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ORIGINAL ARTICLE

Polypharmacy characteristics of 2,819 Brazilians aged 55 years or more — the role of socioeconomic disadvantage and health indicators

Características da polifarmácia de 2.819 brasileiros com mais de 55 anos — o papel da desvantagem socioeconômica e dos indicadores de saúde

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Abstract

Background: The aging process in low- and middle-income countries has accelerated. The increasing use of medicines is a global phenomenon, and middle-aged (45–64 yr) and older (65+ yr) individuals are the most extensive users of multiple medications. **Objective:** To evaluate the prevalence of polypharmacy and verify its association with sociodemographic and lifestyle factors and clinical predictors in a sample of middle-aged and older Brazilians, in the context of a predominantly disadvantaged population. **Method:** Cross-sectional population study with individuals aged 55 to 103 years. A total of 2,819 respondents registered in the Family Health Strategy of Porto Alegre, Brazil, were interviewed at home between 2013–2015. **Results:** The prevalence of polypharmacy was 35.7%, including 28.1% in the middle-aged (55–59 yr) group. After adjustment for sociodemographic and health variables, a strong association with polypharmacy was found in the groups: women, individuals aged 75–79 years, 1–3 years of education, ex-smokers, poor or very poor self-perceived health, chronic conditions (cardiovascular) and depression symptoms. **Conclusion:** The prevalence of polypharmacy is high and begins early. The studied population presented characteristics of low levels of income and education, making it extremely vulnerable to the effects of polypharmacy, and demonstrated a strong association with the presence of chronic diseases and depression.

Keywords: elderly; middle-aged; pharmacoepidemiology; polypharmacy; public health.

Resumo

Introdução: O processo de envelhecimento em países de baixa e média renda acelerou. O uso crescente de medicamentos é um fenômeno global, e indivíduos de meia-idade (45–64 anos) e idosos (65+ anos) são os maiores usuários. **Objetivo:** Avaliar a prevalência de polifarmácia e verificar sua associação com fatores sociodemográficos, estilo de vida e preditores clínicos numa amostra de brasileiros de meia-idade e idosos, no contexto de uma população predominantemente desfavorecida. **Método:** Estudo populacional transversal com indivíduos de 55 a 103 anos. Um total de 2.819 indivíduos cadastrados na Estratégia Saúde da Família, Porto Alegre, Brasil, foi entrevistado em domicílio em 2013–2015. **Resultados:** A prevalência de polifarmácia foi de 35,7%, incluindo os indivíduos de meia-idade (55–59 anos) (28,1%). Após ajuste para variáveis sociodemográficas e de saúde, mulheres, indivíduos com 75–79 anos, com 1–3 anos de estudo, ex-fumantes, com autopercepção de saúde ruim ou muito ruim, condições crônicas

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(cardiovasculares) e sintomas de depressão foram fortemente associadas à polifarmácia. **Conclusão:** A prevalência de polifarmácia é alta e inicia cedo. A população estudada apresenta características de baixa renda e escolaridade, o que a torna extremamente vulnerável aos efeitos da polifarmácia, sendo demonstrada forte associação com a presença de doenças crônicas e depressão.

Palavras-chave: idoso; pessoa de meia-idade; farmacoepidemiologia; polifarmácia; saúde pública.

INTRODUCTION

The aging process in low- and middle-income countries (LMICs) has accelerated at an unprecedented rate, creating a growing challenge for countries and their healthcare systems. The majority of older people currently live in these countries. By 2050, the world population aged 60 years or more is expected to reach 2 billion, with 80% of these living in LMICs, such as Brazil[1]. The concept of older adults is neither straightforward nor universally applicable. According to the World Health Organization (WHO), the chronological classification includes individuals aged 65 years or more[2].

The increasing use of medicines in society is a global phenomenon, and middle-aged (45–64 yr) and older (65+ yr) populations are the most extensive users of multiple medications[3,4]. Long-term medication use is an important part of health care therapeutic approaches for many diseases, especially those considered chronic, with a growing incidence in late adulthood[5]. Consequently, individuals with multimorbidities tend to use several medications simultaneously, increasing the occurrence of polypharmacy. Drug use is intended to be beneficial. Nonetheless, increasing the number of medications exponentially increases the number of combinations of medications, which, in turn, raises the risk of interactions, patient non-adherence and adverse drug reactions, and mortality can compromise the expected benefits of medication use[6-8].

Polypharmacy has been widely studied; however, the majority of predictors and evidences considered have come from high-income countries (HICs)[9-12]. Conversely, and despite all efforts to understand the profile and associated factors in LMICs, only a slight increase in publications related to this topic has been seen in recent years[13,14]. Greater investigation of this topic is required, particularly as several studies take into account descriptive epidemiological characteristics or clinically specific samples. Socioeconomic disadvantage (SED) is commonly found in populations living in LMICs. Characteristics such as poverty, low educational level, adverse home living conditions (e.g., poor sanitation), neighborhood violence and reduced family support (e.g., family breakdown), among others, can adversely affect health. In addition, deprivation is an obstacle that impedes access to healthy eating and health literacy related to transmitted diseases. Accordingly, an environment affected by deprivation could result in a modified incidence and prevalence of health conditions, as evidenced by the profile of drugs used to treat them[15].

