Retrospective Chart Review: Assessing the Prevalence of Food/ Dietary Supplement Use Among In-Patients and Its Potential Drug-Supplement Interaction in a Level 3 Hospital in Quezon City

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ABSTRACT

Background: The popularity of food and dietary supplements in the Philippines has grown due to health and wellness concerns and social media influence. In 2022, 59% of Filipinos used dietary supplements. Despite Food and Drug Administration (FDA) approval, concerns about safety, effectiveness and drug-supplement interactions persist, resulting in over 23,000 emergency visits (2015). Given the widespread use of supplements, particularly among patients with complex health conditions, a retrospective chart review is needed to assess supplement use in Level 3 hospitals.

Objectives: This study assesses the prevalence of utilization of food and dietary supplements among in-patients at a Level 3 hospital and evaluates the potential drug-supplement interactions.

Methods: A retrospective cross-sectional descriptive study was utilized. This study reviewed the in-patient medical records from the Internal Medicine Department of a level 3 hospital from January to June 2022.

Results: With a total of 663 patient charts, 73.75% were found to be using food or dietary supplements. Among these users, 44.78% were middle-aged adults ages ranging from 35 to 60 years old, and 61.75% were females. The most commonly consumed supplements fall under the category "others" (38.24%), specifically multivitamins + minerals + botanicals, followed by minerals (21.42%), vitamins (19.1%), amino acids (15.55%), botanicals (5.1%), and probiotics (0.58%). Within the analyzed 1252 supplement-drug combinations, 61.67% were found to have potential drug-supplement interactions. Among them, most prevalent drug-supplement interactions were Calcium + Amlodipine, which showed moderate severity, Potassium Chloride + Losartan, also with moderate severity, and Ferrous Sulfate + Pantoprazole, with minor severity.

Conclusion: Given this significant interaction between supplements and drugs, it is essential to consider what actions should be taken to address these interactions effectively. Hence, understanding these trends can help healthcare professionals provide safer treatment regimens for patients using supplements alongside their medications.

Key words: Food supplement, nutraceuticals

The Philippines, despite its status as a lower-middle-income country, is a growing market for vitamins and nutraceutical products.[1] According to a market research report conducted in the Philippines, 59% of Filipinos used dietary supplements in 2022.[2]

From the School of Pharmacy

The usage of food or dietary supplements has become significantly popular over the years due to the increasing interest and demands of the population in terms of health and wellness, as well as the influence of exaggerated promotions seen on social media platforms. It is marketed as tailored to the individual's needs for specific health conditions or as additional nutrients that a person's diet might be deficient in. The Food and Drug Administration (FDA) has permitted the manufacturing of supplements; nevertheless, the

absence of post-marketing controls raises concerns about their safety, effectiveness and potential for interactions with other pharmaceuticals.[3]

A case in point is defined by the Food and Drug Administration (FDA) as a processed food item that includes dietary ingredients such as vitamins, minerals, amino acids, herbs or other substances that augment the daily intake to meet the energy and nutrient requirements of both Filipino and international standards.[4] Contrary to popular belief, it is considered a food product rather than a medication substance. Food or dietary supplements are categorized as such because there is no active ingredient present that is capable of curing or mitigating a disease.[5] Although they are popular, there is limited evidence of their health benefits. Common supplements include vitamins and minerals, which are also sometimes recommended by doctors. In this study, the supplements identified were either prescribed or recorded in the patient medication profile, patient medication history or discharge medication of patient charts; not all were confirmed physician-directed.

This underreporting heightens the risk of drug-supplement interactions, as seen in hospital settings globally. Enriquez & Esplana (2022) found widespread herbal supplement use among cancer patients in a Level 3 hospital in the Philippines, with limited physician guidance.[6] Other studies in clinical settings have shown that while supplements are frequently used by hospitalized patients, a substantial proportion are self-initiated rather than physician-prescribed.[7] Ronis et al. (2019) highlighted poor patient disclosure of supplement use. These gaps support the relevance of reviewing inpatient records to quantify supplement use and interaction risks.[8] For instance, Mangosteen Fruit Pulp Powder (MX3), used as an antioxidant and anti-inflammatory, can increase bruising and bleeding when used with medications that slow blood clotting, such as warfarin.[9] Ampalaya Plus can dangerously interact with antidiabetic medicines such as Metformin or Glibenclamide by lowering blood sugar levels.[10] Cannabidiol oil and turmeric also pose risks by disrupting the CYP enzyme system and affecting the prostaglandin pathway, respectively. Adverse effects are a crucial consideration before taking any food or dietary supplement.[10]

