Revista Uningá

doi.org/10.46311/2318-0579.62.eUJ4688

Review of drug-food interactions based on medications used by users of a Basic Health Unit in Sarandi, Parana

Revisão das interações medicamentosas com alimentos a partir de medicamentos utilizados por usuários de uma Unidade Básica de Saúde de Sarandi – PR

Everton Cristian Alves da Silva, Marco Antonio Costa, Gislaine Franco de Moura-Costa*

State University of Maringa – UEM, Maringa, Parana, Brazil

*gfmcosta@uem.br

Received: July 22nd,2024.
Accepted: May 13th, 2025.
Published: August 06th, 2025.

ABSTRACT

Drug-food interactions do exist and occur often in the population, making it difficult for patients to adhere to the proposed treatment, which means the analysis of this problem is essential. This study aimed to review drug and food interactions based on the medicines used by users of a Basic Health Unit in Sarandi, Paraná, and their dietary routine. To this end, a cross-sectional study was conducted at the Basic Health Unit in question, where a semi-structured questionnaire was applied on the medicines used and schedules, dietary routine, socioeconomic and health data of patients. The databases used for research on drug-food interactions were Micromedex, Drugs.com and DrugBank. In this study, we observed that many medicines used by patients may present interactions with food frequently consumed by the population. There is information in the literature that should be known by health professionals to guide patients on the best way to take their medicines, so as to avoid undesirable interactions. The pharmacist is the proper professional to carry out pharmacotherapeutic monitoring, as well as to guide the patient regarding the best time to administer medicines in relation to meal times, avoiding negative impacts on therapeutic efficacy and patient safety.

Keywords: Drug-food interactions. Health-related quality of life. Pharmaceutical care.

RESUMO

As interações entre medicamentos e alimentos existem e ocorrem com frequência na população, dificultando a adesão dos pacientes ao tratamento proposto, tornando-se, portanto, essencial a análise deste problema. Este estudo teve como objetivo revisar as interações medicamentosas e alimentares baseadas nos medicamentos utilizados por usuários de uma Unidade Básica de Saúde de Sarandi – PR e sua rotina alimentar. Para tanto, foi realizado um estudo transversal na Unidade Básica de Saúde em questão, onde foi aplicado um questionário semiestruturado sobre medicamentos utilizados e horários, rotina alimentar, dados socioeconômicos e de saúde dos pacientes. As bases de dados utilizadas para pesquisas sobre interações medicamento-alimento foram Micromedex, Drugs.com e DrugBank. Observou-se neste estudo que muitos medicamentos utilizados pelos pacientes podem apresentar interações com alimentos frequentemente consumidos pela população. Existem na literatura informações que devem ser conhecidas pelos profissionais de saúde para orientar os pacientes sobre a melhor forma de consumir seus medicamentos, a fim de evitar interações indesejáveis. O farmacêutico é o profissional adequado para realizar o monitoramento farmacoterapêutico, bem como orientar o paciente quanto ao melhor horário para administração dos medicamentos em relação aos horários das refeições, evitando impactos negativos na eficácia terapêutica e na segurança do paciente.

Palavras-chave: Cuidado Farmacêutico. Interações medicamento-alimento. Qualidade de vida relacionada à saúde.

INTRODUCTION

According to the World Health Organization (Piggott et al., 2024), drug distribution is a fundamental part of the process of healing, rehabilitation and disease prevention, fitting into primary care settings. These medicines are classified as essential, as they meet the basic health needs of the population.

Interactions between food and medicine are characterized when a given food or nutrient alters the effectiveness of a medicine; this interaction can be physical, chemical, physiologic, or pathophysiologic (Chan, 2013). Given this, a change in the kinetics or dynamics of a medicine or nutrient occurs, considering that pharmacokinetics is defined by the quantitative description or disposition of a medicine, including absorption, distribution, metabolism and excretion (Silva et al., 2023).

Drug-food interactions may only have a hypothetical character, but in some cases, interactions may occur, which result in important clinical effects due to changes in the risk/benefit ratio of the use of the medicine, as the decrease or increase in drug bioavailability has a negative impact on drug therapy, both of which may result in treatment failures or serious toxic effects, respectively (Roy et al., 2022).

