

## "Impact Of Daily Probiotic-Enriched HETAFU Nutrismart Candy on Gut Health: A 3-Month Interventional Study"

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### KEYWORDS

Probiotics, DHA, Phosphatidylserine, Gut microbiota, Oral health, Functional foods, Fermented foods, Dietary habits, HETAFU NUTRISMART candy, Immune modulation.

### ABSTRACT

**Background:** Probiotic supplementation has gained increasing attention for its potential benefits in digestive, oral, and immune health. This study evaluates the effects of HETAFU NUTRISMART candy, a novel formulation containing probiotics, essential oils, DHA, and phosphatidylserine, on a diverse participant population with varied dietary habits and health backgrounds.

**Methods:** The study included participants with a nearly balanced gender distribution (47.5% females, 52.5% males) and a range of dietary patterns. Data were collected on medical history, probiotic consumption experience, and dietary habits, including fermented food intake. Self-reported health improvements and tolerability were assessed.

**Results:** A substantial proportion of participants reported digestive issues (50.5%), oral health conditions (55.0%), and immune-related conditions (46.0%), making them an ideal demographic for probiotic supplementation. Medication use (32.0%) and dietary habits, including high-fat (17.0%) and high-sugar (16.5%) intake, may have influenced gut microbiota composition and response to probiotics. The majority of participants found probiotic consumption easy (68.0%), and side effects were minimal, with 53.0% experiencing none and only 12.0% reporting mild bloating. Regular fermented food intake was associated with a higher likelihood of reporting digestive benefits.

**Conclusion:** HETAFU NUTRISMART candy demonstrated potential benefits for digestive and oral health with high acceptability and minimal side effects. The findings support the role of probiotics, DHA, and phosphatidylserine in modulating gut and oral microbiota. Future studies with objective microbiological assessments and longer follow-up are recommended to confirm these results.

### Introduction

Gut health is fundamental to overall well-being, influencing digestion, immune function, and even neurological processes. The human gastrointestinal tract is home to trillions of microorganisms, collectively known as the gut microbiota, which play a crucial role in maintaining digestive balance, synthesizing essential nutrients, and protecting against pathogens.<sup>1</sup> Disruptions in this microbial ecosystem have been associated with various gastrointestinal disorders, including bloating, constipation, and abdominal discomfort, as well as systemic health issues such as metabolic diseases and mood disorders.<sup>2</sup>

In recent years, probiotics—live beneficial bacteria—have gained attention for their role in restoring microbial balance and improving gut health. When consumed in adequate amounts, probiotics contribute to better digestion, enhanced nutrient absorption, and immune system modulation. In addition to *Bacillus coagulans*, certain bioactive compounds such as essential oils, **docosahexaenoic acid (DHA)**, and **phosphatidylserine** have been explored for their potential synergistic effects on gut and brain health.<sup>3</sup>

*Bacillus coagulans* is a spore-forming, lactic acid-producing bacterium that has garnered attention for its probiotic properties. Its unique ability to withstand extreme conditions, such as high temperatures and the acidic

environment of the stomach, makes it an ideal candidate for inclusion in various food products, particularly those intended to support gut health.<sup>4</sup>

In the case of HETAFU candy, *Bacillus coagulans* plays a pivotal role in promoting oral health. When incorporated into candy formulations, this probiotic helps balance the oral microbiome by encouraging the growth of beneficial bacteria while inhibiting harmful microorganisms like *Streptococcus mutans*, which are known to contribute to dental caries.<sup>4</sup>

The stability of *Bacillus coagulans* ensures its efficacy even in the candy form, where it may be exposed to varying temperatures during production and storage. As the candy dissolves in the mouth, the spores of *Bacillus coagulans* remain viable, traveling to the gut where they can exert their beneficial effects.<sup>4</sup>

**DHA**, an omega-3 fatty acid primarily found in marine sources, is widely recognized for its critical role in brain function, inflammation regulation, and cell membrane integrity. Emerging research suggests that DHA may also influence gut health by modulating the gut microbiome composition, reducing intestinal inflammation, and improving gut barrier function. Omega-3 fatty acids, including DHA, have been shown to promote the growth of beneficial gut bacteria while suppressing the proliferation of harmful microorganisms, leading to improved gut homeostasis.<sup>5</sup>

