

**EVALUATION OF APPROPRIATENESS IN PRESCRIPTION OF GERIATRIC POPULATION IN RESIDENTS OF OLD AGE HOMES USING MAI CRITERIA****Salmanul Faris A<sup>1</sup>, Dr. Satish S<sup>2</sup>, A R Shabaraya<sup>3</sup>**<sup>1</sup>Pharm D., Department of Pharmacy Practice, Srinivas College of Pharmacy, Mangalore, Karnataka, India<sup>2</sup>Associate Professor, Srinivas College of Pharmacy, Mangalore, Karnataka, India<sup>3</sup>Principal and Director, Srinivas College of Pharmacy, Mangalore, Karnataka, India**Article Info: Received 25 July 2019; Accepted 14 September. 2020****DOI: <https://doi.org/10.32553/jbpr.v9i5.800>****Corresponding author: Salmanul Faris A****Conflict of interest statement: No conflict of interest****ABSTRACT:**

WHO evaluated that in every nine people there is one elderly individual, i.e. of age >60 years. Compared to young adults, elderly persons have more illnesses, as ageing is often accompanied by chronic diseases, co-morbidity, disability and social isolation. MAI was developed to evaluate appropriateness of medications in all age group. Objective of the study was to assess polypharmacy and appropriateness in prescription. A cross sectional study was carried out for a period of 6 months to assess medication appropriateness. Patients of both sexes above 60 years of age, with at least one chronic illness were included. Out of 481 drugs 32 drugs were marginally inappropriate and 53 drugs were inappropriate according to MAI criteria and 12 participants were completely frail according to GFI (GFI Score  $\geq 4$ ). Polypharmacy and PIM are highly prevalent in geriatric population, which has a major health care outcome. Standard criteria should be considered before prescribing the medications in geriatric population.

**Keywords:** Geriatrics, polypharmacy, MAI.**INTRODUCTION**

According to WHO in every nine people there is one elderly individual, i.e. of age >60 years. Elderly persons have more illnesses, as ageing is often accompanied by chronic diseases, co-morbidity, disability and social isolation. Polypharmacy is common among the elderly<sup>[1]</sup>. Inappropriate prescribing is also a challenge which is highly prevalent in older people and is a global healthcare concern<sup>[2]</sup>. Polypharmacy in geriatrics is becoming a big problem because it is associated with greater health-care costs<sup>[3]</sup>.

MAI serve as a sensitive measure of potential improvement in prescribing quality. The scores are then summated to provide a summary measure of appropriateness for each medication, ranging from zero (indicating a completely appropriate prescription) to a maximum score of 18 (indicating a completely inappropriate prescription)<sup>[4]</sup>. An advantage of the MAI is that it encompasses elements of drug prescribing that are to any medication and to any clinical condition in any clinical setting<sup>[5]</sup>.

**MATERIALS & METHODS****STUDY DESIGN:** A prospective cross-sectional study to assess medication appropriateness.**STUDY SITE:** The study was conducted in Government old age home Kasaragod, Sainikethansevasramdaigoli, and Bethlehem old age home Rajapuram. Kasaragod, Kerala.**STUDY DURATION:** The study was conducted for duration of 6 months from September 2018 to February 2019.**SAMPLE SIZE:** The study was limited for a sample of 100 based on the time schedule allotted for the project including other circumstances.**ETHICAL CLEARANCE:** The study protocol was approved by the Institutional Ethics Committee (IEC) of Srinivas Institute of Medical Science, Mukka, Mangaluru.

(Ref. No: EC/0009/18-19).

**STUDY CRITERIA****Inclusion criteria:**

- Patients, both male and female above 60 years of age.
- Patient with at least one chronic illness.

**Exclusion criteria:**

- Patients who are less than 60 years of age and not willing to participate.