Drug-food interactions are caused by several factors, such as physical-chemical characteristics of substances used, drug dose, the time at which medicine is ingested, the amount of nutrients available and feeding time. Individual aspects like clinical state, polypharmacy, enzyme constitution and intestinal microflora must also be considered (Roy et al., 2022).

Faced with this problem, healthcare teams play an important role in detecting these interactions and in educating patients in counseling programs (Gunturu & Dharmarajan, 2021). Due to their aging and the consequent increase in the amount of medicines used daily (polypharmacy), elderly people are more vulnerable to both drug interactions and drug-food interactions and must be carefully monitored (Lavrador, Cabral, Castel-Branco, Figueiredo, & Fernandez-Llimos, 2023).

Therefore, pharmacists must act to prevent pharmacotherapeutic complications, working on the management of drug interactions, which occur when there is a change in the effect and/or toxicity of a drug due to the presence of food or other drugs (McCarthy & Fleming, 2024).

This study aimed to review the drug-food interactions based on medicines used by users of a Basic Health Unit in Sarandi, Paraná, and on their eating habits.

MATERIALS AND METHODS

A cross-sectional study was carried out in a Basic Health Unit located in the city of Sarandi, Paraná, Brazil, between

November 2023 and January 2024.

All patients over 18 years old were approached and invited to participate in the research. This study included patients of both sexes, over 18 years old, registered at the Basic Health Unit in question, who take continued-use medications and who agreed to participate by signing the informed consent form.

Data was collected through interviews in which a questionnaire was applied to selected patients and the analysis of prescriptions for continuous-use medication was conducted. Socioeconomic data such as name, age, sex, marital status and level of education were also collected, as well as health data, such as the existence of chronic diseases, foods routinely eaten at meals and the time between drug administration and eating, discomfort during medication use or after meals, if the patient feels unwell when they forget to take the medication, and whether there was improvement with the proposed treatment or not.

The collected data were tabulated in an Excel® spreadsheet and subjected to descriptive statistical analysis.

This research was conducted with permission from the Municipal Health Department and is registered with the Permanent Committee on Ethics in Research with Human Beings from State University of Maringá under number CAAE 73725023.1.0000.0104 and approved by this same Committee under substantiated opinion No. 6.479.404. All ethical precepts mandated by Resolution No. 466/2012 and Resolution No. 510/2016 of the National Health Council were followed.

RESULTS AND DISCUSSION

Research was carried out at the pharmacy of a Basic Health Unit which had 21,376 adults in its registries at the time of this study. Only 30 patients agreed to participate in the study. Unfortunately, a representative number of the population could not be reached due to the duration of the research and also because not all patients who were approached agreed to participate in the study. There was a predominance of female patients (77.7%), married people (63.4%), and individuals with an incomplete primary education (56.7%). These results are shown in Table 1.

All patients reported having been diagnosed with two or more chronic diseases, and among them the most cited was hypertension, with 25 patients (83.3%), followed by diabetes and hypercholesterolemia with 14 patients each (46.7%), depression with seven patients (23.3%), hypothyroidism with six patients (20%), and osteoporosis with one patient (3.3%). These results are shown in Table 2.

Regarding the medications used by patients, 29 different medications provided by the Brazilian Unified Healthcare System were reported, eight of which contain the same active ingredient, but with different concentrations, with losartan 50 mg for arterial hypertension being the most used among patients. The drugs reported and prescribed in patients' prescriptions are shown in Table 3, as well as the time of administration.

In the analysis of prescriptions, this study identified 14 continued-use medications which were not available to patients via the Brazilian Unified Healthcare System. These medications, according to users, had to be purchased from commercial pharmacies and paid for by the patients themselves. Rosuvastatin for hypercholesterolemia was the most mentioned. These data, as well as the period of administration of such medications, are shown in Table 4.

Based on the prescriptions and the interviews conducted with all the patients, they take three to ten continued-use medications daily, with 29 (96.7%) of these patients claiming to take the medications with water and one (3.3%) reporting to take his/her medications with coffee or milk.

Table 1
List of variables (gender, marital status and level of education) for patients treated at a Basic Health Unit in Sarandi, Paraná, from November 2023 to January 2024.

