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Original Research Article

Comprehensive evaluation of sensory taste acceptance, consumer preference and palatability factors in vitamin B (B1, B6 and B12): insights from a sensory analysis study

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ABSTRACT

Background: Vitamins B1, B6 and B12 are essential for neurological and metabolic health, but their sensory properties may affect compliance. This study evaluated the sensory palatability and consumer response to a Vitamin-B supplement.
Methods: A cross-sectional sensory analysis was carried out over six months among 400 participants selected using standardized inclusion criteria at Central Hospital Limited, Dhaka, Bangladesh. Sensory attributes were evaluated using the Modified Mason and Nottingham 9-point scale. Consumer behavior outcomes and statistical analyses, including correlations and internal consistency, were conducted. Ethical approval and informed consent were strictly maintained according to the study protocol.
Results: The sample consisted mostly of females (70%) and participants aged 26–35 years. Prior vitamin-B use was reported by 64%. Sensory evaluation showed high acceptability, with odor (mean 7.23), appearance (6.87), aftertaste (7.41) and general approval (7.10) scoring positively. Overall palatability averaged 7.0±0.5, with 94–95% of responses falling within the "like" category, except for aftertaste, which showed more neutral ratings (29%). Consumer responses were highly favourable: 87.5% rated overall liking ≥7, 85.5% expressed definite purchase intent and 87% were willing to recommend the product. Strong correlations were observed between aftertaste and general approval ($r=0.82$) and palatability significantly predicted purchase intent ($r=0.65$, $p<0.001$). Sensory scale reliability was excellent (Cronbach's $\alpha=0.89$).
Conclusions: The Vitamin-B (B1, B6 & B12) showed high sensory acceptability, strong consumer satisfaction and solid purchase and recommendation intent. Aftertaste and odour strongly influenced overall approval. About 95% of participants genuinely liked the product, reflecting excellent sensory acceptance and consumer appeal.

Keywords: Consumer preference, Purchase intent, Supplement acceptability, Sensory palatability, Vitamin-B

INTRODUCTION

B vitamins-particularly thiamine (B1), pyridoxine (B6) and cobalamin (B12)-play essential roles in energy metabolism, neurotransmitter synthesis and neurological function. Vitamin B1 acts as a key coenzyme in carbohydrate metabolism and nerve conduction, while Vitamin B6 regulates amino-acid pathways and neurotransmitter production and Vitamin B12 supports red blood cell formation, DNA synthesis and cognitive function.[1-3]

Deficiencies in these vitamins can result in neuropathy, anemia, cognitive decline and fatigue, making supplementation a common clinical and preventive strategy.[4] Despite their physiological importance,

adherence to vitamin supplementation is often influenced by the sensory properties of the formulation. Several studies have shown that unpleasant taste, odour and aftertaste significantly reduce compliance, especially when supplements must be taken daily or over long periods.[5,6] Vitamin B12, in particular, is known to exhibit metallic or sulfur-like odors that may discourage consistent intake.[7] Consumer preference research highlights that palatability-encompassing odour, texture, appearance and aftertaste-plays a critical role in shaping overall acceptance and long-term adherence to oral supplements.[8]

Moreover, sensory acceptance is strongly linked to behavioral outcomes, including purchase intent and recommendation behavior, both of which influence product success in real-world settings.[9] Despite the growing use of vitamin supplements in Bangladesh and globally, there is limited evidence assessing how sensory attributes of Vitamin-B formulations affect consumer acceptance and compliance. Understanding these factors is essential for improving formulation quality, promoting adherence and enhancing patient outcomes.

Therefore, this study aims to evaluate the sensory palatability, consumer preference and purchase intent associated with a Vitamin B1-B6-B12 supplement. By exploring how sensory attributes influence user perception and behavior, this research seeks to guide product optimization and strengthen the link between supplement formulation and effective long-term use.

