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Prescription Analysis of Geriatric Patients Among Community Pharmacies in Trivandrum District

Analysing geriatric prescriptions from selected community pharmacies

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Abstract: Prescription pattern analysis is a part of drug utilization studies with the main focus on prescribing of drugs. They promote appropriate use of monitored drugs and reduction of abuse or misuse of monitored drugs. Elderly patients use more prescribed and OTC medications than younger generations. A large number of elderly people suffering from chronic and degenerative diseases, leading in turn to a demand for more medication While being the major consumers and the greatest beneficiaries of modern drug therapy, elderly patients are particularly vulnerable and most at risk of suffering adverse drug reactions (ADRs), drug-drug interactions etc.

Methodology: The study sample included 340 valid geriatric outpatient department (OPD) prescriptions presented to three randomly selected community pharmacies in Trivandrum, collected over a period of 3 months. The collected prescriptions were analyzed for the presence of prescription errors, Drug interactions and Polypharmacy based on prescription parameters defined by the World Health Organization (WHO). Microsoft Office Excel and statistical package for social sciences(SPSS) software were used for processing and analysing the data collected.

Results and discussion: World Health Organization (WHO) core drug prescribing indicators and prescription legibility methods were used for prescription analysis. Using SPSS version 22.0, the collected data were recorded and analysed after manual data verification. Of the total, 1,807 drugs were prescribed with an average drug per prescription of 5.31. Out of these, 9.41% (Optimal value of 20.0%-21.8%) prescriptions consisting of antibiotics, and Prescriptions with injectable medicines were 7.64% (Optimal value of 13.1%-24.1%). The percentage of drugs prescribed with the generic name was 22% and 83% were from WHO essential drug list (Optimal value = 100%). Poor adherence to WHO prescribing indicators and prescribing errors were observed. To identify the root causes of prescription problems in these settings, a comprehensive study needs to be carried out, with point this study as a starting.

Conclusion: The study found that polypharmacy and prescription mistakes are prevalent in Trivandrum, Kerala, with high rates of mistakes and inadequate compliance with WHO prescribing standards. Physicians, clinical pharmacists and community pharmacist should actively involve in prescription analysis for rational prescribing of medications.

Keywords: WHO, Prescription, SPSS version 22.0, geriatric OPD

I.INTRODUCTION

A prescription is a legal document between the physician and the patient. It is an order for a scientific medication for a person at a particular time. Prescribing drugs is an important skill, which needs to be continuously assessed. It shows the doctor's skill in diagnosis and attitude toward selecting the most appropriate cost-effective medication. (1) A prescription has different parts each with its significance. These parts include superscription, inscription, subscription, and signature. A prescription should be according to the prescription writing guidelines which is extremely important for the safety and benefit of the patients (2). Medication errors are among the most pressing problems faced by public health provider, as drugs or medication are the common healthcare link. Knowing where and when errors occur is the first step in trying to prevent these errors. (3).

Elderly patients use more prescribed and over-the-counter medications than younger generations. A large number of elderly people suffer from chronic and degenerative diseases, leading in turn to a demand for more medication. The simultaneous use of multiple drugs by a single patient, for one or more conditions is called polypharmacy. (4) Due to increased comorbidities, polypharmacy is unavoidable in the elderly population. However, polypharmacy has disadvantages, including increased non-adherence, side effects, interactions, and irrational use of medications. The association between polypharmacy and drug-drug interaction has been proven in many studies. (5) Drug-drug interaction (DDI) is said to occur when two or more drugs interact in a way that the efficacy or toxicity of one or more of the drugs is altered. DDIs are considered as avoidable medication-related problem. DDI causes harm to a patient either by increasing the toxicity of a drug or by reducing its efficacy. Chances of DDI occurrence are proportional to the number of drugs prescribed. (6)

While being the major consumers and the greatest beneficiaries of modern drug therapy, elderly patients are particularly vulnerable and most at risk of suffering adverse drug reactions (ADRs). ADRs in the elderly have been characterized as "a major modern epidemic". In India, physicians prescribe medications, and patients purchase them from drug stores mostly run and managed by

non-qualified and nonprofessional individuals. Furthermore, there is no appropriate guidance about the route of administration, dose adjustment, patient counselling, medication management, and education. Therefore, we carried out this study to determine drug interaction, Polypharmacy, and the prevalence of prescription errors among community pharmacies in Trivandrum. (7)

II.MATERIALS AND METHODS

2.1 Study site

Three different community pharmacies in Trivandrum (which is a town on the west coast of India, located to the extreme south of Kerala) were selected for collecting prescriptions.

2.2 Study period:

The study was conducted for a period of three-month period (March 2023 to May 2023)

2.3 Study population and sample size

All the geriatric patients visiting the three selected community pharmacies in the Trivandrum district. Sample size of 340 was calculated considering confidence interval of 95%, margin of error 5% and population proportion assumed as 0.33.

2.4 Study setting:

The study was conducted in 3 different community pharmacies near a tertiary care hospital (Government Medical College Hospital, Trivandrum)

1)Community Pharmacy Services, Paying Counter, Thiruvananthapuram medical college
2)Aswas Community Pharmacy, Chalakuzhy Road, Medical College, Thiruvananthapuram,
3)Viswas Community Pharmacy, Medical College Ulloor Road, Thiruvananthapuram

2.5 Study design:

A Prospective analysis of prescriptions in geriatric patients was carried out using prescriptions issued to patients 60 years and above visiting selected community pharmacies in the Trivandrum district. The study was carried out without informing the physicians but verbal consent was taken from the patients before capturing the prescription images.

