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An interpretation of polypharmacy and prescription pattern in geriatric patients: a prospective observational study

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Abstract

Introduction: Older adults are mostly prescribed with multiple medications due to their medical conditions,which contributes to the risk.Potentially Inappropriate Medication (PIM) and Polypharmacy are more predominant issue among elderly Patients. The main aim of this study was to interpret the Prescription Pattern Use and Polypharmacy above the age group of 65 using AGS 2019 Beer's criteria.

Methodology: This prospective observational study was conducted in tertiary care public hospital, in south India. About 80 In-patients aged >65 years admitted between the month of February-2023 to April-2023 were included, in which the Polypharmacy and prescription pattern use in geriatric patients were recorded. The 2019 AGS Beers criteria was applied to assess prescription patterns. Descriptive statistics was calculated as frequency percentile & Chi-square test were used to assess polypharmacy and prescription pattern. P-value < 0.05 was considered statistically significant. Polypharmacy was categorized as (No-polypharmacy, Polypharmacy, Hyper-polypharmacy) by evaluating the case report form.

Results: Out of 80 patients, 55 (67.5%) are under PIM, and 25 (32.5%) are Non-PIM. The majority of the population was under polypharmacy & hyper-polypharmacy 63 (78.75%). PIM taken by the participants ranged between 1 to 3 medications. Proton pump inhibitors, tramadol & corticosteroids were the top 3 most frequently encountered PIMs. Hyperpolypharmacy and older age were identified as independent factors associated with PIM use. The risk of PIMs rises with the number of medications prescribed.

Conclusion: The evidence presented indicates that the majority of the population was simultaneously prescribed PIM and polypharmacy, which can cause life-threatening adverse drug reactions and may reduce their life expectancy.The possibility of reducing PIM use in elderly patients may be achieved through various interventions such as medication reviews, patient and healthcare provider education, medication therapy monitoring, and deprescribing of unnecessary medications.

Keywords: beers criteria, older adults, potentially inappropriate medications, polypharmacy, geriatric patients.

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1. Introduction

Over 60% of the world's elderly are found in developing nations, representing a sizable demographic in many of these regions. As the number of older adults increases, it is expected that the number of people with chronic health problems that are caused by the unavoidable process of getting aged will continue to increase. Due to this, there may be an uptake in the consumption of multiple drugs (polypharmacy) to manage these comorbidities or to avoid complications.[1] The following reasons make drug usage among the elderly problematic for various reasons: possible drug-drug and drug-disease interactions, as well as the physiological changes that come with aging.[2] Prescription pattern monitoring studies (PPMS) primarily examine how medications are prescribed, dispensed, and administered. They encourage the responsible use of drugs under surveillance and work to prevent their abuse or overuse. PPMS collaborates and builds working relationships with other significant organizations to promote the rational use of medications. These efforts include guiding and supporting prescribers, dispensers, and the public on appropriate drug use. The goal of PPMS is to make it easier for people to use drugs responsibly in society. Drug abuse is a serious issue everywhere in the world. According to WHO statistics, half of all patients do not properly take their medications, and more than half of all prescriptions dispenses, and sales are improper.[4] Utilizing the data produced by the numerous PPMSs conducted in every state and on every drug in India is urgently needed to achieve the primary goal of promoting the judicious use of drugs.[5] Due to their increased susceptibility to side effects, older people experience unfavorable drug reactions seven times more frequently than younger ones. Additionally, when administering treatment to elderly patients, a prudent clinician must constantly consider prospective drug-drug interactions and potentially altered pharmacokinetic dynamics in the aging body. Lists of possibly inappropriate pharmaceuticals for older people have been produced and are routinely updated by professional geriatric organizations in various nations (including the USA, Germany, and the UK). When providing therapy to older individuals, lists like The Beers Criteria list and STOPP/START criteria should always be consulted.[6]

Potentially inappropriate medications (PIMs) are defined as drugs whose adverse drug reactions surpass the health benefits in contrast to alternative treatments.[7.8] To identify PIM use in the elderly, several tools have been created, including the Beers criterion (first published in 1991).[9] After which it was revised in 1997, 2003, 2012, 2015, and 2019, Being one of the most well-liked recommendations for assessing PIM use in older adults.[10]The Beers criteria were created to ensure the safe administration of medicines to the elderly after it was found that the prescription of PIMs was a major contributor to medical complications and morbidity and mortality among the elderly.[3] The Beers criteria include drugs that should be avoided in elderly patients regardless of their condition as well as drugs that should be avoided when a specific diagnosis.[3] Numerous studies have demonstrated a link between PIM usage in the elderly and unfavorable health outcomes, including severe medication responses, hospitalization, and mortality. The use of PIM may lead to greater rates of health service utilization and higher healthcare expenses. Therefore, it's critical to keep monitoring and reducing the frequency of PIM use among seniors.[11] The elderly group uses potentially inappropriate drugs (PIMs) more frequently due to persistent polymorbidity, polypharmacy, and other factors.PIM use has been connected to the worsening of geriatric syndromes, functional status deterioration, emergency hospitalizations, and even greater mortality in elderly

