



Consequences of polypharmacy in older adults

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ABSTRACT

Introduction: the presence of polypharmacy in older adults has emerged as a significant public health issue today.

Objective: to evaluate the patterns of polypharmacy among elderly patients.

Methods: an observational, descriptive, cross-sectional study was conducted in older adults treated at the *Dr. León Cuervo Rubio Clinical-Surgical-Teaching Hospital* between January and August 2023. A probabilistic, simple random sampling method was applied to select a sample of 107 participants who met the inclusion criteria. Data collection was carried out through documentary review and the application of instruments, allowing the study of relevant variables. Descriptive and inferential statistical methods were employed, with adherence to medical ethics.

Results: 49,5 % of the elderly did not present polypharmacy. Female sex predominated (52,3 %), as did the age group 65–69 years (25,2 %). Age, educational level, and marital status were significantly associated with the presence of polypharmacy ($p < 0,05$). Severe dependency was observed in 25,2 % of individuals, while 62,6 % were sedentary. Hypertension was the most prevalent morbidity, and antihypertensives were the most frequently used pharmacological group. 37,4 % of patients reported moderate quality of life, and 37,4 % had a medium level of knowledge. Knowledge levels increased significantly from 29,0 % (high) to 56,1 % ($p = 0,028$).

Conclusions: the analysis of polypharmacy patterns enabled the implementation and evaluation of an educational strategy, which resulted in a significant increase in knowledge among older adults. This improvement is expected to foster better self-care and enhance their quality of life.

Keywords: Aged; Primary Health Care; Quality of Life; Knowledge; Aging; Polypharmacy.

INTRODUCTION

In the contemporary world, aging constitutes one of the most important demographic events of the present century. While it represents one of humanity's greatest triumphs, it also poses one of its main challenges. In this regard, from the 200 million people over 60 years old worldwide recorded in 1950, by early 2020, the planet registered more than 1 billion older adults (OA), representing 13,5 % of the global population. It is estimated that by 2050, one in five inhabitants of the planet will belong to this age group, with 80 % of them living in developing countries.^(1,2)

The aging of the Cuban population, resulting from the State's will and the positive impact of social and health advancement strategies, generates difficulties and challenges. Biomedical deficits, social risks, and functional deterioration accumulate, leading to the concomitance of several chronic diseases, widowhood, loneliness, and physical dependence, which motivates the use of multiple drugs and the consequent increase in vulnerability to them.⁽³⁾

In this context, among the multiple health problems affecting OAs is polypharmacy or polypharmacotherapy, considered a common phenomenon and one of the capital problems of geriatrics. This dangerous condition already concerns health authorities internationally and is of interest not only at the scientific level but also at the family and social levels due to drug interactions.^(4,5)

Considering that the elderly are responsible for 70 % of total pharmaceutical expenditure, polypharmacy, operationally defined as the concomitant use of five or more drugs for a period longer than ninety days, reaches a frequency of up to 40 % in OAs, increasing to 85 % in comorbid geriatric patients. Problems related to polypharmacy include an increase in inappropriate prescriptions, adverse drug reactions and pharmacological interactions, worse treatment adherence, and the potential increase in hospitalizations and mortality, among others.^(6,7) Given this, the present research aimed to evaluate the behavior of polypharmacy in older adults treated at the Dr. León Cuervo Rubio Clinical-Surgical-Teaching Hospital.

METHODS

An observational, descriptive, cross-sectional study was conducted in OAs treated at the Dr. León Cuervo Rubio Clinical-Surgical-Teaching Hospital between January and August 2023.

From a universe consisting of 314 OAs treated at said institution, a sample of 107 was selected using probabilistic, simple random sampling, who met the selection criteria.

➤ Inclusion criteria:

- Patient aged 60 years or older.
- Patient who agrees to participate in the study, expressing so through informed consent.

➤ Exclusion criteria:

- Patient with dementia or cognitive impairment.
- Patient with terminal stage diseases.
- Patient from whom complete information collection cannot be obtained.

