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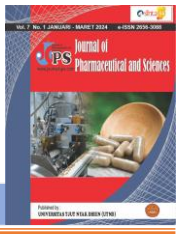

ORIGINAL ARTICLE JPS. 2026, 9(3), 2883-2892

# The Effectiveness of *Small Frequent Feedings* on the Frequency of Nausea and Vomiting in Pregnant Women with Hyperemesis Gravidarum at the Vina Primary Care Clinic in Medan

# Efektivitas Small Frequent Feedings terhadap Frekuensi Mual dan Muntah pada Ibu Hamil dengan Hiperemesis Gravidarum di Klinik Pratama Vina, Kota Medan

Yonike Vita Raini Br Ginting [a], Friza Novita Sari Situmorang [a], Srilina Br Pinem [a], Nayla Sahfitri [a], Sayidina Br Ginting [b]

[a] *Sekolah Tinggi Ilmu Kesehatan Mitra Husada, Medan, Indonesia*
[b] *Klinik Pratama Vina, Medan, Indonesia.*

*Corresponding Authors: yonikaginting@gmail.com*

**Abstract**

**Background:** Small frequent feedings (SFF) is a dietary approach intended to improve food tolerance in pregnant women experiencing nausea and vomiting. **Objective:** To assess changes in symptom severity following SFF at Vina Primary Care Clinic, Medan. **Methods:** A single-group pretest–posttest study included 36 pregnant women with a clinical diagnosis of hyperemesis gravidarum. The protocol prescribed six to eight small meals daily, supported by food diaries and WhatsApp monitoring. Symptoms were assessed on days 1 and 3 using the 24-hour Pregnancy-Unique Quantification of Emesis and Nausea (PUQE-24) scale. Paired scores were compared using the Wilcoxon signed-rank test. **Results:** Mean PUQE-24 scores decreased from 9.28 ± 3.248 to 6.83 ± 3.140, with a mean paired reduction of 2.44 points ($Z = -5.103$; $p < 0.001$; $r = 0.85$). Median scores decreased from 9.0 to 6.0. The proportion with mild symptoms increased from 25.00% to 61.11%, while the proportion with severe symptoms decreased from 22.22% to 8.33%. Scores decreased in 34 participants, remained unchanged in one, and increased by one point in one. Twenty participants (55.56%) met the reported adherence threshold. **Conclusion:** SFF accompanied by education and monitoring was associated with lower PUQE-24 scores during short-term observation. The uncontrolled design precludes causal attribution; controlled studies are needed before its specific effectiveness can be established.

***Keywords: hyperemesis gravidarum; small frequent feedings; dietary modification; PUQE-24; antenatal care.***

**Abstrak**

**Latar belakang:** Small frequent feedings (SFF) merupakan pengaturan makan dalam porsi kecil dan frekuensi sering untuk membantu toleransi asupan pada ibu hamil yang mengalami mual dan muntah. **Tujuan:** Menilai perubahan keparahan gejala setelah penerapan SFF di Klinik Pratama Vina, Medan. **Metode:** Penelitian satu kelompok dengan pengukuran sebelum–sesudah melibatkan 36 ibu hamil dengan diagnosis klinis hiperemesis gravidarum. Protokol mencakup enam hingga delapan kali makan dalam porsi kecil setiap hari, disertai catatan makan dan pemantauan melalui WhatsApp. Gejala dinilai pada hari pertama dan ketiga menggunakan Pregnancy-Unique Quantification of Emesis and Nausea 24 jam (PUQE-24). Perbedaan skor berpasangan dianalisis dengan uji Wilcoxon. **Hasil:** Rerata skor PUQE-24 menurun dari 9,28 ± 3,248 menjadi 6,83 ± 3,140, dengan penurunan rerata berpasangan sebesar 2,44 poin ($Z = -5,103$; $p < 0,001$; $r = 0,85$). Median skor menurun dari 9,0 menjadi 6,0. Proporsi gejala ringan meningkat dari 25,00% menjadi 61,11%, sedangkan gejala berat menurun dari 22,22% menjadi 8,33%. Skor menurun pada 34 responden, tetap pada satu responden, dan meningkat satu poin pada satu responden. Sebanyak 20 responden (55,56%) memenuhi ambang kepatuhan yang dilaporkan. **Kesimpulan:** Penerapan SFF yang disertai edukasi dan pemantauan berkaitan dengan penurunan skor PUQE-24 selama pengamatan singkat. Tanpa kelompok kontrol, perubahan tersebut belum dapat diatribusikan secara kausal kepada SFF; efektivitas spesifiknya memerlukan pengujian terkontrol.