people and can harm their health, functionality, and overall quality of life.[12] Numerous research and reviews from the previous two decades have documented the harmful effects of older patients' heavy reliance on polypharmacy and PIMs, including the increased likelihood of unfavorable outcomes.[13] Explicit criteria for PIMs to be prevented in elderly people have been developed as a result, such as the Beers criteria, the Screening Tool of Older Person's Prescriptions (STOPP), and the Screening Tool to Alert to the Right Therapy.[14] In 2018, the average healthy life expectancy in Ethiopia was 64 years old at birth (for males it was 64.3 years and for women, it was 68.1 years). According to the United Nations Population Division, 3.5% of Ethiopia's population was 65 years of age or older in 2019 and by 2050, this number is projected to rise to 3.8%. Already, multiple research on Ethiopia's elderly population found that falls were more common.[15] The use of PIM and polypharmacy has been linked to unfavorable outcomes for patients, including falls, toxicities from chemotherapy, other adverse events, surgical complications, frailty, functional impairment, and reduced survival. Despite the dangers being acknowledged, polypharmacy and PIM usage are becoming more common because there aren't any standardized procedures for detection and intervention. Tools for formal PIM screening (such as the Beers criteria) have been used in efforts to lower the prevalence. This report summarised the research that is now available evaluating the impact of interventions on lessening the burden of polypharmacy/PIMs and offered suggestions to direct future practice models to lessen the adverse effects related to polypharmacy and PIM use.[16] Due to the hazards and possibly mortality involved, polypharmacy is a serious concern. This geriatric condition has become more prevalent during the past ten years due to a variety of factors.[17]The necessity to address the many medical states that arise as a patient ages make polypharmacy widespread among the older population and will continue to be so. Unfortunately, there is an increased risk of adverse health events, such as greater healthcare expenses, adverse drug events (ADEs), drug interactions, medication non-adherence, lower functional status, and aging disorders, with this rise in the use of many drugs. To demonstrate that the strategies proven to reduce polypharmacy concerns can be applied practically and spread to the many healthcare settings where older patients receive treatment, more implementation studies are required.[18]

2. Methodology

2.1 Study design

This was a prospective observational study, interpreting the Polypharmacy and Prescription Pattern in Geriatric patients using the 2019 American Geriatrics Society’s Beers criteria.The entire study was carried out for 6 months NOV 2022-APRIL 2023.The study was conducted in ESIC Hospital, Ayanavaram, Chennai.The sample size was determined using an online Rao Soft sample size calculator.The estimated sample size of this study was a total of 80 geriatric patients aged above 65 years.The population size was determined based on the prevalence of the study site.

2.2 Study population and setting

The data was collected and evaluated from the case report form of the patient aged above 65 years from various departments such as general medicine, surgery, ENT, orthopedics, and ICU and excluded psychiatric and pediatric department. The study was carried out in the ESIC hospital, Ayanavaram, Chennai, a 500-bedded tertiary care hospital. A total of 80 geriatric patients were enrolled in this study. By using the Rao-soft sample size calculator. In our prospective study, we observe polypharmacy and Prescription pattern in Geriatric patients. By evaluating

prescription patterns with the use of AGS's 2019 beers criteria to define PIM. The use of more than five drugs is referred to as polypharmacy. So we use this study in future evidence-based treatment for geriatric patients.

2.3 Complete study procedure

This study was initiated after reviewing various literature with the same aims and objectives. The study was carried out after obtaining proper ethical clearance from the ethics committee. IEC Reference No. (ECR/288/Indt/TN/2018/RR-21/015). The patients were recruited as per inclusion/exclusion criteria. The demographic data from the patient's records such as the patient's age, gender, and personal and medical history was collected from the clinical features, clinical history, list of prescribed medications, and corresponding dosages. Since, generally, self-medication is not permitted in the hospital, details of all medications prescribed during hospitalization comprise oral medications and injections. However, topical medications, inhaled drugs and eye drops were excluded. Medications were coded using the Anatomical Therapeutic Chemical Classification system. The patient's co-morbidities were grouped and scored using Charlson co-morbidity index score calculator. The data were collected by using a self-prepared data collection tool (Google form). The American geriatric society's updated Beers 2019 criteria was used to evaluate prescription patterns among the research participants. After the complete data collection, all the study parameters were recorded on a spreadsheet and was analyzed using the appropriate statistical analysis tool, SPSS version 26 for Windows.

