



# **Pharmacoepidemiological Safety of Drugs Used in Geriatrics: A Systematic Review in Madanapalle and Punganur Region of Andhra Pradesh**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

In this study, we were provided universal considerations for the setting up and carry out of pharmacoepidemiological studies of drug use for disorders like Osteoarthritis, Hypertension, Hyperlipidemia, Hypothyroidism, Depression, and Osteoporosis in geriatric patient. The study method was focused on monitored and categorized the prescriptions of geriatrics from 650 patient in Madapalle and Punganur region of Andhra Pradesh, Identified and prepare the list of drugs, which were inappropriately prescribed and used in geriatrics by using Revised Beers criteria and also assess the Activities of Daily Living (ADL) by using Modified Barthel Index (MBI). Identify any drug-drug interactions among the drugs used in geriatrics. We were reported the adverse drug reactions appeared in geriatrics and the various treatments that the patients are received with different co-morbidity disease with the assessment of drug exposure, and ascertainment of PIM, PPO STOPP, START criteria and MBI outcomes. Characteristic of statistics sources include evaluation of complete history of drug use in elderly patient with co-morbidity condition, allowing approximate of collective exposure. Result data from beers criteria with PIM, modified barthel index are preferable, but elderly patient treatment data from reliable sources, for example, patient or pathology registries, and medical records are also considered. We present report to showed poly-pharmacy effects of

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drug use on elderly patient improvement and converse the need for employing STOPP and START criteria of PIM and PPO to avoid undesirable drug reaction causation. We emphasize that a study design of beers criteria always be considered and result of Modified barthel index shows the dependency rate in elderly patient. We also underline the need for Comorbidity analyses in geriatric patient and drug usage, as drug utilization in geriatric are prone to dose and number of drugs in treatment dependent. In the main, studies of Prescription analyses like polypharmacy, PIM, PPO in prescription should explore risk Geriatric patient, the present study reveal the PIM and PPO of in prescription from six hundred and fifty geriatric patient. We conclude the pharmacoepidemiological studies of elderly patient are likely to develop significantly in the coming years, due to the rising mortality of long-term drug exposures and less awareness of poly-pharmacy result, the increasing perform of multinational studies, permitting studies of rare and common disease in elderly people, types of medication and procedural development specifically addressing geriatric treatment and long-term outcomes.

**Keywords:** Geriatric; disease; drug; beers criteria; PIM; poly-pharmacy; epidemiology; Andhra Pradesh.

## 1. INTRODUCTION

Pharmacoepidemiology studies investigate the use and effects of drugs and other medical products in populations and the field has made significant step in adults, same way there is a national need for pharmacoepidemiology studies in geriatric. Geriatric treatment therapy is difficult because developmental internal and external changes due to age factors may alter the protection and efficiency of drugs in Geriatric.

The overpowering majority of patient interactions with the health care system involve decision-making about drug therapy. In order to ensure towering care, it is important for decision-makers like patients, caregivers, clinicians and third-party payers to know whether a certain drug therapy provides value for the money. The pharmacoepidemiology studies in different population can be used to help set priorities for the provision of health care management at individual and national levels [1].

The World Health Organization said pharmacoepidemiology studies apply epidemiological frequency, Pattern, methods and knowledge to study the clinical use and effects of drugs in human being, as well as nonprescription drugs, biological Preparations and medical equipments.

The guidelines of Beers criteria were first issued in 1991 and have been updated repeatedly over the years. Dr. M.H. Beers was the principal author of the original 1991 it is universal for medication usage in elders.

Medication-related problems are common, costly, and often preventable in older adults and lead to

poor outcomes. Estimates from past studies in ambulatory and long term care settings found that 27% of adverse drug events (ADEs) in primary care and 42% of ADEs in long-term care were preventable, with most problems occurring at the ordering and monitoring stages of care [1,2]. In a study of the 2000/2001 Medical Expenditure Panel Survey, the total estimated healthcare expenditures related to the use of potentially inappropriate medications (PIMs) was \$7.2 billion [3]. In Geriatric adults reducing medication-related problems and ADEs by avoiding the use of inappropriate and high-risk drugs is an important, simple, and effective strategy. Implicit and explicit criteria were address medication-related problems and identify high-risk drugs using a list of PIMs have been identified through expert panel review as having an critical balance of risks and benefits by themselves and considering alternative available drugs. A list of Beers and colleagues for nursing home residents in 1991 and subsequently expanded and revised PIMs was developed and published by to include all settings of geriatric care in 1997 and 2003.

The term polypharmacy usually refers to the use of a certain number of drugs concurrently, with the cut-off value typically set at four or five [3,4]. New definitions include duplicate prescribing, or lack of indication; there is no compromise. So-called excessive medication is usually defined as using ten drugs or more [5].

The term "inappropriate drug use" refers to a situation where the risks of using the drug(s) in issue to compensate the benefits [6-8]. Although increasingly focused on, but there is no universal definition used. The present study focused on comparisons of studies investigating

inappropriate drug use among older people are vulnerable by different aspects of drug use, both gender of populations in specific region in Andhra Pradesh and different settings studied

## **2. PHARMACOEPIDEMOLOGICAL STUDIES**

### **2.1 Methodology**

The research method was retrospective in personality, descriptive, comparative design. A chart review was concluded for the purpose of relating the suitability of the Beers Criteria versus the STOPP/START Criteria in identifying PIM or PPO based on India setting.

### **2.2 Criteria Validity**

In 1991, panel of 13 experts of Delphi consensus methodology (DCM) was established Beers Criteria content with two rounds of questionnaires before each round group response was validated. In 2012 the Beers Criteria '2003' was update and revised by 11 sponsored experts From the American Geriatric Society [9,10].

Delphi consensus methodology using two round in 2003 and 2006 was established the STOPP/START Criteria's substance validity. A panel of 18 experts in different field of geriatric medicine, pharmacotherapy, old age psychiatry, and primary from countries of Ireland and UK collaborated to establish STOPP/START Criteria finally. Sixty five of the original proposed sixty eight criteria and all twenty two of the original START Criteria in final STOPP Criteria contain. The criteria have strong inter-rater reliability with a kappa coefficient for STOPP 0.88 and START 0.90 among pharmacists and STOPP 0.75 and START 0.68 among physicians [11-13].

