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Article

Investigating the Efficacy of Ginger and Lemon Boiled Water: A New Approach to Treating Mild Hyperemesis Gravidarum in Pregnant Women

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Abstract. In a quasi-experimental study, we investigated the impact of ginger and lemon boiled water on level 1 hyperemesis gravidarum in pregnant women. Utilizing a one-group pretest-posttest design, the study involved 20 participants who reported experiencing severe hyperemesis gravidarum symptoms. Following the intervention, the incidence of severe symptoms was reduced to zero among the participants. Statistical analysis with the Wilcoxon signed-rank test revealed a significant reduction in symptoms (p=0.001), indicating the potential of ginger and lemon boiled water as an effective non-pharmacological remedy for nausea and vomiting in pregnancy. These results advocate for the inclusion of alternative therapies in health education for pregnant women and highlight the necessity of seeking professional healthcare advice when experiencing such symptoms.

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1. Introduction

Ensuring the health of pregnant women is paramount in global health priorities, as it directly influences the quality of future human resources [1-5]. During pregnancy, particularly in the first trimester, women frequently experience digestive disorders, predominantly nausea and vomiting, commonly referred to as morning sickness [6-14]. This condition affects 60-80% of primigravidas and 40-60% of multigravidas, with hyperemesis gravidarum—a severe form of morning sickness—occurring in one out of a thousand pregnancies [15-19]. Despite not being fatal, the prevalence of hyperemesis gravidarum remains significant worldwide, with reported incidences varying greatly across different regions.

In Indonesia, particularly in West Java Province and more specifically in Majalengka Regency, the incidence of hyperemesis gravidarum has been notably high, with the Munjul Health Center reporting numerous cases. Preliminary studies at this center have highlighted a prevalent reliance on traditional herbs and rest to alleviate nausea and vomiting among pregnant women [20-24], revealing a gap in awareness and utilization of potential remedies like ginger and lemon decoction.

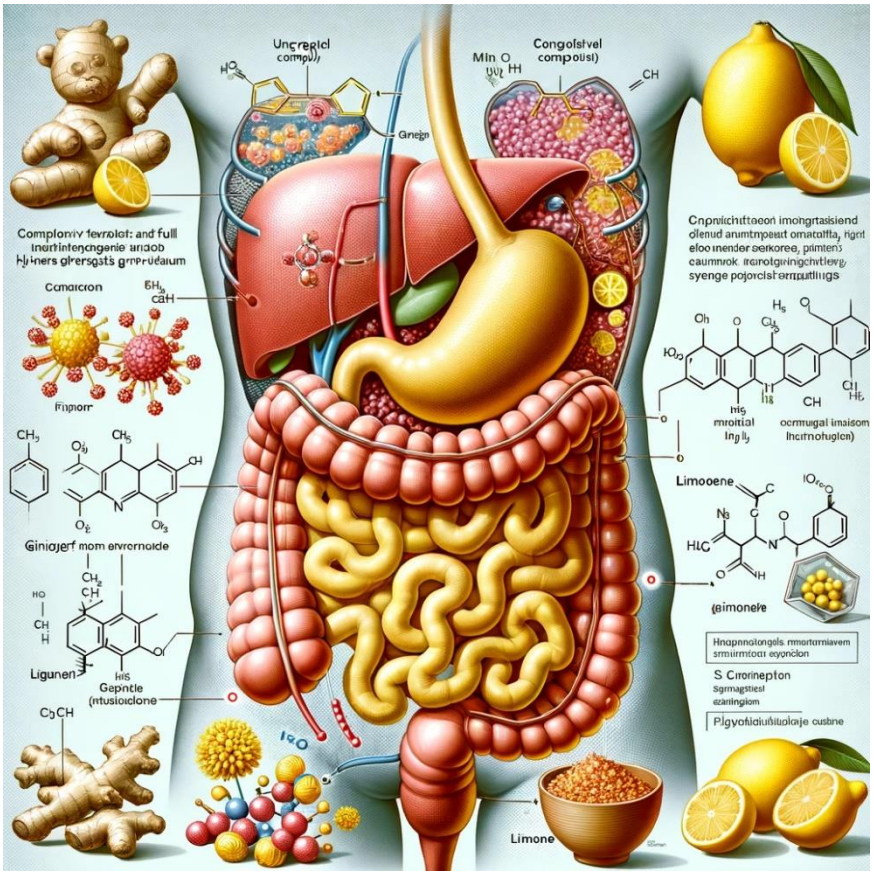

Figure 1. Detailed view of the molecular interactions between compounds found in ginger and lemon and the human digestive system

Hyperemesis gravidarum, categorized into three levels based on severity, poses risks not only to fetal development [25-30]—leading to potential outcomes like abortion, low birth weight, premature birth, and congenital anomalies—but also significant impacts on maternal health, including dehydration and electrolyte imbalances, with further psychological, social, spiritual, and occupational repercussions.