METHODS

This was a cross-sectional sensory evaluation study conducted in Central Hospital Limited, Dhanmondi, Dhaka- Bangladesh from March 2025-August 2025 to assess the palatability, consumer preference and purchase intent of a Vitamin-B (B1, B6 and B12) oral supplement. A total of 400 adult participants were recruited from community settings using convenience sampling, meeting inclusion criteria including willingness to participate and ability to complete sensory assessments using the Modified Mason and Nottingham taste rating scale. Renata PLC one of the top-quality pharmaceuticals in Bangladesh provided all the samples of Vitamin-B (B1, B6 & B12) named "Neurobest". Written informed consent was obtained prior to data collection, ensuring adherence to ethical standards.

Sensory attributes including odor, texture, appearance, aftertaste and general approval-were measured using the Modified Mason and Nottingham 9-point hedonic scale, where 1 represented "dislike extremely" and 9 represented "like extremely." Consumer behavior measures included overall liking (single-item 9-point scale), purchase intent and recommendation willingness. Participants were provided with a standardized Vitamin-B tablet formulation (B1, B6, B12) under controlled conditions to minimize environmental influences. Each participant evaluated the sample individually to prevent peer bias. Data were recorded using structured sensory evaluation forms. Independent variables included demographic characteristics (age, gender), prior vitamin use and sensory scores. Dependent variables included overall palatability, liking, purchase intent and recommendation intent. Ethical approval was obtained from the institutional review board of Central Hospital Limited prior to study initiation and written informed consent was secured from all participants. Participant confidentiality, anonymity and the right to withdraw without penalty were strictly maintained throughout the study.

Descriptive statistics (mean, SD, frequencies, percentages) summarized demographic characteristics and sensory responses. Pearson and Spearman correlation analyses assessed associations between sensory attributes, overall palatability and purchase intent. Internal consistency of the sensory scale was evaluated using Cronbach's alpha. All statistical analyses were performed using SPSS version 27. Confidentiality was ensured through anonymized data collection. Participation was voluntary with the right to withdraw at any stage. Ethical approval followed the institutional protocol guidelines.

RESULTS

The study included 400 participants with a broad age range, demonstrating strong representation across adult groups. The largest proportion belonged to the 26–35 years category (37.8%), followed by participants aged 18–25 years (29.5%). Older adults aged 36–45 years accounted for 22.8%, while only 10% were aged 46 years or above (Figure 1). Of the 400 respondents, 70% were female and 30% were male, showing a female-dominant participation pattern (Figure 2).

A total of 64% of participants reported previous use of vitamin B supplements, indicating widespread familiarity with such products. The remaining 36% were non-users, allowing assessment across both experienced and naïve consumers. Among prior users, the duration of intake varied, with 40.2% using supplements for <6 months and 32% for 6–12 months. Another 27.7% had extended use beyond one year (Table 1). Mean sensory scores indicated overall favorable perceptions of the vitamin tablet. Odor (mean 7.23±1.1) and aftertaste (mean 7.41±2.3) received the highest ratings, suggesting strong acceptability of key sensory attributes. Appearance and general approval also scored well (6.87±0.7 and 7.10±1.13, respectively), while texture received comparatively lower ratings (6.19±3.2).

Minimum and maximum values reflected mild variability in responses. Odor scores were predominantly toward the higher end of the scale, with more than half of participants rating it a 7. Only 1% rated odor negatively (score 3) and neutral ratings were limited to 4–5%. Notably, 25.5% selected a score of 6, while 38% rated it 8, indicating strong positive acceptance. Texture ratings showed a concentration in the mid-to-high range, with 57.5%

assigning a score of 7. Lower ratings (4–5) accounted for only 5%. Scores of 6 and 8 contributed 17% and 20.5%, respectively. No participants assigned extremely low scores. Appearance was rated highly by most participants, with 60.8% selecting a score of 7 and 17% rating it an 8. Only 5% gave neutral ratings and negative ratings were negligible. Aftertaste ratings were more widely distributed but remained largely positive. While 29% of participants selected a neutral score of 5, a substantial proportion rated aftertaste 7 or 8 (30.3% and 26.3%, respectively). Negative ratings were extremely low at 1% (Table 3).

