Supplement Use Among Hypertensive Patients in Two Rural and Two Urban Health Centers in Guyana, South America

ABSTRACT

Objective: This study aimed to comparatively assess the knowledge and practices related to the use of dietary supplements as adjunctive treatment and management for hypertension among patients attending two rural and two urban health centers in Guyana.

Methods: A cross-sectional, mixed-methods design was employed to evaluate the prevalence, patterns, and motivations for dietary supplement use among 144 hypertensive adults (71 urban, 73 rural) in Guyana, with a focus on the influence of cultural practices on healthcare approaches. Data were collected using a structured questionnaire, which was pretested in a pilot study to ensure validity and reliability.

Results: The study sample consisted of 64% female and 36% male participants, with the majority (57%) being over 60 years of age. Urban participants predominantly used vitamin and mineral supplements, demonstrating a statistically significant association between supplement use and blood pressure classification ($\chi^2 = 7.16$, $p = .007$). Conversely, rural participants more frequently relied on herbal remedies, particularly for preventive purposes.

Conclusion: The findings highlight the need for larger-scale, longitudinal studies to comprehensively explore the interplay between cultural influences, dietary supplement use, and hypertension management in Guyana. Such research is essential for informing the development of culturally sensitive public health interventions to enhance hypertension care in diverse populations.

INTRODUCTION

Hypertension, commonly referred to as high blood pressure, is a chronic medical condition characterized by consistently elevated blood pressure levels. This condition occurs when the force exerted by circulating blood against arterial walls is persistently high (CDC, 2020). It is a major public health challenge, identified as the leading cause of premature mortality and a significant contributor to cardiovascular diseases globally (WHO, 2022). As of 2022, approximately 1.13 billion individuals worldwide were affected by hypertension, accounting for nearly 10 million deaths annually (WHO, 2022). Within the Americas, an estimated 20-40% of the adult population, approximately 250 million individuals, are impacted by this condition (WHO, 2022).

Effective management of hypertension often involves a combination of lifestyle modifications, such as dietary changes, physical activity, and stress reduction, along with pharmacological interventions using antihypertensive medications to achieve optimal blood pressure control and mitigate associated health risks (WHO, 2022). However, in recent years, the use of dietary supplements as an adjunctive therapy has garnered increasing attention as a potential avenue for managing hypertension (Caligiuri & Pierce, 2017). Dietary supplements, defined as ingestible products containing vitamins, minerals, herbs, amino acids, enzymes, probiotics, or other beneficial compounds, are designed to complement the diet by providing additional nutrients or bioactive compounds that may be absent or insufficient in regular food intake (Food and Drug Administration [FDA], 2024).

There has been an increasing burden to the healthacre budgets across the world due to the increasing number of hypertenisve cases (Mills et al., 2020). To address the increasing global burden of hypertension, countries have implemented strategic measures to manage the condition, mitigate its complications, and reduce healthcare costs (Vedanthan et al., 2017). However, the rising prevalence of hypertension has also fueled a growing reliance on dietary supplements, used either as standalone treatments or adjuncts to conventional therapies (Harris et al. 2008). This trend has raised concerns regarding the safety and public health implications of herbal and dietary supplements as their usage continues to expand (Ekor, 2014).

Conventional Management and the Emergence of Dietary Supplements

The traditional management of hypertension involves a combination of lifestyle modifications and antihypertensive medications aimed at lowering blood pressure and mitigating associated health risks (WHO, 2022). In recent years, the adjunctive use of dietary supplements has gained traction as a complementary approach.

Emerging evidence suggests that specific dietary supplements may contribute to blood pressure reduction. For example, systematic reviews have highlighted the potential benefits of potassium and magnesium supplementation in reducing both systolic and diastolic blood pressure in hypertensive individuals (Juraschek, 2023; Dibaba et al., 2017; Nicholls et al., 2020). Similarly, omega-3 fatty acids, widely recognized for their cardiovascular benefits, have demonstrated modest but significant antihypertensive effects in both randomized controlled trials and meta-analyses (Miller, 2020). Despite these promising findings, the efficacy and safety of dietary supplements in hypertension management remain areas of ongoing investigation (Jalili et al, 2013;

Satia-Abouta, 2003) . The optimal dosages, long-term effects, and potential interactions between supplements and conventional antihypertensive medications require further exploration to ensure safe and effective clinical applications (Miller, 2020).