This study examined the sociodemographic, lifestyle and clinical predictors of polypharmacy in community-based individuals aged 55 years or more. The findings are also discussed in the context of a sample predominantly formed of disadvantaged middle-aged and older Brazilians, with a particular focus on illiteracy and poverty.

METHODS

Study design and setting

A cross-sectional population study was performed based on multidimensional data collected by the Brain Aging Program, between January 2013 and December 2015. The program is an initiative combining efforts focused on improving health care and data for all individuals aged 55 years or more, registered in the Family Health Strategy (FHS), Porto Alegre, Brazil. The study included individuals from the Partenon/Lomba do Pinheiro and East Health Districts, which correspond to the catchment areas covered by the proposing institution. The total

number of registrations in these areas is approximately 10 thousand people. In the data collection period covered by this study, 2,819 individuals were registered.

The FHS is a proactive community-based public healthcare approach implemented by the Brazilian Ministry of Health, with a focus on active and continued health promotion and monitoring at a community level. The FHS prioritizes those districts in which people live with SED, identifying and enrolling all local residents by the geographic location of their dwelling place within the regions covered by each FHS team.

Health professionals from the FHS teams (doctors, nurses, nursing technicians and community health agents) underwent training for establishment of the Brain Aging Program. The mental health assistance strategy comprises the continuous monitoring of individuals aged 55+ years, registered in the program by community health agents. The active search carried out by these professionals is a primary strategy for capturing the target population.

Measurements

Drug use information

The number of currently used medicines was adopted as an outcome variable. The cut-off point used to evaluate polypharmacy in the present study was five or more medications, as this is most often used in the scientific literature and is known as the optimal discriminating number of concomitant medications associated with geriatric syndromes, functional outcomes and mortality[3,16].

Community health agents performed complete pharmacological evaluations of participants (assisted by their representatives, where necessary), reviewing all regularly used drugs, as part of a wider multidimensional evaluation by the Brain Aging Program. A supplementary home-visit was made to previously enrolled individuals to improve or complement the information held on medical records at the FHS.

Drugs were coded according to the Anatomical Therapeutic Chemical (ATC) classification system recommended by the World Health Organization[17].

Health and lifestyle data

The clinical conditions investigated in the present study were those assessed by community health agents in the first home-visit, which asked individuals about their current health conditions (e.g., "has a doctor told you that you experience the following)" and included the following: hypertension, diabetes, cardiac congestive failure, myocardial infarct, angina pectoris or cerebrovascular disease (all dichotomous variables). This was supplemented with a five-item Likert scale for self-perceived health (rated as very good/good vs. regular vs. bad/very bad), and collection of lifestyle information, including smoking habits (i.e., current, ex-, or never) and alcohol use (yes or no).

The abbreviated Geriatric Depression Scale (GDS-15) was used to assess the presence of depressive symptoms and patients with a GDS score ≥6 were considered to be depressed[18]. Cognitive function was obtained from the Vellore Screening Instrument for Dementia, composed of ten cognitive test items and ten informant items[19]. Signs or symptoms of cognitive deficit were considered with patient scores of ≤11 points or ≥5 points for the cognitive and informant items, respectively. The classifications of "normal" or "impaired" were used. Although the GDS-15 was developed and originally validated in older patients, there is preliminary evidence that the scale has good internal reliability down to the age of 40 years in a general adult population[20].

Sociodemographic data

Sociodemographic data were also collected under the same multidimensional protocol by community health agents and included: gender, age, educational level, marital status/living with a partner, and individual and family income. During the study data collection period, the minimum salary in Brazil was R$880 (equivalent to US$180).

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Statistical analysis

Variables were described using frequencies, means and standard deviations. Associations between categorical variables were tested using Pearson's chi-square test. In specific cases, the chi-square test for linear trend was used for ordinal variables with few categories. A one-way analysis of variance (ANOVA) was performed to compare the means between groups. Student's t-test with Levene's test for equality of variance were used to compare the dichotomous variables with a quantitative variable that had a large sample size or normal distribution. Multinomial logistic regression was used for multivariate analysis to construct a model for the independent factors associated with polypharmacy and to improve control for confounding variables. The model entry criterion for independent variables was $p<0.20$ in the univariate analyses. All variables with $p<0.05$ remained in the final model. The level of statistical significance was set at $p<0.05$. Confidence intervals of 95% were used for all calculations. Data were analyzed using the software Statistical Package for the Social Sciences (IBM SPSS® inc. Chicago, Illinois, version 20).

Ethical considerations

The study was approved by the Research and Ethics Committees of the Pontifical Catholic University of Rio Grande do Sul (no. 826.858) and the Porto Alegre Municipal Secretariat of Health (no. 1.003.962), according to the regulatory guidelines and norms for research set out in Resolution 466/12 of the National Health Council of the Ministry of Health. The willingness of individuals to participate in the study and the confidentiality of the data collected were respected. All investigators responsible for the study signed an agreement for use of the data.

RESULTS

A total of 2,819 individuals were included in the study, with a mean age of 67.0 ± 8.6 years (range 55–103 yr) and the majority female (68.2%). Most participants had completed 4–7 years of study (36.8%), were married or had a stable union agreement (44.2%), lived with a partner (51.4%), and received less than one minimum salary (48.5%). Additionally, just over half of the families (56.8%) had an income of one to three minimum salaries. The prevalence of polypharmacy was 35.7% and the average number of medications used was 3.7 ± 2.8.