### **2.3 Setting**

The setting of this study was a home based review in the districts of Andhra Pradesh. It offered a huge numeral of geriatric patients amid risk for chronic diseases hypertension, diabetes mellitus, cardiovascular disease, cerebrovascular diseases and musculoskeletal conditions.

### **2.4 Participants**

The study populations were an appropriate sample of medical records from various disease

conditions. The sample size for present study was 650 medical records.

Inclusion criteria included both males and females, of all races and ethnicities. Participants were all 55-75 years of age and well we have less than 1% of patients were in the age of 55-60. Average age of population was 65-75 included in the study

### **2.5 Patient Details**

55-65 years of age - (377) 58% = [Male (182) 28% and Female (195) 30%]

66-75 Years of age- (273) 42% = [Male (175) 27% and Female (98) 15%]

Seen at the practice within a two year period (June 2017- May 2019), and took at minimum one prescription medication on a regular basis. Study population had mostly one of the following diagnoses which are included in the STOPP/START Criteria: Osteoarthritis, Osteoporosis, uric deposition in state of gout acid, auricle fibrillation, High blood pressure, Heart failure due to congestion, gastrointestinal bleed, kidney failure, Parkinson's, chronic pain, anxiety, depression, insomnia, or seasonal allergies. Exclusion criteria included nursing home residents, because they are not living in the community and those with diagnosed terminal illnesses because neither criterion is based on care of terminal patients.

### **2.6 Data Collection**

Data was collected in June 2017 from an electronic charting system. Records were accessed electronically by researcher. Selection began by electronically identifying the records of patients seen during two years period (June 2017- May2019) and assessed for inclusion and exclusion criteria, specifically past medical history, up to a convenient sample of 200 participants. Based on expected attrition, three charts were added to the calculated sample size of 200. Then the charts were then coded one through 650 to ensure patient privacy. Once 650 records were found that met inclusion criteria, demographic data was collected as available.

Primarily data are data collected prospectively for the particular studies utilizing hospital or community-based primary data collection have evaluated drug-disease associations for the STOPP Central Nervous System, Psychotropic

Drugs, Musculoskeletal System Drugs, STOPP Drugs that Adversely Affect those Prone to Falls, and STOPP Analgesic Drugs were applied to each medical record. The START Musculoskeletal System Criteria was applied to each medical record prescription of population. Data collection was also collected through questionnaires, interviews, or chart reviews. We collected the primary data of medication taking behavior and the correlated with secondary data from prescription. The PIM to avoid by therapeutic category like Antihistamines, Pain Medications and PIM to avoid in disease/syndrome, Fractures, History of Gastric Ulcer and Duodenal Ulcers, Chronic Kidney Disease were collected according to Beers Criteria. Confidentiality and privacy were ensured with a systematic approach, only identifying the patients by one through 650, and keeping collected information locked.

### 2.7 Data Analysis

- 1) We were analyzed rate of PIM identified by specific sections of the Beers Criteria and specific sections of the STOPP Criteria.
- 2) Identify the rate of PPO by a specific section of the START Beers Criteria.
- 3) According to by each Beers criteria most common PIM or PPO drug classes identified

- 4) Polypharmacy was identified with corresponding co-morbidity.
- 5) Each criterion was identified using descriptive were identified using descriptive statistics reported as percentages, frequencies, numerals.

## 3. RESULT

### 3.1 Demographic Characteristics

A total of 650 medical records were identified and included in this retrospective, descriptive, comparative chart review. Table one summarizes the demographic characteristics of the sample. The age of patients between 55-65 were male 28%, female 30% and 65-75 age in male was 27%, 15% were females. The mean ages of male and female patient were 63.68, 61.29, 74.26, and 72.45 respectively.

### 3.2 Rates of PIM (Potentially Inappropriate Medicines) & Beers Criteria results

Fig. 3 summarizes PIM identified by sections of beers Criteria, after applying the Beers Criteria, a total of 274 (42.15%) PIM were identified in 650 of medical records. The out of 274, 154 (23.65%) medical records with PIM had one medication identified and 120 (18.5%) medical records with PIM had two medications identified. Totally 74% (202) of PIM being prescribed to females and 26% (72) were males in 274 (100%).