***Kata kunci: hiperemesis gravidarum; small frequent feedings; pengaturan pola makan; PUQE-24; pelayanan antenatal.***

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## Introduction

Hyperemesis gravidarum (HG) is a severe form of nausea and vomiting of pregnancy that can impair oral intake, daily activities, and maternal nutritional status. It is estimated to affect approximately 1–3% of pregnancies and differs from the mild nausea and vomiting commonly experienced in early pregnancy. Clinical assessment should consider symptom onset, the ability to maintain oral intake, and the impact on daily functioning, rather than vomiting frequency alone [1,2]. Variation in symptom severity underscores the need for standardised assessment to evaluate changes consistently during care.

Small frequent feedings (SFF) is a dietary approach intended to improve food tolerance by dividing intake into small, frequent meals. Distributing food across several smaller portions allows intake without requiring a large meal at any one time [3,4]. Nevertheless, dietary modification is a component of supportive care and does not replace antiemetics, rehydration, or other treatment indicated by the clinical condition [5,6]. The benefits of SFF should therefore be evaluated as part of care, rather than assumed to constitute a stand-alone treatment for all levels of HG severity.

Within Indonesian midwifery care, research and clinical reports have addressed HG education, maternal knowledge, and dietary support [7–10]. However, educational interventions and case reports do not, by themselves, establish the effectiveness of a dietary protocol. Pamungkas and Adimayanti reported partial improvement in nausea and vomiting after three days of care in a case study, rather than in a comparative trial [11]. Evaluation using a standardised instrument and documentation of protocol implementation remains necessary to characterise symptom changes associated with SFF.

A preliminary survey of seven pregnant women at Vina Primary Care Clinic identified five with symptoms classified as HG and limited understanding of dietary management. These local observations provided the rationale for evaluating SFF within antenatal care. This study aimed to compare nausea and vomiting severity before and after SFF using the 24-hour Pregnancy-Unique Quantification of Emesis and Nausea (PUQE-24) score and to describe protocol adherence among pregnant women at Vina Primary Care Clinic, Medan.

## Methods

### Study design, setting, and period

This quantitative study used a one-group pretest–posttest design without a comparison group. It was conducted at Vina Primary Care Clinic, Jalan Jamin Ginting, Medan Baru District, Medan, North Sumatra. Overall study activities took place from January to June 2026, with data collection and intervention delivery conducted in March–April 2026. Each participant underwent baseline and follow-up assessments, allowing paired comparisons.

### Population, sample, and eligibility criteria

The study population comprised pregnant women diagnosed with HG who received antenatal care at the study site. Thirty-six participants were recruited using the non-probability technique of **purposive sampling**. Inclusion criteria were pregnancy in any trimester, HG diagnosed by the attending midwife, smartphone use with WhatsApp, willingness to remain under observation until day 3, and written informed consent. Exclusion criteria were comorbid conditions other than HG that could influence nausea and vomiting, inability to complete monitoring because of relocation or hospitalisation, and withdrawal of consent.

The sample size was determined by the number of eligible women who could be recruited during the data collection period. No sample-size calculation based on a prespecified hypothesis and anticipated effect size was performed before the study. Accordingly, this was a preliminary evaluation at a single healthcare facility, rather than a confirmatory assessment of effectiveness.

**Intervention framework and SFF implementation**

The Health Belief Model informed the educational component; it was not tested empirically. Explanations of PUQE-24 scores and the consequences of symptoms were intended to help participants understand their susceptibility and symptom severity. Dietary benefits were explained using readily available food options, while implementation barriers were addressed by providing food diaries and involving accompanying family members. WhatsApp reminders served as cues to action, and a completed sample diary was provided to support participants' confidence in following the protocol. The model's constructs were not measured using a separate instrument.