All sociodemographic (Table 1) and health (Table 2) variables were strongly associated with polypharmacy. The mean number of drugs prescribed for women (3.9±2.8) is higher than for men (3.3±2.8).

Polypharmacy was the most common drug use profile for all age groups, including late adulthood (55–59 yr), and exposure to polypharmacy remained very important with increasing age.

Polypharmacy was mainly associated with individuals who were illiterate (38.5% versus 25.2% 3–4 medicines, 18.2% 1–2 medicines and 18.2% no medicine) and the very poorly educated, with 1–3 years of study (41.2% versus 27.2% 3–4 medicines, 18.0% 1–2 medicines and 13.6% no medicine).

The individual and family income variables were interesting. Although not presenting statistically significant results in regard to number of medications used and polypharmacy, they did demonstrate that the majority of the sample population live in SED areas (58.6% with an individual income up to US$180 and 86.5% with a family income up to US$540).

Individuals aged 75 years or more, those with less than three years of schooling, widowers and those not living with a partner used five or more drugs more frequently. However, smokers and drinkers were less exposed to polypharmacy. Considering the aspect of self-perceived health reported by participants, a worse categorization corresponded with a greater number of drugs consumed, as well as the presence of chronic diseases and signs and symptoms of depression and cognitive deficit.

Factors associated with polypharmacy in the multivariate analyses are presented in Table 3. They include gender, age, education, smoker, alcohol use, self-perceived health, hypertension, diabetes mellitus, congestive heart failure, coronary disease, cerebrovascular disease and depression symptoms, and reinforce all the findings described above.

Table 1. Number of drugs and polypharmacy according to the sociodemographic variables (n=2,819).

Variables	Population n (%)	Drug number (%)					Drugs		
		0	1 to 2	3 to 4	≥5	p	M±SD	95%CI	p
Gender									
Male	897 (31.8)	22.7	23.1	24.0	30.2	<0.001*	3.3±2.8	(3.06–3.43)	<0.001†
Female	1,922 (68.2)	13.8	21.6	26.3	38.2		3.9±2.8	(3.74–3.99)	
Age (years)									
55–59	631 (22.7)	21.7	26.9	23.3	28.1	<0.001‡	3.2±2.8	(2.93–3.38)	<0.001§
60–64	632 (22.8)	19.1	24.8	25.6	30.4		3.3±2.8	(3.11–3.55)	
65–69	552 (19.9)	13.9	22.3	25.9	37.9		3.8±2.8	(3.61–4.07)	
70–74	405 (14.6)	13.3	17.0	28.4	41.2		4.1±2.9	(3.83–4.39)	
75–79	286 (10.3)	12.9	16.8	27.3	43.0		4.2±2.8	(3.83–4.48)	
≥80	272 (9.8)	13.6	18.0	25.4	43.0		4.1±2.7	(3.72–4.37)	
Education (years)									
0	314 (11.4)	18.2	18.2	25.2	38.5	<0.001‡	3.8±2.9	(3.48–4.13)	<0.001§
1–3	721 (26.2)	13.6	18.0	27.2	41.2		4.1±2.8	(3.86–4.27)	
4–7	1,011 (36.8)	17.4	21.4	25.6	35.6		3.6±2.8	(3.47–3.82)	
≥8	704 (25.6)	17.5	28.8	24.7	29.0		3.3±2.7	(3.08–3.48)	
Marital status									
Single	482 (17.6)	20.1	22.8	28.8	28.2	<0.001*	3.3±2.8	(3.07–3.57)	<0.001§
Married/ stable union	1,212 (44.2)	18.0	23.3	24.0	34.7		3.6±2.8	(3.42–3.74)	
Divorced	305 (11.1)	17.7	21.6	23.0	37.7		3.7±2.9	(3.38–4.04)	
Widowed	743 (27.1)	12.0	19.8	26.8	41.5		4.0±2.8	(3.84–4.24)	
Living with partner									
Yes	1,320 (51.4)	19.2	22.3	24.6	33.9	0.003*	3.5±2.8	(3.36–3.67)	0.004†
No	1,249 (48.6)	14.1	21.5	26.8	37.6		3.8±2.8	(3.68–3.99)	
Individual income (minimum wage)									
No income	246 (10.1)	20.7	23.6	23.2	32.5	0.918‡	3.3±2.7	(2.97–3.66)	0.104§
<1	1,179 (48.5)	15.0	21.2	27.1	36.7		3.8±2.8	(3.61–3.93)	
≥1–2	749 (30.8)	18.3	20.6	23.0	38.2		3.8±3.0	(3.56–3.99)	
≥2–4	223 (9.2)	16.1	23.8	23.8	36.3		3.7±2.8	(3.27–4.02)	
≥4	34 (1.4)	17.6	35.3	26.5	20.6		3.0±2.6	(2.13–3.93)	
Family income (minimum wage)									
<1	666 (29.7)	16.8	22.7	27.5	33.0	0.115‡	3.5±2.7	(3.31–3.71)	0.028§
≥1–3	1,275 (56.8)	15.5	21.8	24.6	38.1		3.8±2.9	(3.66–3.97)	
≥3	302 (13.5)	16.6	20.5	22.8	40.1		4.0±3.0	(3.62–4.30)	
Total population	2819 (100)	16.6	22.1	25.6	35.7		3.7±2.8		

*Pearson's chi-square test; †Student's *t* test; ‡Chi-square test for linear tendency; §One way ANOVA. M: mean; SD: standard deviation; CI: confidence interval. Minimum wage USD 280.

