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POTENTIALLY INADEQUATE MEDICATIONS IN ELDERLY PEOPLE OF LOS GUIDOS-COSTA RICA, 2018

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ABSTRACT

Background: elderly people due to their physical and mental conditions, receive medications with the intention of improving their quality of life but it is not always right. Methodology: the objective of this observational and descriptive study was to identify potentially inappropriate medications in elderly people older than 65 years of Los Guidos de Desamparados, San José, Costa Rica; based on the application of the Beers-STOPP-START criteria. We visited the home of 143 people, 99 (69%) women and 44 (31%) men. Results: 1.319 cases of medications were found 31.796 units, especially in tablets (79%), 70% of people kept them in the bedroom, 71% came from Social Security, 612 cases (46,3%) had less than six months of permanence at home and 225 (17%) cases got expired date; the cases of medications are to treat affections of the cardiovascular (29%), digestive (22%) and skeletal muscle (12%) system; 78,64% of the elderly presented polypharmacy (>5 medicines) and 71% had at least one potentially inappropriate medication, highlighting furosemide (18 cases), amlodipine (15 cases), atenolol (14 cases), enalapril (11 cases), irbesartan (6 cases), famotidine (35 cases), omeprazole (18 cases), lovastatin (7 cases), metoclopramide (7 cases), hyoscine butyl bromide (7 cases), ibuprofen (31 cases), sulindac (12 cases), indomethacin (9 cases), fluoxetine (18 cases), amitriptyline (12 cases) and chlorpheniramine (9 cases). Conclusions: the particular conditions of the elderly are combined in a negative way with the large number of medicines available at home, which can potentially generate adverse reactions or expire at

home. Interventions are required for a rational use of medicines that improve the quality of life of the elderly.

KEY WORDS: medicine, home, elderly, aging, pharmacoepidemiology.

INTRODUCTION

The elderly population has been growing in different parts around the world[1-4] and in Costa Rica, that amount surpasses the quarter of a million people, although it is expected to continue increasing in the years coming.[5-7]

Among the diseases reported by the elderly are non-degenerative chronic diseases, among the first places are those of the cardiovascular, digestive, respiratory and skeletal muscle systems; such as hypertension, diabetes, lung diseases and arthritis; so also, mobility difficulties, basic and instrumental functionality; problems with sight and mental illness, among others. Acute diseases include respiratory, intestinal and urinary diseases.[1,2,4,7-12]

With the increase in age, physiological changes can occur that cause alterations in the pharmacodynamics (physiological effects of the drug) and pharmacokinetics (absorption, distribution, metabolism and elimination) of the medicines, which exposes elderly people to suffer problems related to the use of medications.[3,7,10,13-21]

Hence, it is common to find polypharmacy, poly-medication or a greater number of drugs in use, which is justified by biological or physical, social, psychological or health system factors; some authors consider that polypharmacy is include between five and ten medications and more than ten medications is considered an excessive polypharmacy. The premise for this greater number of medications is to treat the various chronic diseases; however, this leads to an increase in the likelihood of adverse drug reactions (prevalence between 5-50%), as well as hypo glycaemia, hypotension, over anticoagulation, renal failure, gastrointestinal and hydroelectric disorders.[1,10-13,19,21-26] Therefore, elderly people can often use different medications; such as antibiotics, anticoagulants, diuretics, hypoglycemic agents, analgesics, anti-inflammatory[3], antidepressants[27] and over the counter medications[1,21,28].

The poly-pathology associated with aging and the greater number of medications can cause various interactions: pharmacological, therapeutic and toxic, among which are those of the drug-drug type, drug-disease[19,29], drug-food or food-medication[13-15,30,31] or can also cause the inappropriate use of medicines[10,17,19,20,21,32], where the risks outweigh the possible

benefits, so it may be that there is a prescription when drugs are used that from the clinical point of view are not necessary, that there is deprescription or incorrect prescription when selecting an inconvenience medication in dose, via and duration or underuse of medications because not using the therapy required as recommended.[2,10,16,33]

Elderly people can receive medications not suitable for their particular condition (15-70%), which is related to greater morbidity, mortality and use of health resources; for this reason, there are explicit mechanisms, consensus of experts based on scientific evidence and implicit mechanisms by individual professional assessment of each case that allow the identification of potentially inappropriate drugs to optimize their use. Among the useful instruments to identify these drugs, the following Beers criteria, the Screening Tool of Older Person's Prescriptions (STOPP) - Screening Tool to Alert doctors to Right Treatment (START) criteria.[11,17,25,26,29,34-36]