Baseline assessment was performed on day 1, dietary implementation was documented and monitored during the intervention period, and follow-up assessment was performed on day 3. Participants were instructed to consume approximately 100–150 mL of food per serving, six to eight times daily, at intervals of approximately 1.5–2 hours. Food choices emphasised well-tolerated items, carbohydrate sources, and low-fat foods. The protocol also included a dry snack, such as plain crackers or toast, on waking; avoidance of fatty or spicy foods; and separation of fluid intake from solid meals by at least one hour.

These instructions describe the study protocol rather than an individualised prescription for nutritional adequacy. Actual energy, protein, and fluid intake was not quantified. The food diary recorded meal times, food types and approximate portions, the timing of fluids relative to meals, and the presence or absence of nausea, vomiting, or retching without expulsion of gastric contents after intake.

**Instrument and outcome assessment**

The primary outcome was the total PUQE-24 score. Adapted from the PUQE instrument, PUQE-24 assesses symptoms over the preceding 24 hours. Development and validation studies of PUQE, PUQE-24, and a modified version provide the basis for its use [12–15]. Its usability has also been investigated in women hospitalised with HG [16]. Assessments were conducted through structured interviews administered by research team members.

PUQE-24 comprises three items: nausea duration, vomiting frequency, and retching frequency. Each item is scored from 1 to 5, and the scores are summed to give a total of 3–15. In this study, scores of 3–6 were classified as mild, 7–12 as moderate, and 13–15 as severe; a score of 3 indicates the absence of symptoms across all three items [13,14]. These categories describe symptom severity at assessment and were not used as a substitute for a clinical diagnosis of HG.

**Table 1.** PUQE-24 scoring criteria for symptoms during the preceding 24 hours

| Item | Response options, in order | Score |
|---|---|---|
| Nausea duration | None; ≤1 hour; 2–3 hours; 4–6 hours; >6 hours | 1; 2; 3; 4; 5 |
| Vomiting frequency | No vomiting; 1–2; 3–4; 5–6; ≥7 episodes | 1; 2; 3; 4; 5 |
| Retching frequency | None; 1–2; 3–4; 5–6; ≥7 episodes | 1; 2; 3; 4; 5 |
| Total score | Mild; moderate; severe | 3–6; 7–12; 13–15 |

Scoring criteria are based on PUQE and PUQE-24 validation studies [13,14]. Retching refers to dry heaves without expulsion of gastric contents.

**Adherence monitoring and data quality**

The research team contacted participants through WhatsApp in the morning, at midday, and in the evening to enquire about adherence to the meal schedule and check consistency with diary entries. The adherence threshold included at least six intakes each day and separation of fluids from solid meals. Participants were classified as not meeting the threshold if they recorded fewer than six intakes on any day or meal intervals exceeding two hours on more than two occasions in a day. Adherence was classified dichotomously.

Baseline and follow-up assessments were conducted in a private consultation room. Forms and food diaries were reviewed when collected, and incomplete entries or discrepancies with WhatsApp reports were clarified with participants. Data entered into the spreadsheet were checked against the source forms. No PUQE-24 item responses were missing at either assessment. WhatsApp monitoring relied on reports from the same participants and was not considered an independent observation of food consumption.



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### Statistical analysis

Participant characteristics, severity categories, and adherence were summarised as frequencies and percentages. PUQE-24 scores were described using means, standard deviations (SD), medians, and the first and third quartiles (Q1–Q3). The reported Shapiro–Wilk test indicated non-normality ($p < 0.05$). Paired scores were therefore compared using the two-sided Wilcoxon signed-rank test at a significance level of 0.05. Pairs with a zero difference did not contribute ranks to the test.

Score reduction was defined as the baseline score minus the follow-up score, with positive values indicating improvement. Effect size was reported as $r = |Z|/\sqrt{N}$, where $N = 36$ pairs. The rank-biserial correlation was calculated as the difference between the signed-rank sums divided by the total of all non-zero ranks. Analyses of individual PUQE-24 items were exploratory. Outcomes were not compared by adherence status because adherence was not linked to individual scores in the analysis dataset.

### Ethical considerations and confidentiality

Participants received information about the study's purpose, procedures, potential benefits, and voluntary nature before providing written informed consent. They could withdraw without affecting their antenatal care. The study was reported to have received approval from the institutional health research ethics committee.