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DISCUSSION

The present study was conducted in a population-based sample of 2,819 middle-aged and older Brazilians living in areas of SED. The comprehensive multidimensional interview showed that polypharmacy is prevalent in the present sample in all age groups, including

Table 2. Number of drugs and polypharmacy according to the lifestyle and health variables (n=2,819).

Variables	Population n (%)	Drug number (%)					Drugs		
		0	1 to 2	3 to 4	≥5	p	M±SD	95%CI	p
Smoker									
No	1,167 (43.1)	16.4	21.9	24.6	37.2		3.7±2.9	(3.58–3.91)	
Ex-smoker	984 (36.4)	13.4	19.5	26.8	40.2	<0.001*	4.0±2.8	(3.82–4.18)	<0.001†
Yes	556 (20.5)	22.7	26.8	24.8	25.7		3.0±2.7	(2.79–3.24)	
Alcohol use									
No	2,009 (76.5)	14.6	21	26.3	38.1	<0.001*	3.9±2.8	(3.74–3.99)	<0.001‡
Yes	616 (23.5)	21.8	24	25.6	28.6		3.1±2.7	(2.92–3.34)	
Self-perceived health									
Great/Good	1,214 (43.5)	24.8	27.8	24.5	22.8		2.7±2.5	(2.60–2.88)	
Regular	1,320 (47.3)	10.7	18.7	27.1	43.5	<0.001§	4.3±2.8	(4.10–4.41)	<0.001†
Poor/Very poor	255 (9.1)	8.2	12.9	23.1	55.7		5.0±3.0	(4.65–5.39)	
Hypertension									
No	848 (30.6)	42.6	31.1	16.5	9.8	<0.001*	1.7±2.1	(1.52–1.80)	<0.001‡
Yes	1,920 (69.4)	4.9	17.8	29.7	47.6		4.6±2.6	(4.47–4.71)	
Diabetes mellitus									
No	1,898 (70.6)	22	26.3	26.6	25.1	<0.001*	3.0±2.6	(2.86–3.09)	<0.001‡
Yes	792 (29.4)	3.3	11.1	22.7	62.9		5.4±2.7	(5.26–5.63)	
Congestive heart failure									
No	2,272 (87.0)	18.8	23.7	26	31.5	<0.001*	3.4±2.7	(3.27–3.50)	<0.001‡
Yes	340 (13.0)	2.9	10.9	21.5	64.7		5.7±2.8	(5.37–5.97)	
Coronary disease									
No	2,128 (80.4)	19.5	24.8	26.2	29.5	<0.001*	3.3±2.7	(3.15–3.38)	<0.001‡
Yes	519 (19.6)	5.4	10.4	21.4	62.8		5.4±2.9	(5.19–5.68)	
Cerebrovascular disease									
No	2,299 (88.3)	18.5	23.8	25.5	32.2	<0.001*	3.4±2.8	(3.33–3.56)	<0.001‡
Yes	304 (11.7)	4.3	8.2	23.7	63.8		5.5±2.7	(5.21–5.82)	
Geriatric Depression Scale (GDS-15)									
0–5	1,855 (66.0)	19.4	24.5	25.1	31.0	<0.001*	3.3±2.7	(3.17–3.41)	<0.001‡
≥6	957 (34.0)	10.8	16.8	27.0	45.5		4.4±2.9	(4.26–4.63)	
Vellore									
Normal	2,270 (80.2)	17.4	22.8	25.6	34.4	0.002*	3.6±2.8	(3.46–3.69)	<0.001‡
Impaired	561 (19.8)	12.8	19.4	25.8	41.9		4.1±2.8	(3.87–4.34)	
Total population	2,819 (100)	16.6	22.1	25.6	35.7		3.7±2.8		

Pearson's chi-square test; †One way ANOVA; ‡Student *t* test; §Chi-square test for linear tendency. M: mean; SD: standard deviation; CI: confidence interval.

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Table 3. Multivariate analysis of the factors associated with number of drugs and polypharmacy (n=2,819).