2.5.1 Inclusion criteria

A copy of the original prescription was used for the analysis of prescription patterns, medication errors, drug-drug interactions and polypharmacy. Only those prescriptions which were meant for adults above 60 years were included in the study.

2.5.2 Exclusion criteria

Prescriptions, written on scraps of paper, not containing information about the prescriber or patient, were excluded from the study.

2.5.3 Materials used

- Prescriptions
- Medscape -Drug interaction checker
- WHO core drug use indicators
- WHO Essential drug list
- SPSS (statistical package for social sciences) Software

2.5.4 Data collection instrument

For easy sorting, all data obtained were entered into a Microsoft Excel sheet. The Excel sheet for the analysis of prescriptions consists of different sections that include prescription number, age, gender, no of drugs in prescription, drug prescribed by generic name, number of drug from essential drug list, antibiotics present, injections present, dosage form, number of drug interactions, prescription error, absence of strength, therapeutic duplication, improper abbreviation, frequency of dose, duration of the dose, missing warning, illegible handwriting, absence of date, absence of name and signature.

2.6 Procedure

- Prescriptions of geriatric patients of age above 60 years were collected from three different community pharmacies in the Trivandrum district from March 2023 to May 2023.
- 340 prescriptions were collected according to the sample size determined.
- All the data for the prescription analysis were extracted from these 340 prescriptions and entered into the Microsoft Excel sheets.
- Data entered into the Microsoft Excel sheet were subjected to statistical analysis using SPSS software.

2.7 Study parameters

2.7.1 Drug prescribing pattern

Following, WHO (World health organisation), prescribing indicators were used to assess the drug prescribing drug patterns among geriatric prescriptions:

1. Drugs per encounter (Average Number(No)) = (Drugs prescribed (total number)) ÷ (encounters evaluated (total number)).
2. Drugs given by generic name (% age) = (No. of drugs given by generic name) ÷ (Total No. of drugs prescribed) x 100.
3. Percentage of encounters with an antibiotic prescribed (PEAP) = (number of patients (Pt) came across for the period of which an antibiotic was given) ÷ (Total No. of encounters surveyed) x 100.
4. Percentage of encounters with an injection given = (No of pt. encounters during which an injection was given) ÷ (Total No. of encounters surveyed) x 100.

5. Percentage of drugs written from essential drug list = (No. of drugs written from essential drug list) ÷ (Total No. of written drugs) x 100.

Similarly, along with WHO Indicators, the legibility of prescriptions was also evaluated for prescribing patterns. (7,8)

2.7.2Prescription error

The collected prescriptions were analysed for the presence of prescription errors, and the percentage of prescription errors based on prescription parameters defined by World Health Organization guidelines.

i)Errors in prescriber information such as name and signature

ii)Patients' information on prescription such as name, age, and gender.

iii)Medication information on prescription: Generic name, Strength of drug, Dose of the drug, Route of administration, Therapeutic duplication, Improper abbreviation.

iv) Miscellaneous information on prescription: Illegible handwriting, Date of Prescription, Directions, or warnings for patients.

The data were evaluated using an analysis sheet containing all essential parameters defined by the WHO.(9)

2.7.3 Drug-Drug Interactions

All collected prescriptions were evaluated for DDIs by the online Medscape drug interaction checker, a freely accessible software (Multi-Drug Interaction Checker, Medscape). After finding number of drug interactions, its distribution among three variables, Age, Gender, and Number of medications is found. (10)

2.7.4 Polypharmacy

The collected prescriptions were assessed for polypharmacy based on an average number of drugs. Based on the number of drugs prescribed by the physician to the patient's polypharmacy was categorized into two types, Minor Polypharmacy (Mn. PP); those prescriptions having 2-4 medicines, while Major Polypharmacy (Mj. PP); were those prescriptions having five or more than five medicines prescribed. (3)

2.8 Statistical analysis

Microsoft Office and Descriptive Statistics were used for processing and analysing the data. Statistical analysis was carried out with the SPSS software version 22.

III.RESULT

In our study, a total of 340 patient prescriptions were studied comprising 221(65%) male and 119(35%) female patient prescriptions **(Table 1 and Figure 1)**. Most patients were in the age group of 60-69 years (71%). The demographic characteristics of the study patients are presented in **(Table 2 and Figure 2)** (11)

Figure :1 Age distribution of prescription

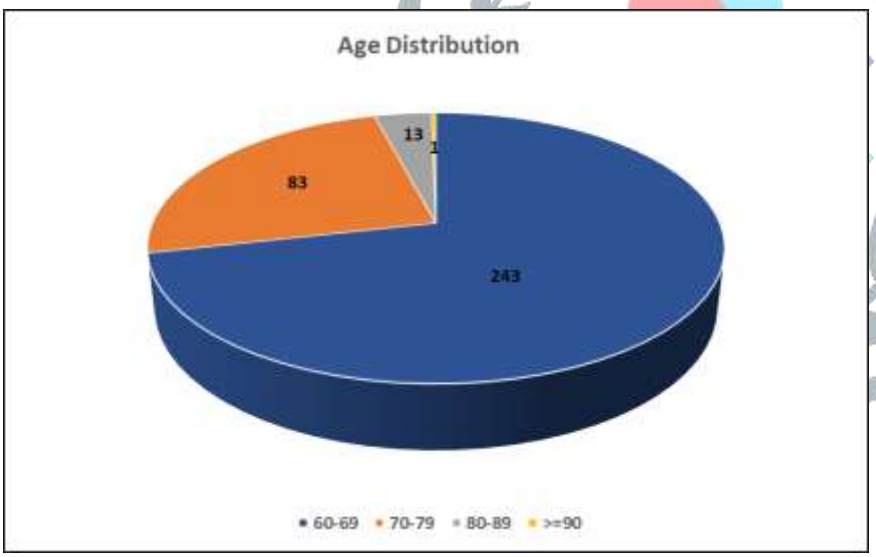


Table :1 Age distribution of prescriptions

Age Group	Frequency	Percentage
60-69	243	71%
70-79	83	24%
80-89	13	4%
>=90	1	0.3%
Total	340	100%