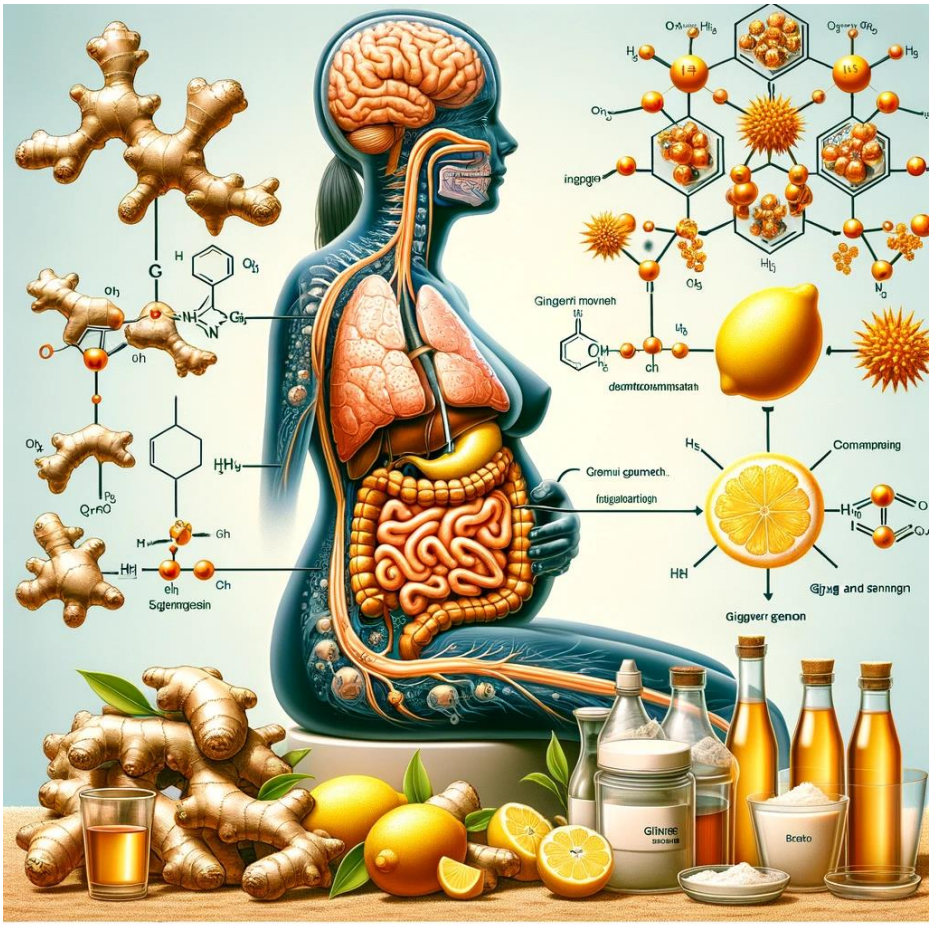

Figure 2. The molecular interactions between compounds found in ginger and lemon and the human digestive system, highlighting their therapeutic effects in treating mild hyperemesis gravidarum

Given the accessibility of ginger and lemon, coupled with their known health benefits, including high levels of vitamins, antioxidants, and essential minerals, these natural remedies present a promising, side-effect-free alternative for managing hyperemesis gravidarum. Previous research has shown the effectiveness of ginger and lemon in reducing symptoms, yet there remains a lack of specificity regarding the type of ginger used in such studies [31-35].

In light of this, our study aims to bridge this gap by focusing on the specific impact of red ginger and lemon boiled water on managing level 1 hyperemesis gravidarum. This research not only explores the efficacy of these natural remedies in a novel context but also contributes to the broader understanding of complementary therapies for pregnancy-related conditions, emphasizing the need for culturally and regionally accessible health solutions.

2. Methodology

This study adopted a quasi-experimental design with a one-group pretest-posttest approach to investigate the effect of a specific intervention on pregnant women diagnosed with hyperemesis gravidarum. Conducted at the UPTD Puskesmas Munjul, Majalengka Regency, the research spanned from May to June 2022.