This is exemplified by mentioning the use of calcium antagonist drugs that aggravate the problem of constipation by decreasing intestinal transit; the use of nonsteroidal anti-inflammatories agents that can affect the control of people with blood pressure disorders[4] or cause dyspepsia, burns in the mouth, gastric irritation, ulcers and bleeding, alone or in combination with other nonsteroidal anti-inflammatories, anticoagulants, corticosteroids[22] and therefore, to these are added famotidine to decrease acidity; however, it may have peripheral anticholinergic effects, such as dry mouth, constipation, urinary retention, blurred vision and central effects, such as confusion, hallucinations and attention deficit, symptoms that are also produced by antidepressants[27]; medications with actions on the central nervous system, especially benzodiazepines alone or in combination with antidepressants, sedative antihistamines, antiepileptic and others, which can promote the risk of falls, accidents, cognitive and behavioral changes[13,15,19,21,29,36]; the use of non-cardio selective beta-blockers in chronic obstructive pulmonary disease due to the risk of bronchospasm[17,37], impairment in nutrition due to the reduction of soluble and non-soluble fiber, fat-soluble, vitamins of group B and minerals; aggravated by calcium antagonist-beta blockers and angiotensin-converting enzyme antagonist drugs that cause dysgeusia or changes in taste perception and affect eating habits.[19]

The need to handle a greater number of medications can affect therapeutic adherence and it is originates from various causes and also generates several consequences[25,38]; a big number of medications in use implies that the management must be better, since this entails a greater

number of names, doses, frequencies and precautions. In addition, it also demands the presence of an adequate social support network, with the intention of obtaining adequate results and reducing the possibility of problems due to medications.[21,33,39]

Drug epidemiological studies such as this allow estimating morbidity in the elderly and knowing about the rational management of medications[9], so that through this research, potentially inappropriate medications were identified in elderly people of Los Guidos de Desamparados in San José, Costa Rica; based on the application of Beers criteria and STOPP/START criteria.

METHODOLOGY

This work is part of the research project of the Institute of Health Research INISA of the University of Costa Rica entitled " Situation of the Older Adult in Los Guidos, Desamparados."

Los Guidos is a marginal urban area with approximately 25.000 inhabitants and is the 13th district of Desamparados area in San José, Costa Rica.

The research project was approved by the Bioethics Committee of the University of Costa Rica and this observational, descriptive and cross-sectional study was carried out through the home review of all medications of elderly people over 65 years of age.

The selection of elderly people was done by systematic random sampling from the voluntary acceptance of the person participating in the research project, a quantity was selected for convenience in the opinion of the researchers.

Home visits were scheduled and during each visit, elderly people was asked to enter the home agreeing to show all medications in this moment.

A data collection template was designed that included the general aspects of elderly people (sex, age) and of each medicine, it was considered: name (generic, commercial), number of total units of medicines, receipt and expiration´s date, pharmaceutical form, acquisition and storage´s place.

The average time for data collection in each home was between forty-five and sixty minutes and was carried out by students and professionals in Pharmacy at the University of Costa Rica.

The Microsoft Excel Software was used for the descriptive analysis of the data.

RESULTS

We visited homes of 143 elderly people, 99 (69,2%) women and 44 (30,8%) men, the youngest 65 years and the oldest 94 years.

There were 1.319 cases of medications (31.796 units) as shown in Table 1, medications were predominant to treat diseases of cardiovascular system (29%), followed by the digestive, metabolism (22%) and skeletal muscle (12%) system.

Table 1. Total cases of medications according to Anatomical Therapeutic Chemical classification.

	Classification	Total	%
A	Digestive system and metabolism	293	22
B	Blood and hematopoietic	58	4
C	Cardiovascular system	378	29
D	Dermatological	79	6
G	Genitourinary system, sexual	5	0,4
H	Systemic hormonal, sexual	64	5
J	Anti-infective agents	25	2
L	Antineoplastic, immunomodulator	3	0,2
M	Skeletal muscle system	154	12
N	Nervous system	116	9
P	Antiparasitic, insecticides	5	0,4
R	Respiratory system	98	7
S	Organs of the senses	28	2
V	Various	13	1
	Total	1.319	100

We found that 78,64% of elderly people have polypharmacy (> 5 medications) as shown in table 2, most had between five and ten medications, only nine people (6,48%) do not use any medication.