2.4 Statistical analysis

Data were extracted from Google form then coded and recorded in the MS Excel spreadsheet. The obtained data were statistically analyzed with the help of SPSS version 26.0. Categorical variables including demographic details such as age, gender, admitted department, length of stay in the hospital, medications prescribed during the hospital stay, and discharge were provided in frequency and percentages. The relationship between the independent and dependent variables was calculated by using the chi-square test. $P<0.05$ was considered to be statistically significant. The data collected were collated, tabulated, and summarized. Results were depicted in the form of tables and graphs.

2.5 Data handling

Data were retrieved by clinical pharmacist interns following approval from the IEC. Two authors extracted and analyzed the relevant data independently. Disagreements were resolved by discussion with a third author. Throughout the research, the privacy of the user data was upheld. A safe, password-protected computer with restricted access was used to store the data that was extracted from Microsoft Excel. To preserve patient privacy, patient records were encrypted.

3. Results

3.1 Baseline socio-Demographic characteristics of the study population

During the study period, 92 patients aged 65 and older were admitted. Of these, 12 patients were excluded as per our inclusion/exclusion criteria. The patient recruitment process is shown in figure-4. A total of 80 patients were thus enrolled in this study. Predominantly the age group of 65-69 aged patients 49 (61.25%) were high in numbers & the 75-79 aged patients 8 (10%) were least in numbers in the study. Out of 80 patients, male participants are predominantly more in numbers (55%) than females (45%) department of general medicine has the highest number of participants got hospitalized during the study period (48.75%). And about 47 (58.75%) of the participants were hospitalized for ≥10 days in the hospital. The 2019 beers criteria identified a total of

55 participants who were prescribed PIM in this study population. A detailed baseline socio-demographic characteristics are shown below in table-2.

Table–1: Baseline Socio-Demographic characteristics of the participants shown in frequency and percentage. (n=80)

S.no	Variable	PIM (n=55) [68.75%]	Non-PIM (n=25) [31.25%]	Overall (n=80) [100%]	P-value
1.	**Age in years (n [%])** a) 65-69 b) 70-74 c) 75-79 d) ≥80	 34 [42.5%] 15 [18.75%] 6 [7.5%] 0	 15 [18.75%] 8 [10%] 2 [2.5%] 0	 **49 [61.25%]** **23 [28.75%]** **8 [10%]** **0**	.866
2.	**Gender (n [%])** a) Male b) Female	 30 [37.5%] 25 [31.25%]	 14 [17.5%] 11 [13.75%]	 **44 [55%]** **36 [45%]**	.904
3.	**Admitted department (n [%])** a) General medicine b) Surgery c) Orthopedics d) ENT **e)** ICU	 32 [40%] 7 [8.75%] 13 [16.25%] 1 [1.25%] 2 [2.5%]	 7 [8.75%] 5 [6.25%] 4 [5%] 3 [3.75%] 6 [7.5%]	 **39 [48.75%]** **12 [15%]** **17 [21.25%]** **4 [5%]** **8 [10%]**	***0.005**
4.	**No. of disease diagnosed (n [%])** a) 1 b) 2 c) 3 d) ≥4	 7 [8.75%] 17 [21.25%] 19 [23.75%] 12 [15%]	 6 [7.5%] 15 [18.75%] 2 [2.5%] 2 [2.5%]	 **13 [16.25%]** **32 [40%]** **21 [26.25%]** **14 [17.5%]**	***0.009**
5.	**No. of prescribed medication during hospital stay (n [%])** a) 1-4 b) 5-9 **c)** ≥10	 9 [11.25%] 20 [25%] 26 [32.5%]	 8 [10%] 13 [16.25%] 4 [5%]	 **17 [21.25%]** **33 [41.25%]** **30 [37.5%]**	***0.024**
6.	**Length of stay (In days) (n [%])** a) 1-4 b) 5-9 **c)** ≥10	 8 [10%] 14 [17.5%] 33 [41.25%]	 6 [7.5%] 5 [6.25%] 14 [17.5%]	 **14 [17.5%]** **19 [23.75%]** **47 [58.75%]**	.566
7.	**No. of prescribed medication during discharge (n [%])**				***0.011**

	a) 1-4 b) 5-9 **c)** ≥10	14 [17.5%] 36 [45%] 5 [6.25%]	15 [18.75%] 10 [12.5%] 0	**29 [36.25%]** **46 [57.5%]** **5 [6.25%]**	
PIM – Potentially Inappropriate Medications; ENT – Ear, Nose & Throat; ICU – Intensive Care Unit **P <0.05 is considered to be statistically significant* *Data was analyzed by using descriptive statistics & Chi-square test*					

Table-1 depicts the baseline socio-demographic characteristics of the research participants such as age, gender, participant hospitalized department, co-morbidities, length of hospitalization, and medications prescribed rate during hospitalization and discharge are measured using descriptive statistics.