- Patients without diagnosed medical condition or prescription

#### SOURCE OF DATA

Data(s) for the study were collected using data collection form from the medical records of Aged care homes and through direct interaction with the patient, nurse and other staffs

#### STUDY METHOD

##### Preparation of Inform Consent Form

Inform consent form were prepared in Malayalam and English and same were used. Before selection of subjects the consent form was orally explained to the participants before filling it and nonverbally by taking help of caregiver and staffs who are well known of the subjects in old age home and made them understood.

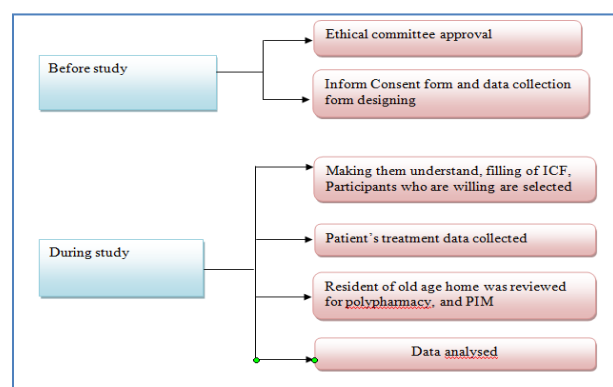
##### Data(s) collection:

Data(s) were collected using data collection form with the aid of medical records and through direct interaction with the patient, nurse and other staffs from old age homes. Data collected include patient name, gender, age, diagnosis, biochemical investigations and the drug prescribed. The obtained data(s) were kept confidential.

#### DATA ANALYSIS

Statistical analysis involves collecting and scrutinizing of every data sample in a set of items from which samples were drawn and a suitable statistical test was applied to analyse the data. The collected data(s) were analysed using Microsoft excel.

#### OPERATIONAL MODALITY



#### RESULTS

##### Demographic Characteristics of Participants

Present study included total of 100 participants from Govt. old age home, paravanadukkam, Sai nikethan sevasram, Daigoli, Bethlehem old age home Rajapuram were participated in this study, among them, 54(54%) male and 46(46%) female, were distributed according to

age group to compare the probability of greater incidents of PIM in different age group. In the present study it was found that majority of participants (60) were of 60-70 age group, 35 participants of 71-80 age group. Very least participants were of the range 81-90. Around 43(43%) participants were receiving <5 medications and 57 (57%) participants were on 5 or more medications. Mean number of medications used by participants was  $4.81 \pm 1.77$  (range 1-10), the data observation confirms polypharmacy among majority of population.

##### Prevalence of Polypharmacy

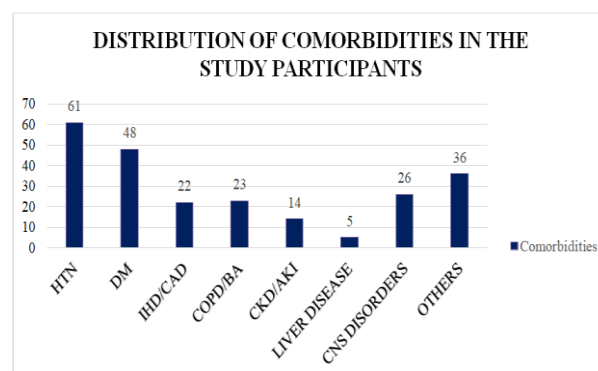
Prescription from the study participants were thoroughly analysed to check polypharmacy. Out of analysed 100 prescription which 57 prescriptions had 5 or more than 5 medications i.e., 57 (57%) participants were observed with polypharmacy. Of this 32(57.14%) male and 25(42.85%) females, receiving 5 or more than 5 medications due to more than 1 comorbidities.

**Table 1:** Prevalence of polypharmacy

<5 drugs	43
5-10 drugs	57
11-15 drugs	0

**Table 2:** Distribution of comorbidities in study participants

COMORBIDITIES	TOTAL NUMBER
HTN	61
DM	48
IHD/CAD	22
COPD/BA	23
CKD/AKI	14
LIVER DISEASES	5
CNS DISORDERS	26
OTHERS	36



**Graph 1:** Distribution of comorbidities in the study participants

##### Distribution of Elderly Patients with Number of Comorbidities (N=100)

Out of the 100 prescriptions evaluated 91% patients were found to have more than 1 comorbidity. 33% of the patients had 2 comorbidities, 30% had 3 comorbidities, 18% of the patients had 4 comorbidities and 8% of the participants had 5 comorbidities. Out of the 100 participants only 2% had more than 5 comorbidities.

