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THE EFFECT OF DYSFUNCTIONALITY CAUSED BY POLYPHARMACY IN ELDERLY PEOPLE CARED FOR IN HEALTH CARE UNITSPRIMARY HEALTH CARE (PHC) IN THE MUNICIPALITY OF VÁRZEA GRANDE (MT)

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Abstract: Aging is characterized by a series of progressive morphological and physiological changes, which lead to an increased vulnerability to various diseases acquired during life. There is an increasing prevalence of frailty syndrome in the elderly (FIS), an identifiable clinical condition resulting from the decline of physiological and functional reserves in multiple systems, culminating in a reduction in the physiological and psychological tolerance of the elderly individual, increasing their dependence. Additionally, the emerging vulnerability attributed to the use of polypharmacy in the elderly is a consequence of the possible adverse effects of drugs, the risks of drug interactions, the stressful routine of administering daily doses of medication and economic difficulties. This study is cross-sectional, analytical, population-based, conducted from March to June 2016, in a population sample of 377 elderly individuals over 60 years of age, treated in primary health care (PHC) in the municipality of Várzea Grande – MT. The objective was to determine the prevalence and factors associated with polypharmacy in elderly people treated in primary health care (PHC) units in the municipality of Várzea Grande. The present study revealed a significant prevalence of polypharmacy in the variables: literate elderly (25.6%, p-value 0.017), female (25.1%, p-value 0.050), vulnerable (26.49%, p-value 0.028 and dependent on the instrumental activities of daily living (IADL) scale (25.53%, p-value 0.022) and activity of daily living (ADL) (29.13%, p-value 0.033).
Keywords: health of the elderly, polypharmacy, geriatric assessment, aging.

INTRODUCTION

The greater prevalence of chronic diseases and multimorbidity, associated with greater life expectancy, has changed the perspective on the use of medicines in health care, especially in the elderly population. The organic, functional and psychological changes that occur in the human organism throughout life are the result of complex interactions between genetic, environmental and lifestyle factors over the years, so that the aging process does not occur uniformly, but some changes are common and typical to occur (ZANETTI et al, 2023).

Polypharmacy is defined as the simultaneous use of five or more medications. The high consumption of medications brings several challenges, such as drug interactions, adverse reactions, missed doses, drug toxicity and self-medication, favoring the risk of iatrogenic events, hospitalizations and even death (RAMOS et al, 2023).

In the elderly population, in addition to the usual consequences of polypharmacy, there are issues of reduced renal and hepatic drug clearance and altered target organ function (SVENSSON et al, 2024).

Another concern about polypharmacy in the elderly is the prescription of medications with the potential to cause disability or loss of functionality, such as opioids, antiepileptics, antidepressants, benzodiazepines and diuretics, which alone or in combination (polypharmacy) can lead to adverse events. (CALIXTO DE SOUZA et al, 2023), such as falls and their serious consequences in this population (SANTOS, et al., 2021).

It is estimated that the risk of adverse reactions increases exceptionally, around 50%, when using 5 medications and exceeds 95% when using 8 or more (OLIVEIRA et al., 2021). Vulnerability is the consequence of several factors, such as the organism itself and its relationship with the environment in which it lives, environmental and social conditions, access to health and measures to prevent diseases and injuries, thus permeating the different models of health and disease (SANTOS, et al., 2021).

This way, the dysfunctionality attributed to aging can be exacerbated or anticipated due to the irrational use of medications, which increases vulnerability and deterioration in the body's compensatory capacity, with a tendency to an insufficient or disordered response (CARVALHO et al.,2020).

Therefore, these individuals are more susceptible to clinical complications and adverse events, and this must be considered in the context of planning medication interventions.

