

Original Article

Comparative Efficacy of Mature Coconut Water and Peppermint Water in Managing Gestational Hypertension: A Quasi-Experimental Study in Faisalabad District

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ABSTRACT

Background: Gestational hypertension poses significant risks to maternal and fetal health, prompting the exploration of safe and effective non-pharmacological interventions. The natural properties of mature coconut water and peppermint water, recognized for their mineral content and potential health benefits, have been hypothesized to mitigate high blood pressure, offering a complementary approach to conventional treatment modalities.

Objective: This study aimed to compare the efficacy of mature coconut water and peppermint water in managing blood pressure among pregnant women diagnosed with gestational hypertension.

Methods: Employing a quasi-experimental design, this research was conducted in the Faisalabad district, targeting pregnant women in their last trimester with confirmed gestational hypertension. Fourteen participants were divided into three groups: a control group receiving no intervention, a coconut water group, and a peppermint water group, with six participants in each intervention group. Daily administration of the assigned intervention was standardized across participants, with blood pressure measurements taken at consistent intervals using a standardized sphygmomanometer. Statistical analysis was performed using SPSS version 25 to identify significant differences in blood pressure outcomes.

Results: The study found significant reductions in blood pressure among the intervention groups. Participants in the coconut water group showed a decrease from an average baseline blood pressure of 146/92 mm Hg to 130/85 mm Hg post-intervention ($p=0.021$), while the peppermint water group experienced a reduction from 147/93 mm Hg to 125/82 mm Hg ($p=0.013$). The control group saw negligible change, from 145/90 mm Hg to 144/91 mm Hg ($p=0.061$).

Conclusion: Both mature coconut water and peppermint water significantly reduced blood pressure in pregnant women with gestational hypertension. These findings suggest that natural beverages, due to their unique nutritional compositions and health benefits, may serve as effective complementary interventions for managing gestational hypertension. However, larger-scale studies are recommended to further validate these results and explore the mechanisms underlying these effects.

Keywords: Gestational Hypertension, Coconut Water, Peppermint Water, Non-Pharmacological Intervention, Blood Pressure Management, Pregnancy Health.

INTRODUCTION

Hypertension is a prevalent global health issue, affecting an estimated 1.3 billion individuals and contributing to approximately 10 million deaths annually. This condition, often referred to as the "silent killer," is particularly concerning due to its asymptomatic nature, which complicates early detection and intervention (1). Gestational hypertension, a specific form of high blood pressure occurring in the last trimester of pregnancy, highlights the need for targeted research and intervention due to its potential to lead to more severe conditions like preeclampsia and its implications for both maternal and child health post-pregnancy (2-3). The link between gestational hypertension and increased risks of chronic hypertension, cardiovascular diseases, and type 2 diabetes in

mothers, as well as cardiometabolic diseases in their offspring, underscores the urgency in finding effective management strategies (1,4,5).

In the quest for safe and effective interventions, natural remedies such as mature coconut water and peppermint water have garnered interest for their potential health benefits. Coconut water, sourced from mature coconuts aged 8-9 months, is lauded for its mineral content, including potassium, sodium, and magnesium, which are crucial in regulating blood pressure (6). Furthermore, its vitamin K and magnesium content enhance its potential for managing blood pressure. Peppermint has been recognized for its enzyme-inhibitory effects, particularly on the angiotensin1-converting enzyme (ACE), a key player in hypertension. It also contains essential minerals that contribute to blood pressure regulation (3).

Given the multifaceted etiology of hypertension, involving genetic, lifestyle, and nutritional factors, a comprehensive approach to its management is warranted. The exploration of natural remedies like coconut water and peppermint in this context is driven by their general tolerability and minimal side effects compared to synthetic drugs. Coconut water, in particular, has been traditionally consumed for its refreshing taste and perceived health benefits, with research supporting its role as a natural diuretic, circulation improver, and blood pressure reducer. Its high potassium content, for example, can mitigate the hypertensive effects of sodium intake (6,7). Similarly, peppermint's traditional use in medicine for its antispasmodic, analgesic, and anti-inflammatory properties, alongside its potential in ACE enzyme inhibition, presents it as a promising candidate for natural hypertension management (8,9).

The current study, set against the backdrop of the Faisalabad district, aims to investigate the comparative efficacy of mature coconut water and peppermint water in managing gestational hypertension. This research not only seeks to add to the body of knowledge on natural remedies for hypertension but also to offer potential alternative or complementary treatments for pregnant women dealing with gestational hypertension, thus addressing a significant public health concern (10).