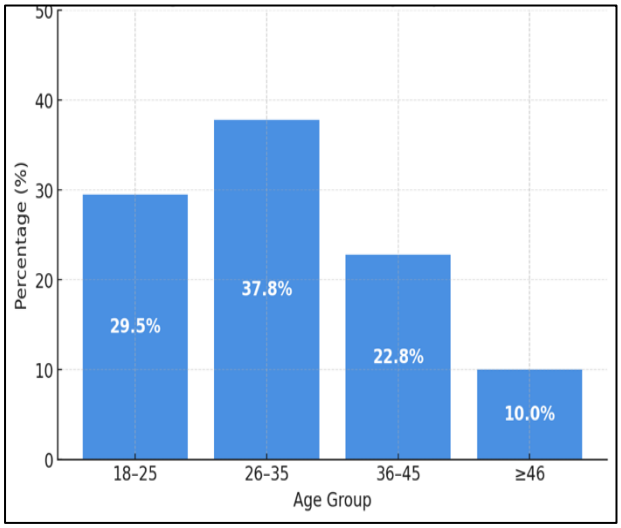

Figure 1: Age distribution of the study population.

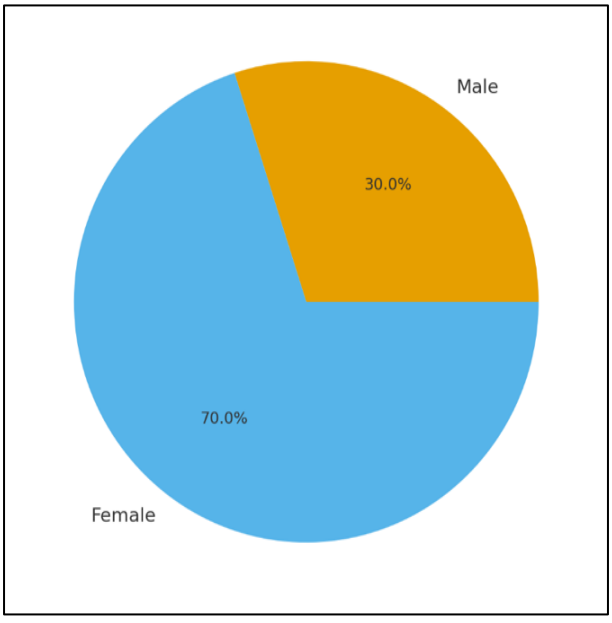

Figure 2: Gender distribution of the study participants.

General approval demonstrated strong acceptance, with half of participants choosing a score of 7 and 30% selecting 8. Neutral ratings were minimal at 4.3% and negative ratings were below 1%. Across all sensory attributes, the majority of participants fell within the "Like" category. Odor, texture, appearance and general approval each achieved over 94% in the "like" range, indicating consistently positive perceptions. Aftertaste showed greater variability, with 29% falling into the neutral category, though 70% still rated it positively. Dislike ratings remained extremely low (<1–1%). These patterns affirm strong consumer acceptance of the vitamin tablet. The combined palatability score yielded a high mean of 7.0, reflecting favorable multisensory evaluation among participants.

The low standard deviation (0.5) suggests consistent responses across the sample. Minimum and maximum values indicate limited dispersion, reinforcing uniform acceptability categorized as "like/acceptable," (Table 4). Purchase intent was overwhelmingly positive, with 85.5% stating they would "definitely buy" the product. An additional 12% selected "probably buy,". Only 2.5% remained undecided and no participants indicated unwillingness to purchase. A large majority (87%) indicated they would recommend the product to others, reflecting high consumer satisfaction and trust. The remaining 13% selected "maybe," while none expressed refusal to recommend (Table 5).