Variables	Women (%)	Men (%)	Total (%)
Gender	23 (77.7)	7 (22.3)	30 (100)
Marital status			
Married	14 (46.7)	5 (16.7)	19 (63.4)
Divorced	6 (20)	1 (3.3)	7 (23.3)
Single	2 (6.7)	1 (3.3)	3 (10)
Widower	1 (3.3)	0 (0)	1 (3.3)
Level of education			
Did not complete elementary education	13 (43.3)	4 (13.3)	17 (56.7)
Completed elementary education	1 (3.3)	0 (0)	1 (3.3)
Did not complete high school	1 (3.3)	0 (0)	1 (3.3)
Completed high school	4 (13.3)	1 (3.3)	5 (16.7)
Did not complete college	1 (3.3)	0 (0)	1 (3.3)
Completed college	2 (6.7)	1 (3.3)	3 (10)
Illiterate	1 (3.3)	1 (3.3)	2 (6.7)

Source: The authors.

Table 2
Illnesses presented by patients treated at a Basic Health Unit in Sarandi, Paraná, from November 2023 to January 2024.

Chronic diseases	Number of patients	%
Arterial hypertension	25	83.3
Diabetes	14	46.7
Hypercholesterolemia	14	46.7
Depression	7	23.3
Hypothyroidism	6	20
Osteoporosis	1	3.3

Source: The authors.

Foods consumed by patients were also investigated in the interviews, and among them the most prominent ones were rice, beans and meat with 28 patients (93.3%) consuming these items at various times of the day, followed by coffee with 26 patients (86.7%), as shown in Table 5.

Regarding the interval between eating and medication administration, none of the patients were found to have administered the medication two hours before meals and immediately before meals. In Table 6, we can see the administrations by patients at different time intervals, before or after meals.

During the interview, on the topic of the need for promoting pharmaceutical care, patients were asked if there was any discomfort after meals or after taking the medication, to which 16 patients (53.3%) responded that they did not feel any discomfort and 14 (46.7%) said they did experience discomfort, and the most cited forms of discomfort were tiredness, shortness of breath, drowsiness, bitter taste in the mouth, feeling bloated, heartburn, diarrhea, dizziness, stress and hot flashes.

When asked if they had received guidance on medication usage, three patients (10%) claimed they had not received any advice at all, while the other 27 (90%) claimed that they did receive

guidance; among these, all said they were advised by their doctor, however, two patients (6.7%) reported having been guided by a pharmacist and a nurse, as well. Among the guidelines received, patients said they were advised on medication administration times, not suspending treatment and physical exercising.

Table 3
Drugs reported and prescribed in patients' prescriptions and time of administration for patients treated at a Basic Health Unit in Sarandi, Parana, from November 2023 to January 2024.

Medications	Before meals	After meals	Total
Acetylsalicylic acid 100 mg	1	5	6
Alendronate sodium 70 mg	1	0	1
Allopurinol 300 mg	0	1	1
Amitriptyline 25 mg	2	5	7
Amlodipine 5 mg	0	1	1
Atenolol 25 mg	2	1	3
Atenolol 50 mg	4	3	7
Captopril 25 mg	0	1	1
Carbamazepine 100 mg	1	1	2
Carvedilol 12.5 mg	0	1	1
Carvedilol 25 mg	1	1	2
Carvedilol 6.25 mg	0	2	2
Clonazepam 2.5 mg/ml	0	1	1
Diazepam 5 mg	1	1	2
Enalapril 20 mg	0	1	1
Ferrous sulfate 40 mg	1	0	1
Fluoxetine 20 mg	1	6	7
Folic acid 5 mg	2	0	2
Furosemide 40 mg	1	0	1
Glibenclamide 5 mg	2	2	4
Hydrochlorothiazide 25 mg	7	8	15
Levothyroxine 100 mg	2	0	2
Levothyroxine 25 mg	2	0	2
Levothyroxine 50 mg	2	0	2
Losartan 50 mg	10	12	22
Metformin 500 mg	3	5	8
Metformin 850 mg	2	4	6
Methyldopa 250 mg	1	1	2
NPH insulin	1	1	2
Omeprazole 20 mg	4	0	4
Propranolol 40 mg	0	1	1
Regular insulin	1	1	2
Simvastatin 20 mg	0	7	7
Simvastatin 40 mg	0	3	3
Spironolactone 25 mg	2	3	5
Valproic acid 250 mg	0	1	1
Valproic acid 500 mg	1	10	11

Source: The authors.

Patients were asked whether they felt any improvement after starting drug treatment, to which 29 (96.7%) answered positively and only one (3.3%) answered negatively.

