**Knowledge and Practices of Dietary Supplement Use in Type 2 Diabetes Management: A Study in Two Hospitals in Guyana**

**Abstract**

**Background:** A dietary supplement is defined as a product that contains a vitamin, a mineral, a herb or other plant product, an amino acid, or a dietary substance that supplements the diet by increasing total intake. Managing Type 2 diabetes is a lifelong struggle. Most people must follow a proper diet, make lifestyle changes, and take medications. Some people believe that dietary supplements can help manage diabetes, and maybe that’s why a lot of people are starting to use them.

**Objective**: The study aimed at determining knowledge and practice regarding the adjunct use of Dietary Supplements in Managing Type 2 Diabetes in two Hospitals in Guyana: Georgetown Public Hospital Corporation (GPHC) and Suddie Hospital (SH). It also aimed to create awareness of dietary supplements and their use as adjunctive therapy in managing specific conditions (s).

**Methods:** This is a cross-sectional quantitative study and the survey instrument was an interview questionnaire. This was conducted on a combined population of 125 diabetic subjects (55 subjects from the GPHC diabetic clinic and 69 subjects from the SH diabetic clinic). This study employed a stratified random sampling technique to select participants from two diabetic clinics: Georgetown Public Hospital Corporation (GPHC) and Suddie Hospital (SH). Results were documented and analyzed using SPSS version 20.0.

**Results:** More than half of the combined subjects (67%) used dietary supplements to manage their condition. Multivitamin was the most used supplement in all subjects (63.5%). At Georgetown Public Hospital Corporation (GPHC), about 76.1% of participants said they take supplements; at Suddie Hospital (SH), 60.9% said the same. A combined total of 67.8% of prescribers prescribe dietary supplements. There was an overall lack of knowledge about dietary supplements used for managing type 2 diabetes on the part of the subjects. The three chi-square tests revealed that regarding dietary supplement use, no significant association was found between hospital type and likelihood of use, χ² (1) = 2.24, p = .134. However, a significant association emerged between hospital type and dietary supplement prescribing (χ² (1) = 8.22, p = .004). Moreover, a significant association was also observed between hospital type and knowledge of dietary supplements (χ² (2) = 11.98, p = .003). This suggests that patients at the two hospitals differed significantly in their level of knowledge regarding dietary supplements. This study highlights important clinical implications for diabetes management in Guyana. The widespread use of dietary supplements, often obtained from non-healthcare professionals, poses a potential risk of adverse interactions with prescribed medications and necessitates careful monitoring. The lack of consistent knowledge regarding supplementing safety and efficacy emphasizes the crucial role of patient education in mitigating these risks.

**Conclusion:** A large percentage of people with type 2 diabetes use dietary supplements, but they are not always aware of the particular purpose of those supplements. A large percentage of prescribers prescribe dietary supplements. Type 2 diabetics do not have accurate information about dietary supplements. Hence, these findings highlight the critical need for improved patient education, standardised prescribing practices, and further research to fully understand the complex interplay of cultural factors, healthcare access, and supplement use in managing type 2 diabetes within the Guyanese context.

**Keywords:** dietary supplements, Type 2 diabetes, patient education, knowledge gaps

**Introduction**

Managing Type 2 diabetes is a lifelong struggle. Most people must follow a proper diet, make lifestyle changes, and take medications. But besides these usual treatments, many people also use natural remedies like bitter melon, ginseng, and aloe vera to help control their blood sugar (Mospan, 2018). Some people believe that dietary supplements can help manage diabetes, and maybe that’s why a lot of people are starting to use them.

A 2021 report prepared by the Pan American Health Organization (PAHO) for Latin/South America described diabetes as a significant public health problem in that region and worldwide (PAHO, 2025). Studies have reported that Asian populations have a higher risk of Type 2 Diabetes than Western populations. Despite the lower prevalence of overweight and obesity, the prevalence of Type 2 Diabetes in overweight and obese populations was higher than that of Western populations. This elevated risk may be because Asian populations, particularly South Asian populations, typically have more [adipose tissue](https://www.sciencedirect.com/topics/agricultural-and-biological-sciences/adipose-tissue) in the ectopic fat region and less lean muscle, which increases insulin resistance (Yang *et al*., 2023). "The citizens of Guyana are severely impacted by Type 2 diabetes, partly as a consequence of national ethnic diversity with Indo-Guyanese (43%), Afro-Guyanese (30%), and Amerindian (9%) – all risk groups" (Guyana Diabetes Care Project, WDF14-862). In 2013, it was estimated that 14% of the then-adult population (20 – 79 years) was afflicted with diabetes (Guyana Diabetes Care Project, WDF14-862). Dietary supplements are not intended to treat, diagnose, prevent, or cure diseases (Office of the Commissioner, 2022); they are becoming widespread for diverse non-conventional treatments, such as general health boosts, symptom reductions, and specific disease prevention (Mahdavi-Roshan et al., 2021).

A dietary supplement is defined as a product that contains a vitamin, a mineral, a herb or other plant product, an amino acid, or a dietary substance that supplements the diet by increasing total intake (Wang et al., 2019). There is limited literature in this area of study. While few studies were done on one particular type of dietary supplement, herbs and traditional medicine for Type 2 diabetes, for example, Jagessar & Kingston (2015) and Boston *et al*., (2019) studies, there is no study of this kind done in Guyana to the researchers' knowledge.

**Use of dietary supplements to manage Type 2 diabetes**

In the U.S., about 22% to 67% of people with diabetes take some kind of supplement. Diabetics are more likely to use supplements than those without, and many prefer natural remedies over meds from the doctor (Mospan, 2018). Additionally, people with Type 2 seem to use supplements more than those with Type 1. Mospan (2018) even found that some people who used certain supplements had lower HbA1c levels, meaning better blood sugar control. A systematic review investigating the possible effects of regular physical exercise in combination with dietary supplement intake on health outcomes in Type 2 diabetes patients was conducted. Dietary supplement intake may potentially increase the benefits of physical training intervention for specific health outcomes in Type 2 diabetes patients (Meuffels *et al*., 2022).

