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DEVELOPMENT OF FUNCTIONAL FOOD BASED ANTI-CRAMP SHOTS FOR MENSTRUAL CRAMP RELIEF

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ABSTRACT:

Menstrual cramps (dysmenorrhea) can greatly impact women's daily life, often causing pain, fatigue, and discomfort due to elevated prostaglandin levels. This study aimed to create "Anti-Cramp Shots," a convenient functional food made with turmeric, ginger, dates, flax seeds, sunflower seeds, and dark chocolate to naturally ease menstrual pain. Nutritional profiling, sensory evaluation, and shelf-life testing showed the product to be safe, palatable, and beneficial for managing menstrual discomfort.

Keywords: Dysmenorrhea, functional food, anti-cramp shots, menstrual wellness, nutritional evaluation

INTRODUCTION:

Primary dysmenorrhea is defined as cramping pain in the lower abdomen occurring just before or during menstruation, in the absence of other diseases such as endometriosis. Initial presentation of primary dysmenorrhea typically occurs in adolescence (Andrew S. Coco et al., 2021)

'Difficult monthly flow' is the Greek word for dysmenorrhea, which is often used to describe painful menstruation.
The easiest way to categorize dysmenorrhea is as primary and secondary.

- Menstrual cramps that are uncomfortable and unrelated to any physical abnormalities or discernible pelvic illness are a symptom of primary dysmenorrhea.
- Secondary dysmenorrhea is characterized by painful menstrual cramps brought on by a particular pelvic abnormality, such as endometriosis, pelvic inflammatory disease, narrowing of the cervical opening, adhesions, ovarian cysts, congenital abnormalities, polyps, or uterine fibroids. (Eugenia Vlachou, et al., 2019)

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In dysmenorrhea, elevated levels of prostaglandins—mainly PGF2α and PGE2—are produced during endometrial shedding. These cause vasoconstriction, strong myometrial contractions, and reduced uterine blood flow, leading to ischemia, accumulation of anaerobic metabolites, and pelvic pain. Prostaglandins are formed through the cyclooxygenase (COX) pathway from arachidonic acid, whose release is controlled by progesterone. In the mid-luteal phase, progesterone peaks, but if conception does not occur, its sharp decline triggers endometrial breakdown, lysosomal enzyme release, and a surge in prostaglandin synthesis. Research shows that women with dysmenorrhea have significantly higher prostaglandin concentrations in the endometrium compared to those without, directly correlating with pain intensity and associated symptoms. (Lama Soubra, et al., 2022)

Dysmenorrhea affects over 30% of women worldwide, causing menstrual cramps and pain that significantly impact daily life and overall well-being. In severe cases, the pain can even require hospitalization. Despite growing awareness of gender equality, menstrual pain remains a taboo and underrecognized issue in many developed nations. Managing dysmenorrhea effectively requires medical guidance, as symptoms vary greatly between individuals. This review highlights how dysmenorrhea affects quality of life, explores its molecular mechanisms, and summarizes current therapeutic options—including pharmacological, botanical, and non-pharmacological approaches. Since no single treatment works for everyone, combining medications with supportive therapies may offer the most effective management. (Hernan Cortes C et al.,2023)

The term "nutraceutical" combines nutrition and pharmaceuticals, referring to foods or dietary components that support normal physiological functions. While drugs are commonly used to treat dysmenorrhea, they often come with adverse effects. Research shows that dietary supplements and lifestyle modifications can significantly influence its occurrence and management. A review of studies from 2000–2022 across databases like PubMed, NCBI, ScienceDirect, and WHO highlights the role of supplements, herbs, and balanced nutrition in reducing menstrual discomfort. Current evidence emphasizes educating young women on proper use of vitamins, supplements, exercise, and healthy eating habits to help manage dysmenorrhea effectively. (Pranay Gupta, et al., 2025)

REVIEW OF LITERATURE:

Gail Gutman et al.,2022 research shows that 41–91% of young women experience dysmenorrhea. Primary dysmenorrhea, caused by prostaglandin overproduction, leads to cramping pain in the lower abdomen or pelvis just before or during menstruation, typically lasting one to three days. Secondary dysmenorrhea, however, results from conditions like fibroids or endometriosis. Symptoms include abdominal cramps, headaches, nausea, and vomiting. Diagnosis is mainly clinical. Treatment often

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involves NSAIDs or hormone therapy, supported by lifestyle changes like exercise and alternative remedies such as herbal supplements.

Itani R, et al., 2022 explained Primary dysmenorrhea (PD) is a common yet often overlooked condition in young and adult women, marked by severe lower abdominal cramps starting just before or at menstruation and lasting up to three days. It significantly affects quality of life, often leading to missed work or school. The pain is linked to excess prostaglandin release which Trigger strong uterine contractions, reduce uterine blood flow causing ischemic pain, heighten nerve sensitivity, worsening discomfort, and may be accompanied by headaches, fatigue, mood changes, nausea, or digestive issues. Treatment includes NSAIDs, hormonal therapy, and non-drug methods like heat or exercise, with regular monitoring for effectiveness and side effects.