Variables	1 to 2			3 to 4			≥5		
	OR	95%CI	p	OR	95%CI	p	OR	95%CI	p
Gender									
Male	1			1			1		
Female	1.675	(1.220–2.299)	0.001	1.884	(1.344–2.642)	<0.001	2.458	(1.709–3.533)	<0.001
Age (years)									
55–59	1			1			1		
60–64	0.983	(0.665–1.453)	0.932	1.423	(0.927–2.184)	0.106	1.575	(0.988–2.511)	0.056
65–69	1.102	(0.716–1.695)	0.659	1.457	(0.915–2.321)	0.113	1.952	(1.192–3.198)	0.008
70–74	0.820	(0.497–1.355)	0.439	1.585	(0.947–2.652)	0.079	1.945	(1.126–3.358)	0.017
75–79	1.068	(0.597–1.910)	0.825	2.166	(1.197–3.922)	0.011	3.126	(1.676–5.831)	<0.001
≥80	0.808	(0.442–1.476)	0.487	1.242	(0.669–2.303)	0.492	1.766	(0.932–3.346)	0.081
Education (years)									
0	1			1			1		
1–3	1.812	(1.053–3.119)	0.032	2.668	(1.524–4.670)	0.001	2.566	(1.433–4.592)	0.002
4–7	1.526	(0.917–2.539)	0.104	1.689	(0.993–2.874)	0.053	1.814	(1.046–3.145)	0.034
≥8	2.328	(1.372–3.959)	0.002	2.333	(1.316–4.076)	0.003	2.225	(1.242–3.988)	0.007
Smoker									
No	1			1			1		
Ex-smoker	1.441	(1.011–2.055)	0.043	1.963	(1.357–2.840)	<0.001	1.892	(1.287–2.780)	0.001
Yes	1.145	(0.796–1.647)	0.465	1.164	(0.786–1.724)	0.449	0.781	(0.508–1.199)	0.258
Alcohol use									
No	1			1			1		
Yes	0.826	(0.590–1.158)	0.268	0.78	(0.545–1.116)	0.173	0.674	(0.458–0.993)	0.046
Self-perceived health									
Great/Good	1			1			1		
Regular	1.513	(1.108–2.066)	0.009	2.065	(1.491–2.860)	<0.001	2.847	(2.014–4.024)	<0.001
Poor/Very poor	1.700	(0.853–3.388)	0.131	3.361	(1.697–6.657)	0.001	6.426	(3.200–12.904)	<0.001
Hypertension									
No	1			1			1		
Yes	5.016	(3.605– 6.980)	<0.001	13.511	(9.555–19.103)	<0.001	25.456	(17.176–37.727)	<0.001
Diabetes mellitus									
No	1			1			1		
Yes	2.152	(1.246–3.718)	0.006	3.182	(1.854–5.462)	<0.001	10.439	(6.114–17.825)	<0.001
Congestive heart failure									
No	1			1			1		
Yes	3.038	(1.123–8.221)	0.029	3.114	(1.167–8.309)	0.023	4.844	(1.827–12.841)	0.002
Coronary disease									
No	1			1			1		
Yes	0.944	(0.521–1.712)	0.850	1.338	(0.753–2.376)	0.321	2.83	(1.601–5.000)	<0.001
Cerebrovascular disease									
No	1			1			1		
Yes	1.323	(0.578–3.029)	0.507	2.273	(1.024–5.046)	0.044	3.998	(1.804–8.863)	0.001
Geriatric Depression Scale (GDS-15)									
0-5	1			1			1		
≥6	1.156	(0.787–1.697)	0.460	1.504	(1.016–2.226)	0.041	1.603	(1.066–2.410)	0.023

Regression logistic multinomial. OR: odds ratio; CI: confidence interval.

those not considered to be elderly. Although polypharmacy appears to be particularly relevant, starting in the middle-aged years, we found few studies that addressed this phenomenon. One such study, called PRescribing Optimally in Middle-aged People's Treatments (PROMPT), defines a set of prescribing criteria and has been developed specifically for use in middle-aged adults[21]. A publication by these researchers revealed high levels of polypharmacy in this age group and suggested that polypharmacy is the principal determinant of potentially inappropriate prescribing[22].

Polypharmacy prevalence in Brazilian population studies varies widely, ranging from 13 to 45% in samples aged 60 years or more[23-27]. Some Brazilian studies involving middle-aged individuals treated in a primary care setting have investigated the frequency of polypharmacy and its association with sociodemographic, lifestyle and clinical predictors[28,29]. One such study recently published by the Brazilian Longitudinal Study of Aging (ELSI-Brazil) group demonstrated an overall prevalence of polypharmacy in individuals aged 50 years or more of 13.5%, rising markedly with increasing age (50–59 yr, 8%; 80+ yr, 29.4%)[30].

In general, recent decades have seen a greater availability of numerous efficacious drugs to treat risk factors for disease and alleviate symptoms, resulting in many people taking medications on a regular basis and at younger ages. Consequently, polypharmacy is no longer particular to elderly individuals only, although it is the 65 years and over group in which a substantial increase in overall prescription rates is seen, especially when evaluating the use of five or more drugs. Polypharmacy exposure represents an independent risk factor in the 65–79 years age group and was three times higher for those aged 75–79 years. Younger people with a new health diagnosis (e.g., hypertension) are probably more able to control their disease through lifestyle changes, while older individuals are more likely to use pharmacological treatment[31]. An important correlation has also been found with the greater occurrence of health problems in older people, usually chronic and more severe, which may require treatment with the use of multiple medications and, in general, this group will have more limited survival[32]. Some diagnoses are progressive, and deterioration and mortality are expected in the oldest age group. Nonetheless, the risk of exposure to polypharmacy did not persist in the elderly participant group aged 80 years or more. We were unable to identify an explanation for this finding, although some studies have reported a survival effect or strategy of "deprescribing" and simplification of drug regimens over the long-term[33,34].