Participant identities were replaced with codes on study forms and in the analysis dataset. Paper records were kept in locked storage, while electronic files were password-protected and accessible only to the research team. The list linking codes to participant identities was stored separately. The use of WhatsApp for monitoring was explained during consent. No participants withdrew or were lost to follow-up after enrolment; all 36 had complete paired data.

## Results

### Participant flow and characteristics

Thirty-six participants completed baseline assessment, monitoring, and follow-up assessment. All were included in the paired analysis. Participant flow is shown in Figure 1, and participant characteristics are presented in Table 2.

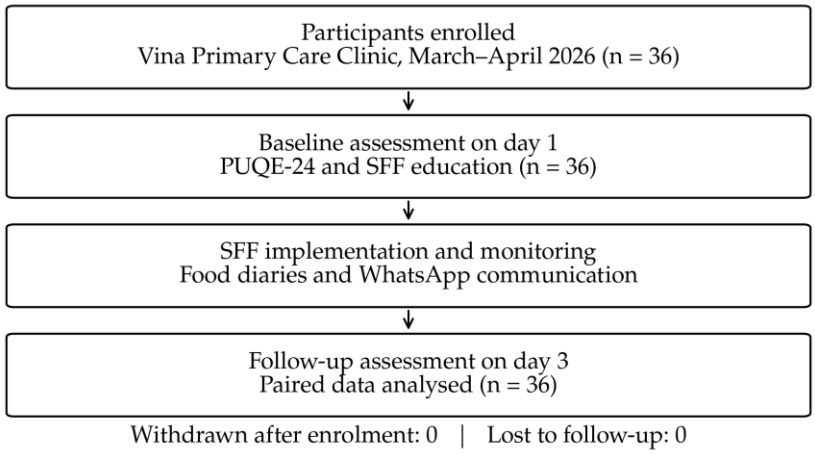


**Figure 1.** Participant flow through baseline assessment, SFF monitoring, and follow-up assessment (n = 36).


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**Table 2.** Participant characteristics (n = 36)

| Characteristic | **Category** | **n** | **%** |
|---|---|---|---|
| Maternal age | <21 years | 1 | 2.78 |
| | 21–35 years | 32 | 88.89 |
| | >35 years | 3 | 8.33 |
| Gestational age | First trimester (0–13 weeks) | 19 | 52.78 |
| | Second trimester (14–26 weeks) | 15 | 41.67 |
| | Third trimester (27–40 weeks) | 2 | 5.56 |
| Parity | Primigravida | 11 | 30.56 |
| | Multigravida | 19 | 52.78 |
| | Grand multipara | 6 | 16.67 |

Percentages are based on 36 participants within each characteristic group. Totals may differ from 100% because of rounding.

Most participants were aged 21–35 years (88.89%). Nineteen were in the first trimester (52.78%), 15 in the second trimester (41.67%), and two in the third trimester (5.56%). Multigravida was the most frequently recorded reproductive-history category, accounting for 19 participants (52.78%). These distributions are descriptive; associations between participant characteristics and symptom changes were not tested.

### Nausea and vomiting severity categories

**Table 3.** PUQE-24 severity categories before and after SFF

| **Category (score)** | **Before, n (%)** | **After, n (%)** |
|---|---|---|
| Mild (3–6) | 9 (25.00) | 22 (61.11) |
| Moderate (7–12) | 19 (52.78) | 11 (30.56) |
| Severe (13–15) | 8 (22.22) | 3 (8.33) |
| Total | **36 (100.00)** | **36 (100.00)** |

Before the intervention, moderate symptoms were the most frequent category (52.78%). At follow-up, mild symptoms predominated (61.11%). The proportion with mild symptoms increased by 36.11 percentage points, while the proportion with severe symptoms decreased by 13.89 percentage points. These changes in distribution are shown in Figure 2.