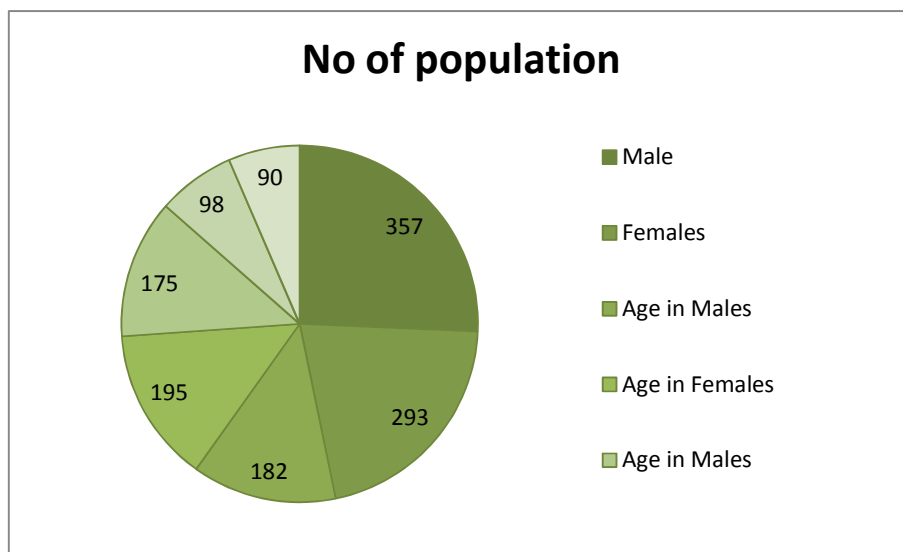


Fig. 1. Demographic details of the study subjects

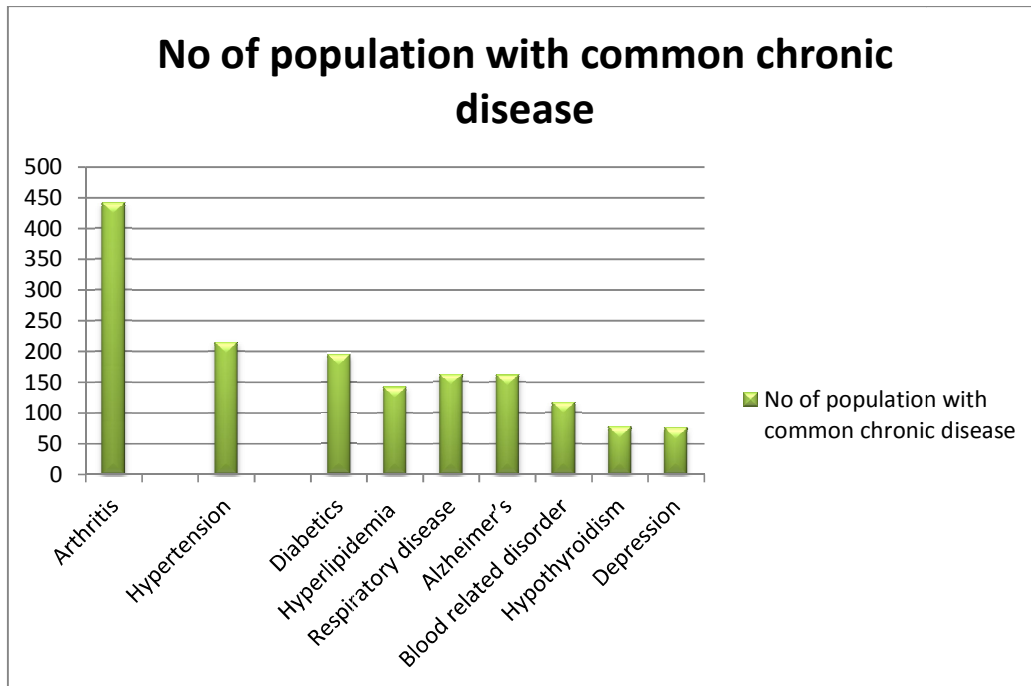


Fig. 2. Demographic details of the study subjects with common chronic disease

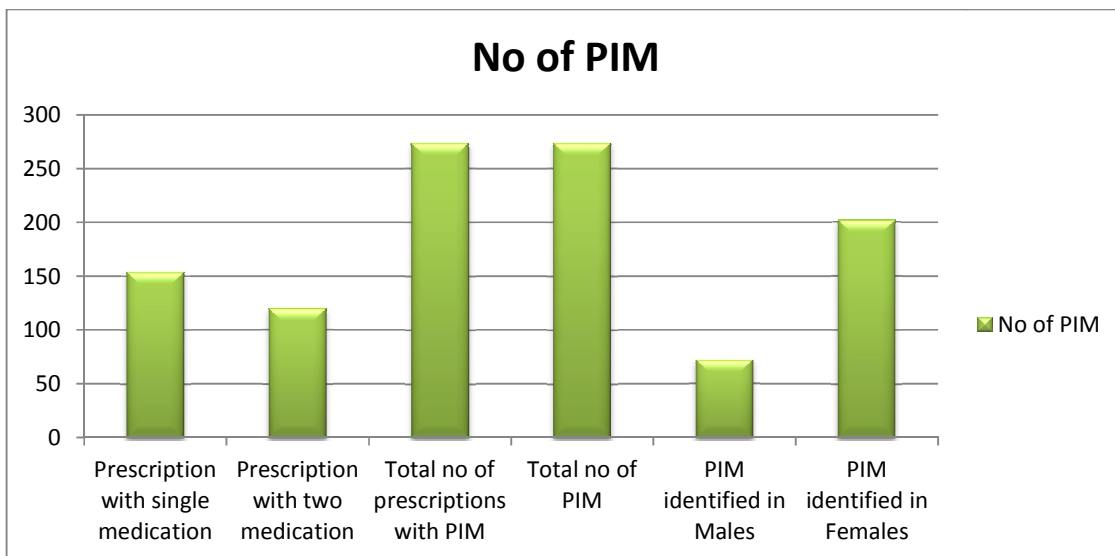


Fig. 3. PIM according to Beers Criteria

**3.3 STOPP (Screening Tool of Older People's Prescriptions) Criteria results**

After applying the STOPP Criteria a total of 386 (59.3%) PIM were identified in 650 (100%) of total medical records. 254 (65.02%) Females and 133 (34.19%) males were prescribed of PIM. 182

(47.14%) medical records with PIM identified one medication, 133 (34.72%) medical records with PIM identified two medications, 51 (13.21%) medical records with PIM identified three medications, 10 (2.59%) medical record with PIM identified four medications, and 9 (2.33%) medical records with PIM identified five medications.