Still, it is important to know that supplements are not like prescription meds. Medications are tested and approved, but supplements are treated like food, so they don’t have to meet the same safety or effectiveness standards. Because of that, Mospan (2018) stated that patients should be warned about the risks and report any bad reactions. A recent study carried out 4 g/day omega-3 supplementation in 823 participants diagnosed with Type 2 diabetes. The results showed a significant reduction in cardiovascular events by 25% when compared to placebo. However, this dose is very high, which makes this dietary supplementation more expensive (Minari et al., 2023). A study examined the effect of a newly formulated antioxidant supplement on a high-fat diet and low-dose streptozotocin-induced type 2 diabetes mellitus in animal model (albino rats) and the results obtained suggest that the antioxidant supplement may be useful in elevating/enhancing the level and activities of antioxidant and antioxidant enzymes which are essential in the management of type 2 diabetes mellitus. It further reveals the potential of antioxidant composition in mitigating oxidative stress and free radical accumulation and the resultant effect on cellular membrane and DNA integrity (Chuku & Chinaka, 2020).

Besides multivitamins, some natural compounds are being studied for diabetes, like Resveratrol. Dan-Dan Huang et al. (2020) stated that Type 2 diabetes management lowers blood sugar, improves insulin use, and protects pancreas cells that make insulin. Their research suggests Resveratrol may help with all of this.

Resveratrol is made by plants when they’re stressed, and it’s found in fruits, veggies, grains, and drinks like tea, coffee, and wine (Dan-Dan Huang et al., 2020). Some trials tested Resveratrol on diabetics. In clinical trials, oral administration of a 5 mg-5 g single-daily dose of RES for 12 months reduced blood glucose and improved insulin sensitivity in diabetic patients. Dan-Dan Huang et al. (2020) noted that clinical trial results suggested that activating specific protein pathways such as AMP-dependent protein kinase (AMPK) and sirtuin (SIRT), RES can restore the abnormal levels of insulin, insulin-like growth factors (IGFs), and blood glucose.

**Frequently prescribed supplements for Type 2 diabetics**

The standard treatment for Type 2 diabetes is evidence-based medicines, such as metformin, which health care providers prescribe for such patients. Studies by Suksomboon, Poolsup & Punthanitisarn (2016) and Gothai et al. (2016) suggested alternative treatments, such as dietary supplements, that effectively manage type 2 diabetes and its complications.

Vitamins are important because they act as antioxidants and may help people with chronic illnesses. Balbi et al. (2018) stated that oxidative stress plays a big role in causing diseases like diabetes. It lowers the body’s antioxidant defenses and increases damage. Ceriello et al. (2016) and Kositsawat & Freeman (2011) also pointed out that low levels of antioxidants may lead to more diabetes complications. The most commonly studied vitamins were B, C, D, and E. Vitamins C, D, and E were found to have notable antioxidant activity by blocking free radicals.

Another mineral, chromium, is an essential nutrient involved in normal carbohydrate and lipid metabolism. The chromium requirement rises with increased glucose intolerance and diabetes (Anderson, et al., 1997). In the double-blind, placebo-controlled study by Anderson et al. (1997), 180 Type 2 diabetics were divided into three groups and given two different dosages of chromium and a placebo. The findings showed that supplementary chromium at various dosages statistically and clinically meaningfully influences insulin and glucose variables in people with Type 2 diabetes. One such variable is the HbA1c which was lowered by chromium supplementation. It should be noted that chromium picolinate is a suitable form of chromium and its use is more efficient than some other forms of chromium (Anderson, et al., 1999).

**Prescribing dietary supplements**

Doctors usually follow treatment guidelines when prescribing diabetes, but how they prescribe can vary. The American Diabetes Association (ADA, 2019) has guidelines called Standards of Medical Care in Diabetes, which outline how to care for diabetes patients. They also recommend medical nutrition therapy (MNT), which is about managing diabetes with food alongside medicine.

The ADA says there is no substantial evidence that taking vitamins, minerals like chromium and vitamin D, or herbs and spices like cinnamon and aloe vera helps control blood sugar in people who do not have a deficiency. So, supplements are not usually recommended (ADA, 2019). However, it is still important for people with diabetes to get the nutrients they need, and there are concerns about whether it is safe to take supplements long-term.

Still, other studies say nutrients like chromium, magnesium, and vanadium may help with diabetes (Wang et al., 2019). Wang et al. (2019) found that forms of chromium, like chromium chloride, picolinate, and ones combined with biotin, can lower HbA1c and fasting glucose. Biotin and chromium together also help the body take up glucose better. Plus, magnesium supplements may improve blood sugar, blood pressure, and insulin sensitivity, according to Guerrero-Romero & Rodriguez-Moran (2004), as cited by Wang et al. (2019).

**Knowledge of the purpose of dietary supplement use by people with type 2 diabetes**

Generally, supplements are prescribed to patients to improve or maintain their health, rectify a nutritional shortfall, or treat a specific health issue. Many people believe that dietary supplements are safer and probably more efficacious than medications in the treatment of diabetes. Despite insufficient evidence suggesting supplements heal or contribute to overall wellness globally, sales have exceeded 100 billion dollars (Hannon, et al., 2020). They found that most supplements for diabetes had insufficient evidence supporting their use. Diet and lifestyle changes, as well as pharmaceutical therapies, are the mainstays of diabetes management. However, consumers should be assured that producers must verify that their products are safe and satisfy specific quality criteria.