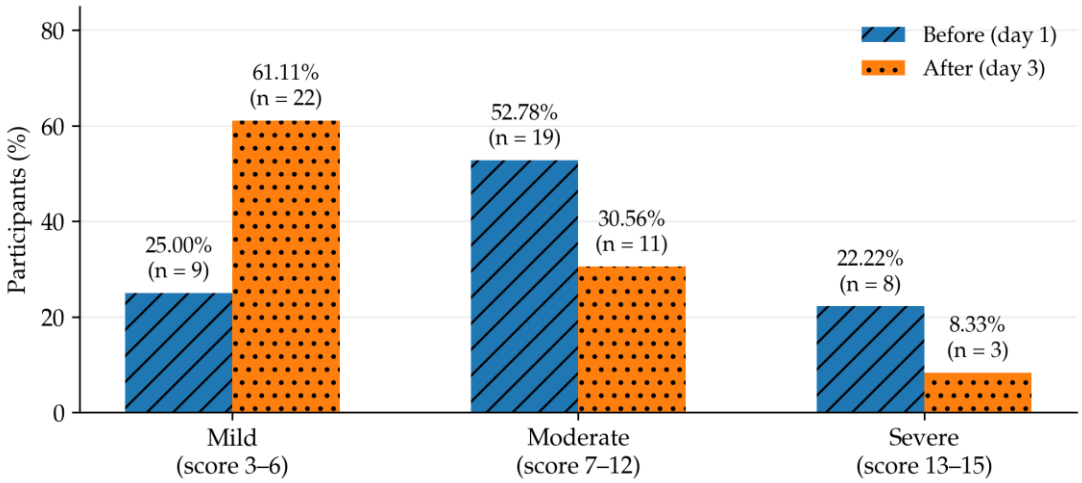


**Figure 2.** Proportions of PUQE-24 severity categories before and after SFF. Labels above the bars show percentages and participant counts; each assessment included 36 participants.

The reported category transitions comprised 13 participants moving from moderate to mild and five moving from severe to moderate symptoms. Nine remained in the mild category, six remained moderate, and three remained severe. Thus, 18 participants (50.00%) moved to a lower severity category, and none moved to a higher category. The one-point increase in one participant's score did not change her severity category.



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**Protocol adherence**

**Table 4.** Adherence to the SFF protocol (n = 36)

| Adherence category | n | % |
|---|---|---|
| Met the adherence threshold | 20 | 55.56 |
| Did not meet the adherence threshold | 16 | 44.44 |
| Total | 36 | 100.00 |

Twenty participants (55.56%) met the reported adherence threshold, while 16 (44.44%) did not. Failure to meet the threshold should not be interpreted as complete non-participation, because this category also includes partial implementation of the protocol.

**Changes in total and individual PUQE-24 item scores**

**Table 5**. Comparison of total PUQE-24 scores before and after SFF

| Assessment | Mean ± SD | Median (Q1–Q3) | Mean reduction | Z | p |
|---|---|---|---|---|---|
| Before (day 1) | 9.28 ± 3.248 | 9.0 (6.75–12.00) | 2.44 | −5.103 | <0.001 |
| After (day 3) | 6.83 ± 3.140 | 6.0 (4.00–9.25) | — | — | — |

Two-sided Wilcoxon signed-rank test: 36 pairs, including 35 with non-zero differences. Reduction was calculated as the baseline score minus the follow-up score. Effect size r = $|Z|/\sqrt{36}$ = 0.85; rank-biserial correlation = 0.98. Observed ranges: baseline, 5–15; follow-up, 3–13.

The mean total score decreased from 9.28 to 6.83, with a mean paired reduction of 2.44 points. The median decreased from 9.0 to 6.0. The Wilcoxon test indicated a difference between the two assessments (Z = −5.103; $p < 0.001$). The effect size of r = 0.85 indicates a large within-group change, but does not estimate a causal effect relative to receiving no intervention.

Scores decreased in 34 participants, remained unchanged in one, and increased by one point in one. The median reduction was 2.0 points (Q1–Q3: 1.00–3.00). Twenty-five participants (69.44%) had a reduction of at least two points. The distribution of score differences in Figure 3 includes all participants, including those who did not improve.