Moreover, the use of dietary supplements is not without risks. Adverse interactions between supplements and prescription medications have been documented, sometimes with serious consequences (Dunnick & Nyska, 2012). For instance, combining hawthorn with antihypertensive drugs has been reported to cause significant fluctuations in blood pressure (Alexa, 2020). Similarly, the concurrent use of garlic supplements and anticoagulant medications like warfarin has been associated with an increased risk of bleeding (Hareera, 2022). These findings emphasize the importance of healthcare providers being informed about patients' use of dietary supplements and incorporating this information into clinical decision-making to avoid adverse outcomes.

Global and Regional Perspectives

Globally, the use of herbal supplements for managing medical conditions is widespread, with a strong reliance on empirical knowledge rather than scientific evidence (Chrysant & Chrysant, 2017). In regions such as Africa, Asia, and Latin America, herbal medicines often serve as primary healthcare solutions. For example, up to 80% of Africans rely on herbal remedies as first-line treatments for various ailments, including hypertension (van Andel & Carvalheiro, 2013).

Regionally, a study in Suriname revealed that 86% of participants had used herbal medicines at least once, with health status and plant knowledge being key determinants of usage (van Andel & Carvalheiro, 2013). Conversely, studies in the United Kingdom report a lower prevalence of supplement use, possibly due to differences in dietary awareness and accessibility (Adegboye et al., 2020).

While some studies highlight the potential benefits of supplements such as vitamin C, fish oil, garlic, and lemongrass in reducing blood pressure, others, like those evaluating pomegranate, present conflicting evidence (Gbinigie et al., 2017). Moreover, the quality and safety of dietary supplements remain significant concerns, as these products are not subjected to the same rigorous testing and regulatory oversight as pharmaceutical drugs (Chrysant & Chrysant, 2017).

The growing interest in dietary supplements for hypertension management reflects a desire for natural, cost-effective solutions (Madhavan et al, 2019). However, the evidence supporting their efficacy is often limited or conflicting, and safety concerns persist due to potential adverse effects and interactions with conventional medications.

Healthcare professionals and patients alike must approach supplement use with caution, ensuring it is informed by scientific evidence and conducted under medical supervision (Zhang & Juraschek, 2023). Further research is necessary to establish standardized guidelines for supplement use, addressing issues such as optimal dosages, long-term effects, and interactions with conventional therapies. Only through rigorous investigation can the safe and effective integration of supplements into hypertension management be achieved.

In the context of Guyana, the use of dietary supplements for managing chronic diseases, including hypertension, is deeply rooted in cultural practices. However, there is a paucity of research exploring the prevalence, efficacy, and safety of these practices in the local population. This gap in knowledge underscores the need for systematic investigations into the role of dietary supplements in hypertension management, particularly in resource-limited settings where access to conventional healthcare may be constrained.

This study aims to contribute to the growing body of literature on the use of dietary supplements in hypertension management by examining their potential benefits, risks, and implications for clinical practice. By integrating evidence-based research with an understanding of local health practices, this investigation seeks to inform public health strategies and clinical guidelines to optimize hypertension management in diverse populations.

METHODOLOGY

This prospective study employed a mixed method research design to systematically examine the knowledge and practices associated with the use of dietary supplements as adjunctive therapy in the management of hypertension.

Population and Sample

Participants for this study were recruited through a systematic random sampling process from two urban and two rural health centers in Guyana. The study population comprised individuals diagnosed with hypertension who were actively receiving care at the selected healthcare facilities. The sample size was determined using **power analysis**, a statistical technique designed to estimate the minimum number of participants required to detect significant effects with an acceptable level of confidence and precision. This process accounted for the expected prevalence of supplement use, variability within the population, and the desired confidence level and statistical power. The sample size was determined to be 144 participants, with 71 individuals recruited from the urban healthcare facilities and 73 from the rural healthcare facilities.

The study population comprised adults (18 years and older) diagnosed with hypertension for more than six (6) and actively managing their condition with conventional medication. Participants were also required to meet additional inclusion criteria before being enrolled in the study.