Table-2: Relation between the Charlson co-morbidity index score with the PIM prescribed rate of the research participant (n=80)

S.No	Charlson Comorbidity Index Score	PIM		Total (n [%])	P - value
		Yes	No		
1.	2	2 [2.5%]	3 [3.75%]	**5 [6.25%]**	**.004***
2.	3	9 [11.25%]	11 [13.75%]	**20 [25%]**	
3.	4	11 [13.75%]	7 [8.75%]	**18 [22.5%]**	
4.	6	18 [22.5%]	2 [2.5%]	**20 [25%]**	
5.	7	15 [18.75%]	2 [2.5%]	**17 [21.25%]**	
Total (n [%])		**55 [68.75%]**	**25 [31.25%]**	**80 [100%]**	
**P <0.05 is considered to be statistically significant* *Data was analyzed by Chi-square test.*					

The results revealed that the participants with a **CCI score of 6** have been prescribed PIM predominantly higher **(32.7%)** and a **CCI score of 2** has the lower PIM prescribed rate **(3.6%)** as shown above in **Table-2.**

Table-3: Incidence of PIMs identified by using the 2019 Beers criteria among study participants shown in frequency and percentage.

S.no	Variables	(n=30) [%]
1.	**Potentially Inappropriate Medication Use in elderly people**	**19 (63.3%)**
	Proton Pump Inhibitors	**19**
	Insulin	**14**
	Glimepiride	**12**
	Chlorpheniramine	**7**
	Alprazolam	**6**
	Ranitidine	**4**
	Diclofenac	**3**
	Amitriptyline	**2**
	Atorvastatin	**2**
	Clopidogrel	**2**
	Aspirin	**2**
	Amlodipine	**2**
	Diazepam	**2**
	Prazosin	**2**
	Zolpidem	**1**
	Prednisolone	**1**
	Glibenclamide	**1**
	Nifedipine	**1**
	Clonazepam	**1**
2.	**Medication Use in Older Adults That May Be Inappropriate Due to Drug-Disease or Drug-Syndrome Interactions**	**3**
	Corticosteriods	**5**
	Ranitidine	**4**
	Non-benzodiazepine	**1**
3.	**Potentially Inappropriate Medications: to Be Used with Caution in elderly people**	**3**
	Tramadol	**6**
	Diuretics	**3**
	Aspirin	**1**
4.	**Potentially Clinically Important Drug-Drug Interactions to be Avoided in elderly people**	**0**
	-NIL-	**0**
5.	**Medications to Avoid or Have Dosage Reduced in Elderly Adults with Varying Levels of Renal Function.**	**5**
	Ranitidine	**10**
	Tramadol	**4**
	Ciprofloxacin	**2**
	Spironolactone	**1**
	Gabapentin	**1**
Total no. of PIM prescribed		**30**

Table – 4: Correlation between the PIM prescribed rate with no. of disease diagnosed in the research participants (n=80)

S. No	No. of Diseases diagnosed for the participant	PIM		Total (n [%])	P-Value
		Yes	No		
1.	1	7 [8.75%]	6 [7.5%]	**13 [16.25%]**	**.009***
2.	2	17 [21.25%]	15 [18.75%]	**32 [40%]**	
3.	3	19 [23.75%]	2 [2.5%]	**21 [26.25%]**	
4.	>4	12 [15%]	2 [2.5%]	**14 [17.5%]**	
Total (n [%])		**55 [68.75%]**	**25 [31.25%]**	**80 [100%]**	

**P <0.05 is considered to be statistically significant*

Data was analyzed by Chi-square test.