In the United States, around 23,005 emergency department visits are associated with adverse events caused by dietary supplements, resulting in roughly 2,154 hospitalizations every year. Weight-loss or energy pills usually cause cardiovascular difficulties in young people between the ages of 20 and 34, as well as unattended youngsters. Furthermore, vitamin deficiencies frequently cause swallowing difficulties in patients over the age of 65.[11]

Given the escalating prevalence of supplements in the market, there is a pressing need to understand the extent of their use and the potential for adverse interactions with prescribed medications. This study proposed a retrospective chart review to assess the prevalence of food and dietary supplement use among in-patients at a Level 3 hospital and to evaluate the potential drug-supplement interactions. The supplements were identified from patient medical records, specifically the Patient Medication Profile (PMP). This profile records all medications the patient is currently taking according to the doctor's orders sheet. By examining these factors, the authors aim to develop strategies to optimize the safe use of supplements and minimize their risks to patient health.

MATERIALS AND METHODS

Study Design and Setting

A retrospective cross-sectional descriptive study was conducted at the Medical Records Department to determine the prevalence of food and dietary supplement use among patients admitted to the Internal Medicine Department of a level 3 hospital from January to June 2022. This sample was chosen for its comprehensive patient population and complex case mix, offering a more accurate depiction of polypharmacy and supplement use. This setting also reflects a greater likelihood of clinically significant interactions.

Total population sampling was used, reviewing all available patient charts meeting inclusion criteria (n=663) from January to June 2022. No sample size calculation was necessary due to the complete chart review design.

Inclusion and Exclusion Criteria

The following inclusion criteria were used:

1. Medical charts of patients admitted under the service of the Internal Medicine Department from January 1, 2022 to June 30, 2022;

The following exclusion criteria were used in the study:

1. Medical charts with no specified age and sex;
2. Medical charts that are not accessible in the medical records department;
3. Medical charts that are not legible;
4. Food or dietary supplements that are administered through inhalation or topically. This is due to minimal systemic absorption and low likelihood of interactions

The following data were collected from the scanned medical charts: patient demographics, supplements, and drugs used.

Study Procedure

Data collection procedure was approved by the DPO and validated by the Chief Medical Officer. Following the inclusion and exclusion criteria of the study, data such as the patient's demographics, supplements, and medications used by the patient were collected from the medical chart and inputted to a structured spreadsheet by the researchers. After collecting the data, it was processed to determine the prevalence of food and dietary supplement use and identify potential drug-supplement interactions.

To properly discard the data, the disposal was entrusted to the DPO. The researchers handed all copies of the data to the office of the Data Protection Officer. The data gathered from the medical charts acquired specific information that remained anonymous and protected throughout the study.

Data Processing and Analysis

Demographic Profile and Food/Dietary Supplements

The sociodemographics and food/dietary supplements were collected from the scanned copies of medical charts and inputted into the spreadsheet. The type of food or dietary supplements was identified specifically according to their categories: vitamins, minerals, amino acids, botanicals, probiotics. Descriptive statistics (frequencies, percentages, and mode) were used to analyze demographics, supplement prevalence, and interaction frequency All analyses were conducted using a spreadsheet.

Drug-supplement Interaction

Drug-supplement interaction analysis was conducted based solely on the prescribed medications documented in the Patient Medication Profile (PMP). This approach ensures that the identified drugs and supplements were concurrently administered during the patient's hospitalization, thereby validating the relevance and potential clinical significance of the interactions analyzed. Drug interaction checkers like Lexicomp and Drugs.com were utilized to evaluate potential interactions between drugs and supplements. These checkers classified the interaction based on its severity, categorizing it as minor, moderate, major, or no interaction. Lexicomp was used as the primary checker, while drugs.com was used as an alternative. MIMS was used as a reference when there was no available information found in the interaction checkers. Lexicomp was selected as the primary drug interaction checker because it is the standard reference used within the hospital, ensuring consistency with institutional practices and enhancing the reliability of interaction assessments.