**Phosphatidylserine**, a phospholipid essential for cell membrane structure and function, has been extensively studied for its neuroprotective effects. It plays a key role in neuronal communication, cognitive function, and stress response. While its primary benefits are associated with brain health, recent studies suggest a potential gut-brain axis connection, where phosphatidylserine may help regulate gut motility and alleviate stress-related gastrointestinal symptoms. Given that psychological stress is a known trigger for gut disorders such as irritable bowel syndrome (IBS), phosphatidylserine supplementation could provide indirect benefits for digestive health by modulating the gut-brain axis.<sup>6</sup>

HETAFU Nutrismart candy is a novel functional food product formulated to support gut health through a combination of **probiotics, essential oils, DHA, and phosphatidylserine**. This study aimed to evaluate the impact of daily consumption of HETAFU Nutrismart candy over a three-month period on self-reported digestive health outcomes. The primary focus was on symptom relief, including reductions in bloating, constipation, and abdominal discomfort. Additionally, participant satisfaction, ease of use, and product acceptability were assessed to determine its practicality as a gut health intervention.

By integrating probiotics with DHA and phosphatidylserine, HETAFU Nutrismart candy offers a **multifunctional approach to digestive wellness**, potentially addressing gut health through both direct microbiome modulation and indirect gut-brain axis interactions. This study seeks to contribute valuable insights into the efficacy and user experience of this innovative gut health supplement.

## Rationale of the study

The human gut microbiome is crucial for digestive health, immune function, and overall well-being. Disruptions in gut microbiota balance can lead to gastrointestinal issues and systemic effects like weakened immunity and inflammation. Probiotics, live beneficial bacteria, have gained attention for their potential to restore gut microbial balance and improve digestive and immune health. HETAFU Nutrismart candy, a probiotic-enriched, chewable formulation, is an innovation that supports gut health while offering an enjoyable and convenient mode of consumption. The candy contains docosahexaenoic acid (DHA) and phosphatidylserine, which provide neuroprotective and anti-inflammatory benefits. The synergistic effect of probiotics, DHA, and phosphatidylserine could offer enhanced digestive, cognitive, and immune benefits. This study aimed to evaluate the real-world effectiveness and acceptability of HETAFU Nutrismart candy over a three-month intervention, analyzing self-reported improvements in digestive health, oral health, and immunity. The findings could contribute to the development of novel probiotic delivery systems and expand research on the role of functional foods in gut health and overall wellness.

## Methodology

### Study Design

This study was a **three-month interventional trial** designed to assess the impact of daily consumption of **HETAFU Nutrismart candy** on digestive health, oral health, immune health, and overall well-being. The study utilized a **self-reported questionnaire** to evaluate participants' experiences, ease of use, perceived benefits, and potential side effects. The results were analyzed using descriptive statistical methods to determine trends in participant responses.

### Participant Recruitment and Selection Criteria

A total of **200 participants** were recruited for the study based on specific eligibility criteria. Participants were **adults aged 18 to 65 years**, with a willingness to consume HETAFU Nutrismart candy daily for **12 weeks** and provide detailed feedback through a questionnaire. Those with **self-reported mild to moderate digestive discomfort** such as bloating, constipation, burping, or abdominal pain were included. Participants with **major dietary restrictions, diagnosed chronic gastrointestinal disorders, recent antibiotic or probiotic use, severe immune-related conditions, pregnancy, or lactation** were excluded to minimize confounding factors.

### Intervention and Compliance

Each participant consumed **one HETAFU Nutrismart candy daily** for a duration of 12 weeks. The candy contained a **combination of probiotics, essential oils, DHA, and phosphatidylserine**, aimed at improving gut health, immune function, and overall wellness. Participants were required to **log their daily consumption**, and those who missed more than **five consecutive days** were classified as **non-compliant** and excluded from the final analysis.

### Data Collection

At the end of the intervention, participants completed a structured questionnaire that collected **demographic details, dietary habits, medical history, probiotic consumption experience, and health outcomes**. The questionnaire included both **closed-ended and open-ended responses** to gather qualitative and quantitative insights.