The rise in interest towards natural remedies as potential therapeutic agents in managing hypertension, especially gestational hypertension, reflects a broader shift towards traditional medicine and dietary interventions in combatting this pervasive ailment. Studies using models like Wistar rats have demonstrated the antihypertensive properties of coconut water, highlighting its role in reducing hypertension levels and its importance in dietary management through the enhancement of potassium intake. This aligns with research pointing to the potential benefits of dietary interventions, such as increasing potassium intake through coconut water consumption, in managing prehypertension—a crucial stage for intervention that precedes full-blown hypertension (11-13).

This research delves into the natural management of gestational hypertension through mature coconut water and peppermint water, rooted in a comprehensive understanding of hypertension's global prevalence, its risks during gestation, and the potential long-term health implications for both mothers and their children. Through a focus on these natural remedies, the study contributes to the ongoing exploration of safe and effective hypertension management strategies, with the ultimate goal of mitigating the global burden of this condition.

MATERIAL AND METHODS

This quasi-experimental study was carried out in the district of Faisalabad, focusing on a select group of pregnant women identified with gestational hypertension during their last trimester. The research was meticulously designed to assess the comparative efficacy of mature coconut water and peppermint water in managing this condition. A total of fourteen participants were carefully selected based on a confirmed diagnosis of gestational hypertension, ensuring they did not present with other significant comorbid conditions (14).

The participants were systematically allocated into three distinct groups. The first group, serving as the control, did not receive any intervention. The second group, comprising six individuals, was administered mature coconut water, while the third group, also consisting of six participants, received peppermint water. The administration of these interventions was carefully standardized in terms of quantity, frequency, and duration to maintain consistency across the study (15).

Data collection was rigorously conducted, with daily blood pressure measurements taken using a standardized sphygmomanometer. These readings were captured at the same time each day to minimize variability and ensure reliability. In addition to blood pressure monitoring, other clinical data pertinent to the participants' health status were recorded, along with any observations related to potential side effects arising from the interventions (16).

To elucidate the therapeutic potential of the interventions, biochemical analyses of the coconut and peppermint water samples were performed. These analyses were instrumental in determining the content of vitamins, minerals, and bioactive compounds, providing valuable insights into the potential antihypertensive mechanisms of these natural remedies. Sensory evaluations were also conducted to assess the palatability and acceptability of the interventions among the study participants.

The collected data underwent comprehensive statistical analysis using SPSS version 25 to identify significant differences in blood pressure outcomes post-intervention. This analysis was pivotal in establishing the correlation between the natural interventions and

changes in gestational hypertension among the participants. P-values were calculated to determine the statistical significance of the observed outcomes (17).

Ethical considerations were paramount throughout the study. Participants were thoroughly informed about the study's objectives, procedures, potential risks, and benefits. Informed consent was obtained from all participants prior to their inclusion in the study, adhering to the ethical guidelines outlined in the Declaration of Helsinki. This ensured the safety, well-being, and rights of the participants were upheld, emphasizing the ethical integrity of the research.

RESULTS

The study presented a detailed comparative analysis of the effects of coconut water and peppermint water on managing gestational hypertension among pregnant women, underpinned by a proximate analysis of the beverages involved. Through meticulous research, the proximate composition of coconut water and peppermint water revealed distinct profiles. Coconut water was characterized by a high moisture content of $95.95 \pm 0.943\%$, minimal ash ($0.47 \pm 0.753\%$), fiber ($0.08 \pm 0.292\%$), and protein ($0.51 \pm 0.854\%$) levels, alongside a moderate carbohydrate percentage of $2.91 \pm 0.744\%$. Additionally, negligible amounts of non-fiber extract (NFE) and crude fat were observed, denoting its low-fat content and richness in essential hydration elements (Table 1). Conversely, peppermint water exhibited a slightly lower moisture percentage of $89.5 \pm 0.933\%$, significantly higher ash content ($3.5 \pm 0.892\%$), and increased fiber ($1.5 \pm 1.042\%$) and protein ($2.19 \pm 1.954\%$) percentages. Notably, the carbohydrate content in peppermint water was remarkably high at $92.31 \pm 0.833\%$, suggesting a profound difference in nutritional value between the two interventions.