The above **table-4** reveals that participants diagnosed with **3 diseases** were predominantly prescribed more PIM **19 (23.75%)** out of **55 PIM-prescribed patients.**

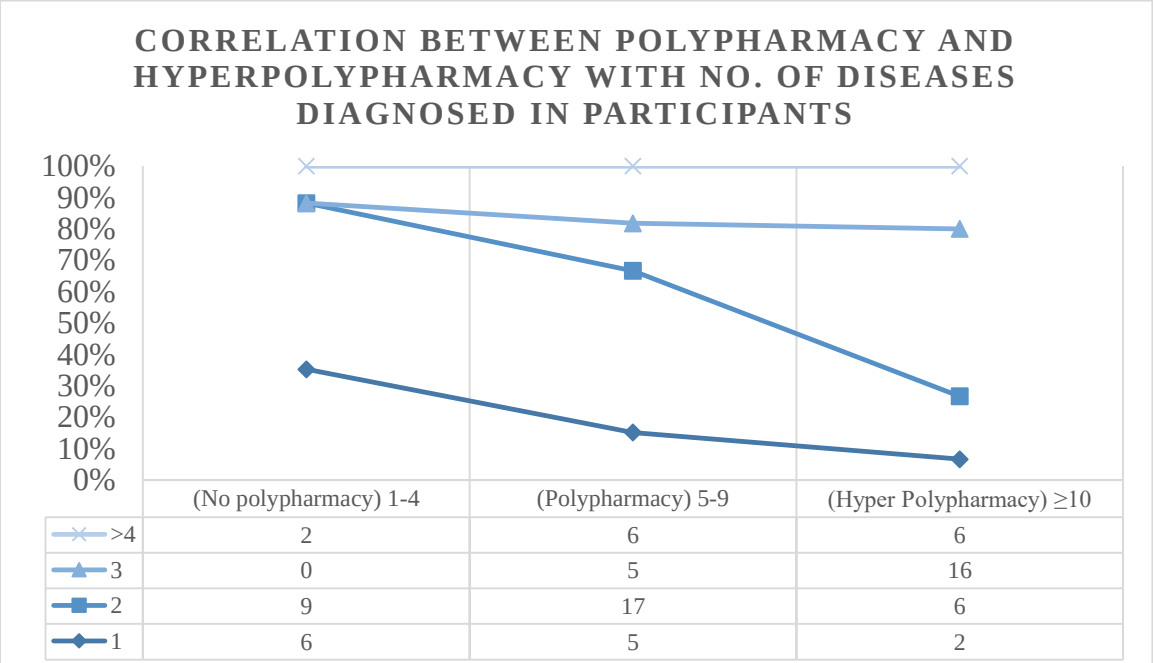


Figure-1: Represents the correlation between No. of medication prescribed during hospitalization & No. of disease diagnosed in the participant.

The above results shown in **Figure-1** reveals that the participants with 2 disease were predominantly prescribed more medications **17 (21.25%)** followed by the participants with 3 diseases **16 (20%)**