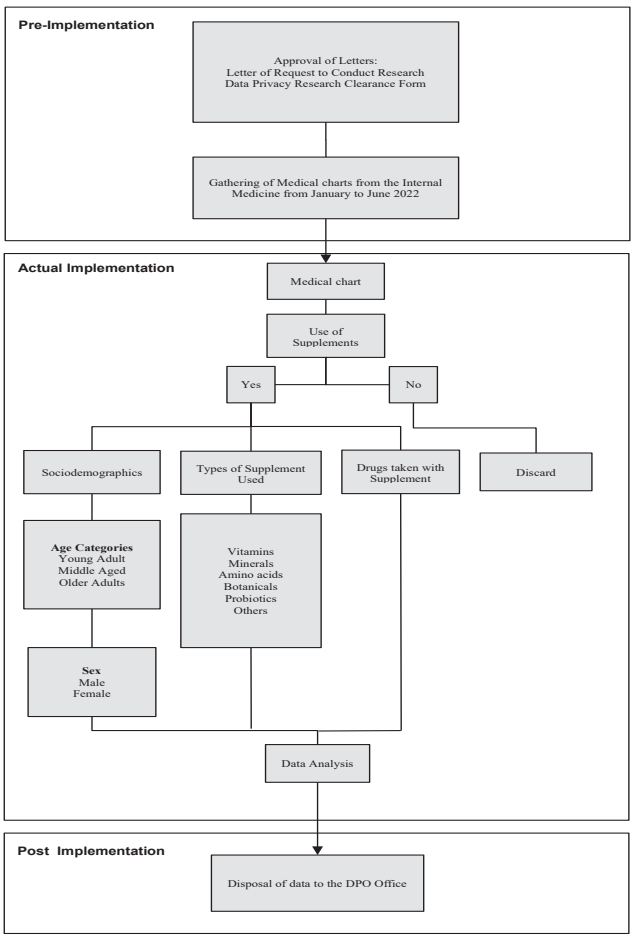

Figure 1. Flowchart of summary of data collection.

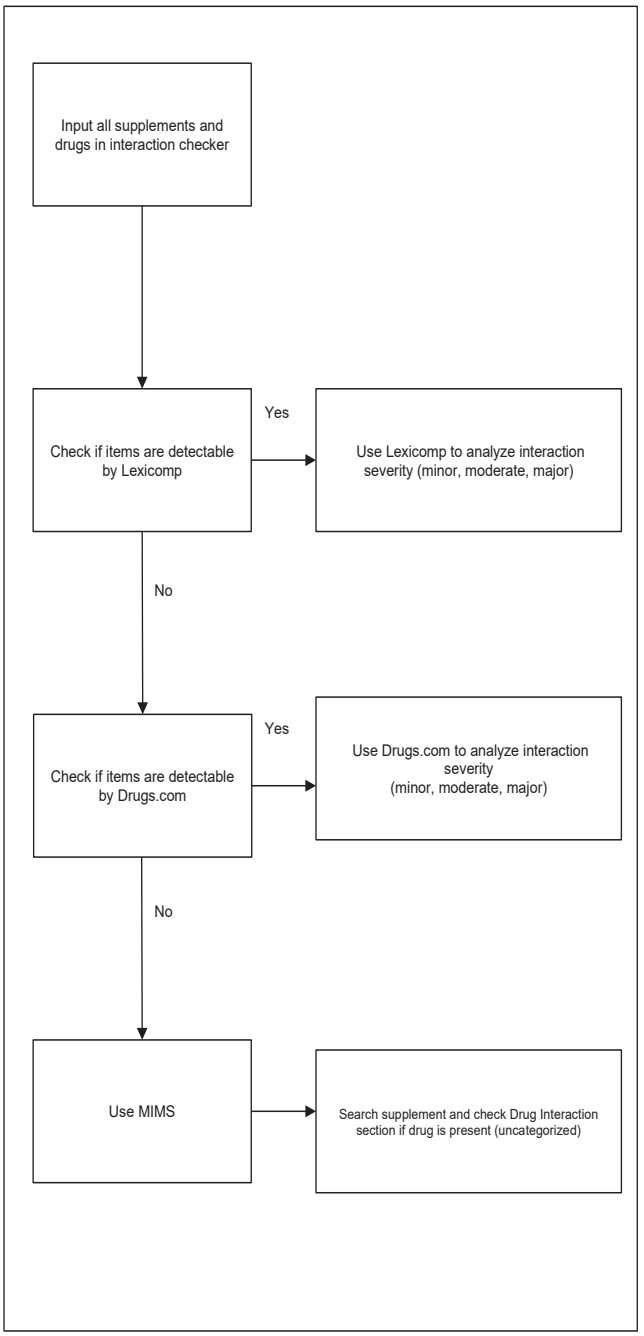

Figure 2. Flowchart of process of analyzing drug-supplement Interaction.