Figure 2: Gender distribution of prescription

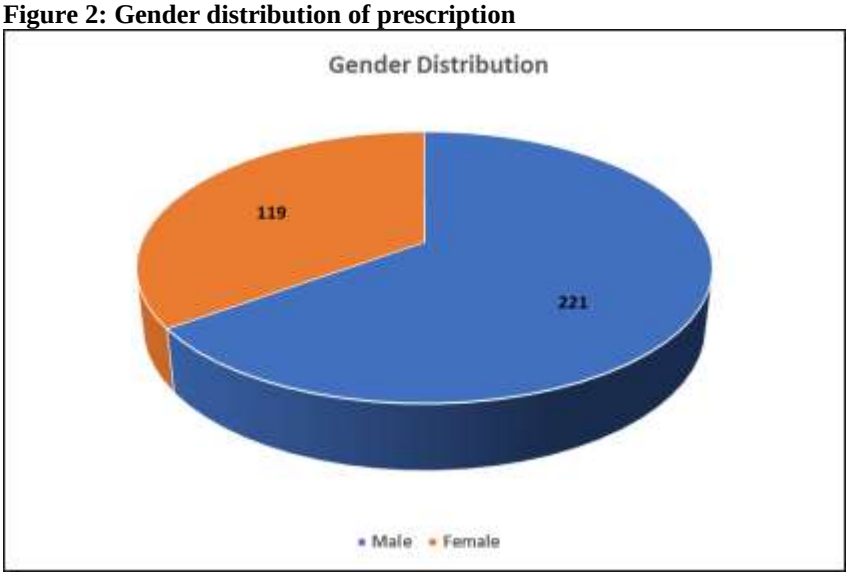


Table :2 Gender distribution of prescription

Gender	Frequency	Percentage
Male	221	65%
Female	119	35%
Total	340	100%

3.1 Drug prescribing pattern

In this study, the prescribers, as expected, were mainly physicians. The average number of drugs per prescription was 5.31 with 1807 drugs prescribed in 340 prescriptions. In Table 3, the pattern of WHO core drug use indicators was tableted in detail. In our study site, most of the drugs are prescribed by their brand name, and very few are prescribed by generic name. This study found only 22% of the drugs, that were prescribed by their generic name.

Of the 340 prescriptions studied a total of 32(9.41%) prescriptions had one or more antibiotics prescribed. Among these 19 (8.59%) were present in male patients and 13(10.92%) were present in female patients. A total of 26 (7.64%) of the prescriptions had at least one injection prescribed along with other drugs of which 19(8.59%) were present in male patients and 7(5.88%) were present in female patients. About 1495(83%) of medicines were prescribed from the WHO essential drug list, of which 968 (65%) were present in male patients and 527 (35%) were present in female patients. (**Table 3)**

Table :3 Drug prescribing pattern

WHO Prescribing Indicators	Male n (%)	Female n (%)	Total n (%)	Standard recommended by WHO
Avg. No. of drugs per prescription	5.33	5.29	5.31	1.6-1.8%
Total No. of drugs prescribed	1178 (65%)	629 (35%)	1807 (100%)	
Percentage of drugs prescribed by generic name	245 (21%)	157 (25%)	402 (22%)	100%
Percentages of encounters with an antibiotic	19 (8.59%)	13 (10.92%)	32 (9.41%)	20.0%-26.8%
Percentage of encounters with an injection	19 (8.59%)	7 (5.88%)	26 (7.64%)	13.4-24.1%
Drugs prescribed from the Essential drug list	968 (65%)	527 (35%)	1495 (83%)	100%

3.2 Prescription errors

In this study, a total of 340 prescriptions were analysed for prescriber's information, patient information, drug information, and miscellaneous information. Each prescription was checked for its proper format. Among the 340 prescriptions, 129 (37.95%) were illegible prescriptions which were due to poor handwriting of the prescribers that may lead to dispensing the wrong medications. Among these illegible prescriptions are found more in patients of the age group 60-69 years. (**Table 4**)

Table :4 Legibility of prescription

Age Group	Legible		Illegible		Legible Total n (%)	Illegible Total n (%)
	Male n (%)	Female n (%)	Male n (%)	Female n (%)		
60-69	96 (64.9)	52 (35.1)	61 (64.2)	34 (35.8)	148 (60.9)	95 (39.1)
70-79	35 (67.3)	17 (32.7)	21 (67.7)	10 (32.3)	52 (62.7)	31 (37.3)
80-89	6 (60)	4 (40)	2 (66.7)	1 (33.3)	10 (76.9)	3 (23.1)
>=90		1 (100)			1 (100)	
Total	137 (64.9)	74 (35.1)	84 (65.1)	45 (34.9)	211 (62.1)	129 (37.9)