The pharmaceutical form that predominated were tablets (1.044/79,2%), followed by creams (58/4,3%), oral inhaler (53/4,1%), capsules (43/3,3) %), ophthalmic drops (40/3,1%), ointments (23/1,7%), injectables (20/1,5%) and others (38/2,8%).

The most frequent medications were: lovastatin (70/49%), famotidine (44/31%), acetylsalicylic acid (43/30%), hydrochlorothiazide (43/30%), amlodipine (38/27%), enalapril (34/24%), metformin (33/23%), atenolol (30/21%), ibuprofen (21/15%), insulin (20/14%), irbesartan (19/13%), omeprazole (19/13%), beclomethasone (18/13%), fluoxetine (18/13%), amitriptyline (15/10%) and salbutamol (15/10%).

Table 2. Number of medications according to sex.

Number of medications	Total	%	Men	%	Women	%
0	9	6,48	5	3,60	4	2,88
1-4	21	14,88	7	4,96	14	9,92
5-10	65	45,68	23	16,16	42	29,52
11-20	46	31,38	9	6,14	37	25,24
> 21	2	1,58	0	0	2	1,58
Total	143	100	44	30,86	99	69,14

Elderly people receive drugs mainly from Social Security (937/71%), while the rest comes from other sources, such as purchase over the counter medicines in the private sector or donations from relatives (386/29%).

Predominant places use by people to store medicines were bedroom (105 cases / 70%), kitchen (30 cases / 20%), dining room (7 cases / 5%), living room (5 cases / 4%) and bathroom (2 cases / 1%).

There were 612 (46,3%) cases of medications that had less than six months of stay at home; 62 (5%) had between six and twelve months; in 616 cases (46,7%), dispensation date was not found, this was not visible or the medication was not labeled, so the time of permanence is unknown; 29 (2,1%) cases were more than twelve months at home. The lowest number of days of a medication at home was 2 days and the highest was 2,7 years.

As table 3 shows, 225 (17%) cases of medicines were expired, and there were 41 (3%) cases of medications at home, which were six months expired and 33 (14.6%) more than twelve months; in 133 (59,1%) cases, the expiration date was not found. The expired medication with the longest period of stay at home was 7,7 years.

Table 3. Days at home of expired medicines, n = 1.319.

Days	Months	Cases	%
< 180	< 6	41	18,2
181-360	6-12	18	8,1
> 360	> 12	33	14,6
Unknown	Unknown	133	59,1
Total	---	225	100

Table 4 shows potentially inappropriate medications according to Beers criteria and STOPP/START criteria.

We found that 102 (71%) elderly people had at least one potentially inappropriate medication.

Table 4. Potentially inadequate drugs by therapeutic groups according to Beers criteria and STOPP/START criteria.

Therapeutic group	Medicines	cases
Antidepressants	Amitriptyline	15
	Imipramine	8
Antihistamines	Chlorpheniramine	7
	Dimenhydrinate	7
	Diphenhydramine	7
	Hydroxyzine	4
Antispasmodics	Hyoscyamine and derivatives	9
Anti-infectious	Nitrofurantoin	1
	Tetracycline	1
	Clarithromycin	1
Antipsychotic	Haloperidol	1
Central alpha blockers	Methyldopa	1
Non-steroidal anti-inflammatory	Diclofenac	3
	Ibuprofen	21
	Meloxicam	1
	Sulindac	8
	Naproxen	2
	Tenoxicam	3
	Indomethacin	9

Therapeutic group	Medicines	cases
Benzodiazepines	Lorazepam	2
H_2 antagonist	Famotidine	46
Prokinetic	Metoclopramide	6
Non-steroidal anti-inflammatory combinations	Diclofenac + Ibuprofen	1
	Ibuprofen + Sulindac	1
	Acetylsalicylic acid + Ibuprofen	6
	Acetylsalicylic acid + Diclofenaco	3
	Acetylsalicylic acid + Indomethacin	2
	Diclofenac + Sulindac	1
	Indomethacin + Ibuprofen	1
	Indomethacin + Sulindac	1
	Acetylsalicylic acid + Sulindac	1
	Diclofenac + Indomethacin	3
Diuretic loops	Hydrochlorothiazide + Furosemide	1
Antihypertensive + Non-steroidal anti-inflammatory	Irbesartan + Amlodipine + Atenolol + Carvedilol + Sulindac + Ibuprofen	1
	Irbesartan + Amlodipine + Acetylsalicylic acid + Ibuprofen	2
	Irbesartan + Amlodipine + Diclofenac	1
	Irbesartan + Amlodipine + Naproxen	1
	Amlodipine + Acetylsalicylic acid	8
	Amlodipine + Indomethacin +Tenoxicam	1
	Amlodipine + Ibuprofen	2
	Amlodipine + Sulindac	1
	Amlodipine + Sulindac + Ibuprofen + Acetylsalicylic acid	1
	Irbesartan + Atenolol + Acetylsalicylic acid	3
	Atenolol + Indomethacin	1
	Atenolol + Tenoxicam	1
	Enalapril + Atenolol + Ibuprofen	2
	Irbesartan + Acetylsalicylic acid	2
	Atenolol + Irbesartan + Ibuprofen + Acetylsalicylic acid	1
	Enalapril + Amlodipine + Ibuprofen	1