Table 1. Lexicomp severity indicators.

Indiators	Definition
Minor	• Effects would be considered tolerable in most cases - no need for medical intervention
Moderate	• Medical intervention needed to treat effects
Major	• Effects may result in death, hospitalization, permanent injury, or therapeutic failure

Table 2. Drugs.com severity indicators.

Indiators	Definition
Minor	• Minimally clinically significant. Minimize risk; assess risk and consider an alternative drug, take step to circumvent the interaction and/or institute a monitoring plan
Moderate	• Moderately clinically significant. Usually avoid combinations; use only under circumstance
Major	• Highly clinically significant. Avoid combination; risk of interaction outweighs benefit

Ethical Considerations

This study was duly approved by the FEU-NRMF Institutional Ethics Review Board (Study Protocol Code: FEU-NRMF IERC 2023-0131) and the Data Protection Office of the Level 3 Hospital. Data collection through retrospective patient medical charts began after the approval letter by the FEU-NRMF IERC and DPO was received.

RESULTS

Prevalence of Food/Dietary Supplement

After retrieving 663 in-patient charts from the Internal Medicine Department between January and June 2022, it was discovered that 73.75% of them used food or dietary supplements. Across 489 charts, middle-aged adults were found to be frequent users of supplements, while majority of the food/dietary supplement users are females (61.75%)

Out of 1723 food or dietary supplements found in the medical charts, “others” were found to be the most prevalent, followed by mineral, vitamin, amino acid, botanical and probiotic. For each type of supplement, the following were found to be most prevalent: multivitamins + minerals + botanicals, vitamin B complex, potassium chloride, ketoanalogue, spirulina, Nutra Healthy Gut and Erceflora. Table 3 only highlights the top 3 supplements that are prevalently used on each category.

Potential Drug-Supplement Interaction

Of the 1252 supplement-drug combinations analyzed, 61.67% had potential drug-supplement interactions; moderate (62.7%) was the most common severity, followed by minor (25.28%) and major (7.88%). Within each severity category, the three most common combinations were found.

Table 3. Factors contributing to supplement use.

Factor		n	%
Socio-demographic	***Age (years)[10]***		
	Young Adult (19 - 34)	53	10.83
	Middle-aged Adult (35 - 64)	219	44.78
	Older Adults (>65)	217	44.37
	Sex		
	Male	187	38.24
	Female	302	61.75
Type of Supplement	***Vitamins***	**329**	**19.10**
	Vitamin B Complex	224	68.09
	Folic Acid	39	11.85
	Vitamin B12	17	5.47
	Minerals	**369**	**21.42**
	Potassium Chloride	151	40.92
	Sodium Bicarbonate	70	18.97
	Calcium	55	14.90
	Amino acids	**268**	**15.55**
	Ketoanalogue	130	48.51
	NAC	93	34.70
	AHCC	23	8.58
	Botanicals	**88**	**5.10**
	Spirulina	27	31.40
	Neuro aid	15	17.44
	Silymarin	8	9.30
	Probiotics	**10**	**0.58**
	Nutra Healthy Gut	4	40.00
	Erceflora	4	40.00
	Bifilac	1	10.00
	Renadryl	1	10.00
	Others	**659**	**38.24**
	Multivitamins + Minerals + Botanicals	609	92.41
	Fatty acids	49	7.00
	Activated charcoal	1	0.15

The most common minor drug-supplement interaction is between ferrous sulfate and pantoprazole with 17.61%, in which the potential effect results in a decrease in absorption of Ferrous Sulfate which may impair anemia treatment due to reduced iron absorption when combined with Pantoprazole, a proton-pump inhibitor. Minor severity usually does not cause significant problems, so patient management is usually unnecessary.[12] In cases of moderate severity, calcium and amlodipine are the most common interactions with 10.77%, in which the potential effect may result in a diminishing therapeutic effect of amlodipine For instance, calcium diminishing amlodipine's effectiveness may lead to uncontrolled hypertension. Moderate severity indicates a worsening of the clinical condition, and potential treatment changes must be considered.[12] In major severity, multivitamins and levofloxacin are the most common interactions with 19.23%, in which the potential effect may affect the absorption of levofloxacin leading to undertreated bacterial infections. Overall, the most prevalent drug-supplement interactions are: Calcium + Amlodipine, Potassium Chloride + Losartan and Ferrous Sulfate + Pantoprazole.