Correlation analysis revealed strong relationships among sensory attributes, particularly between aftertaste and general approval (r=0.82) and odor with general approval (r=0.78). Appearance and texture showed moderate correlations, contributing meaningfully to perceptions. The strong inter-attribute associations reflect coherent sensory experiences. Overall, aftertaste and odor emerged as the most influential determinants of approval (Table 6). A strong positive correlation was observed between overall palatability and purchase intent (Pearson r=0.65, p<0.001).

This indicates that participants with higher sensory satisfaction were more likely to intend purchasing the product. The Spearman analysis confirmed this association (Table 7). Cronbach's alpha of 0.89 indicates excellent internal consistency of the sensory scale used in the study. All five items demonstrated strong reliability, confirming that they collectively measure the same construct palatability.

High internal consistency strengthens confidence in the validity of participant responses. This reliability also supports the use of aggregated sensory scores in further analyses. All sensory items demonstrated strong corrected item–total correlations, ranging from 0.64 to 0.82, indicating good alignment with the overall scale.

Removing any single item did not meaningfully improve Cronbach's alpha, confirming each item's contribution to reliability. Aftertaste and general approval showed the strongest correlations, consistent with their high influence. The consistent item performance supports the structural integrity of the sensory assessment tool (Table 8).

Table 1: Prior vitamin uses and duration of use (n=400).

Variable	Category	Frequency	(%)
Prior vitamin use	Yes	256	64.0
	No	144	36.0
	Total	400	100.0
Duration of use in months (among users, n=256)	<6	103	40.2
	6–12	82	32.0
	>12	71	27.7
	Total	256	100.0

Table 2: Descriptive statistics of sensory scores (1–9 scale, n=400).

Attribute	Mean±SD	Minimum	Maximum
Odor	7.23±1.1	3	9
Texture	6.19±3.2	4	8
Appearance	6.87±0.7	3	9
Aftertaste	7.41±2.3	3	8
General approval	7.10±1.13	4	8

Table 3: Score distribution among study participants (n=400).

Score	Odor score frequency (%)	Texture score frequency (%)	Appearance score frequency (%)	Aftertaste score frequency (%)
1	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
2	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
3	4 (1.0)	0 (0.0)	1 (0.3)	4 (1.0)
4	2 (0.5)	4 (1.0)	0 (0.0)	0 (0.0)
5	16 (4.0)	16 (4.0)	20 (5.0)	116 (29.0)
6	102 (25.5)	68 (17.0)	58 (14.5)	54 (13.5)
7	201 (50.3)	230 (57.5)	243 (60.8)	121 (30.3)
8	152 (38.0)	82 (20.5)	68 (17.0)	105 (26.3)
9	11 (2.8)	0 (0.0)	10 (2.5)	0 (0.0)
Total	400 (100)	400 (100)	400 (100)	400 (100)

Table 4: General approval, sensory acceptance and overall palatability among study participants (n=400).

Measure	Category/attribute	Frequency/value	(%)
General approval score distribution	Score 1–3	0	0.0
	Score 4	3	0.8
	Score 5	17	4.3
	Score 6	59	14.8
	Score 7	201	50.3
	Score 8	120	30.0
	Score 9	0	0.0
	Total	400	100.0
Sensory acceptance categories	Odor (like)	378	94.5
	Texture (like)	376	94.0
	Appearance (like)	379	94.8
	Aftertaste (like)	280	70.0
	General approval (like)	380	95.0
Overall palatability score	Mean±SD	7.0±0.5	–
	Minimum	5.4	–
	Maximum	8.8	–
	Overall category	Like / Acceptable	–

Acceptance categories: Dislike=scores 1–3, Neutral=scores 4–5, Like=scores 6–9. Percentages are calculated column-wise.

Table 5: Purchase and recommendation intent among study participants (n=400).

Response category	Purchase intent N (%)	Recommendation intent N (%)
Definitely will buy/yes	342 (85.5)	348 (87.0)
Probably will buy	48 (12.0)	–
Maybe	10 (2.5)	52 (13.0)
Probably not	0 (0.0)	–
Definitely not/no	0 (0.0)	0 (0.0)
Total	400 (100.0)	400 (100.0)

Table 6: Correlation between sensory attributes (n=400).