Therapeutic group	Medicines	cases
	Enalapril + Amlodipine + Tenoxicam	1
Non-steroidal anti-inflammatory + Antacid	Sulindac + Aluminum Magnesium hydroxide	1
Beta-blocker + calcium channel	Propranolol + Carvedilol +	1
blocker	Verapamil	1
Beta blocker + Oral corticosteroid	Atenolol + Beclomethasone	2
Beta-blocker + Antacid	Atenolol + Aluminum hidroxide	1
Beta-blocker + Loop diuretic	Carvedilol + Furosemide	3
	Atenolol + Furosemide	1
Calcium channel blocker + Diuretic loop	Amlodipine + Furosemide	2
Non-steroidal anti-inflammatory + Loop diuretic	Acetylsalicylic acid + Furosemide	5
	Ibuprofen + Furosemide	2
Digitalic + Loop diuretic	Digoxin + Furosemide	1
Aldosterone Antagonist + Angiotensin converting enzyme inhibitor + Angiotensin antagonist	Spironolactone + Enalapril + Irbesartan	1
	Spironolactone + Irbesartan	3
	Spironolactone + Enalapril	3
Aldosterone antagonist + Non-steroidal anti-inflammatory	Spironolactone + Acetylsalicylic acid	4
Aldosterone antagonist + Loop diuretic	Spironolactone + Furosemide	3
Antipsychotic + Antihypertensive	Haloperidol + Irbesartan + Amlodipine	1
Two antimuscarinics / anticholinergic	Hyoscine butyl bromide + Diphenhydramine	1
	Hyoscine butyl bromide + Chlorpheniramine + Hydroxyzine + Loratadine	1
	Hydroxyzine + Dimenhydrinate	1
	Hydroxyzine + Diphenhydramine	1
	Ipratropium bromide + Hydroxyzine + Loratadine + Cetirizine	1
	Ipratropium bromide + Cetirizine	1
	Chlorpheniramine + Amitriptyline	1
	Hyoscine butyl bromide + Amitriptyline	4
	Dimenhydrinate + Diphenhydramine	1

Therapeutic group	Medicines	cases
Tricyclic antidepressant + H_2 Antagonist	Amitriptyline + Famotidine	1
Tricyclic antidepressant + Prokinetic	Amitriptyline + Metoclopramide	1
	Imipramine + Metoclopramide	1
Antihistaminic + Prokinetic	Diphenhydramine + Metoclopramide	1
	Chlorpheniramine + Metoclopramide	1
Antiespasmódico + Prokinetic	Hyoscine butyl bromide + Metoclopramide	1
Benzodiazepine + Antihistamine + Antidepressant	Lorazepam + Chlorpheniramine + Fluoxetine	1
Antihistamine + Antidepressant	Chlorpheniramine + Fluoxetine	5
Benzodiazepine + Antihistamine + Anticonvulsant	Lorazepam + Diphenhydramine + Carbamazepine	1
H_1 Antagonist + H_2Antagonist	Diphenhydramine + Famotidine	1
Prokinetic + Antihistamine	Metoclopramide + Hydroxyzine + Loratadine	2
Antacid + Oral iron salts	Omeprazole + Fumarate iron	2
	Aluminum -Magnesium -Simethicone + Fumarate iron	3
H_2 antagonist+ Antacid	Famotidine + Aluminum hydroxide	2
Antacid combination	Omeprazole + Famotidine + Aluminum - Magnesium -Simethicone + Magnesium Hydroxide	1
	Omeprazole + Aluminum Hydroxide	1
	Omeprazole + Aluminum -Magnesium - Simethicone + Magnesium Hydroxide	2
	Omeprazole + Famotidine	2
Antiaggregant + Antacid	Acetylsalicylic acid + Aluminum-Magnesium-plus simethicone	1
Two antidepressants	Fluoxetine + Amitriptyline	1
Calcium antagonist + constipation treatment	Amlodipine + Psyllium plantago	1
	Amlodipine + Mineral oil	1
Calcium antagonist + constipating	Amlodipine + Acetaminophen with codeine	1
Two anticonvulsants	Carbamazepine + Divalproex sodium	1
	Phenytoin + Divalproex sodium	1

