11 |
| Day scholar | 13 | 12 | 13 |
| Not applicable | 15 | 11 | 6 |
| Total | 30 | 30 | 30 |
| **Income** | | | |
| Below 20,000 | 2 | 0 | 1 |
| 20,000-40,000 | 3 | 4 | 5 |
| 40,000-60,000 | 15 | 15 | 13 |
| 60,000-80,000 | 7 | 5 | 7 |
| Above 80,000 | 3 | 6 | 4 |
| Total | 30 | 30 | 30 |
| **Socioeconomic status** | | | |
| Lower class | 1 | 4 | 2 |
| Middle class | 27 | 21 | 17 |
| High class | 2 | 5 | 11 |
| Total | 30 | 30 | 30 |
| **Geographical Location** | | | |
| Urban | 26 | 24 | 21 |
| Rural | 4 | 6 | 9 |
| Total | 30 | 30 | 30 |
| **Geographical Location** | | | |
| Own | 25 | 17 | 17 |
| Rented | 5 | 13 | 13 |
| Total | 30 | 30 | 30 |

**Table 1**: Socio-Demographic Characterization of Patients Using Cinnamon Tea, Vitamin D and Starch Capsule

The data about physical pain and dysmenorrhea treatment was also collected through the questionnaire. None of the Participants of all forms in all groups said they had no physical pain. The maximum participants in all forms (1st=12, 2nd= 13 and 3rd=10) of the cinnamon group selected they have very much physical pain, followed by the participants (1st=9, 2nd=9 and 3rd=11) suffering extreme physical pain and participants (1st=7, 2nd= 5 and 3rd=6) a moderate amount of physical pain. In the case of the vitamin D treated group, most participants were suffering from a moderate amount of physical pain, followed by

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participants having very much physical pain and participants facing a little physical pain, as shown in Figure 1B. The participants in starch capsule groups mainly were suffering from very much physical pain, followed by participants with extreme physical pain and participants with a moderate amount of physical pain, as shown in Figure 1C. The maximum participants in all forms (1st=8, 2nd= 12 and 3rd=16) of the cinnamon group preferred a little medical treatment for dysmenorrhea, followed by the participants taking a moderate medicine (1st=7, 2nd=9 and 3rd=6) and participants taking very much treatment (1st=14, 2nd= 6 and 3rd=3). In the case of the vitamin D treated group, most participants said they were taking moderate amounts of medical treatment followed by very little and a little, as shown in Figure 1E. The participants in starch capsule groups took a little treatment, followed by participants with moderate, very much and extreme medical treatments, as shown in Figure 1F.

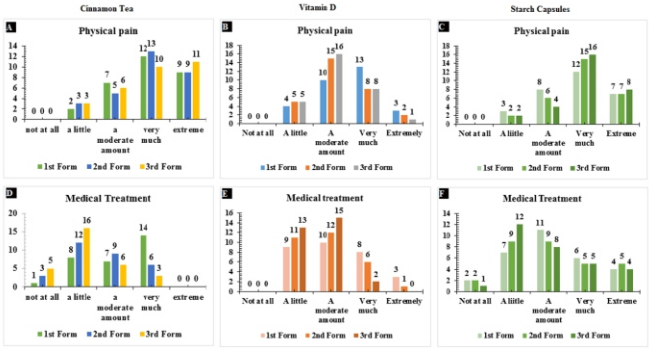



**Figure 1:** A-C: Physical Pain in cinnamon tea, vitamin D and starch capsule consuming groups accordingly, D-F: Medical treatment in cinnamon tea, vitamin D and starch capsule consuming groups accordingly

The daily work routine of the candidates, including sleep, daily activity and work capacity, were also evaluated using three forms for each variable. Most candidates were getting moderate sleep, followed by the participants with slight and completely restlessness (not at all) suffering from dysmenorrhea. Some patients slept for ample time (very much and extreme), as shown in Figure 2A. Most of the vitamin D consuming group were getting a little time for sleep, followed by the number of participants with no rest at all times, moderate sleep, very much sleep and extreme sleep. The starch capsule-consuming patients are almost equally divided into complete restlessness, little sleep and moderate sleep. However, on average of three forms, five patients were getting very much sleep, and two patients were getting extreme sleep. Most patients suffering from dysmenorrhea were doing a minor and moderate daily activity in the consuming cinnamon group. The maximum participants showed no daily activity followed by little and moderate daily activity in Vitamin D consuming group. However, in full dysmenorrhea, participants showed moderate daily activity in starch capsule-consuming groups, as shown in Figure 2F.