Demographic data included **age, gender, occupation, and education level**. Participants were asked about their **dietary patterns**, including whether their diet was balanced, high-fat, high-sugar, or vegetarian. They were also asked about any **dietary restrictions** such as **gluten-free or vegan diets** and their frequency of consuming **fermented foods** (daily, weekly, occasionally, or never).

Medical history was recorded, covering **previous digestive issues (bloating, burping, constipation, abdominal pain), history of gum disease or dental caries, and immune-related conditions (e.g., asthma, allergies, or other chronic conditions)**. Participants were also asked about their **current medications** to assess any potential interactions.

### Evaluation of Product Experience and Health Outcomes

Participants rated the **ease of probiotic consumption** on a scale from **very easy to difficult**. They also reported any **side effects experienced** and rated the **taste and palatability** of the product as poor, average, good, or excellent.

To assess health outcomes, participants provided self-reported ratings for changes in **digestive health, oral health, immune function, and overall well-being**. The **digestive health section** evaluated improvements in **abdominal pain, bloating, burping, and constipation**, while the **oral health section** focused on **gum health, breath freshness, and dental sensitivity**. The **immune health section** examined **changes in the frequency of colds, infections, or general well-being**.

Participants rated their **overall health improvement** on a scale of **"no improvement," "slight improvement," "significant improvement," or "no change."** They were also asked to identify the **most liked aspect** of the product, with common responses including **"convenience" and "health benefits."** Additionally, participants noted **challenges faced**, such as **"remembering to take the supplement daily."**

Finally, participants were asked if they would **recommend the probiotic to others**, with responses categorized as **"yes," "no," or "unsure."** Open-ended comments were collected to gain further insights into individual experiences, including whether they found the product highly effective, satisfactory, or had any specific concerns.

### Data Analysis

Descriptive statistics were used to analyze participant responses. **Frequency distributions** were calculated for categorical variables, including **dietary habits, health conditions, and probiotic acceptability ratings**. Changes in **digestive health, oral health, and immune function** were analyzed using **paired proportions** to determine whether significant trends emerged. Participant feedback on **taste, ease of use, and effectiveness** was summarized to assess overall product acceptability.

## Ethical Considerations

All participants provided **informed consent** before enrollment, and the study adhered to **ethical research guidelines**, ensuring **confidentiality and voluntary participation**. Participants were informed of their right to **withdraw from the study at any time** without any consequences.

## Results

The study included a total of 200 participants, with a nearly balanced gender distribution of 95 females (47.5%) and 105 males (52.5%). In terms of occupation, the participants came from diverse backgrounds, with 36 (18.0%) being homemakers, 48 (24.0%) professionals, 39 (19.5%) students, and 77 (38.5%) belonging to other occupational categories, which may include self-employed individuals, retirees, or unemployed persons. Regarding education level, 51 participants (25.5%) had completed primary education, 33 (16.5%) had secondary education, 38 (19.0%) were graduates, 44 (22.0%) were postgraduates, and 34 (17.0%) fell into other educational categories, possibly including vocational training or incomplete formal education. This demographic distribution provides valuable insights into the varied backgrounds of the participants, which may influence their perspectives and responses in the study as shown in table 1.

**Table 1: Demographic Characteristics**

| Category               | Frequency | Percent (%) |
|------------------------|-----------|-------------|
| <b>Gender</b>          |           |             |
| Female                 | 95        | 47.5        |
| Male                   | 105       | 52.5        |
| <b>Occupation</b>      |           |             |
| Homemaker              | 36        | 18.0        |
| Other                  | 77        | 38.5        |
| Professional           | 48        | 24.0        |
| Student                | 39        | 19.5        |
| <b>Education Level</b> |           |             |
| Graduate               | 38        | 19.0        |
| Other                  | 34        | 17.0        |
| Postgraduate           | 44        | 22.0        |
| Primary                | 51        | 25.5        |
| Secondary              | 33        | 16.5        |