Therapeutic group	Medicines	cases
Anticonvulsant + Antidepressant	Carbamazepine + Amitriptyline	1
Alpha 2 agonist + antidepressant	Methyldopa + Amitriptyline	1
Anticonvulsant + Opioid	Carbamazepine + Tramadol	1
Anticonvulsant + Selective inhibitor recapture serotonin	Phenytoin + Fluoxetine	1
	Divalproex sodium + Fluoxetine	1
Anticonvulsant + Proton Pump Inhibitor	Carbamazepine + Omeprazole	1
Anticonvulsant + Statin	Carbamazepine + Lovastatin	2
Antacid + Statin	Aluminum -Magnesium -Simethicone + Lovastatin	2
Antiarrhythmic + Statin	Amiodarone + Lovastatin	1
Opioid + Selective inhibitor recapture serotonin	Tramadol + Fluoxetine	1
Non-steroidal anti-inflammatory + Selective inhibitor recapture serotonin	Acetylsalicylic acid + Fluoxetine	3
Vitamin + Antacid	Vitamin D + Aluminum -Magnesium -Simethicone	1
Non-steroidal anti-inflammatory + antidepressant	Sulindac + Fluoxetine	1
hypoglycaemic + Non-steroidal anti-inflammatory	Glibenclamide + Ibuprofen	6
	Glibenclamide + Sulindac	2
Hypoglycaemic +Anticonvulsant	Glibenclamide + Carbamazepine	1
Hypoglycaemic +Loop diuretic	Metformin + Furosemide	1
	Insulin + Furosemide	1
Hypoglycaemic + Beta blocker	Glibenclamide + Enalapril	2
	Metformin + Atenolol	1
Calcium channel blocker + Anticonvulsant	Amlodipine + Carbamazepine	2
Two hypoglycaemic	Insulin + Glibenclamide	1
Hypoglycaemic + Thyroid agent	Insulin + Levothyroxine	1
Beta-blocker + insulin	Atenolol + Insulin	1
Beta-blocker + calcium channels antagonist	Propranolol + Carvedilol + Verapamil	1
Loop diuretic + Anti drop	Hydrochlorothiazide + Allopurinol	2
ACE inhibitor + Anti drop	Enalapril + Allopurinol	1

Therapeutic group	Medicines	cases
ACE inhibitors + Antacid	Enalapril + Aluminum + Magnesium + Simethicone	2
Antibiotic + Anti drop	Amoxicillin + Allopurinol	1
Antibiotics + ions	Tetracycline + Calcium + Aluminum	1
Antibiotic + Proton Pump Inhibitor	Clarithromycin + Omeprazole	2
Non-steroidal anti inflammatory + Proton Pum Inhibitor	Acetylsalicylic acid + Omeprazole	4
Antiplatelet agent + Antibiotic	Clopidogrel + Tetracycline	1
Antiplatelet agent + Proton Pump Inhibitor	Clopidogrel + Omeprazole	1
Antidepressant + Proton Pump Inhibitor	Fluoxetine + Omeprazole	2
Cholesterol-lowering agent + Antifungal	Lovastatin + Itraconazole	1
	Lovastatin + Fluconazole	1
Cholesterol-lowering agent+ Antidepressant	Gemfibrozil + Fluoxetine	1
	Gemfibrozil + Imipramine	2
Thiazide diuretic + Antifungal	Hydrochlorothiazide + Fluconazole	1
Antidepressant + Ocular beta blocker	Amitriptyline + Timolol	1
Non-steroidal anti-inflammatory without H_2 antagonist or Proton Pump Inhibitor	Ibuprofen + Acetylsalicylic Acid	3
	Naproxen	1
	Sulindac	1
Non-steroidal anti-inflammatory + Corticosteroid	Acetylsalicylic Acid + Beclomethasone	1
Thyroid agent + Cholesterol-lowering agent	Levothyroxine + lovastatin	3
Thyroid agent + Iron salts	Levothyroxine + Iron	2
Thyroid agent + Anticonvulsivante	Levothyroxine+ Phenytoin	1
Bisphosphonate +Non-steroidal anti-inflammatory	Alendronate + Acetylsalicylic acid	2
Loop diuretic + Non-steroidal anti-inflammatory	Furosemide + Ibuprofen + Diclofenac	1
Antibiotics	Clarithromycin + Amoxicillin + Cephalexin	1