Few studies have addressed polypharmacy characteristics in a context of socioeconomic deprivation. Likewise, the context of SED in polypharmacy has been rarely explored worldwide. Some studies have found an association between polypharmacy and both low income and educational levels, but these characteristics may be very different from the reality experienced in LMICs. In the present study, polypharmacy was seen more frequently in illiterate participants and those with limited education. These individuals may be more exposed to factors related to the earlier incidence of chronic diseases, for example, due to poor access to healthy nutrition, high salt intake, and being overweight/obese[35]. The inability to read or understand complex dosage instructions is a major obstacle and may contribute to chronic continuous misuse of medicines. Research in developed HICs has found a relationship between polypharmacy and low levels of education[9]. Nonetheless, the comparison of education and income influences on polypharmacy addressed in previous studies, conducted mostly in HICs, deserves some careful examination, since comparative group levels of literacy and income can be very different from the reality found in most LMICs. A study conducted in Sweden with more than 600 thousand individuals found an association between polypharmacy and low education levels[36], while studies carried out in Brazil have also shown that polypharmacy is more frequent in those individuals with up to five years of study[27,29]. There are several explanations for this observation, which should consider a patient's knowledge about their own treatment and health, and their expectations. Furthermore, when considering the most frequent chronic diseases like hypertension, diabetes and dyslipidemia, lifestyle changes are the first line of treatment, but individuals with less education may have more difficulty in adhering to these recommendations, which can lead to a higher risk of medication use.

In this context, polypharmacy is strongly related to the incidence of chronic diseases, which increases considerably in late adulthood[3]. A strong association was found in our research between chronic conditions (cardiovascular-related) and depression symptoms with polypharmacy. Similar to these findings, one report found a GDS-15 score higher than 6 as being positively correlated with polypharmacy[37]. Although polypharmacy appears to be particularly relevant from the middle-aged years onwards, the high frequencies seen have often been found in HICs[6,32,38]. This is particularly concerning in LMICs, where control of risk factors and early treatment are less available or effective for a great portion of the population. Aspects related to socioeconomic deprivation may play an important role in the emergence of polypharmacy and chronic conditions.

It is intriguing to note that individuals who have never smoked and those who did not drink alcohol had the highest frequencies of exposure to polypharmacy. Furthermore, people who quit smoking had a high risk of multidrug use. In the work of Brekke et al., one in six former smokers used five or more drugs[39]. A possible explanation for such results may be due to people who are smokers and become ill being exposed to medication use regularly to quit smoking, whereas those who remain healthy, despite their habit, are more likely to continue smoking, have less exposure to health information, and therefore, are less likely to use medicines. Another explanation may be that a large proportion of smokers die before reaching the age of 70–74 years, setting up a survival effect[40]. A similar pattern can also be observed in those who use alcohol. The negative correlation between alcohol use and polypharmacy found in our study has been previously described[39,41]. Another possibility that cannot be ruled out is that smokers and alcohol users with health problems may be among those individuals who did not wish to answer these questions.

The present study benefitted from having a large database to analyze, enabling accurate estimates to be made of drug use patterns by individuals aged 55 years or more, attended by a primary healthcare system; however, the study does have some limitations that should be mentioned. The disadvantages of a cross-sectional and descriptive study design should be considered, such as the lack of quality control of the information provided and cross-checks between variables. In addition, it is impossible to temporally investigate the associated factors. In chronic self-reported diseases, for example, their prevalence may be underestimated due to memory problems or even a lack of diagnosis. The results obtained in our study correspond to the reality found in two of the eight health management districts belonging to the FHS of Porto Alegre, and therefore, may not be representative of the entire Brazilian population.

CONCLUSION

The phenomena of increasing medication use and polypharmacy has been observed worldwide. Polypharmacy, a situation often cited in the elderly, starts earlier and is very prevalent in individuals aged 55 years or more living in the geographic areas covered by the FHS. The strong associations found with chronic conditions and depression reinforces a recognition of the importance of medicine in the health care of this population. Poorer individuals and older adults with the least education also show high frequencies of polypharmacy.

Major investment is needed in age-related health approaches in Brazil and in many other countries with high levels of inequality and healthcare service difficulties. A proactive strategy developed in our program to include a home-based drug-use review facilitates access to health care and increases the availability of services for the middle-aged and older adults. It is also important to highlight the need for pharmaceutical assistance in the planning of specific interventions to ration prescriptions and ensure access to quality medicines, especially for the elderly. This population has increased in number substantially in recent decades and, subsequently, the increasing medication use and exposure to polypharmacy needs to be monitored.

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AUTHORS' CONTRIBUTIONS

VS: Data curation, Formal analysis, Methodology, Project administration, Writing – original draft. ELN: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. PE: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. IG: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing. ACN: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Supervision, Writing – review & editing.