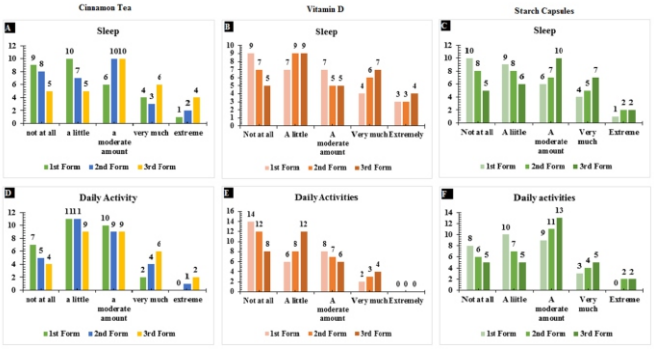
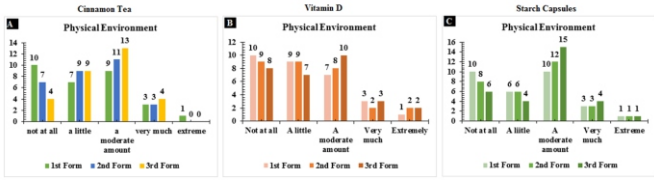



**Figure 2:** A-C: Sleeping habit of cinnamon tea, vitamin D and starch capsule consuming groups accordingly, D-F: Daily activities of cinnamon tea, vitamin D and starch capsule consuming groups accordingly

The effect of cinnamon tea, vitamin D and starch capsule treatments significantly affected the dysmenorrhea patients' physical environment and leisure activities. Cinnamon treatment affected the physical environment of maximum dysmenorrhea patients at moderate levels, followed by numbers of patients falling in litte and not at all effect of cinnamon tea of physical enviroment as shown in Figure 3A. Maximum participants of vitamin D consuming groups gave their opinion that it. D has not to effect on the physical environment. After that, participants (1st=9, 2nd=9 and 3rd=6) of the vitamin D consuming group suggested the little effect and 1st=7, 2nd=8 and 3rd=10 said that vitamin D had a moderate effect. Moreover, most starch-consuming patients said that starch capsules have mild effects on the physical environment, as shown in Figure 3C.

Cinnamon affected the leisure activities of most patients in moderate amounts, and 1st form=10 patients, 2nd Form=7 patients and 3rd Form=4 patients said that Cinnamon did not affect their leisure activity. Vitamin D did not affect the leisure activity of patients (1st form=10 patients, 2nd Form=7 patients and 3rd Form=5); a moderate effect was observed in patients (1st form=8 patients, 2nd Form=11 patients and 3rd Form=9) very much effect of vitamin D was noticed on eight patients (average of three forms). Starch capsules affected the leisure activities of most patients at moderate levels, followed by little, very much and not at all levels.



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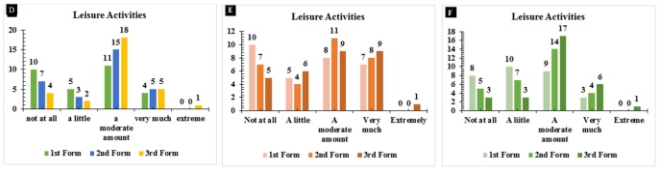


**Figure 3:** A-C: Physical environment of cinnamon tea, vitamin D and starch capsule consuming groups

F: Medical treatment in cinnamon tea, vitamin D and starch capsule consuming groups accordingly

The daily work routine of the candidates, including sleep, daily activity and work capacity, were also evaluated using three forms for each variable. Most candidates were getting moderate sleep, followed by the participants with slight and completely restlessness (not at all) suffering from dysmenorrhea. Some patients slept for ample time (very much and extreme), as shown in Figure 2A. Most of the vitamin D consuming group were getting a little time for sleep, followed by the number of participants with no rest at all times, moderate sleep, very much sleep and extreme sleep. The starch capsule-consuming patients are almost equally divided into complete restlessness, little sleep and moderate sleep. However, on average of three forms, five patients were getting very much sleep, and two patients were getting extreme sleep. Most patients suffering from dysmenorrhea were doing a minor and moderate daily activity in the consuming cinnamon group. The maximum participants showed no daily activity followed by little and moderate daily activity in Vitamin D consuming group.