We found 388 (29%) cases of potentially inappropriate medications: a) 119 (9%) Cardiovascular system, including furosemide (18 cases), amlodipine (15 cases), atenolol (14 cases), enalapril (11 cases), irbesartan (6 cases); b) 108 (8%) Digestive system, including famotidine (35 cases), omeprazole (18 cases), lovastatin (7 cases), metoclopramide (7 cases), hyoscine butylbromide (7 cases); c) 66 (5%) Skeletal muscle, such as ibuprofen (31 cases), sulindac (12 cases) and indomethacin (9 cases); d) 49 (4%) Nervous system, highlighting fluoxetine (18 cases) and amitriptyline (12 cases) and e) 17 (1%) Respiratory system, highlights chlorpheniramine (9 cases).

DISCUSSION

With this study, it was found that 93,5% of elderly people of Los Guidos - Costa Rica, had cases of drugs to treat mainly cardiovascular (29%), digestive (22%), skeletal muscle (12%), nervous (9%) and respiratory (7%) system. These findings are related to the following results found in one study: cardiovascular (22,81%) antimicrobials (16,8%) and gastrointestinal system (13,6%)[28]; nervous system (35,6%), gastrointestinal (24,4%), cardiovascular (23,9%), blood (3,1%), respiratory (3%), skeletal muscle (2,5%)[40] and nervous system (25,4%), cardiovascular (25,2%), gastrointestinal (17,1%), respiratory (7,7) in another study.[41]

Among the medications most consumed by elderly people in Los Guidos - Costa Rica, are those to treat hypertension, such as amlodipine (27%), enalapril (24%), atenolol (21%), irbesartan (13%); for diabetes, metformin (23%) and insulin (14%); for cholesterol, lovastatin (49%), in the case of gastrointestinal disorders, omeprazole (13%) and famotidine (31%); for depression, fluoxetine (13%) and amitriptyline (10%); for pain or inflammation such as ibuprofen (15%).

These findings agree with a study in which they reported that the drugs most consumed in Costa Rica by elderly people were antihypertensive drugs (18%), anti-thrombolytic drugs (11%), diuretics (8%), hypoglycemic drugs (7%) and lipid-lowering drugs (6 %)[42]; similarly, in another study they reported antihypertensives (87%), platelet antiaggregant (36%) and they found as potentially inappropriate prescriptions 24%, included diuretics (25%), statins (20%), hypoglycemic (18%), non-steroidal anti-inflammatory (9%) and antidepressants (4%)[29].

In our study, from elderly people with medication, 45,64% had polypharmacy (5-10) and 31,38% had high polypharmacy (> 10); this result is similar to that reported in the scientific literature, so in one study they found polypharmacy in 52% and high polypharmacy in 23,25%[28], while in another study, they also found 45% of polypharmacy[43] and 75,4% in another[44]; however, these reports are higher than 24,4% reported in one study (> 5)[45], 27,4% in another[29] and 6% in the last one.[46]

It was found in this study that few people had no medication (6%), 15% had between 1 and 4, while the rest had a large number of medications; these results contrast with what was reported in a study where the percentage decreases as the number of medications increases, namely: 0 (42%), 1-4 (36%), 5-9 (15%), 10-14 (4%),> 15 (1%).[41]

In our study, due to the fact that the largest number of drug cases was found in women, there were also more women than men reporting polypharmacy; which agrees with that reported in a study where the frequency of women was higher (29,6%) than in men (19,2%)[45] and in another study, 75,6% was found in women and 59, 3% in men[47] However, these data contrast with the report of a study that indicates that the proportion of men with polypharmacy was 60,03%.[28] The greater the quantity of drugs present, the likelihood of drug-related problems also increases[26], among which the potential interactions stand out, our results agree with the reports of other studies. In our study, it was found that 102 elderly people (71%) had at least one drug with the potential to be inadequate, a fact that agrees with the other study.[48]