The target population consisted of pregnant women experiencing hyperemesis gravidarum. A purposive sampling technique was employed to select 20 participants who met the inclusion criteria,

ensuring a focused and relevant sample group for the study's objectives. The chosen venue for this study offered a controlled environment conducive to monitoring the intervention's effects over time, facilitating the collection of consistent and accurate data.

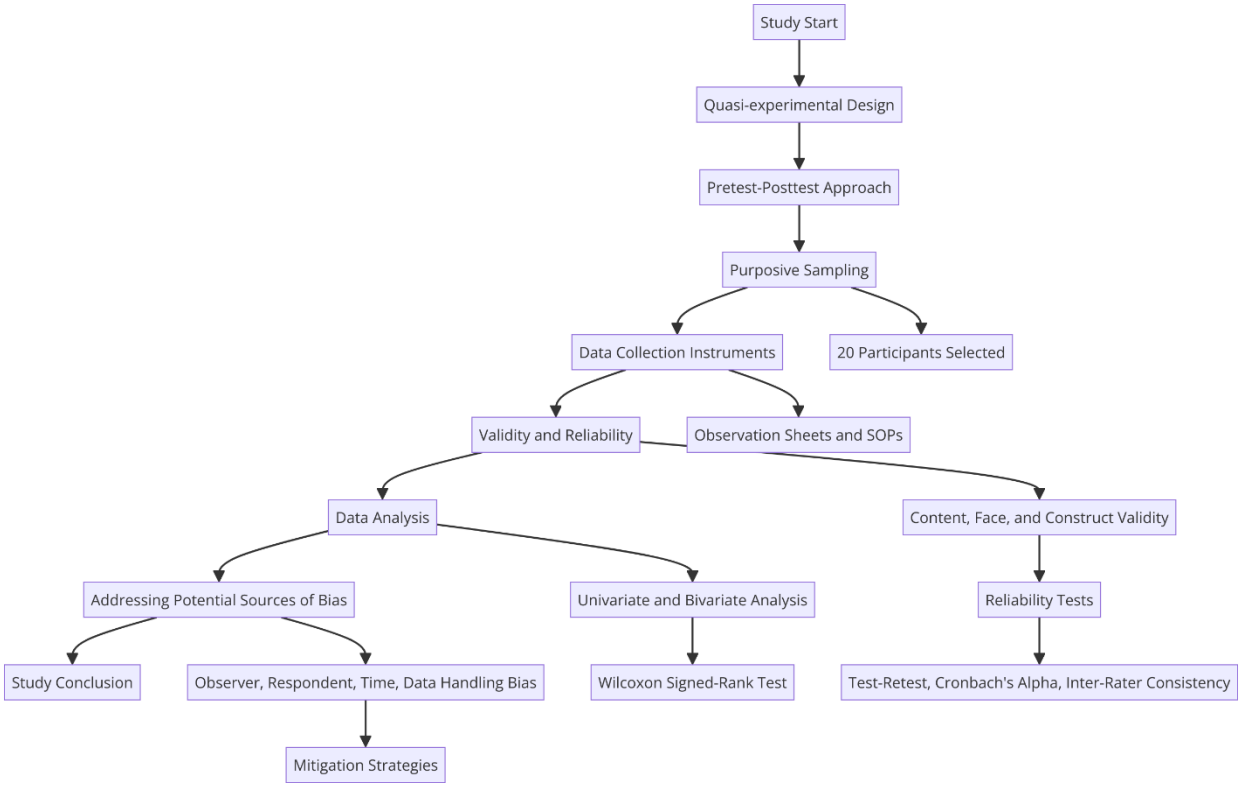

Figure 3. Flow chart of research

Observation sheets and Standard Operating Procedures (SOPs) were the primary tools for data collection [36-38]. These instruments were designed to ensure systematic and reliable data capture, encompassing both qualitative and quantitative aspects of the participants' responses and condition before and after the intervention.

Content Validity was assured through consultations with subject matter experts and review of relevant literature, ensuring comprehensive coverage of the study's key elements. Face Validity involved feedback from a subset of the target population, affirming the instruments' capability to measure the intended variables effectively. Construct Validity was established via factor analysis, assessing the extent to which the instruments accurately represented the underlying concepts or variables.

Reliability was evaluated through test-retest reliability, using a subset of participants to measure the instruments' stability over time. Cronbach's Alpha Coefficient for internal consistency among multiple items within the instruments. Inter-Rater Consistency, when applicable, utilized the Intraclass Correlation Coefficient to ensure uniformity in observations across different raters.