METHODOLOGY

This is a cross-sectional, analytical, population-based study, with a sample established based on calculations for finite populations, considering a 95% confidence interval, a sampling error of 5% and an assumed prevalence of frailty of 0%. It was submitted to the addition of 10% of the total sample to carry out the association tests. Using the cluster sampling model, nine ESFs were chosen during the data collection period, out of the 15 existing in the municipality of Várzea Grande-MT. The sample size was divided proportionally by the same, according to the population of 4364 elderly people registered in the 15 ESF of the municipality, 43 elderly people in the Água Vermelha ESF, 36 elderly people in the Capão Grande ESF, 52 elderly people in the Jardim Glória I ESF, 18 elderly people in ESF Jardim União, 27 elderly people at ESF Manaíra, 29 elderly people at ESF Manga, 93 elderly people at ESF São Matheus, 55 elderly people at ESF Unipark and 24 elderly people at ESF Vila Arthur, making a total of 377 elderly people. In the event of any cognitive deficit presented by the elderly

person, refusal or if they were absent from home at the time of the interview, they were replaced by the elderly person who lived in the nearest residence. The interviews were carried out in the elderly person's own home from March to June 2016 and were carried out by three medical students and two nurses, after training and standardizing data collection among the interviewers.

All individuals aged 60 or over were included in this study, with the inclusion criterion being permanent resident at home. Individuals who had cognitive impairment, conditions such as dementia, psychiatric disorders, mental disability, stroke sequelae with language impairment, blindness and deafness. Cognitive deficit was assessed by the Mini Mental State Examination (MMSE), using the version adapted for the Brazilian population that considers two different cutoff points according to the level of education.

The dependent variable of the study was the existence of frailty, assessed using the Tilburg Frailty Indicator (TFI) instrument. This instrument consists of 15 objective, self-reported questions, distributed across three domains: physical, psychological and social. Most questions only have a yes or no answer, with the exception of four questions that sometimes include the option. At the end, the result is assigned a score that varies from zero to 15 points. A higher score means a higher level of frailty or, alternatively, scores ≥ five points indicate that the individual is frail.

As independent variables, sociodemographic characteristics were evaluated: age; gender; self-reported race/color; marital status; education; number of residents or family arrangement (live alone or with someone); and per capita income (calculated by dividing total family income in reais by the number of people living in the household). Instrumental activities of daily living (IADL) and functional dependence in activities of daily living (ADL) were assessed, respectively, using the Lawton and Katz scales. Depressive symptoms were investigated using the Geriatric Depression Scale (GDS-15); nutritional risk was assessed using the mini nutritional assessment (MANR); the comorbidity classification was carried out using the cumulative illness rating scale (CIRS-G) instrument. Finally, this study included the fourteen most prevalent morbidities among the elderly, which were later regrouped into up to two and three or more morbidities. Polypharmacy was included using, as a reference, the simultaneous use of five or more regular medications.

Variables are described in absolute (n) and relative (%) terms. In a two-variable analysis, a relationship between the response variable (polypharmacy) and other exposure variables was determined. To calculate the statistical significance of the association, the chi-square test was used using the Mantel-Haenszel method (95% CI). Still in the analysis of two variables, Fisher's exact test was used for analyzes with an expected frequency of less than five. Variables with p ≤ 0.20 were selected for multiple analysis using Poisson regression. After the gradual removal of variables (stepwise backward), variables with a significance threshold less than or equal to 0.05 were maintained in the final model.

This study was approved by the research ethics committee of the Júlio Muller university hospital (HUJM) under opinion number 1,243,299. The structure and planning of this project followed the standards established in Resolution 466/2012 of the national research ethics council. All participants signed the informed consent form and were informed.

RESULTS AND DISCUSSION

In the present study, it was possible to verify the frequency of polypharmacy among the population of elderly people followed by primary health care, n=337, showing that

(22%) of the elderly fall into the polypharmacy category. In studies carried out, the highest incidence was noticed in the south and southeast regions of Brazil, the prevalence of polypharmacy is similar, having example the city of Florianópolis with (32%) and other cities such as São Paulo (36%), Porto Alegre (27%), Tubarão (28.8%) and Rio de Janeiro (32.7%) (OLIVEIRA et al, 2021). In the United Kingdom, it is estimated that around 20% of adults use 5 or more medications regularly (PAYNE, 2024).

The investigation between polypharmacy and sociodemographic characteristics revealed an association and high prevalence with literate elderly people (25.6%, 95% CI 1.08- 2.66, p-value 0.017), table 1. The level of education is related to access to health services, especially medicines, since some therapeutic classes are not always available in the public system and the patient needs to buy them. The social determinants of a population directly interfere with health care, where the extremes of lack of access and excess medications can interfere with the health-disease process (THO et al, 2023).