Table 4
Time of administration of medications not provided by the Brazilian Unified Healthcare System for patients treated at a Basic Health Unit in Sarandi, Parana, from November 2023 to January 2024, and the number of users taking them.

Medications	Before meals	After meals	Total
Alogliptin 25 mg	1	0	1
Atorvastatin 50 mg	1	0	1
Chlorpromazine 100 mg	0	1	1
Codeine 50 mg	0	1	1
Dapagliflozin 50 mg	1	0	1
Escitalopram 10 mg	0	1	1
Gliclazide 30 mg	1	0	1
Hydralazine 50 mg	1	0	1
Metoprolol 25 mg	0	1	1
Paroxetine 40 mg	0	1	1
Rosuvastatin 20 mg	1	2	3
Ursodeoxycholic acid 150 mg	1	0	1

Source: The authors.

They were also asked whether they feel unwell if they happen to forget to take their medication, and 19 patients (63.3%) claimed they did not feel unwell and 11 (36.7%) claimed they do; the types of discomfort mentioned in their answers were headaches, chest pain, insomnia, tiredness, shortness of breath, skin redness, and increased blood pressure.

In this study, there was a predominance of female patients and, according to the Brazilian census of 2022 (IBGE, 2023), women represent the majority of Brazil's population, having become the main users of the Brazilian Unified Healthcare System. The historic inequality in work overload between the sexes has a strong impact on women's health conditions. According to the Ministry of Health (Fonteles, 2024), men do not seek primary care services like women do, causing them to have a greater vulnerability to serious and chronic illnesses.

The most reported illness was high blood pressure. In light of this, antihypertensives gain notoriety in drug-food interactions, as can be seen in this study. This fact is due to the medication administration being simultaneous with meals (Lima Filho, 2005). Therefore, healthcare teams need to pay greater attention to therapeutic management.

In this class of medications, among those that present drug-food interactions, losartan stands out, and this drug has contraindications regarding concomitant intake of foods rich in potassium (bananas, beans), which may lead to high levels of this electrolyte in the blood; immediate administration of this drug after a meal delays its absorption, but does not affect the extent of absorption. We also have atenolol, which should not be taken with large amounts of orange juice, as it reduces the effectiveness of this drug. Carvedilol should be taken with food, as this delays absorption and reduces the incidence of adverse effects. Furosemide lowers potassium levels, and patients are recommended to increase the consumption of foods rich in potassium during its use. Hydrochlorothiazide should be taken two hours before or after the administration of antacids (apple), calcium supplements (milk and mozzarella cheese) and iron (beans and broccoli) to avoid reduced absorption of this drug. Patients are also recommended to increase their consumption of foods rich in potassium (bananas and orange juice), as hydrochlorothiazide may cause potassium depletion. On the other

hand, while using enalapril, it is recommended to avoid high potassium intake, which can lead to high potassium levels in the blood. Propranolol should be consumed either during meals or immediately once having a meal, as food increases the absorption of this medication in the body. When using captopril, patients should avoid ingesting products containing potassium because this medication increases the risk of hyperkalemia. Salt intake should also be avoided, as it may attenuate the antihypertensive effect. Captopril should be administered one hour before meals because food reduces the absorption of this drug (Drug Interaction Checker, 2024; Micromedex, 2023; Wishart et al., 2018).

In this class of medications, among those that present drug-food interactions, losartan stands out, and this drug has contraindications regarding concomitant intake of foods rich in potassium (bananas, beans), which may lead to high levels of this electrolyte in the blood; immediate administration of this drug after a meal delays its absorption, but does not affect the extent of absorption. We also have atenolol, which should not be taken with large amounts of orange juice, as it reduces the effectiveness of this drug. Carvedilol should be taken with food, as this delays absorption and reduces the incidence of adverse effects. Furosemide lowers potassium levels, and patients are recommended to increase the consumption of foods rich in potassium during its use. Hydrochlorothiazide should be taken two hours before or after the administration of antacids (apple), calcium supplements (milk and mozzarella cheese) and iron (beans and broccoli) to avoid reduced absorption of this drug. Patients are also recommended to increase their consumption of foods rich in potassium (bananas and orange juice), as hydrochlorothiazide may cause potassium depletion. On the other hand, while using enalapril, it is recommended to avoid high potassium intake, which can lead to high potassium levels in the blood. Propranolol should be consumed either during meals or immediately once having a meal, as food increases the absorption of this medication in the body. When using captopril, patients should avoid ingesting products containing potassium because this medication increases the risk of hyperkalemia. Salt intake should also be avoided, as it may attenuate the antihypertensive effect. Captopril should be administered one hour before meals because food reduces the absorption of this drug (Drug Interaction Checker, 2024; Micromedex, 2023; Wishart et al., 2018).