Data collection was carried out through document analysis of clinical histories and hospital records, complemented by the application of instruments, which allowed obtaining information for the analyzed variables: sex (male, female), age (60-64, 65-69, 70-74, 75-79, 80-84, ≥ 85), education level (unschooled, primary, basic secondary, pre-university, university), skin color (white, mixed race, black), cohabitation (lives alone, accompanied), marital status (single, married/consensual union, separated/divorced, widowed), geriatric functional status (total dependency, severe dependency, moderate dependency, slight dependency, independent), presence of non-communicable diseases (hypertension, diabetes mellitus, bronchial asthma, COPD, heart failure, ischemic heart disease, osteoarthropathies, cancer, gastrointestinal disorders, psychiatric disorders, others), presence of polypharmacy (yes, no), consumed pharmacological groups (vitamins and minerals, psychotropic drugs, anti-inflammatories, non-steroidal anti-inflammatory

drugs [NSAIDs], antihypertensives, hypoglycemics, antiarrhythmics, anti-ulcer drugs, antineoplastics, lipid-lowering agents, others), health-related quality of life (low, moderate, high).

To evaluate the functional status of the geriatric patient, the Barthel Index was used, defined as a generic measure that assesses the patient's level of independence regarding the performance of some activities of daily living. Different scores and weightings are assigned according to the subject's capacity to carry out these activities. This scale consists of ten questions including the assessment of Basic Activities of Daily Living (BADL), identifying the subject's independence or dependence. The maximum independence score is 100 and the maximum dependence score is 0, with intervals of five points. A patient who obtains 100 points on the Barthel Index is able to maintain control of feces and urine, feeds themselves, dresses and gets out of bed and/or chair, bathes themselves, walks at least one block, and can ascend and descend stairs. This does not mean they can live alone; they may not be able to cook or keep the house clean, but they can manage without a health assistant. For the interpretation of data obtained through the application of the instrument, 5 categories were created: total dependency (0-20 points), severe dependency (21-60 points), moderate dependency (61-90 points), slight dependency (91-99 points), and independence (100 points).

To measure health-related quality of life, the MINICHAL questionnaire was used, with an approximate application time of seven minutes. It consists of 16 items with two dimensions: 10 items correspond to the "Mood State" (MS) dimension and 6 items to the "Somatic Manifestations" (SM) dimension. The questions refer to the "last seven days" with four possible answer options: 0 = No, not at all; 1 = Yes, somewhat; 2 = Yes, quite a bit; 3 = Yes, very much. The scoring range goes from 0 (best health level) to 30 (worst health level) in the first dimension and from 0 to 18 in the second. The total MINICHAL score ranges from 0 (best health level) to 48 (worst health level), allowing for the following categories: high HRQoL (0-10 points), medium (11-24 points), and low (25-48 points).

Statistical Processing

Data treatment was performed using the SPSS statistical package version 26 for Windows, employing descriptive and inferential statistical methods for information processing. As descriptive statistical methods, absolute frequencies and percentages were analyzed to represent the univariate behavior of the variables. For bivariate analysis, inferential statistics were used, employing Pearson's Chi-square tests (for categorical variables) and one-way ANOVA tests (for the association between quantitative and categorical variables). A p-value <0.05 was taken as statistical evidence of the differences found. The results will be presented through tables and graphs.

Ethical Aspects

The institution's Scientific Council and Ethics Committee were consulted for the execution of the study, receiving approval from both. Each participant was informed of the confidentiality to which the data and results obtained during the stages of development would be subjected. Each patient was also informed of the objectives and characteristics of the study, and their written informed consent was requested to participate.