We found 388 (29%) cases potentially inappropriate medications, cardiovascular system (9%), digestive (8%) and skeletal muscle (5%) medicines stood out; in one study, they found that 58,2% of elderly people had potentially inappropriate medications and where the nervous system (58,7%), anticholinergic (21,2%) and cardiovascular (10,8%) drugs stood out[49]; in another they found 27% of drugs, especially for nervous system[46] and in another it was found that 82 of 467 elderly people had five or more medicines with potential to cause adverse reactions, including long-term non-steroidal anti-inflammatory agents, long-acting benzodiazepines, anticholinergics, tricyclic antidepressants, metoclopramide[43]; in another study was detected 6,9% of potentially inappropriate medications[29]; in another, they reported 27,1%[46]; in one more study, it was found that there was a 30,6% potential for interactions between central nervous system drugs[50] and in another study, it was reported that 82,6% took at least one potentially inappropriate medication, where antipsychotics

(26,5%) and analgesics (15,1%) stood out, also highlighting that 29,7% were medicines that elderly people should avoid regardless of their condition, 1,1% in certain diseases or syndromes and 1,6% of use with caution[40]; another study mentions that 20% had non-steroidal anti-inflammatory, glibenclamide and insulin, in addition one third with constipation used calcium antagonists[51], non-steroidal anti-inflammatory in hypertensive patients or with acid peptic disease when it has been reported as risky and beta blockers can alter ventilatory dynamics[4]

We found people using haloperidol, which can cause extrapyramidal effects and can also cause variations in blood pressure; however, a case was found where person had the combination of several drugs with anticholinergic effects, such as ipratropium, hyoscine butyl bromide, cetirizine, hydroxyzine, famotidine, amitriptyline and loratadine; although this combination of drugs can inhibit the therapeutic response of haloperidol and, at the same time, those drugs can exacerbate the anticholinergic effects (19), even though, there are those who justify the use of some of these drugs, since it has been described that anticholinergic drugs are used to counteract extrapyramidal effects of antipsychotics.[37]

Another aspect is the use of tricyclic antidepressants (amitriptyline) in combination with drugs to treat glaucoma but it can exacerbate ocular involvement (37); if person also uses a non-steroidal anti-inflammatory agent as ibuprofen and some antihistamines together as hydroxyzine and dimenhydrinate, this makes the effect of timolol decrease, so it must resort to the need to combine timolol with dorzolamide, an inhibitor of carbonic anhydrase to try to control the intraocular pressure.[37] Antidepressants as amitriptyline and imipramine although are not totally contraindicated in older adults, but it is known that their anticholinergic effects can cause or aggravate constipation like other medicines such as furosemide, levothyroxine sodium, and ibuprofen.[51,52]

Likewise, a case of amitriptyline use was found in a person with depression, which uses metoclopramide and it can cause depression, in addition, that person has the benzodiazepine of lorazepam and an antihistamine, chlorpheniramine; what exposes the person at risk of falls and anticholinergic effects can antagonizes metoclopramide´s effect.[37] In another case, one person also uses metoclopramide which can cause extrapyramidal symptoms and these can be accentuated by some antihistamines as loratadine and hydroxyzine, but they may have anticholinergic effects[37]; in addition, hydroxyzine can cause sleep disturbances.[17]

A person had tramadol, an opioid derivative in conjunction with fluoxetine, a selective serotonin reuptake inhibitor, this combination generates risk because long-term fluoxetine can raise cholesterol and the opioid can aggravate depression and cause seizures, that was why, this person maybe receive divalproex sodium; however, the person uses indomethacin and acetylsalicylic acid, those can affect kidney function and affect the opiate elimination[37]; the use of non-steroidal anti-inflammatory leads to the use of omeprazole, a potentially inappropriate prescriptions that can also cause seizures and is metabolized via the liver by altering the bioavailability of other drugs, such as lovastatin, levothyroxine and fluoxetine.