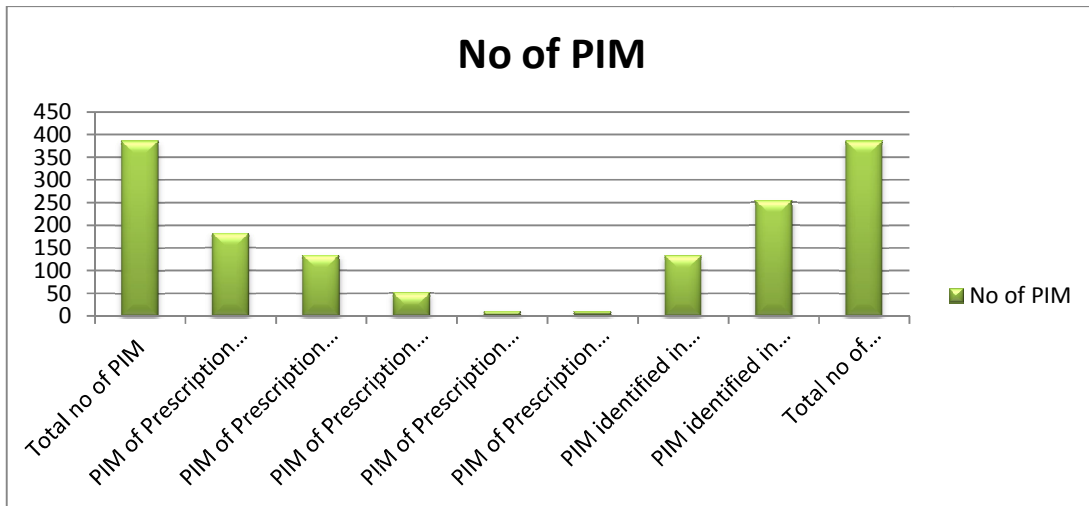


Fig. 4. PIM according to STOPP Criteria

### 3.4 Rates of PPO (Potential Prescribing Omissions) & START Criteria Results

Fig. 5 summarizes the PPO identified by the musculoskeletal section of the START Criteria. After applying the START Criteria a total of 165 (25.38%) PPO was identified in 115 individuals, 73(63.47%) females and 42 (36.52%) males of PIM were prescribed. 62 (37.5%) Medical records with PPO had one medication identified, 103 (62.42%) medical records with PPO had two medications identified. Omission of Calcium supplements accounted for 62 (37.5%) records of all PPO and omission of Vitamin D accounted for 52 records (31.5%) of all PPO. The mean age of those identified with a PPO was 74.5 years while the mean age of those without PPO identified was 70.9 years.

### 3.5 PIM and PPO Identified by Class, PIM Classes Identified by Beers Criteria

Fig. 6 summarizes the most frequent classes of PIM identified by sections of the Beers Criteria. The prescription of NSAIDs, excluding aspirin (ASA), accounted for 183 (56.30%) of PIM identified by the criteria, specifically the section independent of diagnosis. The prescription of benzodiazepines, in 12 patients with a history of falls accounted for 3.6% of PIM identified, and was the only medication class identified by the Beers Criteria section that considers diagnosis. The patient with Antihistamine, Diuretic, anti-infective, H2 antagonist and GIT drug for constipation was 60 (18.46%), 74 (22.76%), 91 (28%), 46 (14.15%) and 39 (12%) respectively.

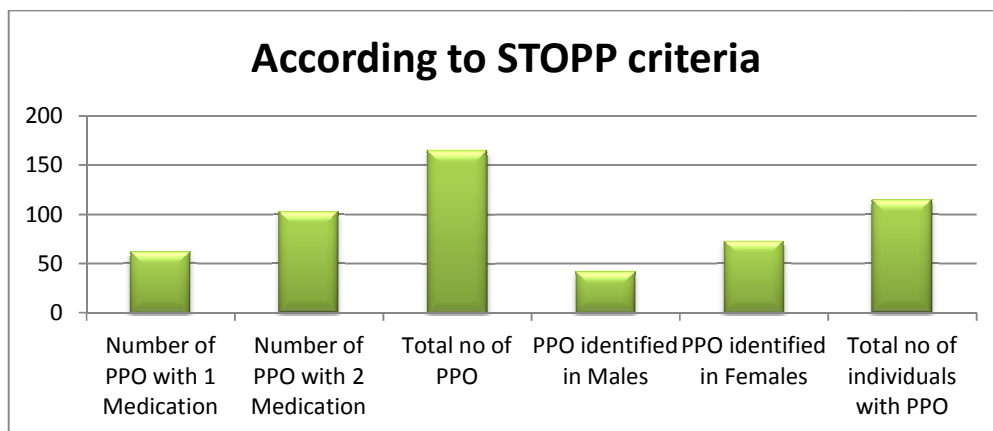


Fig. 5. PPO according to STOPP Criteria

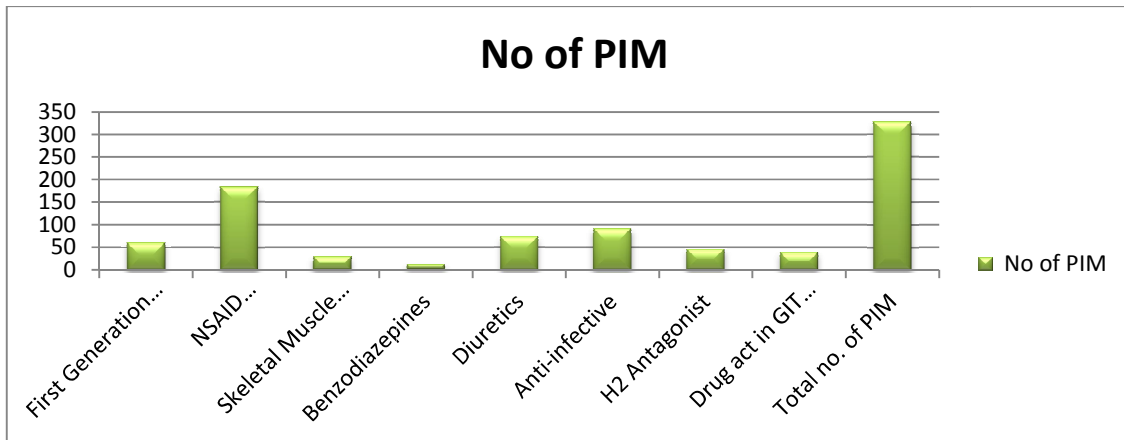


Fig. 6. PIM classes according to Beers Criteria

**3.6 PIM Classes Identified by STOPP Criteria**

Fig. 7 summarizes the most frequent classes of PIM identified by the applied sections of the

STOPP Criteria. The long-term use of NSAIDs to treat OA accounted for 35.83% of PIM and long-term H2 antagonist use to treat mild to moderate ulcer pain accounted for 11.66% of PIM identified by the STOPP Criteria.