Univariate data analysis was conducted using measures of central tendency, while bivariate analysis employed the Wilcoxon signed-rank test to compare pretest and posttest results, providing insights into the intervention's effectiveness. Observer Bias was mitigated by training observers thoroughly on SOP adherence, supplemented by inter-observer reliability checks. Respondent Bias was minimized by obscuring group assignments from participants, aiming for a double-blind setup

where feasible. Time Bias was avoided by conducting observations and measurements at consistently scheduled times. Data Handling Bias was addressed by ensuring objective management of data collected through observation sheets and SOPs, preventing manipulation.

This rigorous methodology framework emphasizes the study's commitment to validity, reliability, and objectivity, laying a foundation for credible and replicable research outcomes. Transparent documentation of the methods allows for verification and potential replication by others, contributing to the broader scientific dialogue on managing hyperemesis gravidarum in pregnancy.

3. Results and Discussion

This research aimed to explore the potential benefits of ginger and lemon boiled water in treating level 1 hyperemesis gravidarum among pregnant women. Conducted at the UPTD Puskesmas Munjul in Majalengka Regency over May-June 2022, the study involved 20 participants experiencing mild hyperemesis gravidarum. The findings, illustrated through tables and narrative descriptions, offer significant insights into the efficacy of this natural remedy.

3.1 Univariate Analysis

3.1.1 Pre-Intervention Hyperemesis Gravidarum Severity

Before the intervention, the distribution of hyperemesis gravidarum severity among participants was as follows: 30% (6 participants) experienced severe symptoms, 55% (11 participants) had moderate symptoms, and 15% (3 participants) reported mild symptoms. This baseline data highlights the predominance of moderate to severe nausea and vomiting among the study group, underscoring the need for effective treatment options.

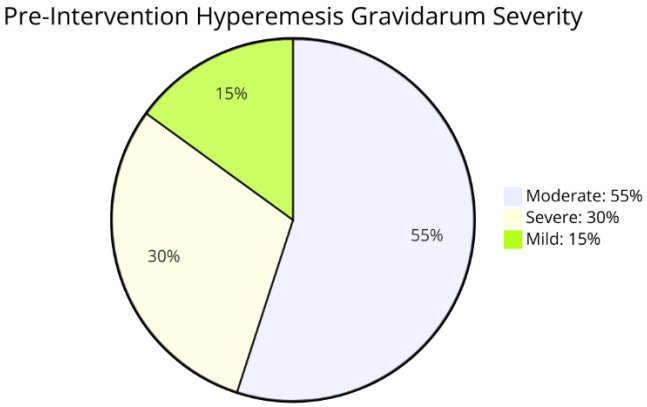

Figure 4. Diagram illustrating the pre-intervention hyperemesis gravidarum severity

3.1.2 Post-Intervention Hyperemesis Gravidarum Severity

Following the intervention, a remarkable shift was observed in the severity distribution: no participants reported severe symptoms, 50% (10 participants) experienced moderate symptoms, and 50% (10 participants) had mild symptoms. The absence of severe cases post-intervention underscores the potential of ginger and lemon boiled water in mitigating the symptoms of hyperemesis gravidarum.

The Pregnancy-Unique Quantification of Emesis (PUQE) scale, among other tools, was utilized to objectively assess symptom severity. The pre-and post-intervention scores provide a quantitative measure of the intervention's impact, suggesting a notable reduction in hyperemesis gravidarum severity among the participants.

The findings from this study indicate that ginger and lemon boiled water may offer a promising treatment for mild hyperemesis gravidarum in pregnant women [39-41]. The significant decrease in symptom severity, particularly the elimination of severe cases, aligns with previous research

highlighting the antiemetic properties of ginger. The addition of lemon, known for its digestive aid and vitamin C content, may enhance the therapeutic effect.

The study's design, a one-group pretest-posttest approach, though lacking a control group, provides preliminary evidence supporting the intervention's efficacy. However, the potential for placebo effects and natural symptom resolution cannot be overlooked. Future research with randomized control trials and larger sample sizes is necessary to confirm these findings and elucidate the mechanism of action.

Comparing the results with existing literature reveals consistency with the anti-nausea effects of ginger documented in previous studies. The novel inclusion of lemon and the method of administration (boiled water) contribute to the body of knowledge on dietary and natural remedies for pregnancy-related nausea and vomiting.

Despite its limitations, this study underscores the potential of simple, natural remedies in managing pregnancy-related ailments. It encourages a holistic approach to maternal health care, emphasizing the need for safe, effective, and accessible treatment options for hyperemesis gravidarum.

