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## RESEARCH ARTICLE

### RISK FACTORS FOR POTENTIALLY INAPPROPRIATE DRUG PRESCRIPTION IN OLDER ADULTS

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#### ABSTRACT

**Background:** The potentially inappropriate pharmacological prescription in older adults occurs when the risk of adverse effects is greater than the clinical benefit when prescribing a medication. **Objective:** Determine the risk factors for potentially inappropriate drug prescription in older adults. **Methods:** Observational, cross-sectional, prospective and analytical study in patients who visited the Veracruz Specialties Naval Hospital. Including age from 65 years, at least one chronic condition and at least one control medication. The STOPP / START questionnaire was used to detect the potentially inappropriate prescription. Two groups were formed: with inappropriate prescription and with appropriate prescription. The risks were included: greater than 4 diseases, greater than 5 medications, age between 65 to 74 years, female sex, analyzed with descriptive and inferential statistics with OR and 95% CI; Chi square. Using statistical package SPSSv24.0. **Results:** 300 patients were evaluated, average age  $75.4 \pm 7.3$  years. The inappropriate pharmacological prescription was 91 (31.7%). The risks greater than 4 comorbidities were inappropriate 17 (18.7%) and appropriate 25 (12.0%); OR 1.6 (IC 95.0-3.3),  $P = 0.123$ . The use of more than 5 drugs in inappropriate 18 (19.8%) and appropriate 40 (19.1%) OR 1.0 (95% CI 0.5-1.9),  $P = 0.897$ . The female sex was inappropriate 48 (52.7%) and 112 (53.6%) OR 0.9 (0.5-1.5),  $P = 0.893$ . No significant statistical differences were identified between each of these variables. **Conclusions:** No association was found between the factors studied and the potentially inappropriate prescription.

#### INTRODUCTION

Potentially inappropriate prescription in older adults (PIP) occurs when the risk of adverse effects is greater than the clinical benefit when prescribing a medication, especially when there is evidence of the existence of safer and / or effective therapeutic alternatives (Salud, 2010). It covers three domains: erroneous prescription which refers to the prescription of a medication that significantly increases the risk of an adverse drug reaction (ADR). This includes the prescription that implies an incorrect dose, the drug is used with a frequency or duration longer than the recommended time, there is an increased risk of harmful interaction with other medications, diseases or clinical conditions or there is duplication of active ingredients within the same pharmacological class; excessive prescription which is referred to as the prescription of medicines for which there is

no clear clinical indication and insufficient prescription that refers to the omission of potentially beneficial drugs that are clinically indicated for the treatment or prevention of a disease (Connor, 2012). This is a very common practice in the first level of medical care and can often be prevented. In some Latin American countries an incidence of PIP is reported up to 65.4% (Fajreldines, 2016). Mexico is no stranger to this problem and in studies conducted in hospitals in Nuevo León and Distrito Federal, it was observed that 48.9% and 22.3%, respectively, of the population studied recorded at least one prescription of potentially inappropriate medications (González-Pedraza, 2015; Martínez-Arroyo, 2014). Among the most frequent PIPs, benzodiazepines (BZD) and nonsteroidal anti-inflammatory (NSAIDs) drugs are reported (González-Pedraza, 2015). Moreira Mori et. al., published in 2017, in Brazil, the prevalence and predictors of PIP among elderly patients at hospital discharge and, however, observed that no variable significantly influenced their identification (Mori, 2017). L Page et. al, in 2010, mentions as polypharmacy and the number of prescribed medications as potential risk factors

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for PIP in older hospitalized adults over 85 years, referring and extrapolating the main causes of adverse drug events (Page, 2010). Other studies published in relation to risk factors, depending on the tool used, show a relationship as a risk factor for PIP, polypharmacy and female sex, using Beers criteria and using the EU (7)-PIM tool (Grina, 2017). In turn, PIP in older adults has also been associated as a risk factor for polypharmacy, this demonstrated by Hitoshi Komiya and collaborators in the study published in 2017 and conducted in Aichi, Japan, in a gerontological center (Komiya, 2017). In 2016, results of the study conducted in Seoul, Korea were published. Performed in the family medicine department, Konkuk University Medical Center, whose results revealed the association between prescription of 5 or more medications with PIP (Lim, 2016). Some of the consequences of polypharmacy mentioned are the prescription cascades, adverse drug reactions, drug interactions and non-adherence to treatment (Ramirez, 2015). Thus, in order to evaluate the PIP, in Ireland, they were developed in the STOPP / STAR criteria (Screening Tool of Older Person's potentially inappropriate Prescriptions/Screening Tool to Alert Doctors to the Right appropriate indicated Treatment), for potentially inadequate prescription and omissions in the prescription, prepared by 18 experts in Geriatric Medicine, Clinical Pharmacology, Pharmacists experts in geriatric pharmacology, Psychogeriatricians and Doctors Primary care. The reliability among the observers was 0.75 Kappa coefficient for the STOPP criteria and 0.68 for the START. The last revision of this tool was carried out in 2012 (O'mahony, 2015).