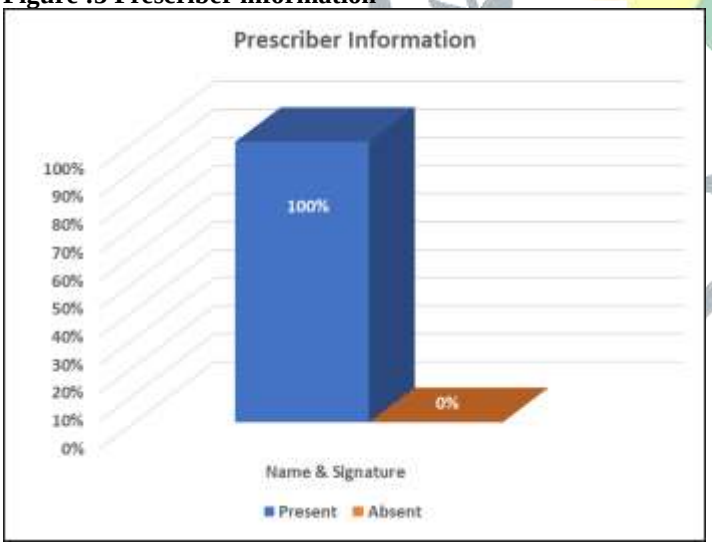
3.2.1Prescriber information

All the 340 prescriptions had prescriber information such as name and signature. **(Table 5 and Figure 3)** But none of the prescriptions contained prescriber address and licence number.

Table :5 Prescriber information

Parameter	Present n (%)	Absent n (%)
Name & Signature	340 (100%)	0 (0%)
Licence Number	0(100%)	340 (100%)
Address	0(100%)	340(100%)

Figure :3 Prescriber information



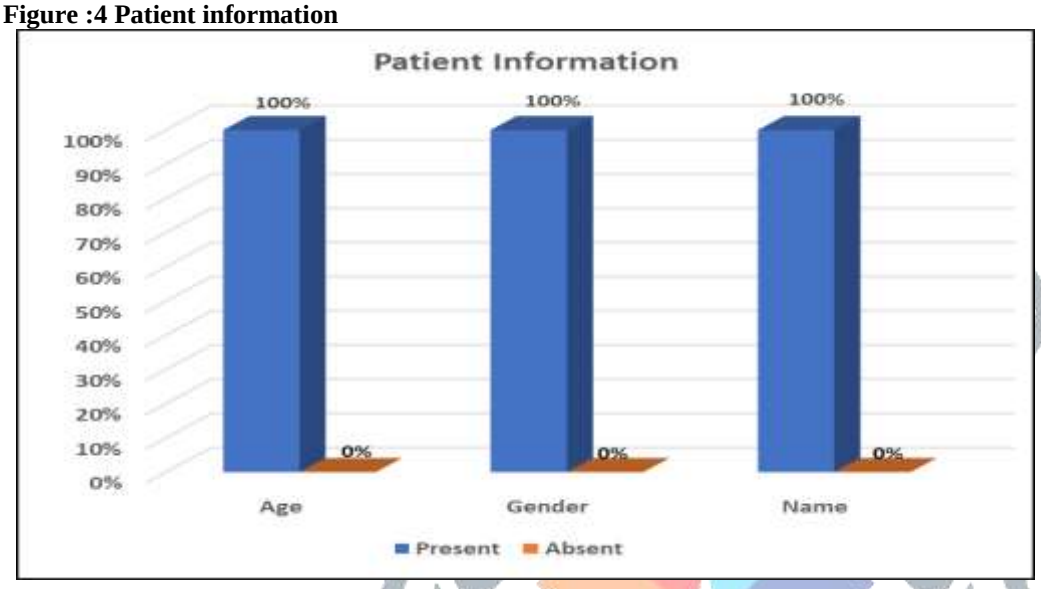
3.2.1Patient information

In our study, all 340 prescriptions contain patient information including age, gender, and name. Even handwritten prescriptions had OP tickets printed with the name, age and gender of the patients. **(Table 6 and Figure 4)**

Table :6 Patient information

Parameter	Present n (%)	Absent n (%)
Age	340 (100%)	0 (0%)
Gender	340 (100%)	0 (0%)
Name	340 (100%)	0 (0%)