REFERENCES

1. World Health Organization. Ageing and health. Geneva: WHO; 2018.
2. World Health Organization. Active ageing: s policy framework. Geneva: WHO; 2002.
3. World Health Organization. Medication safety in polypharmacy. Geneva: WHO; 2019.
4. Guillot J, Maumus-Robert S, Bezin J. Polypharmacy: a general review of definitions, descriptions and determinants. Therapie. 2020;75(5):407-16. https://doi.org/10.1016/j.therap.2019.10.001
5. Guisado-Clavero M, Violán C, López-Jimenez T, Roso-Llorach A, Pons-Vigués M, Muñoz MA, et al. Medication patterns in older adults with multimorbidity: a cluster analysis of primary care patients. BMC Fam Pract. 2019;20(1):82. https://doi.org/10.1186/s12875-019-0969-9
6. Payne RA, Avery AJ, Duerden M, Saunders CL, Simpson CR, Abel GA. Prevalence of polypharmacy in a Scottish primary care population. Eur J Clin Pharmacol. 2014;70(5):575-81. https://doi.org/10.1007/s00228-013-1639-9
7. Ramos LR, Tavares NUL, Bertoldi AD, Farias MR, Oliveira MA, Luiza VL, et al. Polypharmacy and polymorbidity in older adults in Brazil: a public health challenge. Rev Saude Publica. 2016;50(suppl 2):9s. https://doi.org/10.1590/S1518-8787.2016050006145
8. Stewart D, Mair A, Wilson M, Kardas P, Lewek P, Alonso A, et al. Guidance to manage inappropriate polypharmacy in older people: systematic review and future developments. Expert Opin Drug Saf. 2017;16(2):203-13. https://doi.org/10.1080/14740338.2017.1265503
9. Zhang N, Sundquist J, Sundquist K, Ji J. An increasing trend in the prevalence of polypharmacy in Sweden: a nationwide register-based study. Front Pharmacol. 2020;11:326. https://doi.org/10.3389/fphar.2020.00326
10. Jokanovic N, Tan EC, Dooley MJ, Kirkpatrick CM, Bell JS. Prevalence and factors associated with polypharmacy in long-term care facilities: a systematic review. J Am Med Dir Assoc. 2015;16(6):535.e1-12. https://doi.org/10.1016/j.jamda.2015.03.003
11. Valent F. Polypharmacy in the general population of a Northern Italian area: analysis of administrative data. Ann Ist Super Sanita. 2019;55(3):233-9. https://doi.org/10.4415/ANN_19_03_06
12. Mannucci PM, Nobili A, Pasina L; REPOSI Collaborators (REPOSI is the acronym of REgistro POliterapie SIMI, Società Italiana di Medicina Interna). Polypharmacy in older people: lessons from 10 years of experience with the REPOSI register. Intern Emerg Med. 2018;13(8):1191-200. https://doi.org/10.1007/s11739-018-1941-8
13. Romano-Lieber NS, Corona LP, Marques LFG, Secoli SR. Sobrevida de idosos e exposição à polifarmácia no município de São Paulo: Estudo SABE. Rev Bras Epidemiol. 2018;21(S2):E180006. https://doi.org/10.1590/1980-549720180006.supl.2
14. Gbeasor-Komlanvi FA, Zida-Compaore WIC, Dare IH, Diallo A, Darre TP, Potchoo Y, et al. Medication consumption patterns and polypharmacy among community-dwelling elderly in Lomé (Togo) in 2017. Curr Gerontol Geriatr Res. 2020;2020:4346035. https://doi.org/10.1155/2020/4346035
15. Assari S, Helmi H, Bazargan M. Polypharmacy in African American adults: a national epidemiological study. Pharmacy (Basel). 2019;7(2):33. https://doi.org/10.3390/pharmacy7020033
16. Masnoon N, Shakib S, Kalisch-Ellett L, Caughey GE. What is polypharmacy? A systematic review of definitions. BMC Geriatr. 2017;17(1):230. https://doi.org/10.1186/s12877-017-0621-2
17. World Health Organization. Guidelines for ATC classification and DDD assignment. Geneva: WHO; 2020.
18. Lesher EL, Berryhill JS. Validation of the geriatric depression scale--short form among inpatients. J Clin Psychol. 1994;50(2):256-60. https://doi.org/10.1002/1097-4679(199403)50:2≤256::aid-jclp2270500218≥3.0.co;2-e

19. Stanley R, Kuruvilla A, Kumar S, Gayathri K, Mathews P, Abraham V, et al. The Vellore screening instruments and strategies for the diagnosis of dementia in the community. Int Psychogeriatr. 2009;21(3):539-47. https://doi.org/10.1017/S104161020900903X

20. Rule BG, Harvey HZ, Dobbs AR. Reliability of the Geriatric Depression Scale for younger adults. Clin Gerontol. 1989;9(2):37-43. https://doi.org/10.1300/J018v09n02_05

21. Cooper JA, Ryan C, Smith SM, Wallace E, Bennett K, Cahir C, et al. The development of the PROMPT (PRescribing Optimally in Middle-aged People's Treatments) criteria. BMC Health Serv Res. 2014;14:484. https://doi.org/10.1186/s12913-014-0484-6

22. Cooper JA, Moriarty F, Ryan C, Smith SM, Bennett K, Fahey T, et al. Potentially inappropriate prescribing in two populations with differing socio-economic profiles: a cross-sectional database study using the PROMPT criteria. Eur J Clin Pharmacol. 2016;72(5):583-91. https://doi.org/10.1007/s00228-015-2003-z

23. Rozenfeld S, Fonseca MJM, Acurcio FA. Drug utilization and polypharmacy among the elderly: a survey in Rio de Janeiro City, Brazil. Rev Panam Salud Publica. 2008;23(1):34-43. https://doi.org/10.1590/s1020-49892008000100005