**Table 2: Dietary Habits and Restrictions**

| Category                    | Frequency | Percent (%) |
|-----------------------------|-----------|-------------|
| <b>Overall Diet</b>         |           |             |
| Balanced                    | 42        | 21.0        |
| High fat                    | 34        | 17.0        |
| High sugar                  | 33        | 16.5        |
| Low fiber                   | 45        | 22.5        |
| Other                       | 46        | 23.0        |
| <b>Dietary Restrictions</b> |           |             |
| Gluten-free                 | 35        | 17.5        |
| None                        | 39        | 19.5        |
| Other                       | 34        | 17.0        |
| Vegan                       | 49        | 24.5        |
| Vegetarian                  | 43        | 21.5        |

The dietary habits and restrictions of individuals who were given HETAFU NUTRISMART candy were analysed and were depicted in table 2. Regarding overall diet, 21.0% of participants followed a balanced diet, while 17.0% consumed a high-fat diet, and 16.5% had a high-sugar intake. A low-fiber diet was reported by 22.5% of participants, whereas 23.0% followed other dietary patterns. In terms of dietary restrictions, 24.5% of individuals identified as vegan, and 21.5% followed a vegetarian diet. Additionally, 17.5% adhered to a

gluten-free diet, while 19.5% reported no dietary restrictions. Another 17.0% had other unspecified dietary limitations.

**Table 3: Health Conditions and Medical History**

| Category                                    | Frequency | Percent (%) |
|---------------------------------------------|-----------|-------------|
| <b>Medication Use</b>                       |           |             |
| No                                          | 136       | 68.0        |
| Yes                                         | 64        | 32.0        |
| <b>History of Digestive Issues</b>          |           |             |
| No                                          | 99        | 49.5        |
| Yes                                         | 101       | 50.5        |
| <b>History of Gum Disease/Dental Caries</b> |           |             |
| No                                          | 90        | 45.0        |
| Yes                                         | 110       | 55.0        |
| <b>History of Immune-related Conditions</b> |           |             |
| No                                          | 108       | 54.0        |
| Yes                                         | 92        | 46.0        |
| <b>Other Medical History</b>                |           |             |
| Allergy                                     | 44        | 22.0        |
| Asthma                                      | 48        | 24.0        |
| None                                        | 50        | 25.0        |
| Other                                       | 58        | 29.0        |

The health conditions and medical history of participants included in study were assessed and were depicted in table 3. In terms of medication use, 32.0% of individuals reported taking medications, while 68.0% did not. A history of digestive issues was present in 50.5% of participants, whereas 49.5% had no such concerns. Regarding oral health, 55.0% reported a history of gum disease or dental caries, while 45.0% did not. Additionally, 46.0% of participants had a history of immune-related conditions, whereas 54.0% had none. When examining other medical conditions, 22.0% of individuals had allergies, 24.0% had asthma, and 29.0% reported other unspecified conditions, while 25.0% had no medical history of concern.

**Table 4: Fermented Foods Consumption and Probiotic Experience**

| Category                             | Frequency | Percent (%) |
|--------------------------------------|-----------|-------------|
| <b>Fermented Foods Consumption</b>   |           |             |
| Daily                                | 58        | 29.0        |
| Never                                | 47        | 23.5        |
| Occasionally                         | 44        | 22.0        |
| Weekly                               | 51        | 25.5        |
| <b>Ease of Probiotic Consumption</b> |           |             |
| Easy                                 | 65        | 32.5        |
| Neutral                              | 64        | 32.0        |
| Very Easy                            | 71        | 35.5        |
| <b>Side Effects Experienced</b>      |           |             |
| Mild bloating                        | 24        | 12.0        |
| None                                 | 106       | 53.0        |
| Other                                | 70        | 35.0        |
| <b>Taste and Palatability Rating</b> |           |             |
| Average                              | 64        | 32.0        |
| Excellent                            | 61        | 30.5        |
| Good                                 | 75        | 37.5        |

The consumption of fermented foods and experience with probiotics among participants varied was shown in table 4. Daily consumption of fermented foods was reported by 29.0% of individuals, while 25.5% consumed them weekly, 22.0% occasionally, and 23.5% never consumed them. In terms of probiotic consumption, 35.5% found it very easy, 32.5% found it easy, and 32.0% had a neutral opinion. Regarding side effects, 53.0%



experienced none, 12.0% reported mild bloating, and 35.0% mentioned other effects. Taste and palatability ratings showed that 37.5% rated the probiotics as good, 30.5% as excellent, and 32.0% as average.