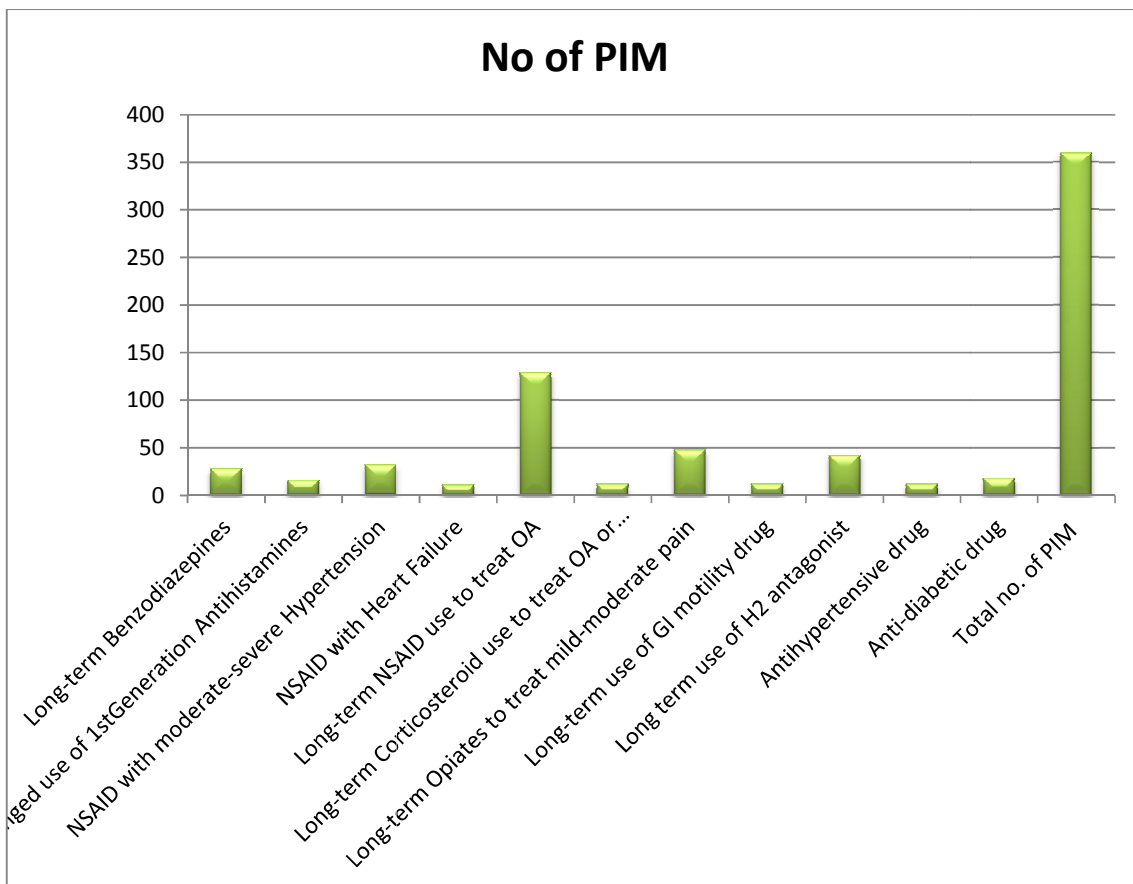


Fig. 7. PIM classes: STOPP criteria

### 3.7 PPO Classes Identified by START (Screening Tool to Alert to Right Treatment) Criteria

Fig. 8 summarizes the most frequent classes of PPO identified by the START Criteria musculoskeletal section. The most common potential prescription omissions identified were Calcium and Vitamin D. Omission of Calcium supplements accounted for 37.5% of all PPO, omission of Vitamin D accounted for 31.3% and Bisphosphonates 25% of all PPO.

### 3.8 Polypharmacy

Fig. 9 summarizes the percentage of the sample with poly pharmacy. Poly pharmacy was identified in 475 (73%) of medical records out of 650. Patients were taking an average of 7.4 medications. Table eight summarizes the average number of medications based on age range of 55-65 and 65-75. The age range between 55-65 years had the average number of medications per patient (7.4) however, there were found 132 (20.30%) medical records included in this age range. The largest numbers of 343

(52.7%) medical records were in the age range of 65-75 years of age group.

### 3.9 Prescribed Medications Included in Beers criteria

#### 3.9.1 Study subjects

The different classes of age wise patient was selected for this study 65 and above, the total 278 patient was identified and included in this study in the age of 65-69 years and it was considerably higher than the other age groups. Very few patient was identified and selected in the age group of >84 in punganr and Madanapalle region.

On the basis of above table and figure the patients across the clinics file information, many of the patients were admitted as inpatient and discharged due to the Cardio, Pulmonary, Internal, Surgery, Neurology, Endocrinology, diabetics and Infection problem were 28.46%, 15.07%, 7.3%, 2.61%, 7.3%, 6%, 15.69% and 9% respectively.