Table 1: Proximate Analysis of Coconut Water and Peppermint Water (Means \pm SD)

Component	Coconut Water	Peppermint Water
Moisture (%)	95.95 ± 0.943	89.5 ± 0.933
Ash (%)	0.47 ± 0.753	3.5 ± 0.892
Fiber (%)	0.08 ± 0.292	1.5 ± 1.042
Protein (%)	0.51 ± 0.854	2.19 ± 1.954
Carbohydrate (%)	2.91 ± 0.744	92.31 ± 0.833
NFE (%)	0.097 ± 1.042	0.034 ± 1.022
Crude Fat (%)	0.061 ± 1.103	0.021 ± 0.933

Table 2: Comparative Effects of Coconut Water and Peppermint Water on Blood Pressure in Pregnant Women with Gestational Hypertension

Group	Starting Average BP (mm Hg)	Ending Average BP (mm Hg)	P-Value
Control Group (Go)	145/90	144/91	0.061
Coconut Water Group (G1)	146/92	130/85	0.021
Peppermint Water Group (G2)	147/93	125/82	0.013

In terms of clinical efficacy, the study's outcomes highlighted the significant impact of both coconut water and peppermint water on gestational hypertension management. The control group, receiving no intervention, showed an insignificant alteration in blood pressure from a baseline of 145/90 mm Hg to 144/91 mm Hg, as evidenced by a p-value of 0.061. This minimal change underscored the natural progression of gestational hypertension without therapeutic intervention. In stark contrast, participants in the coconut water group experienced a notable reduction in blood pressure from an initial average of 146/92 mm Hg to 130/85 mm Hg post-intervention, with a statistically significant p-value of 0.021. This substantial decrease highlighted the potential of coconut water as an effective natural remedy in managing elevated blood pressure levels among pregnant women. Similarly, the peppermint water group observed a remarkable blood pressure reduction from 147/93 mm Hg to 125/82 mm Hg, further supported by a statistically significant p-value of 0.013 (Table 2). This outcome not only confirms the antihypertensive properties of peppermint water but also suggests its slightly superior efficacy compared to coconut water in this specific context.

Collectively, these results offer compelling evidence regarding the beneficial effects of natural interventions, such as coconut water and peppermint water, in the management of gestational hypertension. The proximate analysis provides insights into the nutritional compositions that may underlie the therapeutic benefits observed, whereas the comparative effects on blood pressure underscore the potential of these natural remedies as viable options for pregnant women seeking alternative or complementary treatments for hypertension.

DISCUSSION

The study conducted on the comparative efficacy of coconut water and peppermint water in managing gestational hypertension has provided significant insights into the therapeutic potential of these natural remedies. The findings revealed that both coconut and peppermint waters contributed to notable reductions in blood pressure among pregnant women diagnosed with gestational hypertension, highlighting their utility as non-pharmacological interventions for this condition. The high moisture content of coconut water, coupled with its balanced nutrient profile, suggests a mechanism of action that includes hydration benefits potentially conducive to enhanced blood volume and circulation. This aspect is crucial for managing hypertension, where improved circulation can contribute to the overall regulation of blood pressure levels. Conversely, the rich mineral composition indicated by the higher ash content of peppermint water, alongside elevated fiber and protein levels, suggests a broader spectrum of physiological benefits, including improved digestion and nutritional support, which could indirectly influence blood pressure regulation (14).

The antihypertensive properties of coconut water, previously documented in studies using Wistar rat models, were corroborated by our findings, with the mineral content, especially potassium, playing a pivotal role in this effect. This observation aligns with the World Health Organization's emphasis on potassium's importance in hypertension management and prevention, further substantiating the potential of coconut water as a beneficial intervention for gestational hypertension. Meanwhile, the inhibitory effects of peppermint on the ACE enzyme present a direct mechanism by which peppermint water can lower blood pressure, offering a complementary pathway to the multifaceted approach required for effective hypertension management (19-20).

This study, however, is not without limitations. The small sample size and the quasi-experimental design may limit the generalizability of the findings, suggesting a need for cautious interpretation of the results. Additionally, while the biochemical analysis provided insight into the nutritional compositions of the interventions, a more comprehensive examination of bioactive compounds and their specific roles in antihypertensive activity could enhance our understanding of the mechanisms at play (18).

Future research should aim to address these limitations by expanding the sample size and employing more robust experimental designs to explore the long-term effects and clinical relevance of these natural remedies in a broader population. Detailed biochemical analysis focusing on the identification and characterization of bioactive compounds in coconut and peppermint waters could elucidate their mechanisms of action, contributing to the development of evidence-based guidelines for the use of natural remedies in hypertension management during pregnancy (20).

CONCLUSION

In conclusion, the study highlights the potential of coconut and peppermint waters as natural remedies for managing gestational hypertension, with their distinct nutritional profiles and mechanisms of action offering valuable insights into non-pharmacological approaches to hypertension care. The need for further research is evident, with larger-scale studies and detailed biochemical investigations required to fully understand and leverage the therapeutic potential of these natural interventions.

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