Figure :4 Patient information



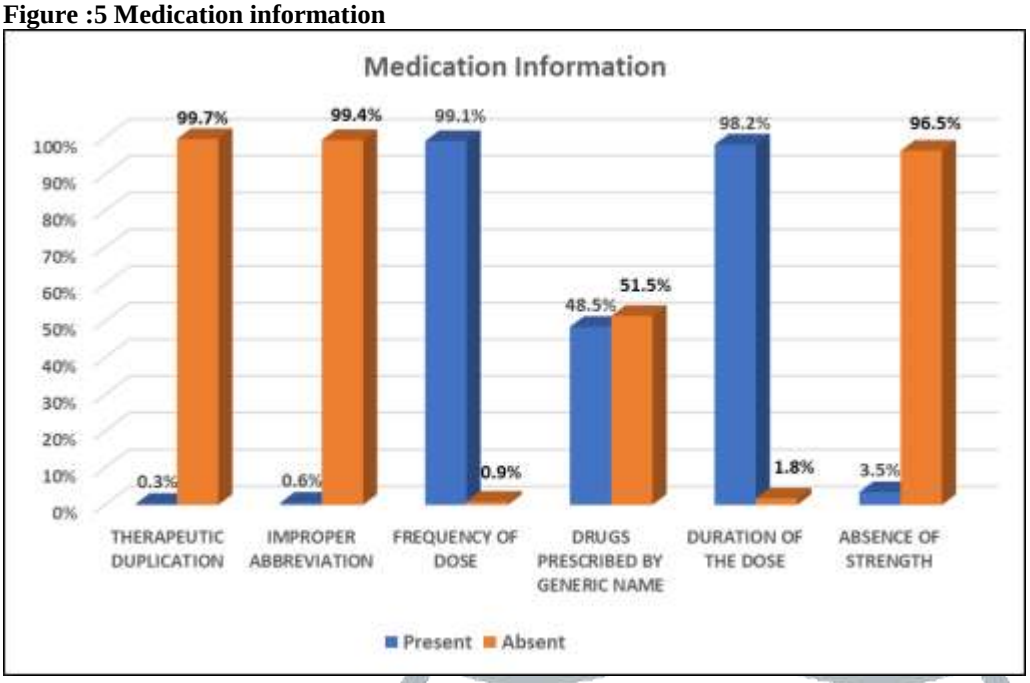
3.2.3Medication information

Each prescription was analysed for medication information. Among 340 prescriptions therapeutic duplication was present only in 1(0.3%) prescription, and improper abbreviation was found only in 2 (0.6%) prescriptions. The frequency of dose is absent in 3 (0.9%) prescriptions. Duration of the dose is absent in 6(1.8%) of prescriptions. The absence of strength is shown in 12(3.5%) prescriptions.**(Table 7 and Figure 5)**

Table :7 Medication information

Parameter	Present n (%)	Absent n (%)
THERAPEUTIC DUPLICATION	1 (0.3%)	339 (99.7%)
IMPROPER ABBREVIATION	2 (0.6%)	338 (99.4%)
FREQUENCY OF DOSE	337 (99.1%)	3 (0.9%)
DRUGS PRESCRIBED BY GENERIC NAME	165 (48.5%)	175 (51.5%)
DURATION OF THE DOSE	334 (98.2%)	6 (1.8%)
ABSENCE OF STRENGTH	12 (3.5%)	328 (96.5%)

Figure :5 Medication information



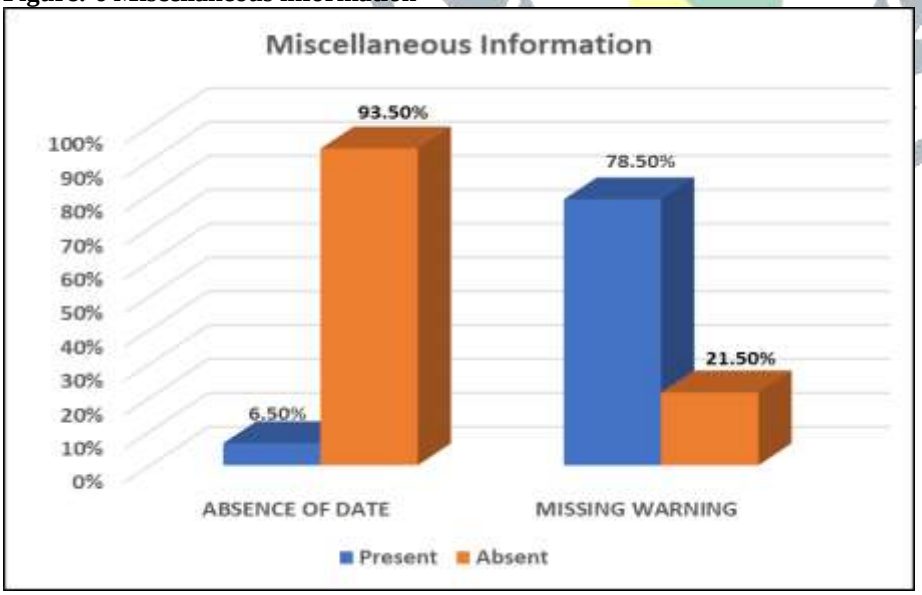
3.2.4 Miscellaneous information

In our study, only 22 (6.5%) prescriptions consist of date of prescription and 318(93.5%) prescriptions are absent of date. In our study, 78.50 % of prescriptions missed warnings and only 21.50% contained warnings. **(Table 8 and Figure 6)**

Table :8 Miscellaneous information

Parameter	Present n (%)	Absent n (%)
ABSENCE OF DATE	22 (6.5%)	318 (93.5%)
MISSING WARNING	267 (78.5%)	73 (21.5%)

Figure: 6 Miscellaneous information



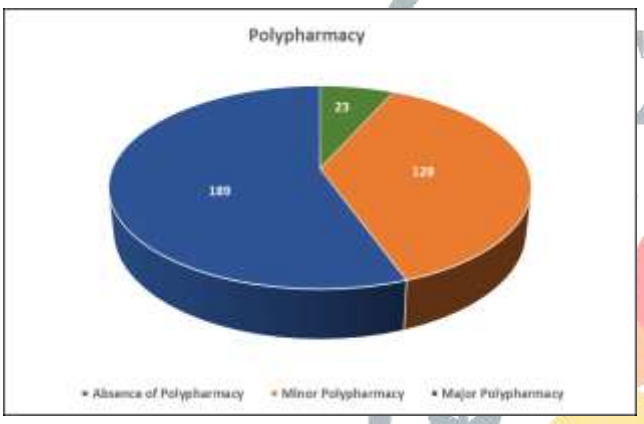
3.3 Polypharmacy

Rational drug prescribing enforces the use of a minimum number of drugs to get a promising outcome in the shortest period with cost-effectiveness. WHO has recommended that per prescription, the average number of drugs should be 2.0. Based on the number of drugs polypharmacy is divided into major polypharmacy (Mj. PP) and minor polypharmacy (Mn. PP). Of these, a total of 128 (37.6%) prescriptions containing 2 to 4 drugs per prescription constitute minor polypharmacy [Males 82 (37.1%) and Females 46 (38.7%) of prescriptions showed (Mn. PP)] whereas 189 (55.6%) prescriptions containing 5 or more drugs constitute major polypharmacy (males 126 (57%) and in females 63 (52.9%) prescriptions. **(Table 9)**