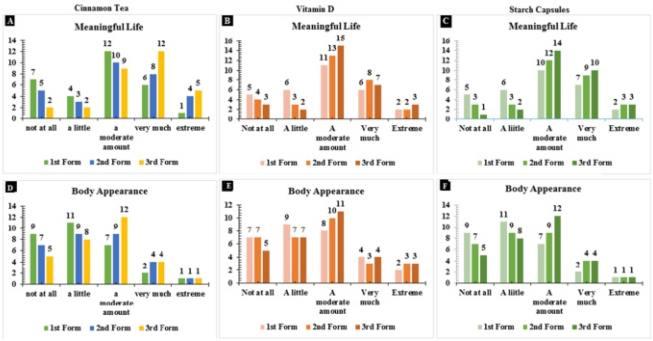


**Figure 4:** A-C: Meaningful life of cinnamon tea, vitamin D and starch capsule consuming groups accordingly,

D-F: Body appearance of cinnamon tea, vitamin D and starch capsule consuming groups accordingly

The Cinnamon enhanced the satisfaction level of life of the patient not at all (5, 4 and 2 patients at 1st, 2nd and 3rd form) a little (8, 5 and 2 patients at 1st, 2nd and 3rd form), moderate (11, 9 and 9 patients at 1st, 2nd and 3rd form), very much (5, 11 and 15 patients at 1st, 2nd and 3rd form) and extreme level (1,1 and 2 patients at 1st, 2nd and 3rd form). The effects of vitamin D were equal on the satisfaction level of life of patients, i.e., 6, 5, and 3 patients at 1st, 2nd and 3rd form had no effect of vitamin D on their satisfied life. 7, 7 and 6 patients at 1st, 2nd and 3rd form had little impact of vitamin D on their satisfied life. 5, 4, and 6 patients at 1st, 2nd and 3rd record had a moderate effect of vitamin D on their satisfying life, and the remaining patients suggested the extreme impact of vitamin D.

At the end of the study, the numeric pain scale was utilized to evaluate the effects of cinnamon tea, vitamin D and starch capsule treatment. Before cinnamon treatment at 1st, 2nd, and 3rd form, 5, 7, and 12 patients had mild pain, 11, 13, and 16 patients had moderate pain, and 16, 11, and 4 dysmenorrhea patients had severe pain accordingly, which reduced significantly by cinnamon treatment. The same trends were shown by the treatment of vitamin D and starch capsules, but their effects were slightly less than Cinnamon, as shown in Figure 5D-F.

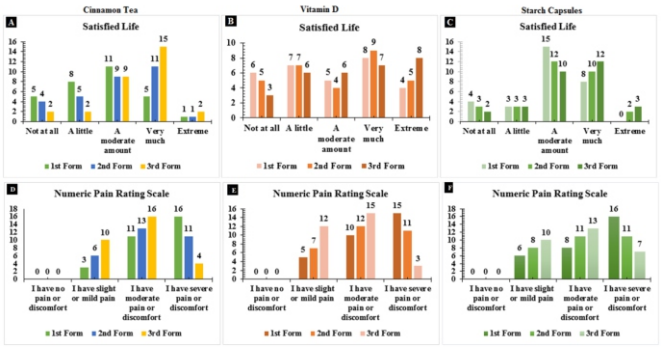


**Figure 5:** A-C: Satisfied life of cinnamon tea, vitamin D and starch capsule consuming groups accordingly, D-F: Numeric pain rating scale of cinnamon tea, vitamin D and starch capsule consuming groups accordingly