Methyldopa, used for gestational hypertension, should not be administered with foods rich in iron, as they interfere with the absorption of the drug, reducing its efficacy (Drug Interaction Checker, 2024).

Another very relevant disease which was often found in the present study was type II diabetes. Most patients with this disease use metformin to control blood glucose. This drug should be taken with food, as it reduces gastric irritation. Another commonly found pathology was hypercholesterolemia, with patients using sinvastatin for treatment. During its use, ingesting green tea should be avoided, as it may increase the drug's levels in the blood (Drug Interaction Checker, 2024; Wishart et al., 2018).

To treat hypothyroidism, levothyroxine is used, which should be taken on an empty stomach, at least one hour before breakfast, as food intake in general reduces its absorption (Drug Interaction Checker, 2024; Micromedex, 2023; Wishart et al., 2018).

When using amitriptyline to treat depression, caffeine intake should be limited to avoid reducing its effects and causing insomnia (Wishart et al., 2018).

Sodium alendronate for osteoporosis should be taken at least one hour before breakfast, as food can reduce its absorption, consequently reducing its effectiveness. After taking this medication, the patient must remain in an upright posture for 30 minutes to avoid irritation and gastric or esophageal ulcers (Drug Interaction Checker, 2024; Wishart et al., 2018).

Table 5
Food consumed daily by patients treated at a Basic Health Unit in Sarandi, Paraná, from November 2023 to January 2024.

Food consumed by patients	Number of patients consuming the food daily (%)
Arugula	3 (10)
Apple	7 (23.3)
Banana	9 (30)
Beans	28 (93.3)
Bread	21 (70)
Broccoli	1 (3.3)
Butter	11 (36.7)
Cabbage	3 (10)
Cake	3 (10)
Carrot	5 (16.7)
Cassava	2 (6.7)
Chayote	4 (13.3)
Cheese bread	1 (3.3)
Coffee	26 (86.7)
Dulce de leche	2 (6.7)
Eggs	8 (26.7)
Endive	10 (33.3)
Fried pastry	3 (10)
Ham	3 (10)
Honey	1 (3.3)
Lettuce	18 (60)
Mango	2 (6.7)
Meat	28 (93.3)
Milk	13 (43.3)
Mozzarella cheese	3 (10)
Natural orange juice	2 (6.7)
Onion	2 (6.7)
Orange	4 (13.3)
Papaya	2 (6.7)
Popcorn	1 (3.3)
Potato	5 (16.7)
Rice	28 (93.3)
Salt cracker	5 (16.7)
Soda	4 (13.3)
Spaghetti	8 (26.7)
Tangerine	1 (3.3)
Tea	2 (6.7)
Tomato	15 (50)
Watermelon	3 (10)
Wild cabbage	1 (3.3)
Yogurt	1 (3.3)
Zucchini	4 (13.3)

Source: The authors.

Among other medications mentioned by patients, we have spironolactone, which can be taken with or without food. Food increases its bioavailability, but products rich in potassium should be avoided, as they increase the risk of hyperkalemia. Omeprazole should be taken at least one hour before meals. This drug interacts with foods rich in vitamin B12 (meat and milk), decreasing the absorption of this vitamin. Acetyl salicylic acid should be taken after a meal, as it prevents gastric irritation. Diazepam should be consumed on an empty stomach, as food reduces absorption and time for its therapeutic effect. Caffeine should be avoided because it reduces the sedative and anxiolytic effects of this drug, as is the case with the use of clonazepam and caffeine at the same time, which will result in a reduction in the sedative and anxiolytic effects of this medication. The concomitant use of carbamazepine and black tea may result in a decrease in its efficacy. Ferrous sulfate should be administered at least two hours before or two hours after a meal, as food can reduce its absorption and blood levels, however, foods rich in vitamin C increase its absorption. Caffeine and milk intake should be avoided, as they reduce iron absorption (Drug Interaction Checker, 2024; Micromedex, 2023; Wishart et al., 2018).