Table :9 Types of Polypharmacy (Based on number of drugs)

Gender	Polypharmacy			Total n (%)
	Absence of Polypharmacy n (%)	Minor Polypharmacy n (%)	Major Polypharmacy n (%)	
Male	13 (5.9)	82 (37.1)	126 (57)	221 (100)
Female	10 (8.4)	46 (38.7)	63 (52.9)	119 (100)
Total	23 (6.8)	128 (37.6)	189 (55.6)	340 (100)

Figure :7 Types of Polypharmacy(Based on number of drugs)



While based on age group absence polypharmacy greater in 60-69 years patients. Mn. PP and Mj. PP is greater in patients of age group of 60-69 and that is 97 (39.9%) and 129 (53.1%) respectively. **(Table 10 and Figure 7)**

Table:10 Age distribution of polypharmacy

Age group	Polypharmacy			Total n (%)
	Absence of Polypharmacy n (%)	Minor Polypharmacy n (%)	Major Polypharmacy n (%)	
60-69	17 (7)	97 (39.9)	129 (53.1)	243 (100)
70-79	5 (6)	26 (31.3)	52 (62.7)	83 (100)
80-89	0	5 (38.5)	8 (61.5)	13 (100)
>=90	1 (100)	0	0	1 (100)
Total	23 (6.8)	128 (37.6)	189 (55.6)	340 (100)

3.4 Drug interactions

A total of 340 prescriptions were used in this study, of which 221 (65%) were men and 119 (35%) were women. Patient demographic details are shown in Table:1 .84 Prescriptions showed zero drug interactions and presence of drug interaction was found in 256 (380-84) prescriptions. The incidence of potential drug- drug interactions(pDDIs) was 75.29% (256/340*100) with a total of 1010 interactions.109 prescriptions showed 1-2 interactions.91 prescriptions showed 3-5 interactions and 56 prescriptions showed >5 interactions per prescription. **(Table 11)**T**able :11**

Drug interaction distribution based on number of drug interactions

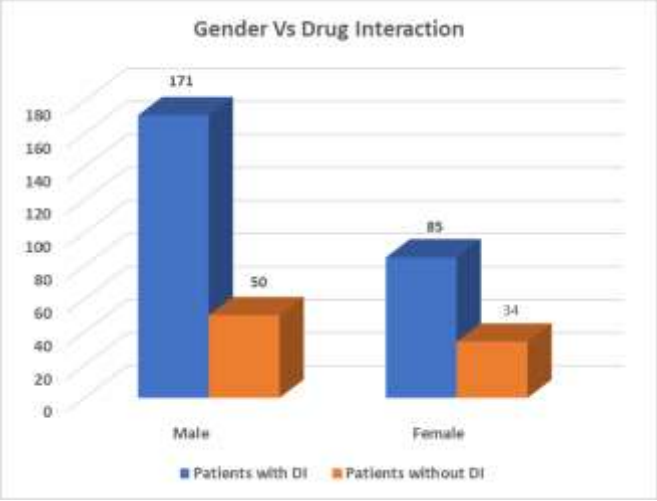
Number of Drug Interactions	Male n (%)	Female n (%)	Total n
0	50 (59.5)	34 (40.5)	84 (100)
1 - 2	71 (65.1)	38 (34.9)	109 (100)
3 - 5	67 (73.6)	24 (26.4)	91(100)
> 5	33 (58.9)	23 (41.1)	56 (100)
Grand Total	221 (65)	119 (35)	340 (100)

In our study, while comparing drug interaction based on gender, Male patient's prescriptions showed more drug interactions 171(77.4%) than Female patient prescriptions 85(71.4%). (**Table 12 and figure 8)**

Table:12 Gender distribution of drug interaction

Variable	Group	Patients with DI n (%)	Patients without DI n (%)
Gender	Male	171 (77.4)	50 (22.6)
	Female	85 (71.4)	34 (28.6)
Total		256 (75.3)	84 (24.7)

Figure:8 Gender-based distribution of drug interaction

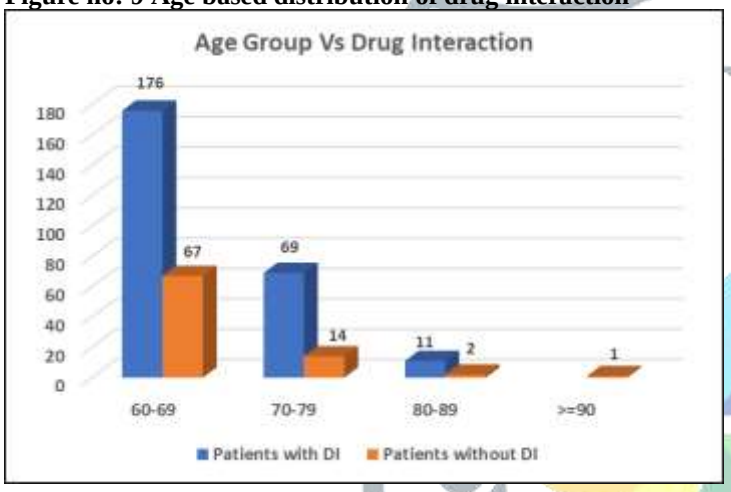


Based on the age group of geriatric patients, a greater number of medications were present in patients of age 60-69 years because of this greater number of drug interactions were shown by this age group 176 (72.4%). **(Table 13 and figure 9)**