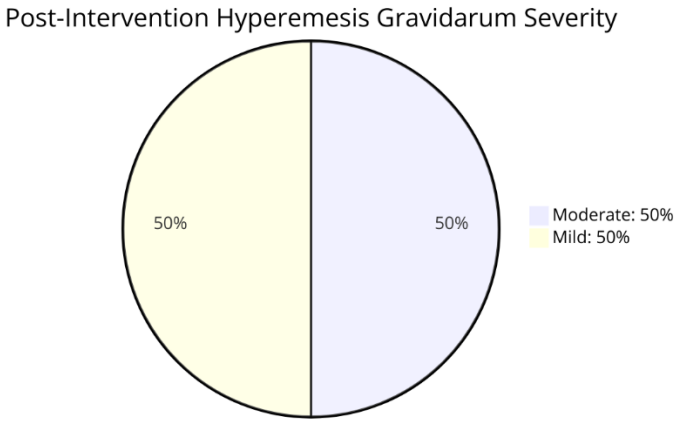

Figure 5. Diagram illustrating the post-intervention hyperemesis gravidarum severity

3.2 Bivariate Analysis

The bivariate analysis focused on assessing the direct effect of ginger and lemon boiled water on level 1 hyperemesis gravidarum among the 20 pregnant women who participated in the study at UPTD Munjul Health Center, Majalengka Regency in 2022.

After the treatment, a significant decline in the symptoms of hyperemesis gravidarum was observed in 12 out of 20 respondents. Meanwhile, 8 respondents did not report any change in their condition. The statistical significance of these changes was assessed using the Wilcoxon test, which produced a p-value of 0.001. Given that the p-value is less than the alpha level of 0.05, the null hypothesis, which posited that there would be no effect, was rejected.

These results substantiate the claim that ginger and lemon boiled water has a statistically significant effect on reducing the symptoms of level 1 hyperemesis gravidarum in pregnant women [42-44]. The p-value of 0.001 is indicative of a strong effect, providing robust evidence against the null hypothesis.

This outcome aligns with existing literature that supports the efficacy of ginger as an antiemetic, suggesting that the addition of lemon might contribute positively to the treatment of hyperemesis gravidarum. The findings are clinically relevant, offering a potential low-risk and accessible intervention for pregnant women suffering from this condition.

The use of the Wilcoxon test, a non-parametric method for comparing two paired groups, was appropriate given the ordinal nature of the hyperemesis gravidarum severity scale. It allowed for the evaluation of the treatment's effectiveness in a statistically robust manner, accounting for the individual differences in symptom severity at baseline.

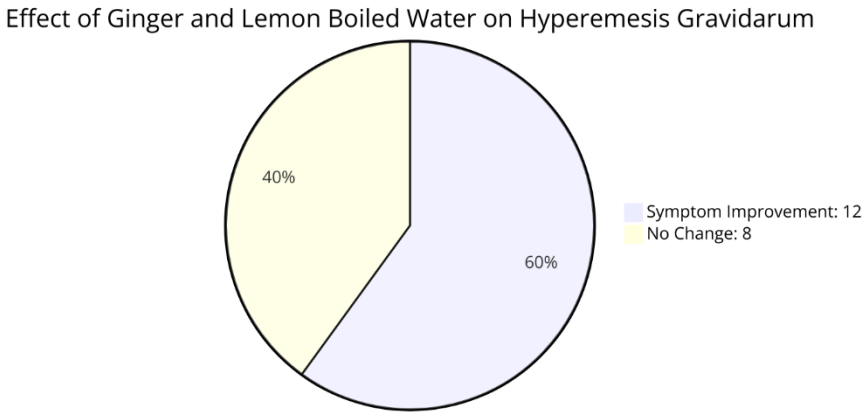

Figure 6. Diagram illustrating the effect of ginger and lemon boiled water on Hyperemesis Gravidarum

The study's design and the statistical methods employed provide confidence in the validity of the results. However, it is important to acknowledge that while the statistical test indicates a significant effect, the clinical significance of the change in symptom severity would benefit from further exploration in larger, controlled trials. Furthermore, understanding the specific contributions of ginger and lemon to the observed effect would be an interesting avenue for future research.

The research at UPTD Munjul Health Center presents compelling evidence for the efficacy of ginger and lemon boiled water in treating level 1 hyperemesis gravidarum. These findings can inform clinical practices and suggest a natural, cost-effective approach to managing mild hyperemesis gravidarum in pregnant women.