DISCUSSION

Prevalence of the Use of Supplements

With a high percentage of 73.75%, more than half of the in-patients in the Internal Medicine Department in 2022 were found to be using supplements. Researchers from the Centers for Disease Control and Prevention's National Center for Health Statistics found that supplement usage from 2017 to 2020 grew higher due to the growing pandemic, particularly when

Table 4. Top 3 drug-supplement interaction on each type of severity.

Severity	n	%	Potential Effect
Minor			
Ferrous Sulfate + Pantoprazole	34	17.61	Pantoprazole (PPI) may decrease absorption of Ferrous sulfate
Calcium + Aspirin	13	6.73	Calcium (Antacids) may decrease serum concentration of Aspirin (Salicylates)
Ketoanalogue + Amlodipine	10	5.18	Ketoanalogue diminish the therapeutic effect of Amlodipine
Moderate			
Calcium + Amlodipine	53	10.77	Calcium may diminish the therapeutic effect of Amlodipine (CCB)
Potassium chloride + Losartan	36	7.31	Potassium salts may enhance the hyperkalemic effect of Losartan (Angiotensin II receptor blockers)
Multivitamins + Clopidogrel	23	4.67	Multivitamins/Minerals may enhance the antiplatelet potency of Clopidogrel (Agent with Antiplatelet Properties).
Major			
Multivitamins + Levofloxacin	10	19.23	Multivitamins decrease the concentration of Levofloxacin (Quinolones).
Potassium Chloride + Diphenhydramine	5	9.61	Diphenhydramine (Anticholinergic) enhances the ulcerogenic effect of Potassium Chloride.
Multivitamins + Ciprofloxacin	4	7.69	Multivitamins decrease the concentration of Ciprofloxacin (Quinolones).

vaccines and treatments were not fully established.[13] Adults usage of dietary supplements, specifically vitamin C, rose to 58.5% in 2020 due to the belief that dietary supplements enhance their immune system to fight off infection.[14] Other than using supplements as a preventive measure, the usage of supplements can also be relevant to people who are into fitness. Dietary supplement use was found prevalent among CrossFit practitioners for reasons that it increases exercise performance and muscle mass.[15] With that being said, being used as a preventive measure against diseases and as a fitness enhancer for better exercise performance are some of the factors contributing to the rising prevalence of supplement usage.

Sociodemographic Characteristics of Supplement Uses

It was determined that middle-aged adults who are around ages 35-64 were the most prevalent age group using supplements, followed by older adults who are 65 years old and older. It suggests that young adults are less likely to use supplements. Additionally, many people experience a decrease in appetite as they get older, and assistance from supplements may be needed to meet their nutritional needs.[16]

An article from the Council for Responsible Nutrition states that startup companies are targeting young adults via monthly subscription boxes or through social media promotions.[17] These findings are slightly different from another study, which revealed higher dietary supplement usage and more positive attitudes are common among older adults compared to middle-aged adults because of their belief in using supplements "to maintain good health" and "to ensure adequate nutrition".[18]

Of the measurements of usage regarding gender, the intake of supplements is more likely for females than males. Using supplements is highly related to the lifestyle choices of individuals. This finding agrees with a study wherein female athletes have a higher prevalence in the intake of supplements such as vitamins and minerals compared to males. Factors include women having a higher micronutrient need than men and advertisements, in which most dietary supplements are often advertised directly for women. Women were also observed to have more positive attitudes toward dietary supplements than men.[19] Contrary to these results, some evidence has shown that males were statistically significant with dietary supplement usage. Middle-aged and older men are more likely to use supplements, as they require more minerals and protein to enhance their immunity and energy levels.[18]

As people age, they tend to be more health-conscious, which may be a factor that drives the usage of supplements. In terms of gender, the positive attitude of females toward supplements was higher than of the opposite sex. Lifestyle views, direct advertisements and health attitudes were the possible factors that affected its prevalence. Despite the lack of knowledge about their components, supplements are often believed to be the answer to getting more nutrition and preventing diseases.