The United States recommends that supplement manufacturers do not claim that their products prevent or treat any ailment. According to the Center for Food Safety and Applied Nutrition, if there is substantiation of scientific data for a supplement delivering a possible health impact, companies are authorized to market their supplements with notices such as “Structure/Function” and "helps maintain healthy joints". However, the label must state that the Food and Drug Administration "has not reviewed the claim" and that the dietary supplement product is not meant to "diagnose, treat, cure, or prevent any illness," because only a medicine may lawfully make such a claim (Center for Food Safety and Applied Nutrition).

There has been an increase in the use and sales of dietary supplements. In Guyana, dietary supplements are readily available and accessible nationwide at local markets, herbal stores, and pharmacies. This does not necessarily indicate that the knowledge and benefits of these dietary supplements are on the increase or even known by Type 2 diabetics.

Against this backdrop, the researchers were interested in the knowledge and practice of supplement use in Guyana. This study sought to determine the percentage of Type 2 diabetic patients from Georgetown Public Hospital Corporation (GPHC) and Suddie Hospital (SH) diabetic clinics who used dietary supplements and their awareness of using them to manage their condition.

**Method**

The study was done in the country of Guyana, South America, which is divided into ten administrative regions. The study sites were at two hospitals, the Georgetown Public Hospital Corporation (GPHC), which is a referral and teaching hospital, and Suddie Hospital, located in regions 4 and 2, respectively. This was a cross-sectional quantitative study and the investigative tool was a questionnaire.

**Variables**

Independent variables

* Age, gender, marital status, employment status, ethnicity, educational background, and

Dependent variables

* Dietary supplements, source of information

**Population:**

The population for this study was taken from Guyana Public Hospital Corporation (GPHC) and Suddie Hospital (SH), respectively. The population at GPHC was (n=520), while the population at SH was approximately (n=500), giving a total of one thousand twenty (n=1020) subjects.

**Sample Frame**

This study employed a stratified random sampling technique to select participants from two diabetic clinics: Georgetown Public Hospital Corporation (GPHC) and Suddie Hospital (SH). The clinics served as strata. The sampling frame was constituted by the patients' attendance at the above-mentioned clinics. It was expected that about 20 patients would attend the clinic weekly at SH while about 80 patients would attend the clinic weekly at GPHC.

An initial sample size calculation using an online tool (SurveyMonkey), with a 95% confidence level and 5% margin of error, suggested a total sample size of 280 participants. This calculation, however, did not incorporate the known or estimated population proportion of the characteristic of interest, which is likely responsible for the discrepancy between the target and actual sample size. To achieve proportional representation from each stratum, the target sample size was allocated as follows: 143 participants from GPHC (520/1020 \* 280) and 137 from SH (500/1020 \* 280), reflecting the relative sizes of the clinic populations (GPHC n=520; SH n=500; Total n=1020).

Due to logistical constraints during the four-week data collection period (concurrent with researchers’ clinical attachments), a convenience sample was collected from patients attending clinics and meeting the inclusion/exclusion criteria. This resulted in a significant deviation from the initially calculated sample size. The final analysed sample comprised 115 participants (46 from GPHC and 69 from SH). Nine GPHC questionnaires were excluded due to >66% missing data. This deviation from the intended sampling method should be considered a study limitation.

**Inclusion Criteria**

* All subjects were 18 years and older
* All subjects were patients of GPHC and SH Diabetic clinics.
* All subjects were Type 2 diabetics

**Exclusion Criteria**

* Type 2 diabetics who were newly diagnosed
* Type 2 diabetics who were on treatment for a nutritional condition or disorder
* Pregnant women with type 2 diabetes

**Results**

A total of 115 individuals participated in this study, 69 from Suddie Hospital (SH) and 46 from Georgetown Public Hospital Corporation (GPHC). Most participants from both hospitals were women, accounting for roughly two-thirds of each group. When looking at ethnicity, most of the participants at Suddie Hospital were East Indian, making up about 85.5% of the sample from that location. In comparison, GPHC had more diverse ethnicities. About one-third (32.6%) identified as Afro-Guyanese, 28.3% were East Indian, 15.2% were Amerindian, and 23.9% said they were of mixed heritage. When looking at age, most of the patients at SH were older, with nearly half (43.5%) being 65 years and over. On the other hand, at GPHC, the largest group was between 45 and 54 years old (39.1%). Not many participants from either hospital were between 25 and 34 years old, making that the smallest age group.

Education levels were also different across the two hospitals. At Suddie, most people had only gone as far as primary or secondary school, and a few had not completed primary school. About 87% of that group did not go beyond secondary education. Meanwhile, at GPHC, most participants had at least a secondary education, and some even had tertiary-level qualifications.

Marital status showed some interesting differences. Most people at SH were married (59.4%), but there were also many widows and widowers (26.1%). At GPHC, the most prominent groups were married (37%) and single (30.4%). Employment was another area where the two groups were quite different. At Suddie Hospital, a large majority of participants (81.2%) were unemployed, which could be linked to many of them being older adults. In contrast, employment status among participants at GPHC was more evenly distributed, with 41.3% employed and 45.7% unemployed. A detailed breakdown of these demographic characteristics can be found in Table 1.