Data Collection

Data collection for this study was conducted using a rigorously designed, self-administered structured questionnaire. The instrument was developed based on a comprehensive review of existing literature and underwent validation through a pilot study with a representative subset of the target population. The pilot's study aimed to ensure the questionnaire's readability, clarity, and usability while confirming its alignment with the study objectives. Feedback from the pilot was

used to refine the tool, enhancing its reliability and validity. The final version of the questionnaire consisted of three meticulously crafted sections:

1. Demographic Information
2. Knowledge of Dietary Supplements
3. Current Practices in Supplement Usage

Data Collection Process:

Data collection spanned a four-month period, during which survey sessions were scheduled at healthcare facilities coinciding with routine hypertension management clinics. This timing ensured the availability and convenience of participants, facilitating a robust response rate. The structured questionnaires were distributed to eligible individuals, accompanied by a participant information sheet along with detailed instructions to promote accurate and consistent responses (Faridah et al, 2017). Trained research assistants were present during survey sessions to clarify questions and address any concerns, ensuring data quality and participant engagement.

Data Analysis

Data analysis for this study was conducted using the advanced statistical software package IBM SPSS, version 29. The analysis involved both descriptive and inferential statistical techniques to provide a robust evaluation of the data and uncover meaningful patterns and relationships among variables. This dual approach ensured a comprehensive assessment of the quantitative aspects of dietary supplement use in the management of hypertension. Data analysis was performed using IBM SPSS 29th edition, employing descriptive statistics (frequencies, percentages) and inferential statistics (chi-square tests) to examine associations between variables. All statistical tests were carried out at p-values of 0.05. This approach allowed for a comprehensive assessment of the quantitative aspects of supplement use in hypertension management.

RESULTS

Demographic Profile of Study Participants

The study's participants represented a diverse range of ethnicities, reflecting the multicultural composition of the population. Among the 144 individuals surveyed, the majority were of African and East Indian descent, while Amerindians accounted for 10%, and Chinese and Portuguese participants constituted 1% each. From a socioeconomic perspective, 80% (115 participants) were employed, whereas 20% (29 participants) were unemployed. The participants' residential distribution revealed that 51% (73 participants) resided in rural areas, while 49% (71 participants) lived in urban settings. It should also be noted that of the study population, 64% were female while 36% were male. Regarding the age distribution, 57% were older than 60 years, 33% were between 41-60 years, and 10% were younger than 40 years.

In terms of educational attainment, approximately 50% of the participants had completed secondary-level education, 30% had attained primary education, and 15% had tertiary qualifications. A minority of 5% reported no formal education. This demographic composition provides valuable insight into the interplay between socioeconomic factors, education, and health behaviors, particularly in the context of dietary supplement use and natural remedies.

Considering the demographics, ethnicity emerged as a key determinant of health practices, particularly in rural African settings where herbal treatments are frequently employed. Research indicates that an estimated 80% of Africans rely on herbal medicines as their primary healthcare approach. This cultural focus correlates with the growing global trend of increased reliance on natural remedies and supplements.

The high employment rate (80%) observed among participants suggests greater access to resources, including healthcare and education, which may influence health-related decisions. Studies indicate that socioeconomic factors significantly impact treatment choices, leading many individuals to seek affordable healthcare alternatives, such as dietary supplements (Chrysant & Chrysant, 2017). Furthermore, the prevalence of secondary-level education among participants suggests a reasonable level of health literacy, which may inform their health decisions (Adegboye et al., 2020). However, despite these advantages, literature highlights concerns regarding the reliance on anecdotal evidence and cultural beliefs when selecting dietary supplements, raising concerns about the safety and efficacy of unregulated products (So & O, 2018).

The link between education, supplementation, and nutrition outcomes warrants careful consideration, particularly regarding the risks associated with self-regulated herbal supplementation (Mills et al., 2020). Users must be informed about potential adverse effects and drug interactions, as herbal products often lack the rigorous regulation and safety checks applied to pharmaceutical drugs. For example, garlic is known to interact with anticoagulant medications, increasing the risk of bleeding (Saif et al., 2020). These safety concerns emphasize the need for greater regulatory oversight and public education on the responsible use of supplements.