Types of Supplements Utilized

Among the different categories of supplements, "others" supplements were found to be the most prevalent, followed by minerals and vitamins. "Others" supplements are classified as supplements that are a combination of different types of supplements like Sodium Ascorbate + Zinc, Ferrous Sulfate + Folic Acid, Purified Fish Oil, and Activated Charcoal, to name a few. A study about the connection between the clinical diagnosis of medical conditions and the usage of dietary supplements, showed that as the value of clinically diagnosed medical conditions grew, there was a higher prevalence of use of multivitamins, minerals and herbal supplements.[19]

Among the vitamins, three of the most prevalent supplements are Vitamin B Complex, Vitamin B9 or Folic Acid, and Vitamin B12 or Cobalamin. These vitamins are a dietary supplement as a prophylaxis for vitamin B1, B6 and B12 deficiency, as well as an adjunct in the management of neuromuscular pain. Among the three, vitamin B complex showed the most prevalence in this type of supplement. A study conducted by Zolfaghari, S. (2016) discussed that women aged 18-49 years old are those who are more likely to consume the least amount of folate, vitamin B12, or vitamin B6 while using oral contraceptives. Consequently, they had a higher incidence of depression, so the intake of folate, vitamin B12, and vitamin B6 improved their health and mood. This study, along with the following use of Vitamin B complex as a treatment for Vitamin B1, B6, and B12 deficiency and as an adjunct for neuromuscular pain, among others, may indicate the reason for its prevalence of supplement use.[20]

Among the minerals, three of the most prevalent supplements that were used were potassium chloride,

sodium bicarbonate, and calcium. The data show that the most prevalent mineral is potassium chloride. Hypokalemia is prevalent in hospitalized patients, which manifests through significant muscle weakness, cardiac arrhythmias, and electrocardiogram changes, among others, where the initial management is through oral potassium supplementation.[21] This study gives a possible explanation for the prevalence of potassium chloride use among in-patients from the data gathered in this study.

Among the amino acids, three of the most prevalent supplements that the data shows are as follows: ketoanalogue, N-acetylcysteine (NAC), and Active Hexose Correlated Compound (AHCC). Ketoanalogue is an essential amino acid that contains the following components: Calcium, Total Nitrogen, L-Tryptophan, L-Tyrosine, L-Histidine, L-Threonine, L-Lysine Acetate, Calcium-DL-2-hydroxy-4(methylthio) butyrate, Calcium-3-methyl-2-oxo-valerate, Calcium-2-oxo-3-phenylpropanoate, Calcium-3-methyl-2-oxo-butyrate, and Calcium-4-methyl-2-oxo-valerate. This dietary supplement is indicated to aid or prevent kidney damage among chronic kidney disease (CKD) patients. N-acetylcysteine is a supplement that is used as an adjunct for a wide range of chronic conditions: mucolytic properties in chronic respiratory disease, neurodegenerative conditions such as addiction, schizophrenia, bipolar disorder and depression, Parkinson disease, and Alzheimer disease. It is also a low-cost supplement, which makes it a viable adjunct for various diseases (Schwaiger, 2021).[22] Lastly, Active Hexose Correlated Compound (AHCC) is an amino acid derived from the extract of Shiitake Mushrooms and is used as an immune-system enhancer, serving as an immune system modulator to prevent microbial infections and tumor malignancy by strengthening host defenses, which have shown positive results in animal models. This supplement is commonly used as an immune system enhancer as it contains a high amount of α-1,4-glucans, showing promising effects on the immune systems of humans and rodents.[23] Among the three supplements, ketoanalogue was found to be the most prevalent. An investigation carried out by Thao Ngoc et al. An economic analysis of a very low-protein diet supplemented with ketoanalogue in 2023 revealed that in patients with CKD. ketoanalogue supplementation is a cost-effective way to manage their disease, hence its prevalence.[24]

Among the botanicals, three of the most prevalent supplements are as follows: spirulina, Neuro aid and silymarin. A popular dietary supplement, spirulina is derived from Arthrospira platensis and Arthrospira maxima and is valued for its anti-inflammatory, hypolipidemic, antidiabetic, antioxidant, and brain-protective qualities.[25] Due to its wide range of nutritional value, this may indicate its prevalence as a botanical supplement. Neuroaid is a vegetable supplement derived from the following: Acorus tatarinowii, Polygala tenuifolia, Prunus persica, Carthamus tinctorius, Angelica sinensis, Ligusticum chuanxiong, Paeoniae rubra, Salvia miltiorrhiza, and Astragalus membranaceus, used for general health and well-being. Lastly, silymarin is a botanical supplement derived from Silybum marianum that has antioxidant and hepatoprotective properties.