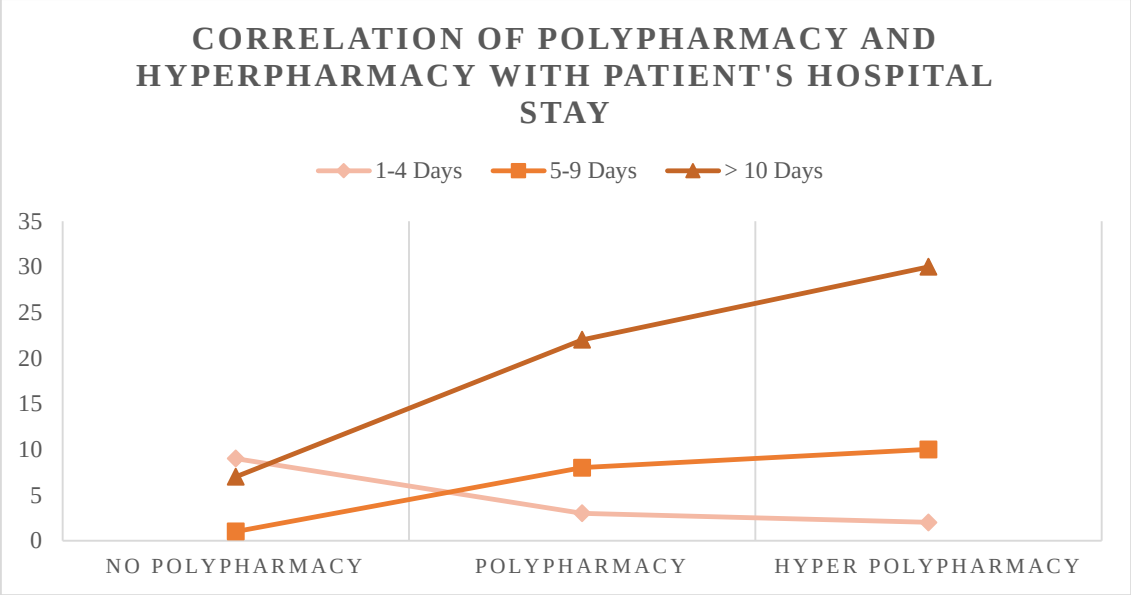
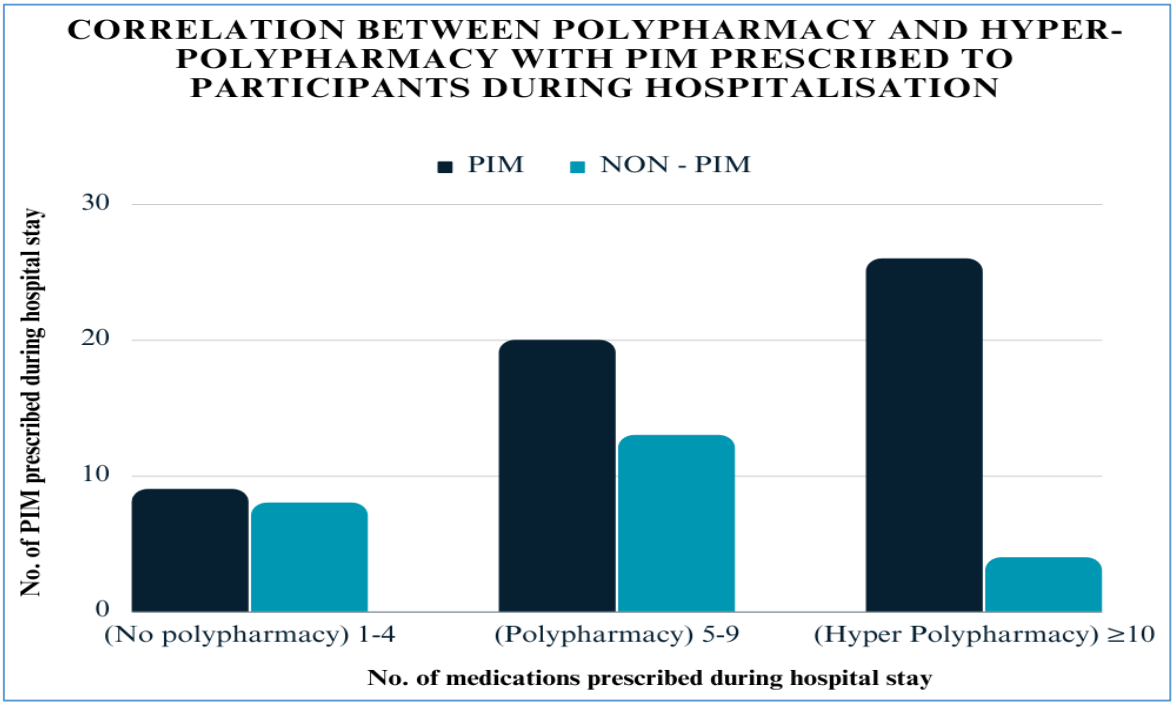


Figure-2: Shows the Correlation of Polypharmacy and Hyper-polypharmacy with a Patient's Hospital Stay

The above results shown in **Figure-2** reveal participants with **≥10 Days** of hospital stay have been predominantly prescribed more medications **40 (50%)** followed by the participants with **1-4 days** of hospital stay has the least medications prescribed **5 (6.25%).**



Figure–3: Correlation between the no. of medications prescribed during hospitalization with the PIM prescribed rate during hospitalization

The results shown in **Figure-3** reveal that the PIM prescribed to the participants is predominantly higher in participants prescribed with **≥10 medications 26 (32.5%)** followed by **5-9 medications 20 (25%) during hospitalization.**

4. Discussion

In this prospective observational single-center study, we observed that nearly 78% of the study population were under polypharmacy & hyper-polypharmacy with 68% of the study population being exposed to PIMs shown in (table-1). In the contemporary era, there is an apparent increase in population aging, particularly in LMICs such as India. This demographic change is accompanied by a significant increase in the prevalence of various diseases that are more prevalent among the elderly population. *Sehgal et.al.,*stated that many primary care doctors possess a poor knowledge of PIM and are unaware of prescribing guidelines such as beer's criteria.[19] Moreover, there appears to be inadequate communication regarding the potential side effects profile of drugs between healthcare providers and patients.