Ultimately, the study's findings suggest that participants' knowledge and health practices are shaped by their diverse ethnic backgrounds and socioeconomic status. These patterns align with global observations on supplementation use among specific populations, particularly in African and Asian regions (World Health Organization, 2023). While some literature highlights the benefits of specific supplements, such as omega-3 fatty acids in hypertension management (Miller et al., 2014; Chrysant, 2015), a strong foundation in scientific research and education remains essential to ensure the safe and effective use of dietary supplements.

Comparative Analysis

This study investigated the knowledge and practices surrounding dietary supplement use among hypertensive patients in rural and urban Guyana, a region where traditional medicine

significantly impacts healthcare (Alexa, 2020). A cross-sectional survey of 144 hypertensive patients (71 urban, 73 rural) revealed distinct patterns in supplement usage and motivations, which we will compare and contrast with existing literature on the efficacy and safety of such practices.

Patterns of Supplement Use: A Rural-Urban Divide

The prevalence of supplement use among hypertensive patients was notable, with distinct variations between rural and urban settings. In urban clinics, B-complex vitamins and multivitamins were the most commonly used supplements, aligning with global trends where multivitamins are frequently used, potentially to mitigate cardiovascular risks (Chrysant, 2015). Conversely, rural patients demonstrated a preference for herbal remedies, such as lemon fruit, lime leaves, and fever grass, reflecting the integration of traditional medicine into hypertension management. These findings align with observations in other regions where herbal medicine serves as a primary healthcare approach (van Andel & Carvalheiro, 2013). This aligns with the study's findings that traditional use was a more prominent reason for supplement use in rural areas compared to urban ones (Table 5).

The motivations for supplement use also varied significantly between settings. Urban patients primarily used supplements to manage existing conditions (Table 5, Urban Clinic Findings), while rural patients more frequently used them for preventative purposes (Table 9, Rural Clinic Findings). This highlights a contrasting approach to healthcare, with urban patients focusing on disease control, whereas rural patients adopt a more proactive, preventive strategy.

Association with Blood Pressure and Demographic Factors

The association between supplement use and blood pressure classification yielded differing results based on location. Urban clinic data showed a statistically significant association between vitamin/mineral supplement use and blood pressure levels ($\chi^2(1) = 7.16$, $p = .007$), indicating that supplement use may be linked to worsening hypertension. Conversely, the rural clinic data, characterized by low expected cell frequencies in the contingency table was not sufficient to find any statistical relationships (Table 9, Rural Clinic Findings). While a precise p-value was not provided, the low expected frequencies suggest that caution should be exercised in interpreting this data. This difference underscores the need for careful consideration of appropriate statistical analysis based on the nature of the data, as the power of a chi-squared test is reduced when expected frequencies are too low. A future study with a larger rural sample size would allow for more robust comparative analysis.

Both urban and rural settings showed a trend of older participants being more likely to utilize supplements (Tables 6 and 5, respectively). While gender differences were observed, they were not statistically significant in either setting. These findings, however, require more detailed analysis and the application of appropriate statistical measures to determine statistical significance.

Table 1:

Category	Subcategory	Percentage (approx.)	Number
Ethnic Composition	African	57%	82
	East Indian	31%	45
	Amerindian	10%	14
	Portuguese	1%	1
	Chinese	1%	2
	Other	0%	0
Socioeconomic Status	Employed	80%	115
	Unemployed	20%	29
Residence	Rural	51%	73
	Urban	49%	71
Educational Level	Secondary	50%	72
	Primary	30%	43
	Tertiary	15%	22
	Did not attend school	5%	7

Table 1 presents the demographic and socioeconomic characteristics of the 144 study participants. Percentages and frequencies are provided for ethnic composition, employment status, residence, and educational attainment.