Attribute	Odor	Appearance	Texture	Aftertaste	General approval
Odor	1.00	0.55	0.50	0.72	0.78
Appearance	0.55	1.00	0.48	0.52	0.60
Texture	0.50	0.48	1.00	0.50	0.65
Aftertaste	0.72	0.52	0.50	1.00	0.82
General approval	0.78	0.60	0.65	0.82	1.00

Table 7: Correlation between overall palatability and purchase intent (n=400).

Correlation type	Coefficient (r / ρ)	P value
Pearson r	0.65	< 0.001
Spearman's rho	0.62	< 0.001

Higher overall palatability scores are significantly associated with stronger purchase intent.

Table 8: Reliability analysis of the sensory rating scale (n=400).

Item / Scale	Corrected item–total correlation	Cronbach's alpha if item deleted	Overall Cronbach's alpha
Panel A. Overall scale reliability (5 items)	–	–	0.89
Panel B. Item–total statistics			
Odor	0.73	0.86	–
Texture	0.68	0.87	–
Appearance	0.64	0.88	–
Aftertaste	0.79	0.85	–
General approval	0.82	0.84	–

DISCUSSION

The findings of this study demonstrate strong sensory acceptability and positive consumer behavior toward the evaluated Vitamin B1-B6-B12 supplement. Overall palatability scores were consistently high, with odor, aftertaste, appearance and general approval all falling predominantly within the "like" category. These results align with previous evidence suggesting that sensory characteristics particularly odor and aftertaste are central determinants of adherence to oral nutritional supplements.[5,6] Vitamin formulations often struggle with bitterness and metallic sensory notes, especially those containing B12, yet the present formulation demonstrated favorable performance, indicating effective palatability optimization.[7] Aftertaste and odor were found to be the strongest predictors of general approval, consistent with literature identifying these components as critical drivers of supplement acceptability and sustained use.[9] The significant association between overall palatability and purchase intent reinforces consumer behavior models where sensory pleasure influences willingness to adopt and maintain supplement intake.[10,11] High purchase intent and strong willingness to recommend (87%) further emphasize the market viability of the product, reflecting consumer trust and perceived value. The high internal consistency (Cronbach's α=0.89) supports the reliability of the applied sensory scale, aligning with psychometric evaluations in prior sensory studies indicating that hedonic scales can robustly capture consumer perception.[12,13] The demographic distribution predominantly female and young adults also mirrors global patterns of supplement consumption, where women generally exhibit higher engagement with health-promoting behaviors.[14,15] Interestingly, while odor and appearance received strong positive ratings, aftertaste showed more neutral responses, a finding consistent with reports that aftertaste remains the most challenging parameter to optimize in nutrient-dense

formulations.[16] Nevertheless, the majority of participants still rated aftertaste positively and it maintained strong correlations with general approval. The study contributes valuable insights to product development by confirming that sensory acceptance substantially shapes compliance and consumer behavior. Improving palatability is not merely a matter of preference-it is directly linked to supplement effectiveness, particularly in long-term regimens where poor sensory attributes often lead to dropout Traynor et al.

Future research should explore sensory differences across subpopulations and assess long-term adherence in real-world settings.

Overall, the results underscore that well-designed Vitamin-B formulations can achieve high acceptance, strong purchase intent and meaningful consumer endorsement, thereby supporting better compliance and public health outcomes.

CONCLUSION

The study demonstrates that the Vitamin-B (B1, B6 and B12) supplement exhibits high sensory acceptability and strong consumer preference among participants (95%). Key sensory attributes, particularly odor and aftertaste, were significant determinants of overall approval and satisfaction. The high palatability scores were strongly associated with increased purchase intent and recommendation behavior. These findings highlight the critical role of sensory optimization in improving adherence to nutritional supplements. Overall, the formulation shows strong potential for enhanced compliance in long-term use.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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