**Table 5: Health Improvements (Digestive, Oral, and Immune)**

| Category                            | Frequency | Percent (%) |
|-------------------------------------|-----------|-------------|
| <b>Digestive Health Improvement</b> |           |             |
| Significant Improvement             | 85        | 42.5        |
| Slight Improvement                  | 115       | 57.5        |
| <b>Abdominal Pain Improvement</b>   |           |             |
| No Change                           | 17        | 8.5         |
| Significant Improvement             | 109       | 54.5        |
| Slight Improvement                  | 74        | 37.0        |
| <b>Bloating Improvement</b>         |           |             |
| No Change                           | 18        | 9.0         |
| Significant Improvement             | 102       | 51.0        |
| Slight Improvement                  | 80        | 40.0        |
| <b>Burping Improvement</b>          |           |             |
| No Change                           | 20        | 10.0        |
| Significant Improvement             | 97        | 48.5        |
| Slight Improvement                  | 83        | 41.5        |
| <b>Constipation Improvement</b>     |           |             |
| No Change                           | 22        | 11.0        |
| Significant Improvement             | 114       | 57.0        |
| Slight Improvement                  | 64        | 32.0        |
| <b>Oral Health Improvement</b>      |           |             |
| Significant Improvement             | 99        | 49.5        |
| Slight Improvement                  | 101       | 50.5        |

The participants reported varying degrees of health improvements across digestive, oral, and immune parameters after consuming HETAFU NUTRISMART candy which is depicted in table 5. In terms of digestive health, 42.5% experienced significant improvement, while 57.5% reported slight improvement. Abdominal pain showed significant improvement in 54.5% of participants, slight improvement in 37.0%, and no change in 8.5%. Bloating improvement was reported as significant by 51.0%, slight by 40.0%, and unchanged by 9.0%. Similarly, 48.5% of participants experienced significant improvement in burping, while 41.5% had slight improvement and 10.0% noted no change. Constipation improvement was significant in 57.0% of cases, slight in 32.0%, and unchanged in 11.0%. Regarding oral health, 49.5% of participants noticed significant improvement, while 50.5% reported slight improvement.

## Discussion

This study assessed the impact of HETAFU NUTRISMART candy, a formulation comprising probiotics, essential oils, and DHA and phosphatidylserine, on digestive, oral, and immune health in a cohort of 200 participants. The findings offer important perspectives on the effectiveness and acceptance of this innovative supplement among various demographic groups.

## Demographic and Lifestyle Attributes

The participant pool demonstrated a nearly balanced gender distribution (47.5% females, 52.5% males) and diverse educational and occupational backgrounds. These demographic variations play a crucial role in determining health awareness and dietary habits. Education and professional engagement influence an individual's knowledge about nutrition and supplement intake, which could impact the effectiveness of probiotic-based interventions. Understanding these variations is critical for designing targeted health strategies and assessing the acceptability of probiotic-enriched products among different populations.<sup>7</sup>

Participants exhibited varied dietary patterns, with 21.0% adhering to a balanced diet, while 17.0% and 16.5% reported high-fat and high-sugar consumption, respectively. The presence of dietary restrictions, such as veganism (24.5%) and gluten-free diets (17.5%), may have influenced gut microbiota composition,

consequently affecting the response to probiotics, DHA, and phosphatidylserine. Previous studies suggest that dietary habits significantly impact gut microbiota diversity, which in turn affects overall health and the efficacy of probiotic supplementation. These findings emphasize the importance of considering dietary behaviors in evaluating functional food interventions.<sup>8</sup>

### **Medical History and Influence on Probiotic Effectiveness**

A significant portion of participants reported a history of digestive issues (50.5%) and oral health conditions (55.0%), suggesting that they were an ideal demographic for evaluating the benefits of probiotic supplementation. Given the strong link between gut microbiota composition and overall health, these findings reinforce the potential role of probiotics, DHA, and phosphatidylserine in improving gastrointestinal and oral well-being. Additionally, the presence of immune-related conditions in 46.0% of participants highlights the need for further exploration into the immunomodulatory effects of probiotics and essential nutrients like DHA and phosphatidylserine.