Table 2: Dietary Supplements Used by Hypertensive Patients (N = 144)

Supplement	Frequency	Percent
B-complex and multivitamins	16	11.1%
B12, vitamin C	1	0.7%
Calcium and vitamin C	1	0.7%
Calcium, magnesium, B complex	2	1.4%
Cod liver oil, B-complex, vitamin C, multivitamins, calcium	2	1.4%

Multivitamins	2	1.4%
Multivitamins, B complex	4	2.8%
Nutrophos	2	1.4%
Nutrophos, B-complex	2	1.4%
Omega 3	1	0.7%
Vitamin C and iron	1	0.7%
Vitamin C, B Complex	11	7.6%
Vitamin D, vitamin C, B-complex, multivitamins	1	0.7%
Vitamin D, vitamin C, B-complex, multivitamins	1	0.7%
Vitamin tonics and multivitamins	1	0.7%
Total	144	100%

This table displays the frequency and percentage distribution of various dietary supplements used by 144 hypertensive patients. B-complex and multivitamins were the most commonly reported supplements. A wide variety of combinations were also noted.

Table 3: Herbal Supplements Used by Hypertensive Patients (N = 144)

Herbal Supplement	Frequency
Lemon fruit & lime leaves	29
Cucumber	21
Rosemary	2
Ginger	7
Spice	3
Turmeric powder	3
Soursop leaves	10
Clove	1
Sijan	1
Neem leaves	2
Mint leaves	2

Sapodilla leaves	5
Apple cider	2
Carrot	1
Corrilla	8
Fever grass	22
Sweetbroom leaves	5
Guava leaves	3
Papaya leaves	4
Callaloo leaves	1
Dandelion buds and leaves	1
Vervain	1
Sweet sage	2
Moringa leaves	1
Sea moss	1
Rose of the mountain	1
Celery	2
Mango leaves	8
Tulsi leaves	1
Total	144

This table presents the frequency of various herbal supplements used by 144 hypertensive patients. Lemon fruit & lime leaves and fever grass were the most frequently reported herbal remedies. A wide range of other herbs were also used.

Table 4: Reasons for Using Dietary Supplements (N = 144)

Reason for Supplement Use	Frequency	Percent
Not applicable	61	42.4%
Religious beliefs	6	4.2%

Traditional use	14	9.7%
Personal experiences of healers	3	2.1%
Strong belief in herbal products/supplements	2	1.4%
Tales/hearsay	13	9.0%
Advice from friends and family	28	19.4%
Information found on the internet	8	5.6%
Radio	1	0.7%
Televisions	8	5.6%
Total	144	100%

This table shows the reasons given by 144 hypertensive patients for using dietary supplements. A significant proportion (42.4%) indicated "not applicable," while advice from friends and family was also a prominent reason. Other reasons included religious beliefs, traditional use, and information from various media sources.

Urban Health Center findings

Table 5: Reasons for Using Additional Supplemental Treatment in Urban Health Centers (N = 70)

Reason for Using Supplements	Frequency	Percent
To prevent the development of a disease	8	11.4%
To control the state of a current disease	61	87.1%
To cure the current disease	1	1.4%
Total	70	100%

Note: Data from urban clinics only.

Table 6: Cross-tabulation of Gender and Vitamin/Mineral Supplement Use in Urban Health Centers (N = 71)

	Vitamin/Mineral Supplement Use	Total
Gender	Yes	No

Female	23	22
Male	10	16
Total	33	38

Note: Data from urban clinics only.

Table 7: Cross-tabulation of Blood Pressure and Vitamin/Mineral Supplement Use in Urban Health Centers (N = 71)

Blood Pressure Classification by Vitamin/Mineral Supplement Use

Blood Pressure (mmHg)	Vitamin/Mineral Supplement Use	No Supplement Use	Total
< 140/90 (Normal/Elevated)	20	10	30
≥ 140/90 (Hypertension)	13	28	41
Total	33	38	71

Note: Data from urban clinics only.

Chi squared statistics: A chi-squared test of independence revealed a statistically significant association between blood pressure classification and vitamin/mineral supplement use, $\chi^2(1) = 7.16$, $p = .007$. Expected frequencies ranged from 13.94 to 21.94. The data were from urban clinics only.

Table 8: Cross-tabulation of Age and Vitamin/Mineral Supplement Use in Urban Health Centers (N = 71)

Age (Years)	Vitamin/Mineral Supplement Use	Total
	Yes	No
< 40	5	2
41 – 60	14	17
> 60	14	19
Total	33	38

Note: Data from urban clinics only.