Our findings suggested that polypharmacy, hyper-polypharmacy, PIM use, and older age are independent risk factors that may reduce the life expectancy of elderly adults. Co-morbidities are the most common cause of polypharmacy and increase in the patient's length of hospitalization. In our study, we observed that the co-morbidity of the patient increases polypharmacy and length of hospitalization (figure-1). Simultaneously as the length of hospitalization of the patient increases, polypharmacy also increases (figure-2). In our study, the participant's co-morbidities were grouped & scored using the Charlson co-morbidity index score calculator. This Charlson co-morbidity index has a numerical score used to assess the likelihood of a patient's morbidity risk based on their present co-morbid conditions [20]. Our results revealed that the participants with a CCI score of 6 have been prescribed PIM predominantly higher (32.7%) & CCI score of 2 has the least PIM prescribed rate (3.6%) as shown in (table-2). With the help of the CCI score, we could see that using PIM in patients with muti-morbid conditions may decrease the patient's life expectancy.

A decade back in 2013 a study conducted by *Sehgal et.al.*,[19] revealed that widespread of PIM use has been practiced. They concluded that there is a need for optimization strategies on the appropriateness of prescribing patterns in elderly patients. In this present study, we investigated the prescription pattern use in geriatric patients by analyzing using the AGS 2019 beer's criteria[21], one of the most common explicit criteria tools used to observe the prevalence of PIM, the prevalence of PIM assessed by the beer's criteria were reported higher than other criteria.

4.1 Potentially Inappropriate Medications Use

The AGS 2019 Beer's criteria identified a total of 30 PIM used by 55 participants out of 80 participants. Among them, 21 took more than 2 PIM, no. of PIM taken by 55 participants ranged between 1 to 3. All male and female participants encountered PIM, male participants are predominantly prescribed higher PIM 30 (37.5%) than female participants 25 (31.25%). The most PIM 34 (42.5%) was given to participants in the 65-69 age group, followed by the 70-74 age group (15.75%), while the participants in the 75-79 age group received the least PIM 6 (7.5%).

Applying the AGS 2019 beer's criteria, we observed that the most frequently encountered PIM category was "Potentially Inappropriate Medication Use in Elderly people" (63.3%), followed by "Medications to Avoid or Have Dosage Reduced in Elderly Adults with Varying Levels of Renal Function" (16.7%), least PIM prescribed was in "Medication Use in Older Adults That May Be Inappropriate Due to Drug-Disease or Drug-Syndrome Interactions" (10%), "Potentially Inappropriate Medications: to Be Used

with Caution in elderly people" (10%) and no PIM identified in "Potentially Clinically Important Drug-Drug Interactions to be Avoided in elderly people" (0%).

Details of the PIM identified in this study are presented in table-3; the most commonly identified PIM use in older adults was, Proton pump inhibitors which may cause c.difficle infection, bone loss & fractures. The second highest PIM prescribed was Insulins (Insulin regimens containing only short (or) rapid-acting insulin dosed according to current blood glucose levels without concurrent use of basal (or) long-acting insulin) which has a high risk of hypoglycemia without improvement in hyperglycemia and the third highest PIM prescribed was Glimepride, it may cause severe prolonged hypoglycemia in older adults. The quality of evidence for these drugs is high as per AGS 2019 beer's criteria.

The most common drug-disease and drug-syndrome PIMs identified were corticosteroids and Ranitidine an H_2 receptor antagonist. The quality of evidence for ranitidine is low as mentioned in AGS 2019 beer's criteria.

The most commonly encountered PIMs to be used with caution is tramadol, it may exacerbate or cause hyponatremia. The quality of evidence for using tramadol in elderly patients is moderate as mentioned in AGS 2019 beer's criteria. In this study, there is no potentially clinically important drug-drug interactions occurred.

The most commonly encountered PIM based on kidney function was ranitidine, tramadol, and ciprofloxacin. These three drugs were prescribed to the research participants without monitoring their renal functions. According to AGS 2019 Beer's criteria, ciprofloxacin can be used with lower doses if the CrCl of the patient is not <30 mL/min, because it may increase the risk of CNS effects like seizure, confusion, and tendon rupture. Tramadol (Immediate dose) can be prescribed to the patients in small doses if the patient's CrCl is not <30mL/min and tramadol (Extended release) should be avoided as it may cause CNS adverse effects. And the third drug ranitidine also can be prescribed to elderly patients but in small doses, if the patient's CrCl is not < 50mL/min, because it may cause mental status changes. The quality of evidence for these three drugs as per AGS 2019 Beer's criteria is moderate.