## DISCUSSION

The candidates were diagnosed with various diseases at the start of the study, including uterus-related pathological disorders, polycystic ovary syndrome, other medical conditions and diagnosis of dysmenorrhea. There were 3 participants in both Cinnamon and vitamin D groups, and 2 in starch capsule treated groups had uterus-related pathogenic disorders. The symptoms of polycystic ovary syndrome were observed in 2 candidates in cinnamon groups, 6 participants in the vitamin D group and 4 in the starch capsule group. The Cysts were noticed in 3 participants in the cinnamon group and 4 in the vitamin D and starch capsule group. Moreover, the collected data showed that more participants were affected by primary dysmenorrhea, i.e., 25, 24 and 26 in Cinnamon, vitamin D and starch capsule treated groups. However, 1-4 participants were suffering from moderate and severe dysmenorrhea. Cinnamon is selected for the management of dysmenorrhea disorder. Cinnamon, as a coagulant, helps prevent bleeding during dysmenorrhea disorder [18]. Vitamin D plays a crucial role in reducing dysmenorrhea disorder as a randomized control trial was suggested to

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prevent and administrate the primary dysmenorrhea disorder [19]. Heidarifar et al., [20] reported that the Starch capsule significantly reduced the severity of primary dysmenorrhea. The decreased in physical pain and medical treatment of the participants taking cinnamon tea, Vitamin D and Starch capsule were noticed in current study. Gutman et al., [21] showed that Cinnamon reduced the physical pain in dysmenorrhea and the medications in patients. Jahangirifar et al., [22] reported the inline results to the current study. The daily work routine of the candidates, including sleep, daily activity and work capacity, were also improved significantly in the petientsof dysmenorrhea. A study conducted in Saudia Arabia supported the current study and resulted that Cinnamon improved the sleeping pattern of 86.5% of people [23].

Most patients suffering from dysmenorrhea were doing a minor and moderate daily activity in the consuming cinnamon group which was considered the main reason of the cyclic cramps in start and improved after cinnomon consumtion. A critical study trial suggested that Cinnamon prevents the cyclic cramps in the pelvic during primary dysmenorrhea that alters the patients' daily activities [22]. The physical enviroment and leisure activities were the main factors leading to the dysmenorrhea. The given treatments reduced the symptoms and ailments of dysmenorrhea in their currrent physical enviroment and leisure activities. A controlled case study in Scotland also resulted that Vitamin D improved the physical environment in perturbations of disease-susceptible patients [24]. Fareena Begum [25] reported that vitamin D improved the patients' leisure activity time and reduced the primary dysmenorrhea-linked symptoms. The overall health condition was improved in the patients of cinnamon consuming groups. According to a study, cinnamon improved the health conditions of patients suffering from dysmenorrhea when used as an alternate medicine option [18]. Mu et al., [26] suggested that vitamin D is a critical element in enhancing the patients' meaningful life and physical environment with polycystic ovary syndrome. Vitamin D showed a moderate impact on maximum patients, very much effect and extreme effect on their body appearance was also observed. Cinnamon improves the cellular levels that will enhance body appearance attributes [27]. During treatment of the patients, the Satisfaction level of the patients was considered. The results indicated that the satisfaction level was greater in maximum number of participants treated with cinnamon tea. A study reported that the cinnamon tea significantly improved the satisfaction level of patients [28]. Moreover, at the end of the study, the numeric pain scale was utilized to evaluate the effects of cinnamon tea, vitamin D and starch capsule treatment. The numeric pain rating scale suggested that the severity of dysmenorrhea was decreased due to cinnamon tea consumption, which acts as a pain reliever. A study concluded that Cinnamon reduced the severity of primary dysmenorrhea [25]. Huang et al., [29] reported that vitamin D improved quality of life, sleep and pain reduction.

## CONCLUSION

The current study concluded that cinnamon and vitamin D significantly reduced pelvic pain and dysmenorrhea symptoms. Cinnamon extracts and vitamin D supplementation can be utilized against the various kinds of dysmenorrhea disorders to reduce belly cramps, severe pains and bleedings, and improve the quality of life, daily activities and satisfaction levels of life among the young girls.

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