24. Carvalho MFC, Romano-Lieber NS, Bergsten-Mendes G, Secoli SR, Ribeiro E, Lebrão ML, et al. Polifarmácia entre idosos do Município de São Paulo-Estudo SABE. Rev Bras Epidemiol. 2012;15(4):817-27. https://doi.org/10.1590/S1415-790X2012000400013

25. Marques PP, Assumpção D, Rezende R, Neri AL, Francisco PMSB. Polifarmácia em idosos comunitários: resultados do estudo Fibra. Rev Bras Geriatr Gerontol. 2019;22(5):e190118. https://doi.org/10.1590/1981-22562019022.190118

26. Constantino JL, Bozzi RP, Souza GPMM, Marchesi R, Jorge AJL, Correia DMS, et al. Polypharmacy, inappropriate medication use and associated factors among brazilian older adults. Cad Saúde Colet, 2020;28(3):400-8. https://doi.org/10.1590/1414-462X202028030245

27. Gomes MS, Amorim WW, Morais RS, Gama RS, Graia LT, Queiroga HM, et al. Polypharmacy in older patients at primary care units in Brazil. Int J Clin Pharm. 2019;41(2):516-24. https://doi.org/10.1007/s11096-018-00780-5

28. Teixeira JJV, Crozatti MTL, Santos CA, Romano-Lieber NS. Potential drug-drug interactions in prescriptions to patients over 45 years of age in primary care, southern Brazil. PLoS One. 2012;7(10):e47062. https://doi.org/10.1371/journal.pone.0047062

29. Araújo LU, Santos DF, Bodevan EC, Cruz HL, Souza J, Silva-Barcellos NM. Patient safety in primary health care and polypharmacy: cross-sectional survey among patients with chronic diseases. Rev Lat Am Enfermagem. 2019;27:e3217. https://doi.org/10.1590/1518-8345.3123.3217

30. Seixas BV, Freitas GR. Polypharmacy among older Brazilians: prevalence, factors associated, and sociodemographic disparities (ELSI-Brazil). Pharm Pract (Granada). 2021;19(1):2168. https://doi.org/10.18549/PharmPract.2021.1.2168

31. Skoog J, Midlöv P, Beckman A, Sundquist J, Halling A. Drugs prescribed by general practitioners according to age, gender and socioeconomic status after adjustment for multimorbidity level. BMC Fam Pract. 2014;15:183. https://doi.org/10.1186/s12875-014-0183-8

32. Sinnige J, Braspenning JC, Schellevis FG, Hek K, Stirbu I, Westert GP, et al. Inter-practice variation in polypharmacy prevalence amongst older patients in primary care. Pharmacoepidemiol Drug Saf. 2016;25(9):1033-41. https://doi.org/10.1002/pds.4016

33. Scott IA, Hilmer SN, Reeve E, Potter K, Le Couteur D, Rigby D, et al. Reducing inappropriate polypharmacy: the process of deprescribing. JAMA Intern Med. 2015;175(5):827-34. https://doi.org/10.1001/jamainternmed.2015.0324

34. Wauters M, Elseviers M, Vaes B, Degryse J, Dalleur O, Stichele RV, et al. Polypharmacy in a Belgian cohort of community-dwelling oldest old (80+). Acta Clin Belg. 2016;71(3):158-66. https://doi.org/10.1080/17843286.2016.1148298

35. Silveira EA, Dalastra L, Pagotto, V. Polypharmacy, chronic diseases and nutritional markers in community-dwelling older. Rev Bras Epidemiol. 2014;17(4):818-29. https://doi.org/10.1590/1809-4503201400040002

36. Haider SI, Johnell K, Weitoft GR, Thorslund M, Fastbom J. The influence of educational level on polypharmacy and inappropriate drug use: a register-based study of more than 600,000 older people. J Am Geriatr Soc. 2009;57(1):62-9. https://doi.org/10.1111/j.1532-5415.2008.02040.x

37. Mizokami F, Koide Y, Noro T, Furuta K. Polypharmacy with common diseases in hospitalized elderly patients. Am J Geriatr Pharmacother. 2012;10(2)123-8. https://doi.org/10.1016/j.amjopharm.2012.02.003

38. Marković-Peković V, Škrbić R. Long-term drug use and polypharmacy among the elderly population in the Republic of Srpska, Bosnia and Herzegovina. Vojnosanit Pregl. 2016;73(5):435-41. https://doi.org/10.2298/vsp150224032m

39. Brekke M, Hunskaar S, Straand J. Self-reported drug utilization, health, and lifestyle factors among 70-74 year old community dwelling individuals in Western Norway. The Hordaland Health Study (HUSK). BMC Public Health. 2006;6:121. https://doi.org/10.1186/1471-2458-6-121

40. Ilomäki J, Gnjidic D, Le Couteur DG, Simon Bell J, Blyth FM, Handelsman DJ, et al. Alcohol consumption and tobacco smoking among community-dwelling older Australian men: the Concord Health and Ageing in Men Project. Australas J Ageing. 2014;33(3):185-92. https://doi.org/10.1111/ajag.12048

41. Wong H, Heuberger R, Logomarsino J, Hewlings S. Associations between alcohol use, polypharmacy and falls in older adults. Nurs Older People. 2016;28(1):30-6. https://doi.org/10.7748/nop.28.1.30.s22