4.2 Factors Influencing PIM Use

Comparing the Non-PIM group with the PIM group using Chi-square test analysis, demonstrated significant differences regarding research participant hospitalized department ($P<0.05$), no. of disease diagnosed ($P<0.05$), no. of medications prescribed during hospitalization and discharge ($P<0.05$). No significant association was found between age, gender, length of hospitalization, and PIM use in this study. (as shown in table-1)

4.3 Risk associated with PIM use across No. of Disease Diagnosed

PIM use in multi-morbidity patients makes them more susceptible to death and reduces their life expectancy. In this study, we observed that PIM is prescribed to patients with multi-morbid conditions. This shows there is an urgent need for change in medication prescribing patterns and the implementation of medication therapy monitoring systems. And also there was a significant association found between no. of disease diagnosed and PIM use in the elderly. (as shown in table-4)

4.4 Risk Associated with PIM Use across No. Of Medications Prescribed during Hospitalization & Discharge

Our study results reveal that There was a nonlinear relationship between the number of prescribed medications and the risk of PIM use. Compared to participants taking 1-4 medications, the use of 5-9 and >10 medications was associated higher risk of PIM use. suggesting that the incidence of PIM use rises with the number of medications prescribed. (figure-3)

4.5 Factors Influencing Polypharmacy & Hyper-Polypharmacy

As said earlier, there is a triangular relationship between patients' co-morbidity, hospitalization duration, and polypharmacy. As the incidence of co-morbidity increases patients' length of hospitalization and polypharmacy use also increases. Co-morbidity and length of hospitalization are independent risk factors for the increase in polypharmacy & hyper-polypharmacy. The significant association between polypharmacy and No. of disease diagnosed ($P<0.05$) in participants and Polypharmacy and length of hospitalization ($P<0.05$) of the participants are shown in figure – 1 & 2.

It is common for geriatric patients to demonstrate multi-morbidity, requiring multiple drugs for the treatment of each disease. To achieve the best clinical benefits, deprescribing has been proven to be effective in reducing polypharmacy and PIMs in older patients.[22] Therefore, systematic strategies should be implemented to minimize polypharmacy, by stopping the inappropriate prescribing of unnecessary medications. It is essential to encourage good collaborative prescriber–pharmacist reviews of drugs should be promoted to mitigate the use of PIMs.

5. Strengths & Limitations

To the best of our knowledge, this study represents the first investigation in Tamil Nadu that provides insight into the interpretation of polypharmacy and prescription patterns among geriatric patients. Previously *Sehgal et al*.,[19] conducted a study in India that identified older individuals as a population at high risk for irrational use of medicines. However, their findings were limited to the evaluation of the prescription pattern of potentially inappropriate medications (PIMs) either during or after hospitalization. The present study highlights the necessity of developing standardized treatment protocols and establishing an effective drug monitoring system.

The current investigation is limited by certain constraints. The present study was conducted with a limited sample size and data were collected over a short period, thereby limiting the ability to observe adverse drug reactions over an extended duration. Also, the assessment of potentially inappropriate medications (PIMs) among elderly patients in India lacks established criteria. Beer's criteria were originally developed for elderly patients in the United States and are not limited to a particular country. India may have medications that are considered potentially inappropriate, yet are not covered within the current list. Consequently, the researchers were incapable of assessing potentially inappropriate medications (PIMs) apart from those that were explicitly mentioned in Beer's criteria. The absence of alternative medication recommendations in the Beers Criteria presents a concern.

6. Conclusion

The results of our study indicate that a high prevalence of polypharmacy and PIM use in elderly patients was observed and the concurrent use of multiple medications (polypharmacy) and the prescription of potentially inappropriate medications (PIM) are distinct risk factors that could significantly minimize the life expectancy of elderly patients. The possibility of reducing potentially inappropriate medication (PIM) use in elderly patients may be achieved through the process of deprescribing unnecessary medications. The findings of this study indicate that there is a positive correlation between the number of chronic diseases and the number of drugs utilized and the prevalence of polypharmacy. It is recommended that a thorough geriatric assessment could be conducted for all patients and analyse the medication

prescriptions pattern in accordance to guidelines for rational drug use. The optimization of medication therapy for geriatric patients, especially in the context of polypharmacy and potentially inappropriate prescribing, can be significantly enhanced with the involvement of a clinical pharmacist. Clinical pharmacists have the potential to enhance medication safety and efficacy in vulnerable populations through various interventions such as medication reviews, patient and healthcare provider education, medication therapy monitoring, and deprescribing of unnecessary medications.

The present study examined the use of polypharmacy and prescription patterns within a single hospital, with a limited scope. A prospective multicenter randomized controlled intervention study of a larger scale is required to evaluate the impact of optimization strategies on the appropriateness of prescribing for the elderly population.

Conflict of Interest

No conflict of interest.

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