RESULTS

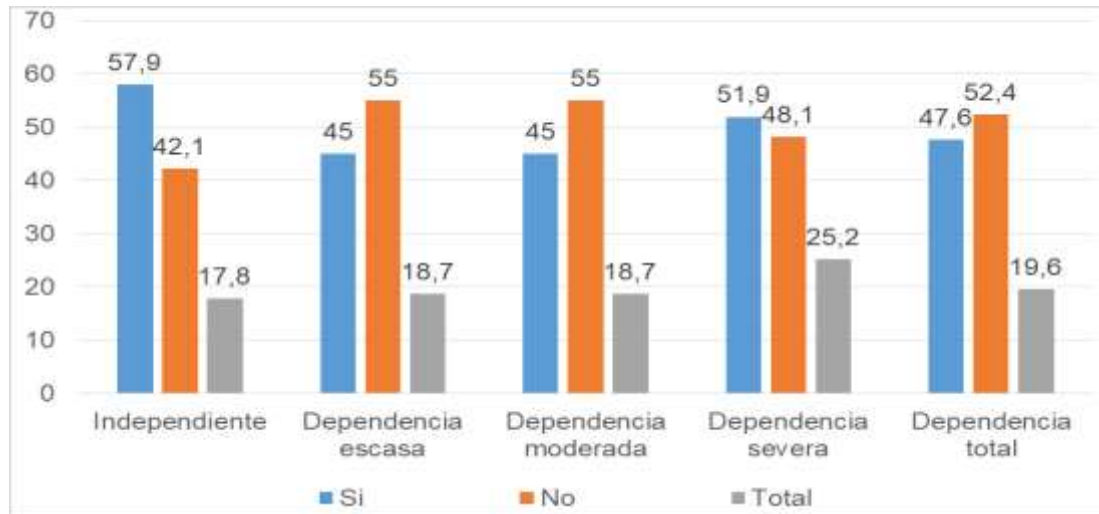
The study confirmed that 49,5 % of the OAs presented polypharmacy. When evaluating their demographic profile (Table 1), a predominance of the female sex (52,3 %), the 65-69 age group (25,2 %), university education level (31,8 %), black skin color (36,4 %), living accompanied (95,3 %), and married or maintaining a consensual union (39,3 %) was observed. Of these variables, age ($p=0,009$), education level ($p=0,018$), and marital status ($p=0,044$) were the only ones that showed a statistically significant association with the presence of polypharmacy, observing the highest percentages of polypharmacy in the elderly aged 60-64 years (68,0 %), with primary education (68,2 %), and divorced (69,2 %).

Table 1. Demographic profile of the sample according to the presence of polypharmacy.

Variables		Presence of polypharmacy				Total		p Value
		Yes		No				
		No.	%	No.	%	No.	%	
Sex *	Male	29	56,9	22	43,1	51	47,7	0,148
	Female	24	42,9	32	57,1	56	52,3	
Age **	60-64	17	68,0	8	32,0	25	23,4	0,009
	65-69	12	44,4	15	55,6	27	25,2	
	70-74	10	58,8	7	41,2	17	15,9	
	75-79	7	36,8	12	63,2	19	17,8	
	80-84	7	46,7	8	53,3	15	14,0	
	≥ 85	0	0,0	4	100	4	3,7	
Education level *	Unschooler	0	0,0	1	100	1	0,9	0,018
	Primary	15	68,2	7	31,8	22	20,6	
	Secondary	8	44,4	10	55,6	18	16,8	
	Pre-university	20	62,5	12	37,5	32	29,9	
	University	10	29,4	24	70,6	34	31,8	
Skin color *	White	19	52,8	17	47,2	36	33,6	0,237
	Mixed race	14	43,8	18	56,3	32	29,9	
	Black	20	51,3	19	48,7	39	36,4	
Cohabitation *	Alone	4	80,0	1	20,0	5	4,7	0,163
	Accompanied	49	48,0	53	52,0	102	95,3	
Marital status *	Single	13	65,0	7	35,0	20	18,7	0,044
	Married/consensual union	16	38,1	26	61,9	42	39,3	
	Divorced	18	69,2	8	30,8	26	24,3	
	Widowed	6	31,6	13	68,4	19	17,8	

Notes: * Pearson's Chi-square test; ** One-way ANOVA test

When evaluating the functional status of the OA (Fig. 1), a predominance of those who showed severe and total dependency (25,2 % and 19,6 % respectively) was specified. The highest percentages of polypharmacy were in OAs with slight or moderate dependency (55 % in both cases). A statistically significant association was established between functional status and the presence of polypharmacy ($p=0,038$).



One-way ANOVA test ($p=0.038$)

Fig. 1 Distribution of the sample according to geriatric functional status.

Figure 2 shows how hypertension (68,2 %), osteoarthropathies (36,4 %), and diabetes mellitus (31,8 %) are the main nosological entities present in the analyzed group.