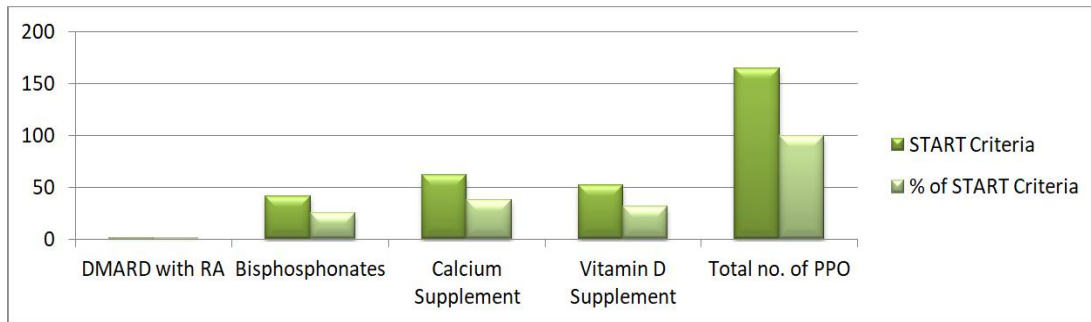


Fig. 8. PPO Classes according to START Criteria

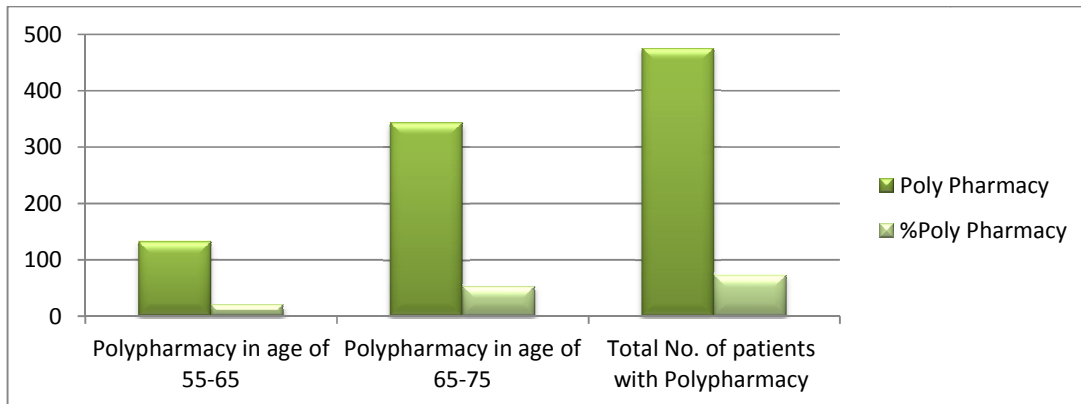


Fig. 9. Patients Experiencing Polypharmacy



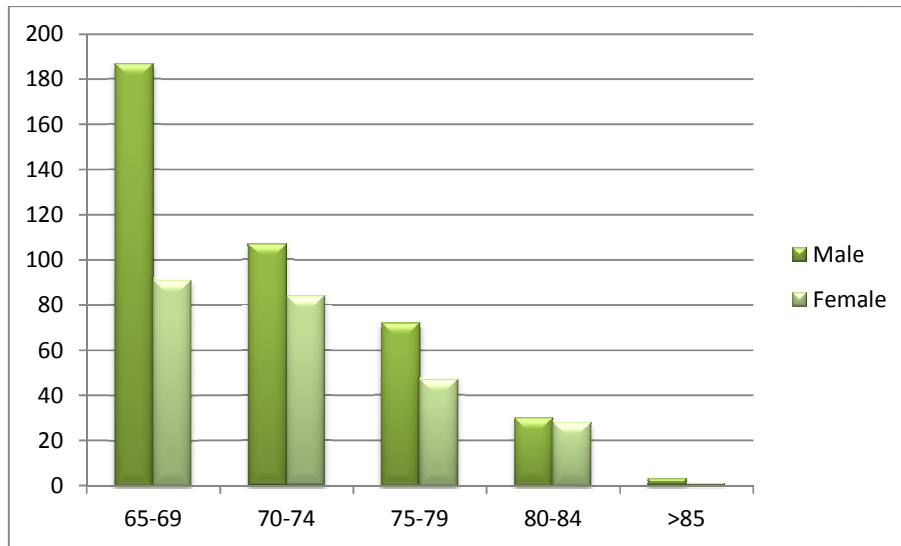


Fig. 10. Shows the diagramatical representation of demographic details of study subjects

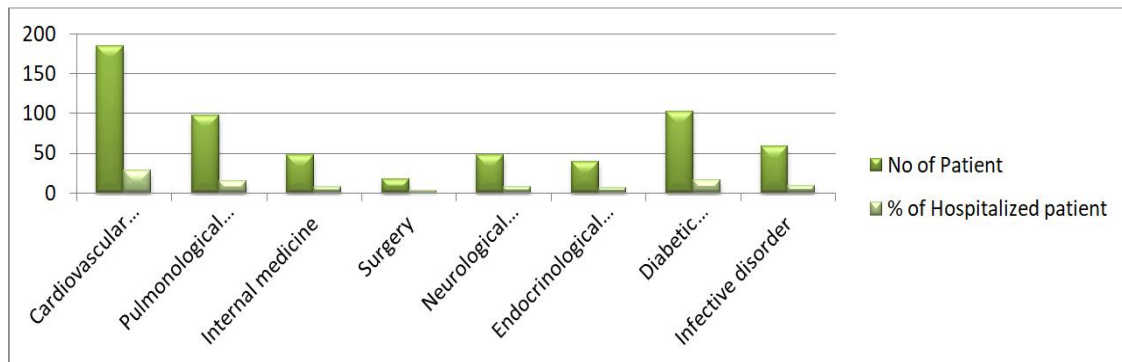


Fig. 11. Inpatient population history from medical records

### 3.10 Prescribed Medications Included in Beers Criteria

Of the total 1480 medicines prescribed, 11.48 % ( $n = 170$ ) were identified to be PIM used during hospitalization as determined by the Beer's Criteria's components; however, 5.3% ( $n = 78$ ) PIMs were observed in the discharge medications. The total prescribed medications that included in Beers Criteria were 16.7 % ( $n = 248$ ).

Proton-pump inhibitors (PPIs) were the most prescribed PIM for patients during hospitalization 10.6% ( $n = 70$ ). From the PPIs, pantoprazole was prescribed most frequently during hospitalization, although some were stopped on discharge. Diuretics such as furosemide was the second most commonly prescribed PIM drug

also classed as PIM even on discharge for a number of patients. Enoxaparin was the third most commonly prescribed medication during hospitalization; however, it was not the third prescribed PIMs furthermore it was stopped in all cases at discharge.

According to the component in Beers criteria, which are PIMs, there were 68.54% ( $n = 170$ ) of PIMs included in this component of the drugs, 2% ( $n = 4$ ) were drug-drug interactions, 5.6% Based in kidney function, 15% Use with caution, 26.4% Drug-disease interaction and 50% Drugs to be avoided in during hospitalization. These groups of components involve drugs that require monitoring or avoidance during the selected period. In addition, some drugs should not be used as the primary choice and some should be avoided in elderly adults.