**Table 1. Demographic characteristics of the studied population**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Demographic Factors** | SH  (n = 69) | | GPHC  (n = 46) | |
| Frequency | % | Frequency | % |
| **Age groups (years)** | | | | |
| 25 – 34 | 1 | 1.4 | 1 | 2.2 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 35 – 44 | 5 | 7.2 | 11 | 23.9 |
| 45 – 54 | 13 | 18.8 | 18 | 39.1 |
| 55 – 64 | 20 | 29.0 | 8 | 17.4 |
| 65 or more | 30 | 43.5 | 8 | 17.4 |
| **Gender** | | | | |
| Female | 46 | 66.7 | 31 | 67.4 |
| Male | 23 | 33.3 | 14 | 30.4 |
| Prefer not to answer | 0 | 0.0 | 1 | 2.2 |
| **Ethnicity** | | | | |
| Amerindian | 1 | 1.4 | 7 | 15.2 |
| East Indian | 59 | 85.5 | 13 | 28.3 |
| African | 2 | 2.9 | 15 | 32.6 |
| Mixed/Others | 7 | 10.1 | 11 | 23.9 |
| **Education** | | | | |
| No formal schooling | 4 | 5.8 | 0 | 0.00 |
| Primary | 30 | 43.5 | 4 | 8.7 |
| Secondary | 30 | 43.5 | 30 | 65.2 |
| Tertiary | 5 | 7.2 | 12 | 26.1 |
| **Marital Status** | | | | |
| Single | 8 | 11.6 | 14 | 30.4 |
| Married | 41 | 59.4 | 17 | 37.0 |
| Divorced | 2 | 2.9 | 9 | 19.6 |
| Widowed | 18 | 26.1 | 3 | 6.5 |
| Prefer not to answer | 0 | 0.00 | 3 | 6.5 |
| **Employment Status** | | | | |
| Employed | 13 | 18.8 | 19 | 41.3 |
| Unemployed | 56 | 81.2 | 21 | 45.7 |
| Prefer not to answer | 0 | 0.00 | 6 | 13.0 |

Many participants from Georgetown Public Hospital Corporation (GPHC) and Suddie Hospital (SH) reported a family history of diabetes. 71.7% of those from GPHC and 82.6% from SH said that relatives, such as parents or grandparents, also had the disease. These relatives included parents, siblings, and grandparents, showing that diabetes is often a family issue passed down through generations.

The number of affected relatives was not always the same among those with a family history. At GPHC, most people (60.6%) said they had just one family member with diabetes, while about 30.3% had two relatives, and a small group (6.5%) had three or more family members living with the disease. Over at SH, 42.9% had one diabetic relative, 25% had two, and a larger portion (32.1%) had three or more.

All of the participants in this study were diagnosed with Type 2 diabetes, and the amount of time they had been living with it ranged widely — some had been recently diagnosed, while others had been managing it for more than 20 years. Most of them had received advice or education from health workers on how to care for themselves, though this was more common at SH (84.1%) than at GPHC (65.2%).

Everyone was using some form of treatment, whether insulin, tablets, diet changes, or a mix of these. The most common medications were metformin, gliclazide, and glyburide. However, some people using insulin didn’t know the name of their medication, and about 70% weren’t sure of the dosage they were taking. More details about how long they had diabetes and what treatments they were using can be found in Table 2.

**Table 2. Time diagnosed as diabetic and treatment**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Factors** | SH  (n = 69) | | GPHC  (n = 46) | |
| Frequency | % | Frequency | % |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Time diagnosed (years)** | | | | |
| **1 -3** | 15 | 21.7 | 12 | 26.1 |
| **4 – 7** | 10 | 14.5 | 21 | 45.7 |
| **8 – 12** | 13 | 18.8 | 9 | 19.6 |
| **13 – 20** | 11 | 15.9 | 2 | 4.3 |
| **> 20** | 20 | 29.0 | 2 | 4.3 |
| **Ever instructed on diabetes care** | | | | |
| **Yes** | 58 | 84.1 | 30 | 65.2 |
| **No** | 11 | 15.9 | 14 | 30.4 |
| **Prefer not to answer** | 0 | 0.0 | 2 | 4.3 |
| **Treatment** | | | | |
| **Diet (only)** | 2 | 2.9 | 1 | 2.2 |
| **Insulin** | 5 | 7.2 | 3 | 6.5 |
| **Oral Medications** | 41 | 59.4 | 9 | 19.6 |
| **Insulin & Oral medications** | 1 | 1.4 | 1 | 2.2 |
| **Diet & oral meds** | 17 | 26.6 | 30 | 65.2 |
| **Diet/ insulin/ oral medications** | 1 | 1.4 | 1 | 2.2 |
| **Insulin and diet** | 3 | 4.3 | 2 | 4.3 |

The study showed that many people with Type 2 diabetes are using dietary supplements. At Georgetown Public Hospital Corporation (GPHC), about 76.1% of participants said they take supplements; at Suddie Hospital (SH), 60.9% said the same. These results are in line with what other researchers, such as Mospan (2018) and Mahdavi-Roshan et al. (2021), have found — that more people with chronic illnesses like diabetes are turning to dietary supplements to help manage their symptoms and possibly avoid complications.

Regarding the types of supplements used, more than half of the participants from Suddie Hospital (58%) reported using herbal remedies. In comparison, just over half of those from GPHC (56.5%) said they take vitamins. Interestingly, many people from Suddie make their herbal remedies using plants, highlighting how deeply rooted traditional medicine is in Guyanese culture. Boston et al. (2018) also noted that herbal medicine is widely used nationwide.

However, not many people are getting professional advice about which supplements to take. Only a few participants — 5.8% at SH and 6.5% at GPHC — said a pharmacist advised them. Instead, most of them figure it out independently or listen to local herbalists. In fact, 58% of those from SH said they rely on what they know or what an herbalist tells them. This can be risky because, as Halat and Dennehy (2003) pointed out, people might not know the right amount to take or how to mix things safely.

There were noticeable differences in how patients from the two hospitals managed their diets. At GPHC, over half (59%) of participants said they stick to a diet plan to help control their diabetes. However, at Suddie Hospital, most people (78%) admitted they did not follow any specific plan. Instead, they avoid eating too many sweet foods and simple carbs. Even though that might help a little, following a proper diet is not the same. The American Diabetes Association’s Standards of Medical Care stress that having a structured diet is an important part of managing diabetes, taking medicine and making lifestyle changes.

**Prescribing of dietary supplements by a health care provider/ doctor**

The table shows that 67.8% of participants from both hospitals said their doctors prescribed dietary supplements, which suggests that giving supplements is a common practice. However, when looking closer at GPHC, there is only a tiny difference — about 4.3% — between those who received a supplement prescription and those who did not. This means that nearly half of the patients at GPHC were not prescribed supplements.