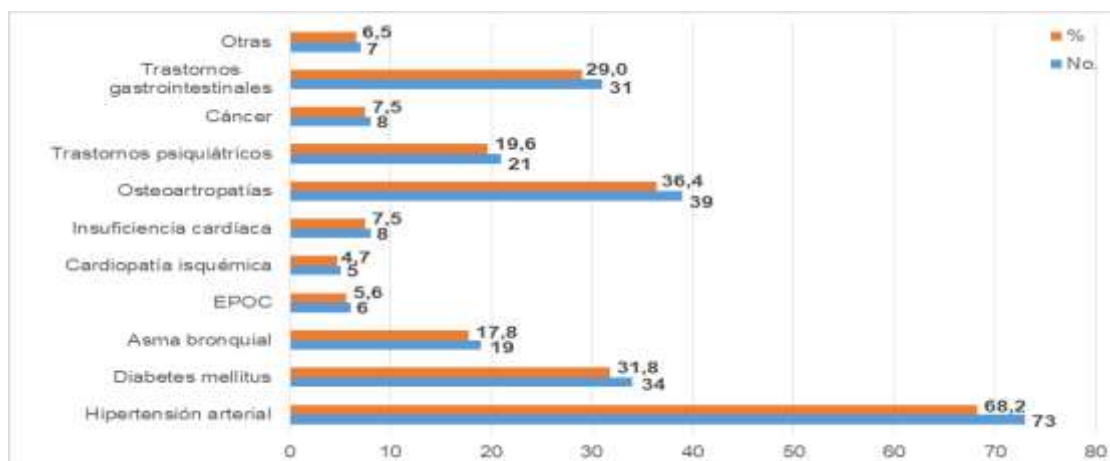
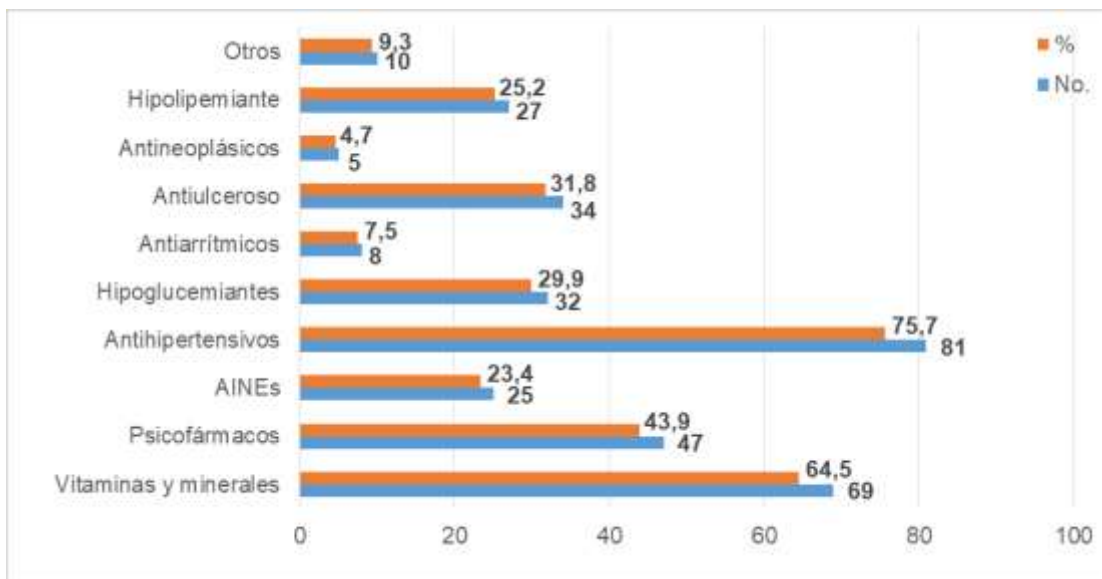


Fig. 2 Presence of non-communicable diseases.