Excessive health interventions, unnecessary disease tracking and other actions related to quaternary prevention also contribute to the occurrence of polypharmacy in the general population (PAYNE, 2024).

Regarding gender, an association and high prevalence with female gender was observed (25.1%, 95% CI 1.01- 2.30, p-value 0.050), table 1, these findings may be related to the greater expectation of women's lives when compared to the opposite gender, due to the search for medical care and consequently treatment (OLIVEIRA et al., 2021).

In a longitudinal cohort study, the relationship between polypharmacy and social isolation was demonstrated (OR, 1.29; 95% CI, 1.02-1.64; P 0.036) (SVENSSON et al, 2024). This finding is also related to the tendency of males to isolate themselves in cases of widowhood, separation and loneliness, contributing to the increase in polypharmacy. However, the findings of this research did not demonstrate statistical significance between depression and polypharmacy p 0.720, table 2, as well as marital status together or separately p 0.219, table 1.

Regarding the functionality scale, ADL activities of daily living, dependent elderly people report higher rates of drug use (29.13%), a factor reinforced by the 95% CI of 1.04- 2.26, p-value 0.033, which demonstrates dependence as a risk factor for polypharmacy, corroborating the results regarding the scale of instrumental activities of daily living (IADL), related to more complex functions, elderly people considered dependent demonstrated a higher prevalence of polypharmacy than those who were more independent, 25, 53% and 15.49%, respectively, CI 95% 1.05- 2.56, p- 0.022, table 2.

Polypharmacy is linked to reduced physical function and physical exercise, however, it is known that these are essential factors in the treatment of various diseases (KOREN et al, 2024). Thus, guidelines on lifestyle and reducing a sedentary lifestyle become mandatory for the health of the elderly (CALIXTO DE SOUZA et al, 2023).

A study carried out in Ireland, in the period 2009-2011, with 3,499 elderly people aged 65 and over, concluded that the simultaneous use of five or more medications resulted in an association with dependence in carrying out instrumental life activities. This result is expected, given that these elderly people benefit from family care and the majority had health plans, which allowed them easier access to several consultations with different specialists, being more subject to medical prescription and administration of various medications (REZENDE et al., 2021).

The presence of vulnerability also

Variable	N	%	PR	95% CI	P- value
Education					
Literate	61/238	25.63	1.69	1.08-2.66	0.017
Not literate	21/139	15.11	1.00		
Gender					
Feminine	57/227	25.11	1.51	1.01-2.30	0.050
Masculine	25/150	16.67	1.00		
Race/Color					
Black/Brown	60/293	20.47	0.78	0.51-1.19	0.263
White	22/84	26.19	1.00		
Age range					
60-69 years old	49/214	22.89	0.88	0.59–1.30	0.536
70-79 years	33/163	20.24	1.00		
Marital status					
Together	51/212	24.05	1.28	0.86–1.90	0.219
Separate	31/165	18.78	1.00		

Table 1: Prevalence and prevalence ratio of polypharmacy according to the sociodemographic characteristics of the elderly.

Variable	N	%	PR	95% CI	P- value
AVD functionality					
Dependent	30/103	29.13	1.53	1.04-2.26	0.033
Independent	52/274	18.98			
IADL functionality					
Dependent	60/235	25.53	1.64	1.05-2.56	0.022
Independent	22/142	15.49			
Vulnerability					
Vulnerable	49/185	26.49	1.54	1.04-2.28	0.028
Not vulnerable	33/192	17.19			
Depression Scale					
Depression	27/118	22.89	1.08	0.72-1.62	0.720
No depression	55/259	21.23			
TFI					
Fragile	59/246	23.98	1.36	0.88–2.10	0.150
Not fragile	23/131	17.55			
MANR					
At risk	41/172	23.84	1.19	0.81-1.75	0.369
Without risk	41/205	20.00			

Table 2. Prevalence and prevalence ratio of polypharmacy according to the health conditions of the elderly in the study sample.

remained associated with polypharmacy (26.49%, 95% CI 1.04-2.28, p-value 0.028), table 2, demonstrating statistical significance and a risk factor. In one study, an association was noted between vulnerability measured by VES-13 and the simultaneous use of several drugs, with a strong risk association (LUCIANE et al, 2010).