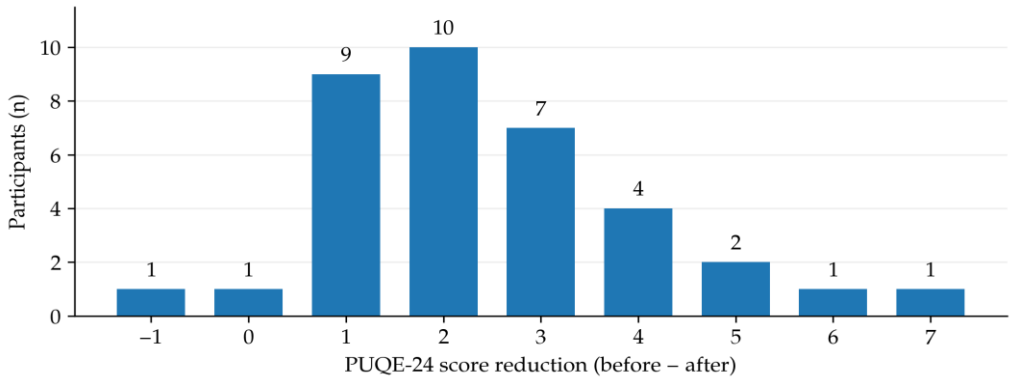


**Figure 3.** Distribution of reductions in total PUQE-24 scores (baseline minus follow-up). Positive values indicate improvement, zero indicates no change, and −1 indicates a one-point increase. The chart was constructed from the reported frequencies of score differences (n = 36).

Each item is scored from 1 to 5, and the total score ranges from 3 to 15. Item values are ordinal scores, not durations in hours or actual episode counts. Item-level Wilcoxon tests were exploratory, without adjustment for multiple comparisons.

Mean reductions were observed in nausea duration scores (0.92 points), vomiting frequency scores (0.81 points), and retching frequency scores (0.72 points), each with $p < 0.001$. The change in the total score was therefore accompanied by changes in all three components. These findings do not establish a specific physiological mechanism because gastric function and biomarkers were not measured.



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**Table 6.** Changes in PUQE-24 item scores before and after SFF

| Item/composite | Before (mean ± SD) | After (mean ± SD) | Mean reduction | Z | p |
|---|---|---|---|---|---|
| Nausea duration score | 3.50 ± 1.13 | 2.58 ± 1.36 | 0.92 | −4.249 | <0.001 |
| Vomiting frequency score | 2.94 ± 1.22 | 2.14 ± 1.13 | 0.81 | −4.081 | <0.001 |
| Retching frequency score | 2.83 ± 1.08 | 2.11 ± 1.01 | 0.72 | −3.978 | <0.001 |
| Total score | **9.28 ± 3.248** | **6.83 ± 3.140** | **2.44** | **−5.103** | **<0.001** |

## Discussion

### Principal findings and interpretation of symptom changes

PUQE-24 scores decreased during SFF implementation accompanied by education, food diaries, and monitoring. Changes were evident in the total score, all three instrument items, and the distribution of severity categories. These findings indicate symptom improvement during observation, but do not distinguish the contribution of dietary modification from education and repeated contact with researchers. They should therefore be interpreted as within-group changes, rather than evidence that SFF independently caused symptom reduction.

The increase in the proportion of participants with mild symptoms to 61.11% and the decrease in the median score to 6.0 indicate a shift in the symptom profile during observation. However, the study neither specified a minimal clinically important difference nor assessed changes in food tolerance, body weight, or quality of life. The mean reduction of 2.44 points therefore demonstrates a change in symptoms, but is insufficient to establish the magnitude of clinical benefit experienced by individual patients. Interpretation of individual benefit requires symptom assessment alongside functional and nutritional outcomes.

### Comparison with the literature and biological rationale

Advice to consume small, frequent meals is consistent with discussions of nutritional care in HG and the clinical review by Martinez de Tejada and colleagues [3,4]. The findings also relate to Indonesian reports of midwifery care and dietary education [9,10]. Nevertheless, similarity in the direction of findings does not imply equivalent evidence quality. Pamungkas and Adimayanti conducted a descriptive case study in which symptoms were only partially resolved after three days; that study provided neither a comparative effect estimate nor evidence that SFF prevents complications [11].

A recent review emphasises the limited availability of high-quality evidence for HG management [2]. In nutritional education, Nazmi and colleagues published a randomised controlled trial protocol for the Ottawa Nutritional Guide in 2025 [17]. That publication describes the planned study rather than intervention results, and therefore provides no effectiveness estimate that can be compared with the present findings. Controlled evaluations remain necessary to distinguish changes occurring during observation from the specific benefits of dietary approaches.