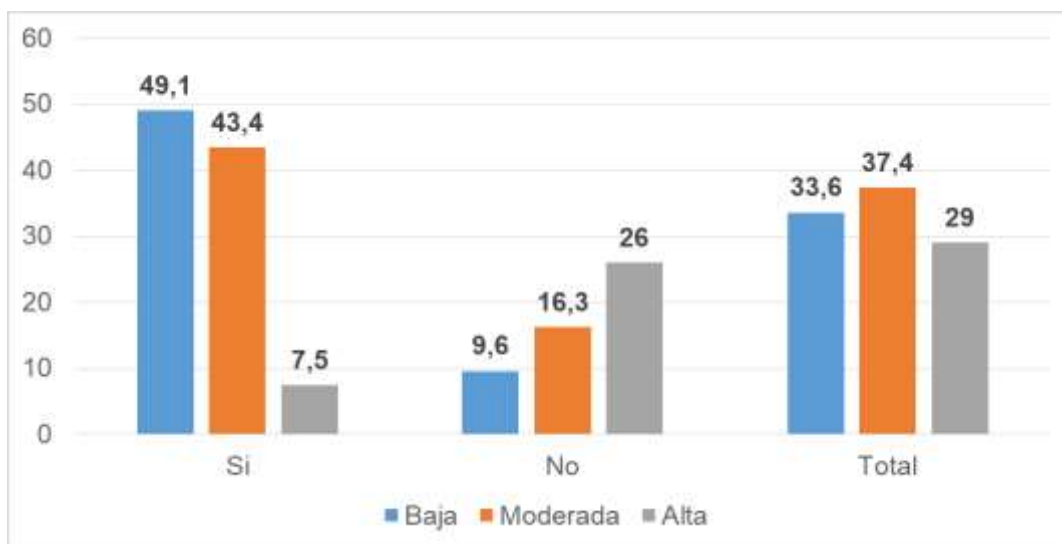
When evaluating the consumed pharmacological groups (Fig. 3), antihypertensives (75,7 %) and vitamins and minerals (64,5 %) were the main ones used in the studied population. It is noteworthy that 43,9 % of patients consumed psychotropic drugs.



Notes: NSAIDs (Non-steroidal anti-inflammatory drugs)

Fig. 3 Pharmacological groups consumed by the studied simple.

Figure 4 specifies a predominance of OAs with moderate quality of life (37,4 %). A higher percentage of individuals with low HRQoL was observed among those with the presence of polypharmacy compared to those who did not have it (49,1 % vs. 9,6 %). A statistically significant association was confirmed between both variables ($p=0,014$).



One-way ANOVA test ($p=0.014$)

Fig. 4 Health-related quality of life presented by the studied simple.

DISCUSSION

Gutiérrez-Valencia et al.,⁽⁷⁾ report that 27.3% of their study population presented polypharmacy, a percentage lower than that specified in the present investigation. Other authors,^(8,9) do not agree with these results, specifying polypharmacy values ranging between 25-35 %, totally contrary to what was reported by Wastesson JW,⁽¹⁰⁾ where more than 65 % of their OAs presented polypharmacy, a value more accepted currently, given the rise in medication consumption, generally due to self-medication.

The findings agree with those documented in the literature,⁽¹⁾ and the truth is that, rarely, in the last decade has any study been observed dealing with drug consumption in aging populations in which polypharmacy does not stand out as one of the main health problems to take into consideration, taking into account all the repercussions it brings with it. Similarly, given the increase in the average number of medications, many of these studies are already beginning to use the terms minor and major polypharmacy.⁽¹¹⁾

Faced with this situation, the challenge consists of simplifying treatments, using the smallest number of drugs possible, and improving the quality of prescription; and it is that polypharmacy has a spectrum that goes beyond the number of drugs, its analysis should not be done in quantitative terms, because the quality or characteristics of the prescribed drug are more important than counting the number of them. The use of more medications does not correspond to more sanitation nor does it always equate to more health.⁽¹²⁾

Regarding demographic data, in Cuba there has been an uninterrupted trend towards population feminization since 2012, with a masculinity ratio in 2016 of 991 men per 1000 women.⁽¹³⁾ Currently, in almost all countries of the world, females have greater survival, hence the high frequency of women frequently found in studies of this nature.⁽¹⁴⁾

Regarding age, other studies such as that of Díaz-Rodríguez,⁽¹⁾ found a predominance of patients in the 75 to 80 years age group, which contrasts with the present investigation, these authors having a mean age superior to that of the present investigation. Regarding marital status, the predominance of married older adults and family cohabitation reported by Fernández-Maffú,⁽¹⁵⁾ is related to the results of the present study. Said researcher indicates how this situation manages to mitigate drug consumption in the couple and their environment, since once the state of widowhood and loneliness appears, polypharmacy levels tend to increase in the geriatric patient.