**Table 3. Prescribing of dietary supplements by health care provider/ doctor**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **GPHC n=46** | | **SH n=69** | | **GRAND TOTAL n=115** | |
| **Healthcare providers/doctors prescribe dietary supplements** | No. | % | No. | % | No. | % |
| **Yes** | 23 | 50 | 55 | 79.7 | 78 | 67.8 |
| **No** | 21 | 45.7 | 14 | 20.3 | 35 | 30.4 |
| **No response** | 2 | 4.3 | 0 | 0 | 2 | 1.7 |

Breaking it down, about half (50%) of GPHC participants said their doctors prescribed supplements, compared to 79.7% at Suddie Hospital. At SH, three people were specifically given B complex for neuropathy, but interestingly, 20 participants admitted they had no idea why they were taking the supplements. This goes against what the American Diabetes Association’s Standards of Medical Care (ADASMC) recommends, as patients are supposed to be properly informed about any treatment they are given. Table 4 shows that those who did not get prescriptions often turned to other sources for supplements.

**Table 4. Sources of dietary supplements**

|  |  |  |
| --- | --- | --- |
|  | **SH (n= 14)** | **GPHC (n=21)** |
| **Source of dietary supplement** | No. | No. |
| **Purchase from pharmacy** | 7 | 11 |
| **Purchase online** | 0 | 2 |
| **Other** | 2 | 2 |
| **No response** | 5 | 6 |

The table shows that 51.4% (11 – SH; 7 – GPHC) of subjects who obtained supplements from sources other than healthcare providers, bought them from pharmacies. It should be noted that 31.4% of the total samples did not respond to this item.

**Dietary Supplement Usage Frequency**

The chart shows that multivitamins were the most used supplement, with 63.5% of participants (34 from SH and 39 from GPHC) using them regularly. Of these, 36.2% at SH and 41.3% at GPHC said they "always" use them. Vitamin C was the second most prevalent (39.1%), followed by bitter melon (28.7%), which is traditionally used for diabetes, as noted by Mospan (2018). Most SH participants (95%) reported using additional supplements like B complex, One-A-Day Women, and turmeric, with B complex being the most common. In contrast, only 8.7% of GPHC participants mentioned extra supplements.

Overall, 90% of participants had no side effects. Out of all participants, only 10% reported side effects. At Suddie Hospital, some people got rashes from herbal remedies, while a few at GPHC said they felt sick to their stomach or vomited. Interestingly, the people at Suddie who had rashes never told their doctors about it, even though Mospan (2018) recommends informing healthcare providers about these problems. Also, 7% of all participants said they never used supplements, mainly because they could not afford them, were not sure if they were safe, or did not think they needed them.

**Knowledge of Type 2 diabetic patients about their supplements**

The table reveals that subjects at both hospitals accessed information about dietary supplements from a total of nine different sources. The top three sources were family (9.6%, SH: 9; GPHC: 2), physicians (7%, SH: 4; GPHC: 4), and fellow patients (7%, SH: 7; GPHC: 1). At SH, 34.8% (24 subjects) relied on multiple sources for supplement information, while 10.1% (7 subjects) did not seek information. For GPHC, 67.4% (31 subjects) indicated multiple sources, with 10.9% not responding.

**Table 5. Sources of information on dietary supplements**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **GPHC N= 46** | | **SH N=69** | |
|  |  | |  | |
| **Information sources** | No. | % | No. | % |
| **Internet** | 1 | 2.2 | 4 | 5.8 |
| **Family** | 2 | 4.3 | 9 | 13.0 |
| **Print media** | - | - | 3 | 4.3 |
| **Pharmacist** | 1 | 2.2 | 2 | 2.9 |
| **Fellow patient** | 1 | 2.2 | 7 | 10.1 |
| **Physician** | 42. | 8.7 | 4 | 5.8 |
| **Television** | 1 | 2.2 | 1 | 1.4 |
| **Other** | - | - | 6 | 8.7 |
| **Friend** | - | - | 2 | 2.9 |
| **Total** | 10  (21.7%) |  | 38 (55.1%) | |

Overall, the percentages of subjects seeking information from any source were nearly equal: 89.9% from SH and 89.1% from GPHC, indicating a strong interest in understanding dietary supplements. This finding aligns with Mospan (2018) in the literature review. Additionally, data was collected on patients’ knowledge of dietary supplements for Type 2 diabetes, with responses categorized as 'agree,' 'disagree,' or 'not sure.' The results for these items were grouped and summarized with corresponding percentages in Tables 6 and 7.

**Table 6. Knowledge Type 2 Diabetics at GPHC have of their supplements. (n=49)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Statements | Agree | | Disagree | | Not sure | |
| No. | % | No. | % | No. | % |
| FDA requires that dietary supplements be proven to be safe and effective before they are marketed. | 39 | 84.8 | 1 | 2.2 | 5 | 10.9 |
| Regular use of dietary supplements prevents Type 2 diabetes | 13 | 28.3 | 11 | 24.0 | 21 | 45.7 |
| Dietary supplements are sold over the counter, so they are entirely safe to take | 29 | 63.0 | 6 | 13.0 | 10 | 21.7 |
| The number of supplements you get from food is enough for your health needs | 28 | 60.9 | 3 | 6.5 | 14 | 30.4 |

The results show that most people from both hospitals got item 20 right — 84% at GPHC and about 80% at Suddie — which matches what Mospan (2018) found. But when it came to other questions, like items 21, 22, and 23, there were clear gaps in what patients knew about dietary supplements. For example, in item 21, less than half of the total group disagreed with a false statement, meaning a lot of people were unsure.