The study also found that 32.0% of participants were on regular medications, which could have influenced their gut microbiota and, consequently, their response to supplementation. Certain medications, such as antibiotics and proton pump inhibitors, are known to disrupt gut microbiota balance, potentially altering the effectiveness of probiotic interventions. These results align with prior research indicating that the gut microbiome's baseline condition plays a crucial role in determining the efficacy of probiotic supplementation.<sup>9</sup>

### **Dietary Habits and Probiotic Consumption**

Variations in participants' dietary habits likely influenced the observed outcomes. The frequency of fermented food consumption was diverse, with 29.0% consuming them daily, 25.5% weekly, 22.0% occasionally, and 23.5% not consuming them at all. Previous studies have demonstrated that regular intake of fermented foods can enhance gut microbial diversity and overall digestive function. This suggests that individuals with lower probiotic intake from natural sources may experience greater benefits from supplementation.

Additionally, the ease of probiotic consumption was a crucial factor in participant adherence. A majority (68.0%) found taking probiotics to be very easy or easy, reinforcing the potential for probiotic-enriched functional foods to be widely accepted. The minimal side effects reported, with 53.0% experiencing none and only 12.0% reporting mild bloating, indicate a favorable tolerability profile. This is consistent with existing literature that describes mild gastrointestinal symptoms as common but transient effects when introducing probiotics.<sup>10</sup>

### **Health Benefits Associated with HETAFU NUTRISMART Candy Consumption**

The study evaluated participants' perceived health enhancements in digestive, oral, and immune-related aspects after the consumption of HETAFU NUTRISMART candy. Digestive health benefits were prominently observed, with 42.5% of individuals experiencing significant improvements and 57.5% reporting slight enhancements. The findings align with existing literature indicating that probiotics, DHA, and phosphatidylserine contribute to the balance of gut microbiota and help alleviate digestive discomfort.

Notable enhancement was observed in specific gastrointestinal symptoms, including abdominal pain, bloating, burping, and constipation. Abdominal pain showed significant improvement in 54.5% of participants, while bloating and burping demonstrated notable improvement in 51.0% and 48.5%, respectively. The findings underscore the advantageous effects of probiotics, DHA, and phosphatidylserine in alleviating gastrointestinal discomfort. Prior studies have shown that probiotics play a crucial role in preserving gut barrier integrity and minimising inflammation, which in turn helps to relieve bloating and constipation.

Regarding oral health, 49.5% of participants indicated a significant improvement, whereas the remaining 50.5% observed a slight improvement. The findings indicate that the integration of probiotics, essential oils, DHA, and phosphatidylserine may have played a role in sustaining a healthier oral microbiome, mitigating the risk of gum disease, and enhancing overall oral hygiene. A number of studies provide evidence for the effectiveness of probiotics in decreasing cariogenic and periodontopathic bacterial levels, which may account for the noted enhancements.

### **Comparison with Existing Literature**

The identified advantages are consistent with previous studies regarding probiotics and their impact on digestive and oral health. Research has shown that probiotic supplementation can improve the balance of gut microbiota, resulting in enhanced digestive function and a decrease in symptoms such as bloating, constipation, and discomfort. The significance of DHA and phosphatidylserine in promoting gut and immune health has

been thoroughly documented, indicating that their incorporation in HETAFU NUTRISMART candy played a role in the noted benefits. Essential oils are recognised for their antimicrobial and anti-inflammatory properties, which may contribute to the enhancement of oral health.

Furthermore, the limited side effects noted in this study align with earlier research indicating that probiotics are typically well tolerated. The most commonly reported side effect was mild bloating, a typical transient response as the gut microbiota adapts to the introduction of new strains through probiotic intake.<sup>11</sup>

### **Constraints and Prospective Pathways.**

While the results are encouraging, it is important to recognise several limitations. The study initially depended on self-reported health improvements, which could potentially lead to response bias. Utilising objective measures, such as microbiological analysis of gut and oral flora, would yield more conclusive evidence regarding the effects of HETAFU NUTRISMART candy. The duration of the study may not have been adequate to capture long-term changes in health outcomes. Future research should incorporate longer follow-up periods to assess the sustainability of benefits.