Table 13: Age distribution of drug interaction

Variable	Group	Patients with DI n (%)	Patients without DI n (%)
Age	60 – 69	176 (72.4)	67 (27.6)
	70 – 79	69 (83.1)	14 (16.9)
	80 – 89	11 (84.6)	2 (15.4)
	>= 90		1 (100)
Total		256 (75.3)	84 (24.7)

Figure no: 9 Age based distribution of drug interaction

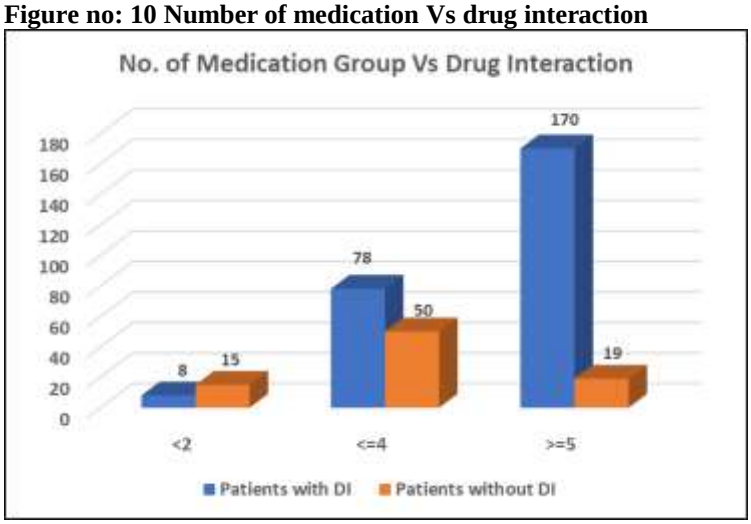


In our study prescriptions consisting of greater than or equal to five medications shows more drug interactions 170(89.9%). **(Table 14 and figure 10)**

Table:14 Drug interaction based on the number of medications

Variable	Group	Patients with DI n (%)	Patients without DI n (%)
No. of Medication	< 2	8 (34.8)	15 (65.2)
	<= 4	78 (60.9)	50 (39.1)
	>= 5	170 (89.9)	19 (10.1)
Total		256 (75.3)	84 (24.7)

Figure no: 10 Number of medication Vs drug interaction



IV.DISCUSSION

Drug prescriptions form a very important point of connection between the healthcare provider and the user. An average number of drugs per prescription is an important index of prescription analysis. In our study, the average number of drugs per prescription was 5.31. Other prescription analysis studies in India reported 2-5 drugs per prescription (12,13,14), lower than our study. It is preferable to keep the number of drugs per prescription as low as possible since higher figures lead to an increased risk of drug interactions, adverse effects, etc. In this study, we found that only a very few percentages of drugs were prescribed by generic name (22%), which is not in accordance with the WHO standard. The use of the generic name is important as a safety measure for patients because it depicts a clear identification that can enable better communication between healthcare professionals. Prescribing generic drugs can also help in maintaining affordable access to medication, particularly in lower-middle-income countries such as India. the antibiotic prescribed was 9.41% of the total appointments, which was also not in accordance with the WHO recommendation (20%–26.8%). This figure is low as compared to other Indian studies (17,18,19,20), which have even reported in the range of 20%–72.8%. The irrational use of antibiotics leads to an increased risk of adverse drug events, an increase in antimicrobial resistance, and higher healthcare costs. The total number of encounters with injectables was 7.64%, which is lower than the standard value (13.4%–24.1%). This figure is low compared to other Indian studies. However, two Indian studies have reported figures of 0.17 and 0.2% (17,18). Drugs from the Essential Drug List (EDL) constituted about 83% which is close to WHO standards. A Study conducted by Georgekutty et al showed that 51%of drugs used were from Essential Drug List (16)

In this study, 340 prescriptions were analyzed based on prescription writing criteria as per WHO for prescription errors. Among 340 prescriptions, 129 (37.95%) were illegible , due to poor handwriting of the prescriber which may lead to dispensing of wrong medications. Illegible prescriptions are found more in patients of the age group 60-69 years. Each prescription was analysed for Prescription information, Patient information, and Medication information. Among 340 prescriptions therapeutic duplication and improper abbreviation were present in 1(0.3%) and 2 (0.6%) prescriptions. The frequency of dose, the strength of the medication, and duration of the dose are absent in 3 (0.9%), 12(3.5%), and 6(1.8%) of prescriptions respectively. These errors in medication information are smaller in number than that reported by Maria Abdul Gafoor Raja and coworkers in the analysis of the degree of errors in handwritten medication prescriptions in Rafha, Saudi Arabia (15)

The current study revealed that 21.50% of prescriptions missed warnings for patients. Also, 22 (6.5%) prescriptions did not contain the date, and 318(93.5%) prescriptions indicated the date, which is more than that reported by Maria Abdul Gafoor Raja and coworkers in the analysis of the degree of errors in handwritten medication prescriptions in Rafha, Saudi Arabia (15) their study revealed that only 1.2 % of prescriptions did not indicate the date.