Syeda Tuba Imam et al., 2023 Dysmenorrhea is caused by excess production of prostaglandins and cytokines during menstruation. While NSAIDs are commonly used for pain relief, their long-term use can lead to side effects like infertility, hormonal imbalance, nausea, and irregular cycles. A new topical formulation containing menthol, cinnamaldehyde, quercetin, and trans-anethole offers strong anti-inflammatory and anti-spasmodic effects with fewer adverse reactions. Menthol provides cooling relief and eases nausea, vomiting, and diarrhea, while anethole regulates calcium and potassium channels to reduce uterine contractions. Quercetin and cinnamaldehyde block pro-inflammatory cytokines, lowering inflammation. This oil-in-water cream is designed for easy application, quick skin penetration, and targeted action on the uterus, making it safer and more effective than traditional NSAIDs. It will undergo various quality and safety tests, including skin permeation, sterility, viscosity, and sensory evaluations.

Ying-Yu Zhong et al., 2025 The study aimed to compare the pain reduction effects of ethnic medicinal plant extracts and nonsteroidal anti-inflammatory drugs (NSAIDs) in women with primary dysmenorrhea. A total of 12 pieces of literature were included. Meta-analysis showed that there was no significant difference between ethnic medicinal plant extracts and NSAIDs in reducing the Visual Analog Scale (VAS) pain scores for primary dysmenorrhea (SMD = 0.32, 95% CI (–0.14, 0.78), p = .17). However, ethnic medicinal plant extracts were more effective than NSAIDs in reducing the proportion of people with pain, with a slight difference (OR = 1.75, 95% CI (1.02, 3.02), p < .05). And this study concluded that ethnic medicinal plant extracts can effectively reduce the VAS pain scores in women with primary dysmenorrhea and the proportion of people with pain. The effect is comparable to or even better than that of NSAIDs, with fewer side effects. Therefore, ethnic medicinal plant extracts can be considered as a clinical option to alleviate menstrual pain.

Petra V Kolic et al.,2021. The menstrual cycle, a natural biological process, often brings physical symptoms that affect women's emotions, thoughts, and daily activities. This study used a mixed-method approach to explore how menstruation impacts physical

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activity in adult women. An online survey of 128 participants assessed symptoms like bleeding, pain, and fatigue, while 21 respondents shared their personal experiences in interviews. Of the surveyed women, 44 avoided physical activity during menstruation, reporting heavier flow, longer periods, and more discomfort than the 84 who did not. Interviews revealed two main responses—complete avoidance of exercise or adapting activities to cope with symptoms. Menstrual symptoms, personal beliefs, and social perceptions all influenced these decisions. The findings stress the need to consider both physical and social factors to better understand and normalize physical activity during menstruation.

MATERIALS AND METHODOLOGY:

The study was conducted at Kasturba Gandhi Degree and PG College, Manasa ladies hostel at West Marredpally focusing on menstruating women across all age groups. Data for the research was gathered using a structured questionnaire, ensuring that participants could comfortably share their experiences and insights. A sample size of 100 participants were selected to provide clinical data related to the study, while an additional 50 non-trained panel members were involved in the sensory evaluation of the developed product, allowing for a well-rounded understanding of both clinical and sensory aspects.

Anti cramp shots were developed by using functional bioactive-rich ingredients such as dates, fenugreek seeds, turmeric powder, ginger powder, sunflower seeds, pumpkin seeds, flax seeds, and dark chocolate. Anti cramp shots are developed in such a way that support menstrual health, reduce menstrual cramps and supply essential nutrients for cramp prevention naturally.

Ingredients used for preparation of product: Fresh dates, pumpkin seeds, sunflower seeds, flax seeds. Fenugreek seeds, turmeric powder, ginger powder, jaggery, dark chocolate, almonds.

Method of preparation:

1. Take a pan, add sunflower seeds, pumpkin seeds, flax seeds, fenugreek seeds, and saute on a simmer for 15-20 mins.
2. Make the sauted seeds into fine powder by adding ginger powder and turmeric powder.
3. Take dates and remove the seeds. Mix the dates as a paste.
4. Take the seed mix powder, dates, and jaggery into a bowl and mix thoroughly.
5. Make small sized shots with the mixture and keep aside.
6. Now, take dark chocolate and melt it by the double boiler method.
7. Take prepared shots into a plate and coat with melted chocolate.
8. Add grated almonds as toppings and refrigerate for an hour.

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9. Now, Anti Cramp shots are ready to eat.

Sensory evaluation:

The present study was conducted using a 5 point hedonic scale. Sensory evaluation test was conducted for parameters such as Appearance, colour, texture, taste and overall acceptability. A total of 50 untrained panelists were randomly opted, served panelits. Organoleptic evaluations were carried out using 5-hedonic scale, the scale ranges from 5-excellent to 1-very poor.