Table 6
Intervals between meals and medication administration, along with the usage frequency of the aforementioned drugs by patients treated at the Basic Health Unit in Sarandi, Paraná, from November 2023 to January 2024.

Time gap	Number of medications
1 hour before meals	20
30 min before meals	37
Immediately after meals	29
30 min after meals	22
1 hour after meals	20
2 hours after meals	23

Source: The authors.

Regarding medicines purchased from drug stores, metoprolol should be taken with food, preferably during or immediately after meals, as food increases the absorption of the drug, consequently improving its efficacy. All the other aforementioned purchased medicines can be taken with food as this reduces gastric irritation (Drug Interaction Checker, 2024; Micromedex, 2023; Wishart et al., 2018).

Oral drugs must be administered with water, helping dissolve the drug, whereas those administered with coffee or milk pose a risk for drug-food interactions. According to Lima Filho (2005), ingesting food along with the drug may influence the absorption of medicines, promoting either an increase or even a reduction in their absorption due to a range of occurrences, for example: gastric emptying delay, direct interaction of the drug with food constituents, change in pH and interaction with transporters.

In this study, the foods that stood out the most in terms of consumption were rice, beans, meat, coffee and bread. As stated by Souza, Pereira, Yokoo, Levy and Sichieri (2013), Brazilians have a basic diet characterized by coffee, bread, rice, beans and beef, accompanied by the presence of juices or soft drinks. The older population tends to include higher amounts of fruits and vegetables in their diet, which helps prevent chronic diseases such as diabetes and cardiovascular diseases. The consumption of oils and fats used to prepare food was disregarded in this study, as these items were not reported in isolation.

At the end of the interview, participants were asked about the pharmaceutical care aimed at improving the quality of life of users of the Brazilian Unified Healthcare System, with the purpose of investigating whether the population is receiving adequate care. According to Rodrigues, Melo, Bastos and Randau (2021), the importance of pharmacists in basic healthcare stands out as fundamental in identifying possible interactions, helping the patient adopt an appropriate schedule for their treatment routine, and promoting self-care. Pharmaceutical care is responsible for monitoring pharmacotherapy, aiming to achieve results which improve quality of life, directly reducing problems linked to pharmacotherapy, and playing a vitally important role as an agent that promotes proper usage of medicines (Lima, Sant'anna, Pereira, Dellatorre, & Almeida, 2021).

In view of the present work that was conducted, in most cases, it has been observed that food-drug interactions occurred in different treatments with the drugs mentioned; in this context, the pharmacist, fulfilling their role, must advise patients on which foods should be suspended or added to meals and adjust the best time of day for administering drugs between meals to avoid undesirable interactions and improve treatment. The manner in which patients are approached is very important, as people do not just want professionals to advise them on medication use; they want and, in many cases, need someone who will listen to their needs with empathy, providing clear communication and advice, demonstrating in so many ways the importance of the patient's health, thus establishing a relationship of trust.

CONCLUSION

In this study we observed that many medications used by the patients are likely to present interactions with foods which are frequently consumed by the population.

There is plenty of information in the literature that should be known by health professionals in order to guide patients on the best way to take their medication to avoid undesirable interactions.

The pharmacist is the proper professional to carry out pharmacotherapeutic monitoring, as well as to guide patients on the best time for medication administration in relation to eating times, thus avoiding negative impacts on therapeutic effectiveness and patient safety.

ACKNOWLEDGMENT

We thank the Sarandi Health Department and the coordination of the Basic Health Unit for their support in the making of this study.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

FUNDING ACKNOWLEDGEMENTS

The authors declare that they have no financial interests.

AUTHOR CONTRIBUTIONS

Conceptualization: G. F. M. C. *Data curation*: E. C. A. S. *Formal analysis*: E. C. A. S. *Investigation*: M. A. C., G. F. M. C., E. C. A. S. *Methodology*: M. A. C., G. F. M. C., E. C. A. S. *Project administration*: G. F. M. C. *Supervision*: G. F. M. C. *Writing the initial draft*: E. C. A. S. *Revision and editing of writing*: M. A. C., G. F. M. C.

PEER REVIEW

Revista Uningá thanks the anonymous reviewers for their contribution to the peer review of this work.