**Table 1. Shows the Beers criteria recommendations for PIM**

Beers criteria components	Number of PIMs	Recommendations				
		Avoid	Avoid as 1 <sup>st</sup> choice	Avoid with exceptions	Use with caution	Reduce dose
Drug-drug interaction	2% (n = 4)	100% (n = 4)	–	–	–	–
Based in kidney function	5.6% (n = 10)	40% (n = 4)	–	–	20% (n = 2)	40% (n = 4)
Use with caution	15% (n = 26)	–	–	–	100% (n = 26)	–
Drug-disease interaction	26.4% (n = 45)	62.2% (n = 28)	29% (n = 13)	9% (n = 4)	–	–
Drugs to be avoided	50% (n = 85)	13% (n = 11)	28% (n = 24)	59% (n = 50)	–	–

**Table 2. Shows the Beers criteria recommendations for potentially inappropriate medications at discharge**

Beers criteria components	Number of PIMs	Recommendations				
		Avoid	Avoid as 1 <sup>st</sup> choice	Avoid with exceptions	Use with caution	Reduce dose
Drug-drug interaction	6% (n = 5)	100% (n = 5)	–	–	–	–
Based in kidney function	4% (n = 3)	67% (n = 2)	–	–	–	33% (n = 1)
Use with caution	21.7% (n = 17)	–	–	–	100% (n = 17)	–
Drug-disease interaction	20.5% (n = 16)	62.5% (n = 10)	31.3% (n = 5)	6.7% (n = 1)	–	–
Drugs to be avoided	47.43% (n = 37)	14.4% (n = 5)	18.8% (n = 7)	67% (n = 25)	–	–

According to the component in Beers criteria, which are PIMs, there were 31.4% ( $n = 78$ ) of PIMs included in this component. Of the drugs, 6% was drug-drug interactions, 4% were based in kidney function, 21.7% were Use with caution, 20.5% were Drug-disease interaction and 47.43% were Drugs to be avoided in during at discharge.

### 3.11 Comparison of PIM use during Hospitalization and Discharge in Beers Criteria Recommendations

Of the study subjects were found to be using PIMs during hospitalization 41.53% (270), one

PIM was prescribed to 40% , followed by 29%, 16.5% and 15% were second, third and more than four PIM was prescribed respectively. While at discharge, from 13.23% (86/650) patients who had PIMs, one PIM was prescribed to 37%, and followed by 30.2%, 11.6% and 21% PIM was prescribed.

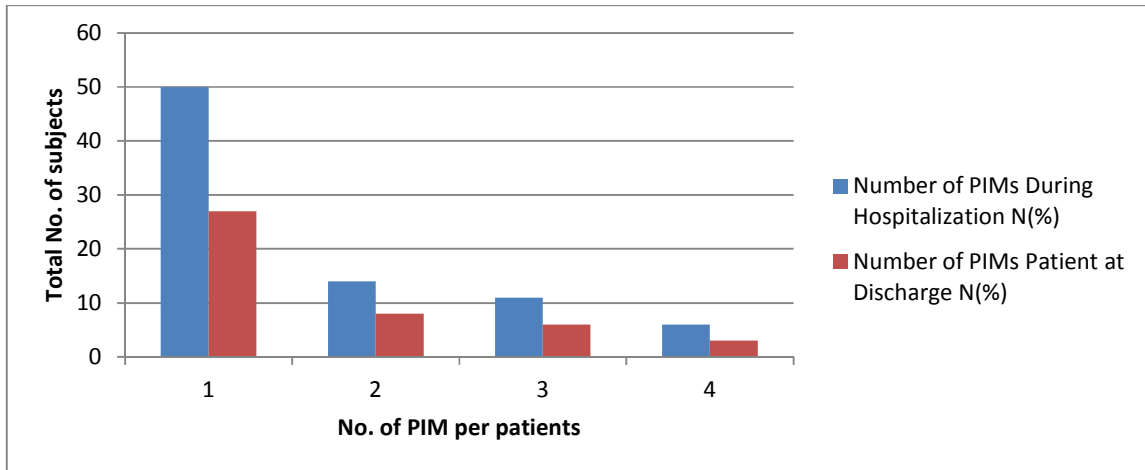
#### 3.11.1 Reason of hospitalization with co morbidities conditions

In the above table most common comorbidities in the studied subjects have hypertension, 25.4% (N=134), diabetes, 24.3% (N=128) and Ischemic heart disease, 14.8% (N=78).

**3.11.2 Assessment of Modified Barthel Index (MBI) scores**

The above table of Barthel Index for activities of daily living base line mean was  $75 \pm 19.91$  and first follow up mean was  $75 \pm 45.28$ . in base line Activities of daily living range of total dependency

were 75, severe dependency were 64 moderate dependency were 107 and slight dependency were 54 geriatric patients. The first follow up of Activities of daily living range of total dependency were 44, severe dependency were 34 moderate dependency were 150 and slight dependency were 71 geriatric patients.



**Fig. 12. Shows the Comparison of PIM use during hospitalization and Discharge in Beers criteria recommendations**

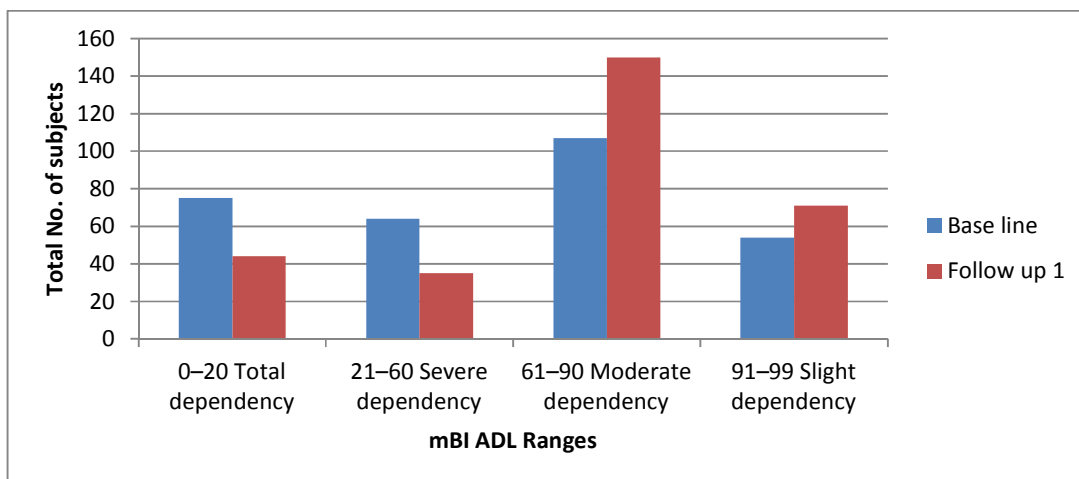
**Table 3. shows the Reason of hospitalization with co morbidities conditions**