Among the probiotics, the data shows that only four were reported to be used: Nutra Healthy Gut, Erceflora, Bifilac, and Renadryl. Nutra Healthy Gut is a food supplement probiotic, which is a combination of prebiotics and probiotics. Erceflora is a probiotic that contains the bacterium Bacillus clausii. Bifilac is a food supplement that helps improve digestion and absorption of nutrients from food, relieves constipation, diarrhea or IBS, regulates the intestinal flora, and stimulates the immune system of the gut. There is a lack of studies regarding the prevalence of probiotic use, which is consistent with the data provided in this study, where a low usage of this supplement type was found. Research carried out by Yi et al. (2019) regarding the prevalence of probiotic use among in-patients, reported that among 145 hospitals with a total of 1,976,167 discharges in 2012, the usage of probiotics was found in 51,723 in-patients, with occurrence in 139 hospitals, supporting the low number of probiotic users in this study.[26] No further studies regarding the prevalence of probiotic use were found in recent years.

Among "others" supplements, data shows that the three most prevalent supplements are multivitamins, fatty acids, and activated charcoal. Multivitamins are a mixture of different types of supplements (e.g., vitamin C + zinc) which are used to treat or prevent vitamin deficiencies. Dietary supplements containing fatty acids, including EPA, DHA, and ALA, are used to treat or prevent hypertriglyceridemia and as a secondary preventive measure against myocardial infarction. A research carried out by Eliason et al. (2019) on its patients' use of dietary supplements in a family practice clinic revealed that 73% of the patients had taken one or more supplements in the previous year. Most of the patients relied on media

regarding their supplement use, and reasons for their use include improving their immune system, dietary and energy enhancement, and cancer prevention.[27]

A possible explanation from the following data may indicate supplement usage to fill in nutritional gaps cannot always be supplemented by food due to varying dietary lifestyles, along with the prevention of specific conditions like cancer, heart disease, osteoporosis, and depression. Furthermore, based on the following data provided, a combination of one or more supplements is also used to improve their immune system, enhance energy, and prophylaxis nutrient deficiencies. Supplementation has been demonstrated to help people live better lives, and it is also an affordable strategy to prevent diseases like cancer and chronic kidney disease from developing or worsening.

Potential Drug-supplement Interaction

Minor Interactions

The consequences of these interactions, the potential risk of adverse events, may vary between the types of drugs and dietary supplements.[7] In the study, it has been presented that there are numerous drug-supplement interactions of various severity (minor, moderate, and major) and potential effects.

For instance, within the minor interactions, the first drug-supplement interaction that was presented was the ferrous sulfate + pantoprazole. According to Lexicomp, the mechanism of interaction can be due to the proton pump inhibitor-mediated increase in gastrointestinal pH, resulting in decreased iron absorption. The absorption of oral iron supplements is decreased by omeprazole and possibly by all proton pump inhibitors.[28] The presented reports within the drug interaction checker also stated that there are inconsistent results regarding its effect along with its patient management that do not require clinical action that is necessary, thus it was in the minor.

Moderate Interactions

In the moderate category, the first drug-supplement interaction that was presented was calcium + amlodipine. According to Lexicomp, increasing the extracellular calcium concentration may decrease the effects, therapeutic or toxic, of the calcium channel blockers (CCBs). The presented reports within the drug interaction checker also stated that it can decrease therapeutic effects such as antihypertensive, antiarrhythmic, and anti-ischemic effects of specific drugs (e.g., verapamil, nifedipine, etc.). Furthermore, its patient management involves a monitoring therapy for decreased therapeutic effects of CCBs when the dosage of the calcium supplement is increased or started; or increased therapeutic effects when the calcium supplement is discontinued or the dose is decreased. Amlodipine also counteracted the effect of dietary calcium on arterial blood pressure.[29]

Major Interactions

The category of major severity presented multivitamins + levofloxacin as the first drug-supplement interaction. According to Lexicomp, the polyvalent cations included in multivitamins, such as calcium and zinc, may lower the serum concentration of quinolones, inhibiting the therapeutic effectiveness of the antibiotic. As reported in the drug interaction checker, the functional groups 3-carbonyl and 4-oxo form a chelate with the cations, which results in the inactivation of quinolones. It is suggested to intake oral quinolones 2 hours before or 6 hours after the intake of multivitamins and to monitor if there is a decrease in the therapeutic effects of quinolones. In addition, the article by the FDA (2024) stated that multivitamins + levofloxacin are in phase IV clinical studies to identify unfavorable side effects and keep an eye on the medication's efficacy. It also states that common interactions between males and females include plasmacytoma and thrombocytopenia, and common interactions between females and males include dyspnea and gait disturbance.[30]

Out of all the drug supplement interactions that were checked, the moderate category is most prominent of all severity. The drug supplement interactions that are checked can possibly indicate that most physicians are unaware that the supplements and drugs that are taken by the patient can fall in a moderate category of severity, which requires monitoring. The study by Yuan J., et al. (2021) stated that physicians have insufficient knowledge about drug interactions and their clinical significance when it comes to prescribing multiple drugs.[31] Findings support establishing protocols for routine supplement documentation and mandatory DI checking during hospital admissions. Clinical pharmacists should be empowered to intervene when significant interactions are identified.