Our study also demonstrated that polypharmacy is common among geriatric prescriptions. Lack of knowledge and education, disparities in medical treatment, weak regulatory standards, empirical and charitable therapy, socioeconomic class variations, and characteristics of population morbidity and mortality are some potential causes of polypharmacy (22). The legendary alchemist Paracelsus once said, "Everything is poisonous and nothing is non-poisonous." "The dose determines whether it's toxic or therapeutic." (22). In general, taking more than one medication at once increases the risk of drug interactions and side effects, whether prescribed or over-the-counter. Similarly, to this, polypharmacy may contribute to the misuse, overuse, and underuse of essential medications. Patients' deaths from drug-related causes may be attributed to polypharmacy. (22,23).

Total polypharmacy, Major and Minor polypharmacy were higher in our studies compared to other studies conducted in the same context, Major polypharmacy was 55.6%, Minor polypharmacy was 37.6%, and total polypharmacy was 93.23% in our study, compared to our study's findings for major polypharmacy, a similar study from Somaliland by Sidamo T et al reported an overall polypharmacy rate of 71%, Minor polypharmacy rate of 68% and Major polypharmacy rate of 3 %.

Elderly patients are the largest consumers of medication and their prescriptions contain multiple medications so potential drug-drug interactions are more likely common in this population. There are different methods used to identify drug-drug interactions. In this study,We used Medscape drug interaction checker for identifying drug-drug interactions. 340 prescriptions were used in our study of which 221 (65%) were men and 119 (35%) were women. The incidence of potential drug drug interactions(pDDIs) was 75.29% (256/340*100) with a total of 1010 interactions, which is sufficiently high to warn us to have careful monitoring for pDDI in the prescription of geriatric patients. Our study revealed that 84 prescriptions showed no potential drug-drug interactions, 109 prescriptions showed 1-2 interactions,91 prescriptions showed 3-5 interactions, and 56 prescriptions showed >5 interactions per prescription. Similar study findings are reported in the Evaluation of potential drug-drug interactions with medications prescribed to geriatric patients in a tertiary care hospital by Varsha Shetty and coworkers, it includes a total of 209 patients and a total number of drug interactions identified is 663 (21). In another study, Turner et al identified 398 potential drug interactions in 300 patients (24). Male patient's prescriptions showed more drug interactions 171(77.4%) than Female patient prescriptions 85(71.4%) and our

study revealed that more medications were present in patients of age 60-69 years because of this number of drug interactions shown by this age group 176 (72.4%). Also, while comparing drug interaction with the number of medications(polypharmacy), it shows direct proportionality, therefore it is evident from our studies that as the number of medications increases, it increases the chances of conditions like polypharmacy. Most of the geriatric patients suffered from heart diseases, therefore aspirin was found on majority of prescriptions. During prescription analysis we found out that aspirin was mostly co-prescribed with drugs such as enalapril, metoprolol, clopidogrel etc. Aspirin helps prevent blood clot formation in the arteries, which may lower the risk of a heart attack or stroke. A strong interaction between aspirin and the ACE inhibitors such as enalapril will decrease the benefit of enalapril and lead to a decrease in renal function. Patients receiving this combination should properly monitor kidney function. Recent studies have identified the 'triple whammy' in which combinations of diuretics, nonsteroidal anti-inflammatory drugs (NSAIDs), ACE inhibitors (ACEI) and/or angiotensin receptor antagonists (ARA) may impair renal function.

V.CONCLUSION

This study demonstrated that polypharmacy and prescription mistakes are prevalent in Trivandrum, Kerala. The study reveals substantial prescription mistake rates and inadequate compliance with WHO prescribing standards. Polypharmacy, low rates of generic prescribing, and omissions in medication information were significant issues. Drug interactions with prescribed medications have been remarkable. These major flaws in current medical procedures point to the necessity of establishing rational drug therapy. Physician education on proper prescription writing, follow-up on the issue, and sufficient monitoring for a newly trained physician are needed. A solid and current understanding of applied therapeutics and pharmacology is necessary for effective prescribing. Through patient education, the supply of prescribing information, and the provision of pharmaceutical care in an outpatient context, clinical pharmacists play a significant role in promoting rational drug use. Therefore, more clinical pharmacist posts in hospital settings may help in reducing problems like drug interactions and polypharmacy to a large extent. Also in community pharmacies, the role of pharmacists is not confined to preparing and dispensing medication. They should be actively involved in educating, caring, and counselling patients not only about the medication but also diseases, work patterns, food habits, lifestyle, and future risk factors related to their health.

VI.LIMITATION OF STUDY

The study was carried out only in three selected community pharmacies in the Trivandrum district due to time limitations which cannot reflect the generalised prescribing practice of the whole district.

VII.LIST OF ABBREVIATIONS

ADR: Adverse Drug Reaction, pDDI: Potential drug-drug interaction,DDI:Drug-Drug intractions WHO: World health organisation, SPSS: Statistical Package for Social Sciences, OPD: Outpatient Department, PEAP: Percentage of Encounters with Antibiotic prescribed, Pt: Patients, Mn. PP: Minor polypharmacy, Mj. PP: Major polypharmacy, OP: Outpatient, No: number.

VIII. CONFLICTS OF INTEREST

The authors express no conflict of interest. There are no financial or other relationships that might lead to conflicts of interest .

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