RESULTS AND DISCUSSION:

The study revealed that the majority of participants (89%) reported having a regular menstrual cycle, while only a small proportion (11%) experienced irregular or unpredictable cycles. Most participants (71%) reported a menstrual duration of 3–5 days, with very few experiencing cycles shorter than 3 days or longer than 7 days. Menstrual cramps were common among the participants, with only 13% reporting no cramps. Nearly half of them (46%) experienced moderate pain levels (rated 6–10), followed by those reporting mild cramps, while only a small number experienced severe pain or none at all. In terms of duration, most participants reported experiencing cramps for one day (27%) or often (22%), with a few experiencing them for just an hour (5%) or not at all (13%). Furthermore, 87% of participants did not report any underlying health conditions, while 13% were diagnosed with issues such as anemia or polycystic ovary syndrome (PCOS). Interestingly, the study also highlighted that most participants did not consume functional foods for menstrual cramp relief, with only 22% reporting their use, indicating a relatively low level of awareness regarding their benefits.

To know the significant acceptance of the anti-cramp shots from the information obtained from sensory evaluation (where n=50) statistically, t-test, standard deviation, tests were performed.

STATISTICAL ANALYSIS OF SENSORY EVALUATION

Product	Appearance	Colour	Texture	Taste	Overall acceptability
Mean	4.56	4.58	4.72	3.72	4.54
Std deviation	0.0912	0.0916	0.0944	0.07	0.089
t-value	130	131.6	132.3	80	128.3

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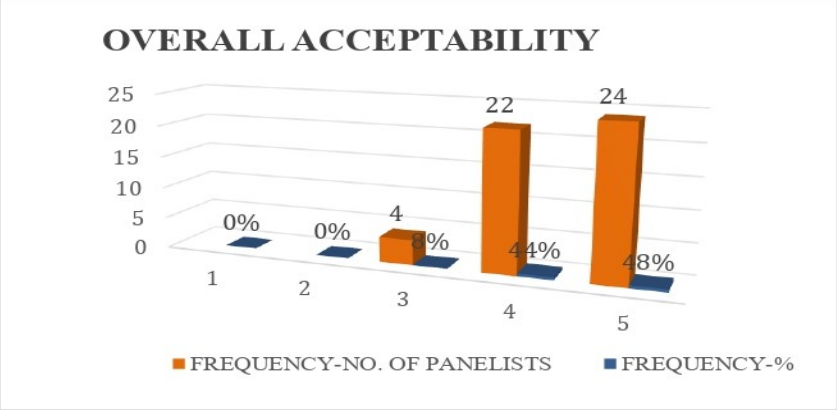

Fig 1: Frequency and percentage of overall acceptability

The one-sample t-test indicates that the mean acceptability score of 4.54 is significantly above the neutral score of 3 ($p < 0.0001$). This demonstrates that the panelists statistically favored the product. Consequently, the product is considered well-received and positively evaluated.

NUTRITIONAL ANALYSIS OF ANTI- CRAMP SHOTS

S.NO	TEST PARAMETER	UNIT OF MEASUREMENT	TEST METHOD	TEST RESULT
1	Energy	kcal/100 g	Calculated	444.7
2	Carbohydrates *Sugars* *Dietary Fiber*	g/100 g g/100 g g/100 g	FSSAI/AOAC 20th Edition	55.9 12.8 1.5
3	Total Fat	g/100 g	FSSAI/AOAC 20th Edition	14.3
4	Protein	g/100 g	FSSAI/AOAC 20th Edition	23.1
5	Moisture	%	FSSAI/AOAC 20th Edition	4.5

Shelf life study:

The product stored at room temperature for 15 days maintained good texture and color but developed slight rancidity due to oil oxidation of seeds. The product stored in an airtight container retained its texture, color, appearance, and taste. And the product

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stored in the refrigerator (0–4°C) and later exposed to room temperature preserved its appearance and colour but showed a slight change in texture, becoming little hard.

CONCLUSION:

This study developed Anti-Cramp Shots, a functional food product made with natural ingredients like turmeric, ginger, dates, flax seeds, sunflower seeds, and dark chocolate to help manage primary dysmenorrhea, a common menstrual condition caused by elevated prostaglandin levels leading to painful uterine contractions. Designed as a safer alternative to painkillers and hormonal treatments, these shots provide anti-inflammatory, muscle-relaxing, and mood-boosting benefits while offering essential nutrients. Tested for nutritional value, sensory acceptability, and shelf life, they proved effective and well-suited for regular use, highlighting the potential of natural, food-based solutions in reducing menstrual pain, improving mood, and supporting overall well-being, with further large-scale studies recommended.

FUTURE RECOMMENDATIONS:

- Conducting controlled human studies will help validate the effectiveness and safety of the anti-cramp shots, ensuring credibility and consumer trust.
- Future versions of the product can be customized based on hormonal profiles, dietary habits, or pain severity, offering a more targeted and effective solution.
- Adding well-researched adaptogens like ashwagandha or herbal extracts such as ginger, fennel may enhance the anti-inflammatory and soothing properties of the shots.
- Developing biodegradable or reusable packaging can align the product with environmentally conscious consumer values and reduce plastic waste.
- Enhancing palatability and increasing shelf life without artificial preservatives can improve user experience and market reach.

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