In practical terms, small portions may facilitate adjustment of intake to food tolerance. However, the observed score reductions do not establish that SFF acts by reducing gastric acid secretion or altering gastric emptying. The biological understanding of HG also extends beyond gastrointestinal changes: Fejzo and colleagues demonstrated the role of fetoplacental GDF15 production and maternal sensitivity to this hormone [18]. These mechanistic findings support an understanding of HG as a multifactorial condition, rather than simply a consequence of an empty stomach or unwillingness to eat.

### Adherence and application of the behavioural framework

Only 55.56% of participants met the adherence threshold. This proportion suggests that accepting a recommendation is not equivalent to being able to implement it consistently. Food intolerance, availability of household assistance, and the burden of diary completion are possible explanations, but reasons for non-adherence were not collected systematically and cannot be established in this sample. Literature on husbands' support and women's experiences of HG provides context for the importance of support, rather than evidence of the causes of non-adherence in this study [19,20].


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The Health Belief Model helped structure counselling and reminders, but observed adherence does not demonstrate changes in perceived susceptibility, benefits, barriers, or self-efficacy. Nutritional education and knowledge of HG have been addressed in previous studies [8,21]; direct measurement of behavioural constructs remains necessary to evaluate these pathways. Because adherence data were available only at the group level, the study also could not determine whether participants who met the threshold experienced greater score reductions.

**Limitations and alternative explanations**

The principal limitation is the absence of a control group. Symptom fluctuations, the natural course of pregnancy, regression to the mean, and the effects of attention and participant expectations may explain part of the observed change. A short observation period does not exclude these possibilities. The course of nausea and vomiting may vary with gestational age [1,5], whereas this sample included all three trimesters and was not analysed by gestational age. The contribution of the natural course of symptoms to the observed score changes cannot be determined.

HG was diagnosed clinically at the study site, but operational diagnostic criteria and the timing of symptom onset were not described in detail. This limits assessment of population consistency, particularly among participants with mild baseline scores or advanced gestation. Hydration status, weight change, and actual intake were not assessed as outcomes. The report also lacks information on antiemetics, intravenous fluids, or other interventions received during observation, preventing separation of the effects of concomitant treatment.

The small, single-clinic sample, non-random recruitment, and absence of an a priori sample-size calculation limit generalisability. Local studies of age, reproductive history, and nutritional status indicate that HG characteristics may vary across populations [22–26], but the descriptive distributions in this study cannot establish risk factors. Self-reported food diaries are susceptible to recall and social-desirability bias. A dichotomous adherence classification also fails to capture variation in the intervention dose actually received.

Study strengths include standardised symptom assessment, reporting of baseline and follow-up scores, documentation of implementation, and complete paired data for all participants. Nevertheless, complete follow-up does not eliminate confounding or measurement bias. Further studies require a comparison group with equivalent contact intensity, documentation of concomitant treatment, a consistent adherence definition, and longer follow-up. Outcomes should include the ability to maintain oral intake, weight change, quality of life, and the need for additional care, alongside PUQE-24 scores.

**Implications for clinical practice**

SFF may be considered an adjunct to care for women who can maintain oral intake, with food choices and schedules adapted to tolerance. Clinical assessment and treatment must remain priorities when intake cannot be maintained or dehydration and clinical deterioration occur. Royal College of Obstetricians and Gynaecologists (RCOG) guidance supports antiemetics when indicated, together with management of fluid and nutritional requirements; dietary modification should not delay necessary treatment [6,27]. This study did not assess comparative safety, cost-effectiveness, prevention of hospital admission, or fetal outcomes, and cannot support claims concerning these outcomes.

## Conclusion

SFF accompanied by education and monitoring in 36 pregnant women at Vina Primary Care Clinic was associated with lower PUQE-24 scores between days 1 and 3. The mean paired reduction of 2.44 points was accompanied by an increase in the proportion with mild symptoms from 25.00% to 61.11%. These findings provide preliminary evidence of within-group symptom changes, rather than causal evidence of SFF effectiveness. Controlled trials with more detailed reporting of diagnosis, exposure duration, adherence, and concomitant treatment are needed to assess the specific benefits and durability of these changes.

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