**Table 7. Knowledge Type 2 diabetics at SH have of their supplements. (n=69)**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Statements** | **Agree** | | **Disagree** | | **Not sure** | |
| No. | % | No. | % | No. | % |
| **FDA requires that dietary supplements be proven to be safe and effective before they are marketed.** | 55 | 79.7 | 4 | 5.8 | 10 | 14.5 |
| **Regular use of dietary supplements prevents Type 2 diabetes** | 25 | 36.2 | 32 | 46.4 | 12 | 17.4 |
| **Dietary supplements are sold over the counter, so they are entirely safe to take** | 35 | 50.7 | 22 | 31.9 | 12 | 17.4 |
| **The number of supplements you get from food is enough for your health needs** | 20 | 29.0 | 41 | 59.4 | 8 | 11.6 |

Even more worrying, on item 22, many participants — 63% at GPHC and just over half at Suddie — agreed with a statement that wasn’t true. This shows that a lot of people think over-the-counter supplements are always safe, which is not true and something Mospan (2018) warned about. Although pharmacists and doctors should be educating patients about supplements, this doesn’t always happen in Guyana. Because of that, patients might be using supplements without understanding the risks. Item 23 highlighted this problem too. More people at Suddie — around 59% recognised a false statement, but at GPHC, only about 6.5% got it right, which is a big difference.

It is surprising that even though more people at GPHC had higher education — 26.1% went to university compared to just 7.2% at Suddie — this didn’t seem to help them know more about supplements. Overall, most people did not seem to have enough information to make good choices about using supplements for their diabetes. Many believe store-bought supplements are entirely safe, which goes against what Mospan (2018) and Cefalu et al. (2011) have written. Also, while many GPHC patients thought supplements were enough to meet their needs, most people from Suddie disagreed.

**Statistical Results**

Three chi-square tests examined associations between hospital type (GPHC vs. Suddie Hospital) and (a) dietary supplement use, (b) dietary supplement prescribing, and (c) knowledge of dietary supplements. Regarding dietary supplement use, no significant association was found between hospital type and likelihood of use, χ² (1) = 2.24, p = .134. However, a significant association emerged between hospital type and dietary supplement prescribing, χ² (1) = 8.22, p = .004, indicating that the hospitals differed significantly in their prescribing practices. Finally, a significant association was also observed between hospital type and knowledge of dietary supplements, χ² (2) = 11.98, p = .003. This suggests that patients at the two hospitals differed significantly in their level of knowledge regarding dietary supplements.

**Table 8: Chi-Square Test of Dietary Supplement Use by Hospital**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hospital** | **Observed Frequency (Yes)** | **Observed Frequency (No)** | **Expected Frequency (Yes)** | **Expected Frequency (No)** |
| GPHC | 35 | 11 | 30.8 | 15.2 |
| Suddie Hospital | 42 | 27 | 46.2 | 22.8 |
| **Total** | **77** | **38** |  |  |
| **χ² (1) = 2.24, p = .134** |  |  |  |  |

**Table 9: Chi-Square Test of Dietary Supplement Prescribing by Hospital**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Hospital** | **Observed Frequency (Yes)** | **Observed Frequency (No)** | **Expected Frequency (Yes)** | **Expected Frequency (No)** |
| GPHC | 23 | 21 | 30.37 | 13.63 |
| Suddie Hospital | 55 | 14 | 47.63 | 21.37 |
| **Total** | **78** | **35** |  |  |
| **χ² (1) = 8.22, p = .004** |  |  |  |  |

**Table 10: Chi-Square Test of Knowledge of Dietary Supplements by Hospital**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Hospital** | **Observed Frequency (Agree)** | **Observed Frequency (Disagree)** | **Observed Frequency (Not Sure)** | **Expected Frequency (Agree)** | **Expected Frequency (Disagree)** | **Expected Frequency (Not Sure)** |
| GPHC | 13 | 11 | 21 | 15.00 | 16.97 | 13.03 |
| Suddie Hospital | 25 | 32 | 12 | 23.00 | 26.03 | 19.97 |
| **Total** | **38** | **43** | **33** |  |  |  |
| **χ² (2) = 11.98, p = .003** |  |  |  |  |  |  |

Further investigation might explore the nature of these associations, mainly why differences exist in prescribing practices and knowledge levels between the two hospitals. Consider post-hoc tests if appropriate.

**Discussion**

This study investigated the prevalence and patterns of dietary supplement use among type 2 diabetic patients at two healthcare facilities in Guyana: Suddie Hospital (SH) and Georgetown Public Hospital Corporation (GPHC). The findings reveal considerable differences in demographic characteristics between the patient populations at the two facilities, impacting the interpretation of supplement use and knowledge.

**Demographic Disparities and Supplement Use**

The study sample demonstrates notable differences between SH and GPHC patient populations. SH patients were older (43.5% aged 65 or older compared to 39.1% in the 45-54 age group at GPHC), predominantly East Indian (85.5%), had lower educational attainment (87% primary or secondary education), higher unemployment rates (81.2%), and a higher proportion of widowed individuals (26.1%). In contrast, GPHC patients exhibited greater ethnic diversity, higher levels of secondary and tertiary education, and more balanced employment figures (Mospan, 2018). These demographic differences might influence supplement usage patterns due to variations in access to information, financial resources, and cultural practices related to healthcare. For instance, the higher prevalence of herbal supplement use at SH (58%), prepared from raw ingredients, reflects the cultural significance of traditional medicine in Guyana (Boston et al., 2018).

**Similarities in Family History and Treatment**

Despite demographic differences, a high proportion of patients from both SH (82.6%) and GPHC (71.7%) reported a family history of diabetes, suggesting a shared genetic predisposition. Both facilities' patients received diabetes education from health professionals, albeit at different rates (84.1% in SH vs. 65.2% in GPHC), and utilized similar treatments including insulin, oral medications (metformin, gliclazide, glyburide), and dietary management. The high percentage of insulin users (70%) unsure of their dosage across both facilities highlights a potential gap in patient education. It reinforces the need for improved patient-provider communication regarding medication management (Mahdavi-Roshan et al, 2021).