3.3 Initial Presentation of Level 1 Hyperemesis Gravidarum

The study commenced with an evaluation of the initial severity of Level 1 Hyperemesis Gravidarum among pregnant women at UPTD Munjul Health Center, Majalengka Regency in 2022. The findings indicated that prior to the intervention, 30% of the subjects experienced severe symptoms. These symptoms often manifested as discomfort and morning vomiting, triggered by certain odors or the physical changes associated with early pregnancy. The frequency of such episodes ranged from once to twice daily, with some cases reporting up to five times a day. This condition necessitates medical attention to alleviate the discomfort and potential risks associated with severe nausea and vomiting.

The prevalence of severe hyperemesis gravidarum in this study is comparable to findings from other studies, such as Harahap (2020) in Bandung Regency and Wulandari (2019) in Sukabumi, albeit slightly lower than the prevalence observed by Kundaryanti (2021) in Serang Banten City. Hyperemesis gravidarum not only affects the physical health of the mother, leading to dehydration and electrolyte imbalance, but can also have serious repercussions for the fetus, including abortion, low birth weight, premature birth, and malformations [45-47]. Moreover, the condition carries psychological, social, spiritual, and occupational impacts for the expectant mother.

Hyperemesis gravidarum's severity is categorized into three levels, with Level I characterized by weakness, lack of appetite, weight loss, and epigastric pain. Level II and III represent progressively

severe conditions with additional symptoms such as reduced skin turgor, dry and soiled tongue, rapid pulse, low blood pressure, temperature variations, and even decreased consciousness at Level III.

The management of hyperemesis gravidarum involves both pharmacological and non-pharmacological strategies. The pharmacological approach includes antiemetics, antihistamines, anticholinergics, and corticosteroids. Meanwhile, non-pharmacological treatments embrace dietary adjustments, emotional support, acupuncture, and complementary therapies like ginger and lemon.

The research underscores the persisting incidence of hyperemesis gravidarum among pregnant women and advocates for proactive health worker interventions. These include counseling on non-pharmacological management of nausea and vomiting, as well as practical demonstrations on preparing ginger and lemon boiled water at home. Such measures are critical for pregnant women suffering from excessive nausea and vomiting, as they provide accessible remedies that can be self-administered and complement other therapeutic practices.

This study contributes to the body of evidence supporting the effectiveness of ginger, and potentially lemon, in mitigating the symptoms of hyperemesis gravidarum. It echoes the importance of an integrative approach to treatment, blending conventional medical therapies with home-based remedies to offer holistic care for expectant mothers. Further research is needed to quantify the specific benefits of ginger and lemon boiled water and to establish standardized guidelines for its use in clinical settings.

3.4 Post-intervention Hyperemesis Gravidarum Severity

The post-intervention phase of the study at UPTD Munjul Health Center, Majalengka Regency in 2022 revealed a substantial improvement in the severity of Level 1 hyperemesis gravidarum symptoms among pregnant women following the consumption of ginger and lemon boiled water. Remarkably, none of the participants reported severe symptoms post-treatment.

The complete absence of severe hyperemesis gravidarum cases post-intervention suggests a significant reduction in symptom severity. The shift from severe to moderate or even no symptoms highlights the potential therapeutic effects of ginger and lemon boiled water. Adherence to SOP recommendations for consuming this remedy appears to be a contributing factor to the observed improvements.

Comparative data from similar studies like Kusdaryanti (2021) and Wulandari (2021) indicate that the results of our intervention are favorable, with our study showing a complete elimination of severe cases. Such outcomes bolster the evidence for non-pharmacological interventions in managing hyperemesis gravidarum.

The successful reduction of hyperemesis gravidarum symptoms with ginger and lemon boiled water underscores the importance of non-pharmacological treatments. These alternative therapies are particularly valuable due to their affordability and lack of pharmacological side effects. In contrast to pharmacological treatments, which may lead to adverse effects like headaches, diarrhea, and drowsiness, ginger and lemon offer a safe and effective remedy for pregnant women.

The therapeutic properties of ginger, rich in vitamins, organic acids, and oleoresins, have been widely recognized in traditional medicine. Similarly, lemon's high vitamin C and antioxidant content contribute to its efficacy. The combination of lemon's sourness and ginger's spiciness creates a synergistic effect, which according to the literature, can alleviate nausea and vomiting.