The Spanish language translation was carried out in Spain in 2009, and two researchers applied it independently. 87% positive agreement was obtained, with 0.75% Kappa. The criteria were ordered according to the most relevant physiological systems to facilitate their consultation easily (in approximately 5 min), and consist: START is an inventory based on the evidence of 22 medication prescription indicators, for prevalent diseases in the elderly and the STOPP which is a list of 65 clinically relevant criteria of potentially inappropriate prescription drugs each STOPP criterion is accompanied by a concise explanation of why its prescription is considered inadequate in older people. The last update was made in 2014 (Gallo, 2015). The use of the STOPP / START criteria for potentially inappropriate prescription and omissions are transcendental and in some countries they have been incorporated as screening tools in the national polypharmacy and medication guidelines in the elderly. In the Mexican Clinical Practice Guideline for pharmacological prescription in the elderly, the use of the STOPP / START criteria is recommended (Salud, 2010). The purpose of this study is to determine the risk factors for potentially inappropriate pharmacological prescription in older adults who attend the outpatient clinic of Family Medicine of Veracruz Specialties Naval Hospital in the period from March to June 2018.

## MATERIALS AND METHODS

Observational, cross-sectional, prospective and analytical study in patients who went to an outpatient clinic of Family Medicine from March to October 2018. Patients with age from 65 years of age, with at least one chronic condition with indication of at least 1 control medicine, which are those for which the patient comes to his office monthly and that keeps the patient stable.

Patients who did not have a history of medication for more than one month were excluded and patients under 65 years of age were eliminated, and were discharged without treatment.

The study variables were age, sex, comorbidity, number of drugs used. Once this study is approved by the ethics and research committee of Veracruz Specialties Naval Hospital, with registration number 058/18. The patient was located in an outpatient clinic of Family Medicine and the benefits of the study were explained, so that once he accepted, he was invited to go to a doctor's office and answer simple questions about his prescriptions, as well as review the electronic file to be assessed by the STOPP / START questionnaire, for this, the patient was questioned about the medications he was consuming prescribed by his doctor, later this treatment was checked against those described in his last prescriptions to corroborate dose and time he has consumed it, to finally check with electronic file. Through non-randomized sampling for convenience, and non-probabilistic sample size, were included as risks: greater than 4 diseases, greater than 5 medications, age between 65 to 74 years, female sex, based on the literature consulted. Once knowing the result of this questionnaire, two groups were formed: Group A with inappropriate prescription and group B with appropriate prescription. To describe the subjects with inappropriate prescription, the STOPP / START questionnaire was applied, which consists of two dimensions that are the START, which is an inventory based on the evidence of 22 medication prescription indicators, for diseases prevalent in the elderly, being positive for inappropriate pharmacological prescription with one or more criteria. the STOPP, which is the other domain and consists of a list of 65 clinically relevant criteria for potentially inappropriate prescription drugs, each STOPP criterion is accompanied by a concise explanation of why its prescription is considered inappropriate in older people, if there is an erroneous prescription, it is taken as inappropriate. The results of the variables were coded in Excel 2013 for analysis in a statistical package. A descriptive statistical analysis was performed with calculation of measures of central tendency (mean and median) for quantitative variables. And absolute and relative values for qualitative variables. The statistical inference was made by means of Chi-square test with Yates correction in addition to odds ratio (OR) and 95% confidence interval, with a statistical significance value of  $p < 0.05$ , using the statistical package SPSSv24.0.

## RESULTS

We interviewed 300 patients with ages equal to or greater than 65 years of both sexes who attended the outpatient clinic of Family Medicine of the Naval Hospital of Specialties of Veracruz who met the inclusion criteria. of which the average age was 75.4 +/- 7.3 years. 46.0% (138) were male patients and 54.0% (162) female patients. Of the population studied, 95 (32%) patients presented at least one inappropriate prescription according to the STOPP / START lists as shown in Figure 1. 67 (22.3%) presented an inappropriate prescription according to the START list and 22 ( 7.3%) I present at least one omission according to the STOPP list and 6 patients (2%) for both listings. According to the STOPP criteria corresponding to inappropriate prescriptions, 10 patients (6.3%) with Benzodiazepine use and 8 patients (5.4%) with long-term sulfonylurea use were found. And according to the START criteria, the omission of the pneumococcal vaccine was found in 39 patients (26.2%).