Vulnerability related to nutritional status is directly associated with polypharmacy, however, it makes the task of establishing the proportional contribution of comorbidities and polypharmacy to the state of malnutrition complex (ZANETTI et al, 2023). When it comes to vulnerability, it is worth highlighting the risk of falls, notably related to polypharmacy and its consequences (RAMOS et al, 2023).

The other variables studied did not demonstrate statistical significance, however, it is known that mood disorders, anxiety and depression contribute to polypharmacy, increasing the vulnerability of the elderly (CALIXTO DE SOUZA et al, 2023).

CONCLUSION

The present study revealed a significant prevalence of polypharmacy in the variables: female gender, literate elderly, vulnerable and dependent on the instrumental activities of daily living (IADL) and activity of daily living (ADL) scale, contributing to dysfunctionality and loss of autonomy.

Polypharmacy is a practice that often becomes indispensable, since a large part of the elderly population has comorbidities and requires the use of different medications, so prescription and use are not necessarily incorrect, but careful regulation, geriatric assessment broad range with safe deprescription and monitoring are necessary.

In view of the complications presented by elderly people using different drugs, it is concluded that there is a need to improve polypharmacy surveillance strategies, as the lack of clinical protocols and easy access to medicines can contribute to their abusive use. Demonstrating the need for studies on polypharmacy and the development of public policies focused on this topic.

REFERENCES

CALIXTO DE SOUZA, I. K. et al. Polypharmacy, physical activity, and sedentary time in older adults: A scoping review. **Experimental gerontology**, v. 183, 112317, 2023.

CARVALHO, F. B. G. C. Conceitos para a abordagem da síndrome de fragilidade em idosos. **Portal PEBMED**, 2020. Disponível em: <https://pebmed.com.br/conceitos-para-a-abordagem-da-sindrome-de-fragilidade-em-idosos/>. Acesso em: 22. Jan. 2024.

KOREN, M. J. et al. Association of healthy lifestyle and incident polypharmacy. **The american journal of medicine,** 3, 2024.

LUCIANI, A. et al. Detecting Disabilities in Older Patients With Cancer: Comparison Between Comprehensive Geriatric Assessment and Vulnerable Elders Survey-13. **Journal of Clinical Oncology**, v. 28, n. 12, p. 2046–2050, 20 abr. 2010.

OLIVEIRA, P. C. DE et al. Prevalência e Fatores Associados à Polifarmácia em Idosos Atendidos na Atenção Primária à Saúde em Belo Horizonte-MG, Brasil. **Ciência & Saúde Coletiva**, Belo Horizonte, v. 26, n. 4, p. 1553–1564, abr. 2021.

PAYNE, R. A. Polypharmacy and deprescribing. **Medicine,** v. 52, p. 36-39, 2024.

RAMOS, K. A. et al. Effect of polypharmacy and Fall-Risk-Increasing Drugs (FRIDs) on falls among Brazilian older adults: The SABE cohort study. **Archives of Gerontology and Geriatrics,** v. 115, 105127, 2023.

REZENDE, G. R. et al. Prevalência e fatores associados à polifarmácia em idosos residentes em Rio Branco, Acre, Brasil: estudo transversal de base populacional, 2014. **Epidemiologia e Serviços de Saúde**, Brasília, v. 30, n. 2, p. 202-386, 2021.

SANTOS, R. B. et al. Older adults' views on barriers and facilitators to participate in a multifactorial falls prevention program: Results from Prevquedas Brasil. **Archives of gerontology and geriatrics,** v. 92, 104287, 2021.

SVENSSON, M. et al. Association of polypharmacy with occurrence of loneliness and social isolation among older adults. **Archives of Gerontology and Geriatrics,** v. 116, 105158, 2024.

THO, J. J. Y. Prevalence and health outcomes of polypharmacy and hyperpolypharmacy in older adults with frailty: A systematic review and meta-analysis. **Ageing research reviews,** v. 83, 101811, 2023.

ZANETTI, M. et al. Polypharmacy and malnutrition in older people: A narrative review. **Nutrition,** v. 115, 112134, 2023.