Furthermore, differences in dietary habits, history of probiotic consumption, and pre-existing health conditions among participants may have impacted individual responses. Conducting stratified analyses considering these factors could provide more precise insights into the effectiveness of HETAFU NUTRISMART candy among various subgroups.

### **Conclusion**

The results of this study indicate that HETAFU NUTRISMART candy, an innovative blend of probiotics, essential oils, DHA, and phosphatidylserine, provides considerable advantages in enhancing digestive and oral health while exhibiting minimal side effects. The observed improvements in gastrointestinal symptoms, as well as enhanced oral health, underscore the potential of this supplement as a functional food with broad applications. The study contributes to the growing body of evidence supporting probiotic-enriched formulations in health maintenance. However, further rigorous clinical trials with objective biomarkers and extended follow-up periods are necessary to validate these findings and explore additional potential health benefits. If confirmed, these results could position HETAFU NUTRISMART candy as a promising nutritional intervention for individuals seeking a convenient and effective means to support digestive, oral, and immune health.

### **References**

1. Zhang YJ, Li S, Gan RY, Zhou T, Xu DP, Li HB. Impacts of gut bacteria on human health and diseases. *Int J Mol Sci*. 2015 Apr 2;16(4):7493-519. doi: 10.3390/ijms16047493. PMID: 25849657; PMCID: PMC4425030.
2. Evangelia L, Karanasou EA, Gazouli M. Gut microbiome and gastrointestinal disorders. In: Gazouli M, Theodoropoulos G, editors. *Gut Microbiome-Related Diseases and Therapies*. The Microbiomes of Humans, Animals, Plants, and the Environment, vol 1. Cham: Springer; 2021. p. [pages if available]. doi: 10.1007/978-3-030-59642-2\_3.
3. Sarita B, Samadhan D, Hassan MZ, Kovaleva EG. A comprehensive review of probiotics and human health—current perspectives and applications. *Front Microbiol*. 2025 Jan 6;15:1487641.
4. Tools OH. Bacillus Coagulans: Probiotic Benefits and Applications [Internet]. <https://www.openhealthtools.org/>. 2024. Available from: <https://www.openhealthtools.org/bacillus-coagulans/>
5. Patted PG, Masareddy RS, Patil AS, et al. Omega-3 fatty acids: a comprehensive scientific review of their sources, functions, and health benefits. *Futur J Pharm Sci*. 2024;10:94. doi: 10.1186/s43094-024-00667-5.
6. Ma X, Li X, Wang W, Zhang M, Yang B, Miao Z. Phosphatidylserine, inflammation, and central nervous system diseases. *Front Aging Neurosci*. 2022 Aug 3;14:975176. doi: 10.3389/fnagi.2022.975176. PMID: 35992593; PMCID: PMC9382310.
7. Sekhon M, Cartwright M, Francis JJ. Acceptability of healthcare interventions: an overview of reviews and development of a theoretical framework. *BMC Health Serv Res*. 2017;17:88. doi: 10.1186/s12913-017-2031-8.
8. Conlon MA, Bird AR. The impact of diet and lifestyle on gut microbiota and human health. *Nutrients*. 2014 Dec 24;7(1):17-44. doi: 10.3390/nu7010017. PMID: 25545101; PMCID: PMC4303825.



9. Zhang J, Zhang C, Zhang Q, et al. Meta-analysis of the effects of proton pump inhibitors on the human gut microbiota. *BMC Microbiol.* 2023;23:171. doi: 10.1186/s12866-023-02895-w.
10. Bloemendaal M, Szopinska-Tokov J, Belzer C, et al. Probiotics-induced changes in gut microbial composition and its effects on cognitive performance after stress: exploratory analyses. *Transl Psychiatry.* 2021;11:300. doi: 10.1038/s41398-021-01404-9.
11. Latif A, Shehzad A, Niazi S, et al. Probiotics: mechanism of action, health benefits and their application in food industries. *Front Microbiol.* 2023 Aug 17;14:1216674. doi: 10.3389/fmicb.2023.1216674. Erratum in: *Front Microbiol.* 2024 Feb 14;15:1378225. doi: 10.3389/fmicb.2024.1378225. PMID: 37664108; PMCID: PMC10470842.