Practice and Policy Implications

The study's findings demonstrate how common it is for hospitalized patients to utilize food or dietary supplements, as well as how prevalent there are possible drug-supplement interactions, many of which have moderate clinical importance. These results highlight how urgently institutional procedures requiring thorough medication reconciliation, including food and dietary supplements, at the time of patient admission are needed. Healthcare professionals, particularly pharmacists, should take an active role in recognizing, recording, and assessing supplement use as part of standard treatment from the standpoint of clinical practice. In order to facilitate well-informed clinical decision-making, policies should also mandate the incorporation of trustworthy drug interaction checkers (like Lexicomp) into hospital systems. These tactics will enhance treatment results for in-patients, encourage safer prescribing practices, and lower the possibility of unfavorable interactions.

Study Strengths and Limitations

This study aimed to provide insights into the pattern and risk associated with supplement usage in a hospital setting. This study contributed localized hospital-based data from the Philippines, which is scarce in existing literature, especially in terms of in-patient supplement documentation and interaction analysis. There are several strengths to conducting a retrospective chart review of every medical chart. One of which is cost-effectiveness, since retrospective design is less expensive compared to other research designs. Another is the strength of having a large sample size to provide enough association to detect the outcomes of interest. Real-world applicability is also one of the strengths of the study since it provides insight as to how real applications of treatments or interventions are performed. Furthermore, it captures diverse demographics, such as rare cases and other comorbidities that can't be taken into account if other research designs are used.

However, limitations include a retrospective design, which may limit the comprehensiveness of data retrieval. Factors such as incomplete records, illegible handwriting, and unrecorded information may have resulted in gaps in the dataset. Second, the data primarily derives from the medical charts of adults within the Internal Medicine Department, thus limiting the age range represented in this study. Furthermore, the focus on in-patients overlooks the prevalence of supplement usage among out-patients, thereby restricting the generalizability of our findings to the broader hospital population. Third, our analysis primarily measures the frequency of supplement usage without considering the indications or reasons behind their usage, or the initiator of supplement usage (e.g., physician or patient). This limitation hinders our understanding of the purpose and influence of supplement usage among patients. And lastly, while our study identifies the potential for drug-supplement interactions, it does not confirm their occurrence in patients. Additionally, the lack of assessment regarding the frequency of interactions per patient and the absence of exploration into interactions between different supplements limit the depth of our analysis. Given the retrospective design, some supplement uses may have been underreported. To address this, future studies should consider adopting a prospective cohort design with an extended duration of data collection. To enhance generalizability, data should be collected from a more diverse patient population, including both in-patients and out-patients across various hospital departments. Researchers should also aim to explore the purpose and factors influencing supplement use to gain a deeper understanding of their prevalence and potential impact on healthcare outcomes. Conducting a prospective study can also facilitate real-time monitoring of drug-supplement interactions, including their frequency and possible adverse effects. Additionally, future research should assess interactions between different supplements to evaluate any potential synergistic or antagonistic effects.

CONCLUSION

This study provides a retrospective chart review on the prevalence of food or dietary supplement use among in-patients and its potential drug-supplement interaction in a level 3 hospital in Quezon City during the first-half of 2022. Findings conclude that food/dietary supplement use is common within hospital settings. Specifically, there is a prevalence of food or dietary supplement use across various sociodemographic factors, revealing that middle-aged adults (ages 34-64 years old) and females exhibit the highest usage rates. Regarding the type of food or dietary supplement, a combination of supplements,

or "others" is most commonly used, followed by minerals, vitamins, amino acids, botanicals, and probiotics

Furthermore, the study delves into potential drug-supplement interactions and their potential effects. Parameters such as severity and frequency of interactions are considered, with moderate interactions being the most prevalent. calcium + amlodipine emerges as the top combination associated with moderate interactions.

Eventually, this research sheds light on the patterns of food or dietary supplement usage and potential interactions among in-patients in a level 3 hospital setting. Understanding these trends and risks can aid healthcare professionals in providing safer and more effective treatment regimens for patients using Food/Dietary supplements alongside their medications.

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