Furthermore, lemon aromatherapy, derived from the essential oils of citrus lemon, is established as a safe practice for pregnant women. It has been noted for its antibacterial, antifungal properties, and ability to neutralize unpleasant odors, while also providing psychological benefits such as anxiety and stress reduction.

In light of these findings, health workers can confidently recommend ginger and lemon boiled water as a non-pharmacological alternative to combat nausea and vomiting in pregnant women. This

study supports the self-administration of such remedies, enabling pregnant women to manage their symptoms independently and safely.

The significant decrease in hyperemesis gravidarum severity post-intervention with ginger and lemon boiled water highlights the potential of this natural remedy. The findings advocate for further research and integration of such non-pharmacological treatments into maternal healthcare protocols, providing a safe, cost-effective, and self-manageable option for pregnant women experiencing hyperemesis gravidarum.

3.4 The Impact of Ginger and Lemon Boiled Water on Hyperemesis Gravidarum Severity

The research at UPTD Munjul Health Center, Majalengka Regency, in 2022 sought to evaluate the effects of ginger and lemon boiled water on level 1 hyperemesis gravidarum in pregnant women. The results demonstrated a significant impact, as evidenced by the p-value of 0.001, indicating that the intervention played a substantial role in reducing the severity of nausea and vomiting symptoms.

The study's findings are consistent with previous research, such as that by Harahap (2020), which highlighted the effectiveness of ginger decoction in reducing nausea and vomiting among first-trimester pregnant women. Similar results were observed by Wulandari (2019) with warm ginger drinks and by Kumaladewi & Uci (2020), who examined the effects of ginger drink and lemon aromatherapy. In each of these studies, significant improvements in symptoms were reported, with p-values far below the 0.05 threshold.

The theory that lemon aromatherapy, in conjunction with ginger, can alleviate symptoms of nausea and vomiting is supported by the data [48-50]. The non-pharmacological approach, which includes such therapies, offers pregnant women a safer and more cost-effective treatment option with fewer side effects compared to pharmacological alternatives.

Ginger contains gingerol, a natural compound known for its antiemetic properties, effective not only for pregnancy-related nausea but also for chemotherapy-induced nausea. The daily consumption of ginger, particularly around 1.5 grams, has been identified as an effective dose. When combined with lemon, which is high in vitamin C and other beneficial compounds, the concoction forms a potent remedy that is safe for pregnant women. Healthcare providers are encouraged to educate pregnant women about non-pharmacological treatments for nausea and vomiting, such as ginger and lemon decoctions. This approach is particularly relevant given the potential for pharmacological treatments to adversely affect the fetus.

3.5 Potential Limitations and Considerations

While the results are promising, the study's design—specifically the quasi-experimental one-group pretest-posttest approach—has inherent limitations. The absence of a control group makes it challenging to attribute changes solely to the intervention. Future research could benefit from incorporating control groups and larger sample sizes to enhance the validity and generalizability of the findings.

Other considerations include the potential for external factors influencing the results, which can be mitigated by careful monitoring and integration into the data analysis. Additionally, statistical techniques such as regression can be used to control for confounding variables, thereby strengthening causal inferences.

The possibility of Hawthorne effects or contamination must also be acknowledged and addressed through appropriate participant guidance. Finally, while the Wilcoxon test is suitable for the data analysis, it should be applied correctly, with statistical consultation if necessary, to ensure the robustness of the results. The study provides valuable insights into the efficacy of ginger and lemon boiled water as a treatment for hyperemesis gravidarum in pregnant women. It lays the groundwork for further research and supports the inclusion of these natural remedies in maternal healthcare strategies.

3.6 Analysis

The study compelling case for the use of ginger and lemon boiled water as a non-pharmacological treatment for mild hyperemesis gravidarum (HG). Conducted with 20 pregnant women experiencing level 1 HG, the research shows a significant reduction in symptoms post-treatment, with 0% of participants reporting severe HG after consuming the ginger and lemon boiled water. This outcome highlights the potential of this natural remedy in managing HG symptoms, offering a safer alternative to pharmaceutical interventions.

The study utilizes the Pregnancy-Unique Quantification of Emesis (PUQE) scale for objective symptom measurement, ensuring a reliable assessment of HG severity. Despite the lack of a control group, which limits the ability to attribute improvements solely to the treatment, the study implements measures like the Wilcoxon test to statistically validate the treatment's effectiveness. The results align with previous research on the efficacy of ginger for nausea and vomiting in pregnancy, further supported by the positive statistical significance (p-value = 0.001) indicating the treatment's impact.