Polypharmacy in older adults is frequently observed in the female sex, in people with low levels of education and socioeconomic status. A large percentage presents a cascade effect in drug consumption, due to the large amount of medications consumed and the number of doctors consulted, producing pharmacological interactions, which affects their functionality and quality of life.⁽¹⁶⁾

Poblano-Verástegui et al.,⁽¹⁷⁾ in a multivariable adjusted analysis, highlights how among the factors significantly associated with polypharmacy are having social security, being treated in public institutions, age, presenting chronic disease, and low educational level. People ≥ 65 years (OR=1,9, 95 % CI: 1,40-2,74) have a higher risk of presenting polypharmacy, compared to those with higher or greater level (OR=0,65, 95 % CI: 0,46-0,91). Presenting a chronic disease increases the risk of polypharmacy by 84 %. Those adults with social security have a greater possibility of

polypharmacy than those who do not have social security (OR=1,64, 95 % CI: 1,30-2,10) and those who were treated in public institutions have a 70 % (OR=1.7, 95 % CI: 1,30-2,20) greater possibility that the doctor treating them prescribes ≥ 5 medications.

Other authors detail a positive association of polypharmacy with the female gender, age equal to or greater than 80 years, living alone, perceived health status as negative, and those who have attended a medical consultation in the last three months.^(10,18)

It is important to take into account that social events inherent to old age such as widowhood, the condition of being an elderly person alone, lack of care and support, absence of contacts in the social network, and functional dependence are factors that constitute adversities and place the elderly in conditions of vulnerability facing the contingencies of their health status and therefore to the excessive and inappropriate use of drugs.⁽¹²⁾

Hernández Chacón,⁽¹⁹⁾ observed in his study how only a small part of the long-lived individuals who participated in the research were independent in performing activities of daily living, requiring assistance for the same in the majority, a result coinciding with the present investigation. Said researcher also reports how recent studies in Spain reflect that dependency figures for basic activities of daily living oscillate, for the population over 65 years, between 15 and 25 %. When referring to those over 75, these figures rise to 25 and 35 % with a clear difference between sexes: three out of four dependent persons are women.

Basic activities of daily living mark the individual's independence for the most elementary activities of life, are the last to be lost, constitute a reflection of the situation of fragility and comorbidity and, at the same time, are predictors of the need for socio-health resources, incapacity, institutionalization, and mortality. Functional deterioration, except in the case of serious acute diseases, will not occur in unison in most areas of function, but progressively until placing the elderly in a state of functional dependence over the years.⁽²⁰⁾

The main triggering factor of polypharmacy is the prevalence of chronic degenerative diseases, secondary to the multiple physiological changes inherent to aging, since the importance of chronic diseases as the main cause of morbimortality is increasing. According to the WHO, 75 % of the causes of deaths in the Latin American region are a consequence of these, which predispose them to geriatric syndromes.⁽²¹⁾

High comorbidity defines the elderly as a multimorbid patient and at high risk of suffering complications. Furthermore, its strong degree of association with polypharmacy, confirmed in several investigations, complicates pharmacotherapeutic management and favors prescription errors. On the other hand, the elderly population expresses a modified pattern of disease with an evolution towards chronicity, which generally accompanies the high number of prescriptions. Additionally, the possible combinations of diseases in the elderly are infinite, which complicates adequate pharmacological approach. An example of this is hypertension, the most important cardiovascular risk factor, with a prevalence of 68 % in people over 60 years; while diabetes mellitus is an increasingly frequent pathology that presents grouped with hypertension. Both diseases are detected in the study and appear inadequately prescribed.⁽¹¹⁾

Another study shows the predominance of a high comorbidity index in 76 geriatric patients of the total investigated, of which 47 (61,8 %) with polypharmacy predominated, followed by 29 (38,2 %) with major polypharmacy and a high comorbidity index. The registration of elderly people with a chronic disease and polypharmacy 14 (63,6 %) or absence of diseases and major polypharmacy of 8 (36,4 %) is alarming.⁽²²⁾ In this sense, it is usual that after a careful study,

several pathological processes coexisting in the same individual (comorbidity) are detected. It is estimated that the average number of diagnoses in outpatient patients can be three or four, which increases to five or six in the hospitalized elderly.

González Casanova et al.,⁽²³⁾ when analyzing clinical conditions, found a predominance of patients with two or more intercurrent diseases (95,79 %), finding a majority of patients with osteomyoarticular system affections (87,89 %), sleep disorders (78,95 %), cardiovascular diseases (60,53) and hypertension (57,89 %).