Rural Health Center findings:

Table 9: Reasons for Using Additional Supplemental Treatment in Rural Health Centers (N = 73)

Reason for Using Supplements	Frequency	Percent

Not Applicable	8	11.0%
To prevent the development of a disease	22	30.1%
To control the state of a current disease	42	57.5%
To cure the current disease	1	1.4%
Total	73	100%

Note: Data from rural clinics only.

Table 10: Cross-tabulation of Gender and Vitamin/Mineral Supplement Use in Rural Health Centers (N = 73)

	Vitamin/Mineral Supplement Use	Total
Gender	Missing	Yes
Female	6	15
Male	1	7
Total	7	22

Note: Data from rural clinics only.

Table 11: Cross-tabulation of Blood Pressure and Vitamin/Mineral Supplement Use in Rural Health Centers (N = 29)

Blood Pressure Category	Vitamin/Mineral Supplement Use	Total
Normal (< 120/80 mmHg)	0	5
Elevated/Hypertensive (≥ 120/80 mmHg)	7	17
Total	7	22

Table 12: Cross-tabulation of Age and Vitamin/Mineral Supplement Use in Rural Health Centers (N = 73)

Age (Years)	Vitamin/Mineral Supplement Use	Total

	No	Yes
< 40	0	4
41 – 60	0	6
> 60	7	12
Total	7	22

DISCUSSION

Ethnicity and the Use of Herbal Medicines

Ethnic and cultural backgrounds significantly influence health practices, particularly in regions where traditional remedies are prevalent. In African rural settings, for example, herbal treatments are a primary healthcare approach, with an estimated 80% of individuals resorting to herbal medicines as their first line of treatment (World Health Organization, 2023). This trend aligns with a global shift towards natural remedies and supplements, underscoring the need to understand cultural perspectives in healthcare practices.

The study's findings suggest that the participants' diverse ethnic backgrounds may play a role in shaping their health practices, particularly their reliance on dietary supplements. This observation is consistent with global trends where natural remedies are often perceived as cost-effective alternatives to conventional medical treatments.

Socioeconomic and Educational Influence on Health Decisions

The high employment rate (80%) observed among participants suggests greater access to resources, including healthcare and education, which may influence health-related decisions. Educational attainment, particularly at the secondary and tertiary levels, is associated with increased health literacy. Health-literate individuals are more likely to make informed decisions about their treatment options, including the use of dietary supplements (Adegboye et al., 2020).

However, despite the potential benefits of health literacy, the literature also highlights concerns regarding the misuse of dietary supplements. Many individuals rely on anecdotal evidence or cultural beliefs rather than scientific validation when choosing supplements. This overreliance on unproven remedies raises safety concerns, particularly given the lack of rigorous regulation and testing compared to pharmaceutical drugs (So & O, 2018).

Comparison with Existing Literature

These results concerning the supplementation among patients suffering from hypertension are very similar to the results from around the globe, where there is a high prevalence of the use of herbal treatment and dietary supplementation, primarily due to their culture, availability or affordability (Chrysant & Chrysant, 2017). Additionally, our observations of the increased trends of supplement use in the management of hypertension in different forms of care systems fit within the already existing trend of the use of supplements for managing or preventing diseases trend (World Health Organization, 2023). Notably, this warrants further investigation to determine the range of the distinct impacts of health-seeking behaviors since the high number of urban patients relying on supplements for control of the disease resulted in a deviation from the rural focus that relied on a prevention approach.

Although the findings of the research suggest a link between hypertension and the use of dietary supplements, their safety and effectiveness have not been established conclusively. Although some supplements like omega-3 fatty acids (Miller et al. 2014; Nicholls et al. 2020) or vitamin C (Chrysant, 2015) do show promise, there exists the risk of these supplements interacting adversely with some medicines (Alexa, 2020; Madhavan et al., 2019; Hareera, 2022). Thus, such valuable tools as dietary supplements should only be used in conjunction with other conventional treatments of hypertension, and this must be discussed with the patients by the doctors.