Table 1. Risk factors of appropriate and inappropriate pharmacological prescription at the Veracruz Specialties Naval Hospital

| Riesgos/presentes     | Inapropiada | Apropiada   | OR % (IC 95%) | Valor P |
|-----------------------|-------------|-------------|---------------|---------|
| Edad entre 65-74 años | 43 (47.3%)  | 113 (54.1%) | 0.7 (0.4-1.2) | 0.227   |
| Sexo femenino         | 48 (52.7%)  | 112 (53.6%) | 0.9 (0.5-1.5) | 0.893   |
| ≥ 5 fármacos          | 18 (19.8%)  | 40 (19.1%)  | 1.0 (0.5-1.9) | 0.897   |
| ≥ 4 enfermedades      | 17 (18.7%)  | 25 (12.0%)  | 1.6 (0.8-3.3) | 0.123   |

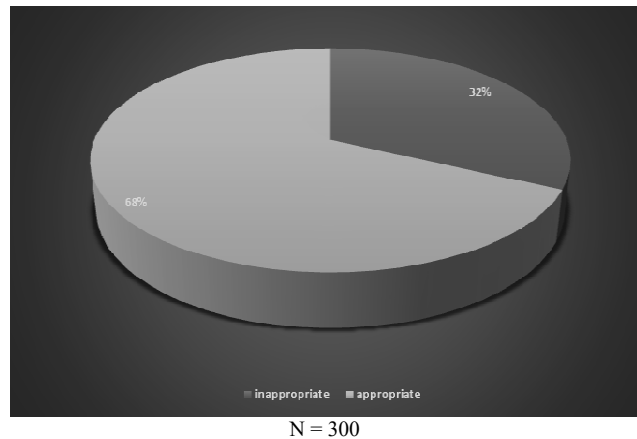


Figure 1. Frequency of appropriate and inappropriate pharmacological prescription at the Veracruz Specialties Naval Hospital

When performing the statistical regression analysis, two groups were taken into account: potentially inappropriate and appropriate pharmacological prescription. The risks greater than 4 comorbidities were inappropriate 17 (18.7%) and appropriate 25 (12.0%); OR 1.6 (95% CI 0.8-3.3), p = 0.123. The use of more than 5 drugs in inappropriate 18 (19.8%) and appropriate 40 (19.1%) OR 1.0 (95% CI 0.5-1.9), p = 0.897. The female sex was inappropriate 48 (52.7%) and appropriate 112 (53.6%), OR 0.9 (0.5-1.5), p = 0.893. And the age between 65-74 years was inappropriate 43 (47.3%), appropriate 113 (54.1%), OR 0.7 (0.4-1.2), p = 0.227. Table 1

**DISCUSSION**

In this study, 300 patients were selected who went to the outpatient clinic of Family Medicine of the Veracruz Specialties Naval Hospital, where it was observed that the prescription was inappropriate in 95 (32%) similar to studies conducted in Madrid, Spain where they indicate that in 81 (32%) inappropriate prescription was observed in patients older than 65 years (Parodi López, 2014). That also the average age of the patients in our study was 75.4 ± 7.3 years, of them, the male sex prevailed with 46%, as in New Zealand where the PIP was detected in 41%, the study subjects being close to 74 years fifteen (Mpharmprac, 2015). Comparing with the studies carried out in Mexico, the prevalence found in the patients studied in this study was lower than that reported by Martínez-Arroyo in the study carried out in Monterrey, Nuevo León, in the year 2013 to 2014 in which a prevalence was found for inappropriate prescription of drugs of the 30% according to the STOPP criteria and 96% according to the START criteria; and it was also lower than the one reported by González-Pedraza in the study conducted at a gerontological center in Mexico City, reporting that of the 300 patients studied, 195 (65%) recorded at least one prescription of potentially inappropriate medications (González-Pedraza Avilés, 2015; Martínez-Arroyo, 2014). The most frequently found prescription was the use of benzodiazepines, according to the rest of the literature

(Fajreldines, 2016; González-Pedraza, 2015); However, the most frequent omission in this study it was the application of pneumococcal vaccines in 26.2% of patients, this is different from what was reported in the literature by Nauta et. al where it reports a prevalence of 17% omission in the use of statins in patients with a well-documented history of coronary arteriosclerotic, cerebral or peripheral arterial disease, unless the patient is at the end of life or his age is over 85 years (Nauta, 2017). Regarding associated risk factors, it was found that in the population studied, none of the risk factors analyzed had any significant association with the potentially inappropriate prescription, this being in accordance with the review carried out by Moreira and collaborators in Brazil in 2017. The female sex did not represent a risk factor for potentially inappropriate drug prescription, this in contrast to the study by Grina et. al., where an association was found (Grina, 2017). Age, polypharmacy and suffering more than 5 diseases also did not represent risk factors for potentially inappropriate prescription, this is contrasted with what was reported by L. Page et. al., in 2010 and by Hitoshi Komiya and collaborators in the study published in 2017 and conducted in Aichi, Japan, in a Gerontological center (Page, 2010; Komiya, 2017). Therefore, in our study the frequency of 32% in PPI is considered acceptable, which corresponds directly to the population over 65 years of age.

**Conclusion**

This study concludes that in our Navy environment, female sex, the age between 65 and 75 years, polypharmacy and suffering more than 5 diseases, are not risk factors for potentially inappropriate pharmacological prescription in older adults.

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