Variables	Total Number	Percentage
Cardiogenic shock, MI, atrial fibrillation (AFib)	255	39.3
Sepsis or (ADRS)	39	6
Surgery	47	7.3
Upper gastrointestinal bleeding (UGIB)	39	6
Infection without sepsis [including cholangitis, pneumonia, cellulitis, pancreatitis, urinary tract infection (UTI) and diabetic foot infection (DFI)]	140	21.6
Ischemic or hemorrhagic stroke	41	6.3
Status epilepticus	26	4
Others (road traffic accident, acute kidney injury (AKI))	60	9.3
<b>Total</b>	<b>650</b>	
<b>Co morbidities</b>		
Hypertension (HTN)	134	25.4
Atrial fibrillation (Afib)	32	6
Ischemic heart disease (IHD)	78	14.8
Myocardial infarction (MI)	64	12
Congestive heart failure (CHF)	12	2.2
Cerebrovascular disease	11	2
Chronic obstructive pulmonary disease (COPD)	17	3.2
Diabetes mellitus	128	24.3
Uncomplicated	12	2.2
Complicated (end organ damage)	25	4.7
Moderate-to-severe chronic kidney disease	13	2.4
<b>Total</b>	<b>526</b>	

**Table 4. Shows the modified barthel index (MBI)**

<b>1. Bowels</b>			
Incontinent or needs enemas (0)	Occasional accident (5)	Continent (10)	
<b>2. Bladder</b>			
Incontinent or needs enemas (0)	Occasional accident (5)	Continent (10)	
<b>3. Grooming</b>			
Needs help with personal care (0)	Independent (including face, hair, teeth, shaving) (5)		
<b>4. Toilet Use</b>			
Dependent (0)	Needs some help (5)	Independent (10)	
<b>5. Feeding</b>			
Unable (0)	Needs help, e.g. cutting (5)	Independent (10)	
<b>6. Transfer (bed to chair and back)</b>			
Unable, no sitting balance (0)	Major help (1 or 2 people), can sit (5)	Minor help (verbal or physical) (10)	Independent (15)
<b>7. Mobility</b>			
Immobile (0)	Wheelchair independent (including corners) (5)	Walks with the help of 1 person (physical or verbal help) (10)	Independently walk >50 yards mobility (15)
<b>8. Dressing</b>			
Dependent (0)	Needs help –can do ~½ unaided (5)		Independent (including buttons, zips, laces,etc.) (10)
<b>9. Stairs</b>			
Unable (0)	Needs help (verbal or physical) (5)	Independent (10)	
<b>10. Bathing</b>			
Dependent (0)	Independent (bath or shower) (10)		

*Interpretation: 0–20 Total dependency; 21–60 Severe dependency ; 61–90 Moderate dependency; 91–99 Slight dependency*



**Fig. 13. Shows the digrammatical representation of assessment of modified barthel index (MBI) scores**

#### 4. DISCUSSION

The present epidemiological study result revealed total number of medications prescribed was 768, with a range of 5-10 medications per prescription and a mean of 5.62 medications per prescription. The most common chronic disease identified as Osteoarthritis in 68% of the population and the medical record of female shows PIM higher than the males so the necessary aspect of drug therapy should analyze to avoid PIM in elderly female population and it may influenced by specific drug therapy in female like calcium, hormonal related drugs and also anatomy and physiological variation in female. Result shows the PIM was observed more with single drug compared to two or more drug in single prescription at the same more than 50% of two potentially inappropriate drugs was seen in prescription but four PIM drug was identified least prescription

The medical records triggered PIM in multiple sections of the STOPP Criteria for number of medication classes including NSAIDs, benzodiazepines, opiates, and first generation antihistamines. Those medications were only counted as one PIM, because the different sections identified one PIM, several different times. There were, however, several medical records that had more than one medication from a drug class listed, including NSAIDs, anti-hypertensive drug, anti-diabetic drug, morphine like drugs, and those medications were counted separately and included in the total PIM. From STOPP and START criteria the result revealed elderly population medical record should review accordingly and poly pharmacy with co-morbidity disease should considered before initiating drug therapy, barthel index showing dependency and non dependency rate, dependency rate was initially was high and regular follow up will decreasing the dependency. The proper follow up with the previous medical from patient was essential to improve the independency rate and decrease the dependency. The present epidemiological studies result suggest, medical related problem in the region punganur and Madanapalle region might have less awareness and important of treatment therapy from elderly population specially in female and also professional negligence. Not only in region was it estimated at national level so in order to avoid complication in treatment of elderly patient this initial studies might be helpful to professional to create awareness of drug therapy importance to the patient and past medical record review was

important tool to avoid of PIM and PPO drugs in prescription.

#### 5. CONCLUSION

The epidemiological methods are doing a revolutionized pharmacoepidemiological data collection and there is no doubt that this data basis will continue to develop and provide better information for the health professionals and regulatory authorities. We conclude that there is a need to build global collaborative capacity and funding opportunities for geriatric pharmacoepidemiology because this is one of the most powerful ways to provide evidence of drug safety in geriatrics. Although the field of geriatric pharmacoepidemiology is steadily developing evaluation, is mainly focused on few drug classes and safety outcomes and concerns mainly drug use in developed countries. Small study size is a specific challenge in geriatrics. Reporting should be improved to achieve goal in better geriatric treatment.

#### CONSENT

It is not applicable.

#### ETHICAL APPROVAL

Approval from the Institutional Review Board and Permission from institutional ethical committee was obtained prior to the conduct of the study from Dr Sundaram, Authority of Spanadana Hospital (Institutional Ethical committee No: IEC/SPH/2016/02). The nature of this retrospective study design, the researcher were collected data using patient medical record with the individual patient and no patient harm was predictable. The ethical considerations was defending patient's health information and protect patient's privacy, the only data collected was information that appeared on the approved demographic collection tool.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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