Risks Associated with Self-Regulated Supplementation

The intersection of education, supplementation practices, and health outcomes warrants careful consideration, particularly regarding the risks of self-regulated herbal supplementation. Unchecked use of herbal products can lead to adverse effects and drug interactions. For instance, garlic has been shown to interact with anticoagulant medications, increasing the risk of bleeding (Saif et al., 2020). Similarly, other supplements, such as St. John's Wort, have demonstrated interactions that can diminish the efficacy of prescription medications (Davis et al., 2014). These risks highlight the importance of regulatory oversight and patient education in ensuring the safe use of supplements.

CONCLUSION

This study provides valuable insights into the contextual factors driving supplement use among Guyanese populations, emphasizing the importance of culturally sensitive and scientifically grounded approaches to hypertension management. The findings also call for interventions tailored to the specific needs and challenges of urban and rural communities to improve health outcomes while preserving cultural heritage and promoting best practices.

The comparative analysis of dietary supplement use among hypertensive patients in rural and urban Guyana highlights significant differences in usage patterns and motivations, shaped by cultural, socioeconomic, and demographic factors. Urban participants primarily used supplements for disease control, while rural participants focused on prevention, reflecting broader global trends in health-seeking behaviors. These findings align with patterns observed in regions like Africa and

Asia, where cultural practices and natural remedies significantly influence healthcare choices (World Health Organization, 2023).

Despite the growing evidence supporting the potential benefits of certain supplements, such as omega-3 fatty acids (Miller et al., 2014; Chrysant, 2015), their safety and efficacy remain inconclusive. The study underscores the need for further research to address gaps in understanding the long-term effects, safety concerns, and interactions between dietary supplements and prescribed medications. Robust patient education and evidence-based healthcare practices are essential to optimizing the safe use of supplements in managing hypertension.

RECOMMENDATIONS

1. **Increase Sample Size and Stratification**
   Future studies should involve a larger and more diverse sample size, particularly in rural areas, to improve statistical power. Stratification by socioeconomic status, ethnicity, and healthcare access can further illuminate the interplay of these factors in supplement use and health outcomes.

2. **Adopt Longitudinal Study Designs**
   A longitudinal approach would allow researchers to assess the long-term effects of supplement use on hypertension management and related health outcomes. Such studies would help determine whether supplement use contributes to sustained blood pressure control or adverse effects over time.

3. **Integrate Qualitative Research**
   Incorporating qualitative methods, such as focus groups and in-depth interviews, can provide deeper insights into patients' beliefs, cultural practices, and experiences with supplement use. This would enrich understanding of the social and cultural drivers of health behaviors.

4. **Conduct Biochemical Analyses**
   Objective measurements of vitamin, mineral, and compound levels in blood samples would offer empirical evidence of supplement efficacy, metabolism, and absorption, reducing reliance on self-reported data.

5. **Analyze Medication Interactions**
   Comprehensive pharmacokinetic and pharmacodynamic studies are necessary to evaluate the potential interactions between supplements and prescribed antihypertensive medications, ensuring patient safety and optimal treatment outcomes.

6. **Ensure Supplement Quality Control**
   Standardized evaluation of the purity, potency, and composition of

7. **Standardize Blood Pressure Measurement**
   Clinical settings should adopt uniform protocols for blood pressure measurement using

certified devices operated by trained personnel. This standardization would enhance the accuracy, reliability, and replicability of future studies.

8. **Explore Ethnic and Cultural Differences**
   Investigating supplement use patterns across the diverse ethnic groups in Guyana would provide nuanced insights into how cultural practices influence health behaviors, enabling more targeted and inclusive interventions.

9. **Evaluate Economic Impacts**
   Future studies should assess the financial implications of supplement use, including costs to patients and the healthcare system, as well as the economic burden of managing side effects or adverse reactions related to supplementation.

10. **Implement Public Health Interventions**
    Evidence-based public health initiatives should focus on educating patients about safe supplementation practices, monitoring supplement quality, and accrediting reliable products. Tailored education programs and community outreach can help bridge knowledge gaps and promote informed decision-making.

Ethics

The study was conducted in full compliance with recognized ethical principles to safeguard the rights, dignity, and well-being of all participants. Ethical approval was secured from the Institutional Review Board (IRB) at the Ministry of Health (Guyana).

Informed Consent Process

A comprehensive informed consent process was implemented to guarantee that participants were fully aware of the study's nature and their role within it. Participants were provided with a detailed particpant information sheet.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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