Moreover, the study underscores the importance of non-pharmacological treatments for HG, reflecting on the broader implications for pregnant women seeking alternative remedies. Ginger and lemon's properties, such as antioxidants, vitamins, and their synergistic effect in alleviating nausea and vomiting, are discussed, emphasizing the treatment's safety and accessibility.

However, the study acknowledges its limitations, including the small sample size and the quasi-experimental design's inherent constraints. Future research with a control group and larger sample size is suggested to reinforce these findings and explore the treatment's full potential. This research contributes to the growing body of evidence supporting natural remedies in pregnancy care, potentially influencing clinical practices and patient choices towards safer, more holistic treatment options for HG.

3.7 Interpretation

The study compelling evidence on the positive impact of ginger and lemon boiled water on reducing symptoms of mild Hyperemesis Gravidarum (HG) in pregnant women. Conducted at UPTD Puskesmas Munjul, Majalengka Regency, with 20 respondents, the research employed a one-group pretest-posttest design without a control group, focusing on the practical implementation and observable benefits of this non-pharmacological treatment.

The findings highlight a significant reduction in HG symptoms among participants after the consumption of ginger and lemon boiled water, demonstrating a shift from severe and moderate symptoms to mild or no symptoms. This outcome is supported by statistical analysis, showing a significant effect of the treatment on reducing HG levels. The study underscores the potential of ginger and lemon, known for their anti-nausea properties and nutritional benefits, as a safe, accessible, and effective remedy for managing HG symptoms.

Despite its promising results, the study acknowledges several limitations due to its quasi-experimental design, such as the small sample size and the absence of a control group, which may affect the generalizability and causality of the findings. Future research is suggested to include more robust experimental designs with larger sample sizes and control groups to strengthen the evidence of the treatment's efficacy.

This research aligns with existing literature on the effectiveness of ginger in reducing nausea and vomiting in pregnant women, adding to the body of evidence supporting non-pharmacological approaches to managing HG. It offers valuable insights for healthcare providers seeking alternative treatments for HG, emphasizing the importance of holistic and patient-centered care in managing pregnancy-related conditions.

3.8 Comparison

The study presents a novel approach to managing mild HG symptoms by utilizing a natural remedy. This research stands out due to its focus on a specific combination of ginger and lemon, unlike other studies that might only examine the effects of ginger alone. It demonstrates significant improvements in HG symptoms among participants, showing a transition from severe and moderate symptoms to mild or none, after the consumption of the ginger-lemon water concoction.

Comparatively, previous research has explored the effectiveness of ginger for nausea and vomiting in pregnancy but has not extensively investigated the combined use of ginger and lemon. This study fills that gap by providing evidence of the benefits of this combination, supported by statistical analysis indicating a significant reduction in HG symptoms. The use of the Pregnancy-Unique Quantification of Emesis (PUQE) scale for symptom assessment aligns with established methods for evaluating nausea and vomiting in pregnancy, ensuring the study's findings are both reliable and relevant to existing literature.

However, the study acknowledges its limitations, including the absence of a control group and a small sample size, which might impact the generalizability of the results. Future research is encouraged to incorporate more robust experimental designs, larger sample sizes, and control groups to further validate the efficacy of ginger and lemon boiled water in treating HG. This research contributes to the growing body of evidence supporting non-pharmacological treatments for pregnancy-related nausea and vomiting, offering a safe, accessible, and effective alternative for pregnant women experiencing mild HG.

4. Conclusion

The research conducted at UPTD Munjul Health Center in Majalengka Regency has provided substantial evidence supporting the efficacy of ginger and lemon boiled water as a treatment for mild hyperemesis gravidarum in pregnant women. The significant reduction in the severity of nausea and vomiting symptoms, validated by statistical analysis, aligns with previous studies, reinforcing the therapeutic potential of these natural ingredients. Ginger, with its active component gingerol, and lemon, rich in vitamin C and antioxidants, have been shown to offer a safe, cost-effective, and accessible remedy, particularly suitable for those seeking non-pharmacological treatment options. The study's findings advocate for the integration of ginger and lemon boiled water into the repertoire of treatments for hyperemesis gravidarum and highlight the importance of further research to optimize and standardize this treatment method. Despite the limitations inherent to the one-group pretest-posttest study design, the results are promising and suggest a new avenue for alleviating the discomfort associated with this condition in early pregnancy. Health workers are encouraged to consider this natural approach as part of comprehensive maternal care, potentially enhancing the well-being of pregnant women and reducing the reliance on pharmacological interventions with their associated side effects.

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