**Table 3: Distribution of elderly patients based on the number of comorbidities**

SL. No.	No of patients	No of comorbidities
1	9	1
2	33	2
3	30	3
4	18	4
5	8	5
6	1	6
7	1	7

#### Distribution of drugs prescribed according to organ system

In the present study a total of 481 drugs were prescribed for 100 participants. Most frequently prescribed classes of drugs prescribed were cardiovascular system drugs 168(34.9%), endocrine drugs 68(14.1%) and Central Nervous System drugs 50(10.3%) followed by gastro intestinal tract drugs and respiratory tract drugs.

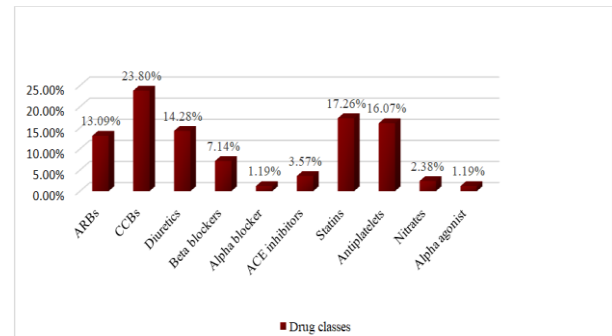
**Table 4: Distribution of drugs prescribed according to organ system**

Organ system	Number (%)
Cardiovascular system	168(34.9%)
Antimicrobials	12(2.4%)
Gastrointestinal system	47(9.7%)
Multi vitamins	32(6.6%)
Respiratory system	37(7.6%)
CNS	50(10.3%)
Endocrine system	68 (14.1%)
Genitourinary System	6 (1.2%)
Analgesics	26 (5.4%)
Immunosuppressant's	8 (1.6%)
Others	26 (5.4%)

#### Utilization of Medications for Chronic Conditions

##### CARDIOVASCULAR SYSTEM MEDICATION UTILIZATION

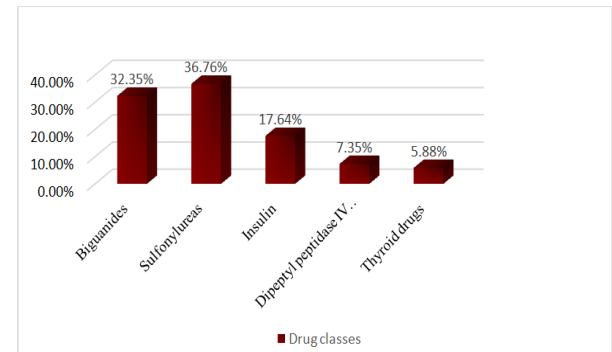
A total of 168 cardiovascular system drugs were prescribed for 83 participants for the treatment of various cardio vascular complications viz., IHD, CAD, hypertension. Calcium channel blocker (23.80%) were most frequently prescribed to the participants. This was followed by statins (17.26%) and anti-platelet agents (16.07%). Alpha agonist and alpha blockers are the less frequently prescribed drugs.



**Graph 2: Cardiovascular system medication utilization**

##### ENDOCRINE SYSTEM MEDICATION UTILIZATION

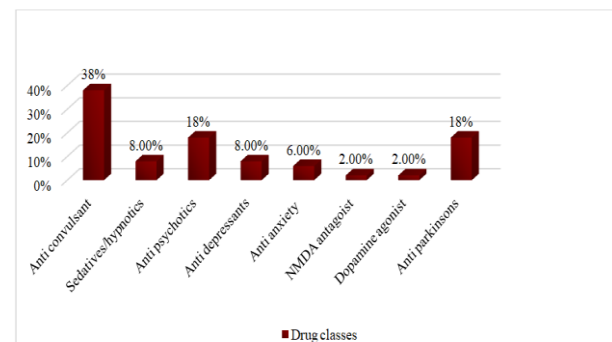
A total of 68 drugs acting on endocrine system was prescribed for 48 participants who were in the treatment of various endocrine complications, viz., Diabetes mellitus, hypothyroidism out of which sulfonylureas were the most frequently prescribed drug class (36.76%) followed by biguanides (32.35%) and insulin (17.64%).