REFERENCES

Brasil. (2022). IBGE – Instituto Brasileiro de geografia e Estatística. Censo demográfico, 2022. *Características gerais da população, religião e pessoas com deficiência*.

Chan, L. N. (2013). Drug-nutrient interactions. *Journal of Parenteral and Enteral Nutrition*, *37*(4), 450-459. doi: 10.1177/0148607113488799

Drug Interaction Checker. (2024). *Quickly check your meds.* (n.d.). Drugs.com. Retrieved from: https://www.drugs.com/drug_interactions.html

Fonteles, J. A. C. M. (2024). Implementação da política nacional de atenção integral à saúde do homem: revisão integrativa. *Revista Contemporânea*, *4*(10), e6235-e6235.

Gunturu, S. G., & Dharmarajan, T. S. (2021). Drug–Nutrient Interactions. In Pitchumoni, C. S., & Dharmarajan, T. S. (Eds.), *Geriatric Gastroenterology* (p. 381-408). Springer Nature, Reference.

Lavrador, M., Cabral, A. C., Castel-Branco, M., Figueiredo, I. V., & Fernandez-Llimos, F. (2023). Polypharmacy and medication adherence. In Oliveira, P. J., & Malva, O. J. (Eds.), *Aging* (p. 435-453). Academic Press. doi: 10.1016/B978-0-12-823761-8.00014-8

Lima, P., Filho. (2005). *Estudos da biodisponibilidade e bioequivalência de medicamentos com alimentação: fundamentos e critérios de execução*. [Master's Thesis, School of Pharmaceutical Sciences, University of São Paulo]. Teses USP. doi: 10.11606/D.9.2018.tde-09012018-115505

Lima, L., Sant'anna, E., Pereira, N., Dellatorre, C., & Almeida, B. (2021). Assistência farmacêutica na atenção primária à saúde. *Cadernos Camilliani*, *16*(2), p. 1182-1196.

McCarthy, S., & Fleming, A. (2024). Drug Interactions and their Management. In Jose, J., Cox, A. R., & Paudyal, V. (Eds.), *Principles and Practice of Pharmacovigilance and Drug Safety* (p. 77-104). Cham: Springer International Publishing.

Micromedex® (electronic version). (n.d.). Retrieved from https://www.micromedexsolutions.com

Piggott, T., Moja, L., Huttner, B., Okwen, P., Raviglione, M. C. B., Kredo, T., & Schünemann, H. J. (2024). WHO Model list of essential medicines: Visions for the future. *Bulletin of the World Health Organization*, *102*(10), 722-729. doi: 10.2471/BLT.24.292359

Rodrigues, J. F. B., Melo, D. F. S, Bastos, W. D. G., & Randau, K. P. (2021). O cuidado farmacêutico na melhora da adesão ao tratamento medicamentoso. *Research, Society and Development*, *10*(16), e316101623753.

Roy, R., Marakkar, S., Vayalil, M. P., Shahanaz, A., Anil, A. P., Kunnathpeedikayil, S., ... & Yadav, K. K. (2022). Drug-food interactions in the era of molecular big data, machine intelligence, and personalized health. *Recent Advances in Food Nutrition & Agriculture*, *13*(1), 27-50. doi: 10.2174/2212798412666220620104809

Silva, G. F. A., Assunção, T. G., Gomes, P. M. O., Gomes, V. E. B. O., Magalhães, C. F. C. B., Gomes, A. T. M., ... & Machado, R. S. A. (2023). As consequências da interação fármaco-nutriente no tratamento de pacientes hospitalares: uma revisão sistemática. *Research, Society and Development*, *12*(2), e8212239933. doi: 10.33448/rsd-v12i2.39933

Souza, A. D. M., Pereira, R. A., Yokoo, E. M., Levy, R. B., & Sichieri, R. (2013). Alimentos mais consumidos no Brasil: Inquérito nacional de alimentação 2008-2009. *Revista de Saúde Pública*, *47*(Suppl 1). doi: 10.1590/S0034-89102013000700005

Wishart, D. S., Feunang, Y. D., Guo, A. C., Lo, E. J., Marcu, A., Grant, J. R., ... & Wilson, M. (2018). DrugBank 5.0: a major update to the DrugBank database for 2018. *Nucleic acids research*, *46*(Issue D1), D1074-D1082.