**Dietary Supplement Use and Knowledge Gaps**

The study revealed a high prevalence of dietary supplement use in both groups (60.9% SH, 76.1% GPHC), consistent with the observations of Mospan (2018) and Mahdavi-Roshan et al (2021) regarding the increasing trend of supplement use for disease management. However, there is concern over the sources and methods of supplement usage. A significant proportion of SH patients relied on self-knowledge and local herbalist recommendations (58%), raising concerns about appropriate dosing and preparation (Halat & Dennehy, 2003). While a substantial number of patients at both sites (67.8% overall) reported receiving dietary supplement prescriptions from healthcare providers, this practice was significantly less common at GPHC (50%). This discrepancy, highlighted by the chi-square test (χ² (1) = 8.22, p = .004), warrants further investigation into the prescribing practices at each facility.

A significant finding was the difference in patient knowledge regarding dietary supplements, particularly regarding safety and efficacy (χ² (2) = 11.98, p = .003). Although both groups demonstrated a high degree of awareness of FDA regulations, a sizable portion incorrectly perceived over-the-counter supplements as entirely safe (63% GPHC, 50.7% SH), aligning with Mospan's (2018) concerns about the misperception of supplement safety. This misperception highlights a critical need for public health education campaigns to improve understanding of supplement regulations and potential risks (Mospan, 2018; Cefalu et al., 2011). Even after accounting for higher educational attainment at GPHC, the significant difference in knowledge levels between hospitals suggests that factors beyond education significantly shape patient understanding. This calls for targeted interventions tailored to each hospital’s specific patient population.

Clinical Implications and Future Research: This study highlights important clinical implications for diabetes management in Guyana. The widespread use of dietary supplements, often obtained from non-healthcare professionals, poses a potential risk of adverse interactions with prescribed medications and necessitates careful monitoring. The lack of consistent knowledge regarding supplementing safety and efficacy emphasizes the crucial role of patient education in mitigating these risks. Further research should explore the factors contributing to the differences in supplement prescribing practices and knowledge levels between the two facilities. Qualitative studies could delve into patient perspectives on supplement use, healthcare providers' perspectives on prescribing practices, and the cultural context influencing supplement selection and use. Additionally, exploring the effectiveness of different health education strategies in improving patients’ knowledge and behavior change would be highly beneficial.

**Conclusion**

This study reveals a high prevalence of dietary supplement use among type 2 diabetic patients in Guyana, with notable variations in patterns and knowledge levels between Suddie Hospital (SH) and Georgetown Public Hospital Corporation (GPHC). While a significant proportion of patients reported receiving supplement prescriptions, the practice was considerably less common at GPHC, suggesting a disparity in healthcare provider approaches. Furthermore, many patients, particularly at SH, relied on non-professional sources for supplement information and guidance, raising concerns about safe and effective use. Despite varying educational levels, the significant difference in patient knowledge about supplement safety and efficacy between the two hospitals underscores the need for targeted interventions to address these knowledge gaps. These findings highlight the critical need for improved patient education, standardised prescribing practices, and further research to fully understand the complex interplay of cultural factors, healthcare access, and supplement use in managing type 2 diabetes within the Guyanese context. Future qualitative studies could provide valuable insights into patients and provide perspectives to inform more effective interventions.

**Recommendations**

1. University of Guyana: Update the Medicine and Pharmacy curricula to emphasize practical application and patient-centered care for type 2 diabetes management.

2. Ministry of Public Health: Develop policies to integrate dietary supplements into diabetes treatment and establish a research unit to investigate their efficacy. Disseminate findings through accessible media at health facilities.

3. Hospitals/Clinics: Incorporate diabetes education sessions into clinic schedules, ensure patients understand their supplement prescriptions, actively follow up on absent patients, and encourage (or arrange for) in-person medication refills for better monitoring and counseling.

4. Pharmacies: Enhance pharmacist knowledge of dietary supplements and ensure facilities provide quality care for type 2 diabetics.

5. Type 2 Diabetics: Actively learn about relevant and effective dietary supplements, understand potential interactions with medications, and consult healthcare professionals before selecting supplements.

COMPETING INTERESTS DISCLAIMER:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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1.

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**References**

American Diabetes Association. (2019). 5. Lifestyle Management: Standards of Medical Care in Diabetes-2019. Diabetes Care, 42(Suppl 1), S46–S60.

Anderson, R. A., Cheng, N., Bryden, N. A., Polansky, M. M., Cheng, N., Chi, J., & Feng, J. (1997). Elevated Intakes of Supplemental Chromium Improve Glucose and Insulin Variables in Individuals with Type 2 Diabetes. Diabetes, 46(11), 1786–1791. <https://doi.org/10.2337/diab.46.11.1786>

Balbi, M. E., Tonin, F. S., Mendes, A. M., Borba, H. H., Wiens, A., Fernandez-Llimos, F., & Pontarolo, R. (2018). Antioxidant effects of vitamins in type 2 diabetes: A meta analysis of randomized controlled trials. Diabetology & Metabolic Syndrome, 10(1), 18. https://doi.org/10.1186/s13098-018-0318-5

Boston, C., Kurup, R., Rosales, J., Singh, J. (2019). Knowledge and utilization of Traditional Medicine for Type 2 Diabetes Mellitus among Residents of Pakuri in Guyana.