That person also uses insulin and metformin, but also enalapril and atenolol and nonselective beta-blockers can cause hypoglycemia and mask signs / symptoms of hypoglycemia of salicylates and metformin. This elderly person uses lovastatin to lower cholesterol, perhaps by the use of fluoxetine, but the statin can cause seizures and neuromuscular reactions, such as pain, weakness and spasms, also uses levothyroxine which can also cause muscle pain and tremor; but its absorption may be diminished by antacids as aluminum hydroxide, magnesium hydroxide, every one alone plus combination with simethicone or by iron salts or by the effect of phenytoin.[27,37]

Other possible interactions between drugs found in this study, it is mentioned that serum phenytoin concentrations may increase in the presence of fluoxetine; thiazide diuretics together with allopurinol can exacerbate gout[37]; the use of alendronate with acetylsalicylic acid may have a risk of gastrointestinal adverse effects, especially in conjunction with other medications that may favor these disorders such as lovastatin and levothyroxine[37]; potassium-sparing diuretics such as spironolactone and angiotensin converting enzyme inhibitors may cause hyperkalemia risk when combined with irbesartan; amoxicillin, angiotensin converting enzyme inhibitors and thiazide diuretics may promote the hypersensitivity of allopurinol; hydrochlorothiazide may increase plasma levels of fluconazole; furosemide may increase the effects of verapamil, atenolol, and metformin, and potentiate the hypotensive and renal effects of non-steroidal anti-inflammatory and angiotensin converting enzyme inhibitors by hypovolemia, but metformin may decrease furosemide concentrations; furosemide may also increase the risk of toxicity with digitalis due to hypokalemia and cause fatigue.[50,53]

Metformin in conjunction with calcium channel blockers tends to produce hyperglycemia; the use of itraconazole is contraindicated with lovastatin due to the enzymatic inhibition that

elevates its serum levels; propranolol and carvedilol increase the effect of verapamil which can cause bradycardia; high concentrations of clopidogrel could interfere with the metabolism of irbesartan and some non-steroidal anti-inflammatory agents, which would generate toxicity, some medicines can cause delirium, such as famotidine, amitriptyline, diphenhydramine, non-steroidal anti-inflammatory agents; some drugs cause alterations at the enzymatic level of cytochrome P450 in the liver, which affects the metabolism of other drugs, such as omeprazole and clopidogrel[50,54], tramadol and omeprazole, fluoxetine with amitriptyline, carbamazepine and omeprazole, anticonvulsants and fluoxetine, clarithromycin and calcium channel blockers[55], risk of hip fracture has been reported in omeprazole users for a short period of time.[47]

The use of furosemide, levothyroxine and ibuprofen has been associated with constipation; which can be aggravated by the use of medications with anticholinergic properties.[56] Carbazepine has been associated with diarrhea.[51] In case of hypertensive people, the damage caused by non-steroidal anti-inflammatory agents include acute renal failure and angiotensin-converting enzyme inhibitors, angiotensin receptor blockers and diuretics is mentioned[57]; hypotension is also reported due to the combination of angiotensin converting enzyme inhibitors, loop diuretics and calcium channel blockers.[43]

In addition, interactions between medications are possible[14,50,58], but this study shows the lack of therapeutic adherence by elderly people[38,39,48,59], since half of them had cases of medication in their homes for more than six months, which is long time to store them at home, although most of them stored in the bedroom (70%), some of them were stored an inconvenience place, such as kitchen (too hot) and bathroom (high humidity); besides, seventeen percent had reached their expiration date and a significant percentage of older people buy over-the-counter medications or receive them through donations from others.

In Costa Rica, a previous study found that people acquire medicines from the Social Security and accumulate them at home, even if they have reached their expiration date.[59,60] These data agree with another study in which they found that 93% of the people keep the medicines in the bedroom and that 50% keep them even if they are expired[61]; a contrary situation is reported in other places, where they found that 9% of people used to stored expired medicines.[48,62-65] Other risk conditions to consider are the use of over-the-counter medications[66-68], which aggravate polypharmacy and drugs that are potentially inappropriate; however, this is reported as a common practice among older adults, both in

Costa Rica[59] and in other countries.[66-68] In addition, it is important to always remind that possible interactions between medications and foods should be considered.[31]

As a limitation of this study, we have the fact that it cannot be guaranteed that elderly people were using all medicines[9] that were present at home; however, the conditions in which these drugs were found, make them a latent risk[68], which requires a better team work of health professionals and the social support network[61] to minimize all kind of negative impact of medications[15,38] on quality of life of the elderly population.

CONCLUSIONS

This study demonstrates the potential for adverse reactions due to potentially inappropriate medications present at elderly people homes. The medications at home are mainly delivered to the Social Security and specially to treat diseases of cardiovascular, digestive and skeletal muscle system. The large number of medicines present is consistent with the definition of polypharmacy and favor possible drug interactions; in addition, older people accumulate a large number of drugs for a long time, which means that some of them reach the expiration date. Adequate interventions are needed to help older adults make rational use of medicines improving their quality of life.

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