With age, the presence of pathophysiological factors contributing to the development of ischemic heart disease, cerebrovascular disease, chronic obstructive pulmonary disease, bronchitis and pneumonia or both, and others increases; in addition to the presence of hypoventilation, caused largely by the permanence of patients in decubitus, sitting or semi-sitting positions, which prevents the optimal function of respiratory muscles or musculoskeletal affectations very common in said patients.⁽²⁴⁾

The finding of hypertension, cardiovascular diseases, diabetes mellitus, and digestive diseases as the most frequent affections coincides with several studies. This can be explained by the increase in the population of predisposing factors for these diseases such as stress, inadequate eating habits, sedentary lifestyle, atherosclerosis, dyslipidemias, obesity, increased consumption of alcoholic beverages, and smoking.^(5,11,22)

Ramírez-Pérez et al.,⁽²²⁾ highlight in their study a greater polypharmacy fostered by self-medication, which is related to the high index of comorbidity and possible drug interactions by combining frequently used drugs that respond to the main health problems in the geriatric population. In this regard, among the most consumed pharmacological groups reported in the literature are vitamins and minerals, psychotherapeutic medications, and cardiovascular drugs, with the present study coinciding with said results.⁽²³⁾

Ramírez Pérez.⁽¹¹⁾ analyzed 716 medications prescribed in an OA population belonging to nursing homes in Cienfuegos, of which 216 were related to inadequate medication, with benzodiazepines, neuroleptics, and loop diuretics being used, without relation to the clinical condition. Other highly prescribed medications were acetylsalicylic acid (17,2 %), H1 antihistamines, glibenclamide (9,4 %), and tricyclic antidepressants (7,8 %).

Technological advances, therapeutic improvements, and better living conditions increase life expectancy, generating the desire for the quantity of years to increase together with health quality, to thus be in optimal conditions to develop multiple activities, but this does not always translate into a better quality of life. Regarding the same, Roca García IC Y et al.,⁽²⁵⁾ Mendoza et al.,⁽²⁶⁾ in their research, explore the impact of polymedication and its influence on the quality of life of OAs who are in a geriatric center where the most affected dimension was physical functioning, specifying a predominance of the elderly with some affectionation of quality of life, as specified in this study. This also coincides with the studies of Robles and col.,⁽²⁷⁾ in a program of OA packers, whose affectionation to physical health was marked. Thus, it agrees with the literature by reporting how the dimensions of social functioning and the psychological sphere are less affected than physical health.

Hernández Chacón,⁽¹⁹⁾ details in turn how the category of quality of life that predominated in his research was the medium one. This researcher alleges that the study of quality of life in old age forces the inclusion of aspects related to this stage of the life cycle, in which the subject not only faces chronological aging but also functional aging, given the latter by the decrease in physical, psychic, and social capacities for the performance of activities of daily living. The approach to quality of life at this stage has focused basically on: autonomy, functional status, geriatric evaluation, and subjective well-being.

It is worrying that the largest amount of the sample studied in this investigation is at a medium level of quality of life, study projects are necessary to help reach high levels in this group. It would be essential to improve social, economic, family, and health conditions in this segment of the population so susceptible to the different changes inherent to aging, society, and with a very low degree of adaptation to said changes. Said result contrasts with what was reported by Cortés Ibarra and et al.,⁽²⁸⁾ who specify how 86 % of the subjects in their study manifested having a good self-perception of their health status.

Research has shown that the perception of well-being in the elderly is not necessarily linked to material living conditions and often maintains a relative independence from health. It has more to do with the attitude assumed towards life events, and the way they are faced.⁽¹⁶⁾

Polypharmacy accompanied by inappropriate use of medications becomes a high-risk factor for the integrity of the quality of life of patients, who are more vulnerable to adverse events from medications and irreversible complications; directly increasing public health spending, both due to the quantity of drugs that must be prescribed and due to hospitalizations secondary to adverse effects triggered by their misuse.⁽²⁹⁾

In Cuba, there is a plan that favors the preparation of motivated elderly people, to achieve an active and satisfactory quality of life, through the University of the Older Adult; grandparents' clubs, nursing homes, grandparents' houses; but this task is still insufficient, the participation of different state institutions and organizations as well as the unconditional support of the family in the management and confrontation of old age with all the repercussion that it entails is primordial; in addition to "geriatrizing" the majority of the population with the purpose of achieving the best expected quality of life in this population group.^(19,30)

CONCLUSIONS

With the realization of the study, it was identified that close to half of the participants showed polypharmacy, their demographic and clinical characteristics being described, showing age, school level, and marital status association with the presence of polypharmacy. Elderly people with severe dependency also predominated, with a moderate health-related quality of life, related to the presence of polypharmacy.

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