Cefalu, W. T., Stephens, J. M., & Ribnicky, D. (2011, August 1). Diabetes and herbal (botanical) medicine - NCBI bookshelf. Diabetes and Herbal (Botanical) Medicine. Retrieved June 7, 2022, from https://www.ncbi.nlm.nih.gov/books/NBK92755/

Centers for Disease Control and Prevention. (2016). Dietary Supplements and Prescription Medication – DSQ. Retrieved on May 17, 2022 from <https://wwwn.cdc.gov/nchs/data/nhanes/2015-2016/questionnaires/DSQ_I.pdf>

Ceriello, A., Testa, R., & Genovese, S. (2016). Clinical implications of oxidative stress and potential role of natural antioxidants in diabetic vascular complications. Nutrition, Metabolism and Cardiovascular Diseases, 26(4), 285-292.

Diabetes. (2025, February 18). PAHO/WHO | Pan American Health Organization. <https://www.paho.org/en/topics/diabetes>

Gothai, S., Ganesan, P., Park, S. Y., Fakurazi, S., Choi, D. K., & Arulselvan, P. (2016). Natural Phyto-Bioactive Compounds for the Treatment of Type 2 Diabetes: Inflammation as a Target. Nutrients, 8(8), 461. <https://doi.org/10.3390/nu8080461>

Guerrero-Romero, F., Tamez-Perez, H. E., Gonzalez-Gonzalez, G. E., Salinas-Martinez, A. M., Montes-Villarreal, J., Trevino-Ortiz, J. H., & Rodriguez-Moran, M. (2004). Oral magnesium supplementation improves insulin sensitivity in non-diabetic subjects with insulin resistance. A double-blind placebo-controlled randomized trial. Diabetes & metabolism, 30(3), 253-258.International diabetes

Halat, K. M., & Dennehy, C. E. (2003). Botanicals and Dietary Supplements in Diabetic Peripheral Neuropathy. The Journal of the American Board of Family Practice, 16(1), 47–57. <https://doi.org/10.3122/jabfm.16.1.47>

Hannon, B. A., Fairfield, W. D., Adams, B., Kyle, T., Crow, M., & Thomas, D. M. (2020). Use and abuse of dietary supplements in persons with diabetes. Nutrition & Diabetes, 10(1), 14. <https://doi.org/10.1038/s41387-020-0117-6>

Huang, D. D., Shi, G., Jiang, Y., Yao, C., & Zhu, C. (2020). A review on the potential of Resveratrol in prevention and therapy of diabetes and diabetic complications. Biomedicine & Pharmacotherapy, 125, 109767.

Jagessar, R. C., & Kingston, S. (2015). The status of diabetes in Guyana, it's herbal and synthetic drug treatments.

Kositsawat, J., & Freeman, V. L. (2011). Vitamin C and A1c relationship in the national health and nutrition examination Survey (NHANES) 2003–2006. Journal of the American College of Nutrition, 30(6), 477-483.

Mahdavi-Roshan, M., Rezazadeh, A., Joukar, F., Khorshidi, Y., Naghipour, M., & Mansour-Ghanaei, F. (2021). Dietary supplements consumption and its association with socioeconomic factors, obesity and main non-communicable chronic diseases in the north of Iran: the PERSIAN Guilan Cohort Study (PGCS). BMC Nutrition, 7(1). https://doi.org/10.1186/s40795-021-00488-2

Mospan, C. M., PharmD, BCACP, BCGP Assistant Professor of Pharmacy Wingate University School of Pharmacy Wingate, North. (n.d.). The Role of Supplements in Diabetes Management. Retrieved May 26, 2022, from https://www.uspharmacist.com/article/the-role-of-supplements-in-diabetes-management

Nutrition, Center for Food Safety and Applied. 2022. “Questions and Answers on Dietary Supplements.” FDA. Retrieved June 7, 2022, from

Office of the Commissioner. (2022, June 2). FDA 101: Dietary supplements. U.S. Food And Drug Administration. <https://www.fda.gov/consumers/consumer-updates/fda-101-dietary-supplements>

Suksomboon, N., Poolsup, N., & Punthanitisarn, S. (2016). Effect of Aloe vera on glycaemic control in prediabetes and type 2 diabetes: a systematic review and meta‐analysis. Journal of clinical pharmacy and therapeutics, 41(2), 180-188.

Wang, Y., Yan, A., Li, S., Liu, B., Li, H., & Yan, Y. (2019). Efficacy and safety of Berberine in the treatment of type 2 diabetes with insulin resistance: Protocol for a Systematicreview.*Medicine*,*98*(35),e16947.https://doi.org/10.1097/MD.0000000000016947

Zimmet, P., Alberti, K. G. M., & Ríos, M. S. (2005). A new International Diabetes Federation (IDF) worldwide definition of the metabolic syndrome: the rationale and the results. *Revista Española de Cardiología (English Edition)*, *58*(12), 1371-1375.

Yang, H. Y., Hung, K. C., Chuang, M. H., Chang, R., Chen, R. Y., Wang, F. W., ... & Chen, J. Y. (2023). Effect of zinc supplementation on blood sugar control in the overweight and obese population: A systematic review and meta-analysis of randomized controlled trials. *Obesity Research & Clinical Practice*, *17*(4), 308-317.

Meuffels, F. M., Isenmann, E., Strube, M., Lesch, A., Oberste, M., & Brinkmann, C. (2022). Exercise interventions combined with dietary supplements in type 2 diabetes mellitus patients—a systematic review of relevant health outcomes. *Frontiers in Nutrition*, *9*, 817724.

Minari, T. P., Tácito, L. H. B., Yugar, L. B. T., Ferreira-Melo, S. E., Manzano, C. F., Pires, A. C., ... & Yugar-Toledo, J. C. (2023). Nutritional strategies for the management of type 2 diabetes mellitus: a narrative review. *Nutrients*, *15*(24), 5096.

Chuku, L. C., & Chinaka, N. C. (2020). Influence of Antioxidant Supplementation on High Fat Diet-Streptozotocin (HFD-STZ) Induced Type 2 Diabetes Mellitus in Albino Rats. *European Journal of Medicinal Plants*, *31*(17), 29–40.