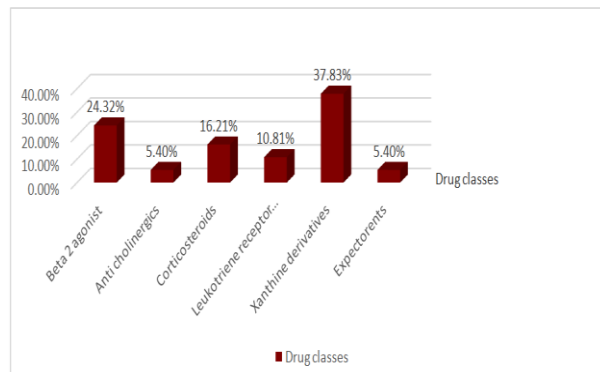
**Graph 3: Endocrine system medication utilization**

##### CENTRAL NERVOUS SYSTEM MEDICATION UTILISATION

A total of 50 CNS drugs have been prescribed for were prescribed for 26 participants who were in the treatment of various nervous system complications, viz, epilepsy, parkinsonism, dementia, psychosis, bipolar disorder, stroke. Out of which Anti convulsions agents were the most frequently prescribed drug class (38%) followed by Anti-psychotics (18%) and anti-Parkinson agents (18%).



**Graph 4: Central Nervous System medication utilization**



## RESPIRATORY SYSTEM MEDICATION UTILISATION

**Graph 5: Respiratory system medication utilization**

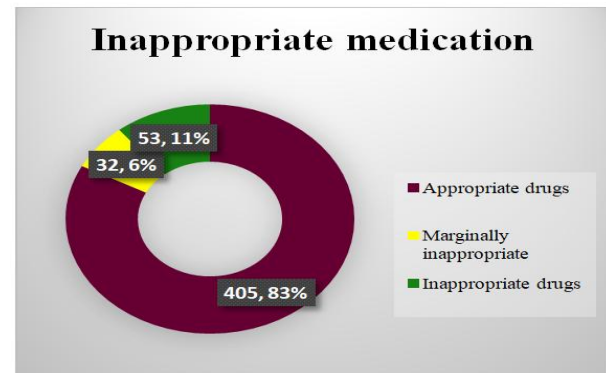
A total of 37 Respiratory tract system drugs have been prescribed for 100 participants who were in the treatment of various respiratory system complications, viz, Bronchial asthma, COPD and LRTI . Out of which Xanthine derivatives were the most frequently prescribed drug class (37.83%) followed by  $\beta$ -2 agonists (24.32%) and corticosteroids (16.21%).

A2A-Alpha 2 agonist, AA-Alkalinizing agent, AB-Alpha blocker, AC- Anti convulsant, ACEI-Angiotensin converting enzyme inhibitors, ACH-Anticholinergics, ACN- Anti coagulant, AD- Anti depressants, AH- Anti histamine, AM-Anti microbial, AP-Anti platelets, APD-Anti Parkinson, APT- Anti pyretic, APS- Anti psychotics, ARB-Angiotensin 2 receptor blocker, ARI- Alpha reductase inhibitors, B2A-Beta 2 agonist, BB-Beta blocker, BG-Biguanide, BZD- Benzodiazepines, Ca-Calcium, CAI- Carbonic anhydrase inhibitors, CCB-Calcium channel blockers, CRS-Corticosteroid, DA-Dopamine agonist, DS-Diuretics, DPI- Dipeptyl peptidase inhibitor, EX-Expectorant, GA-GI agent, GP- Gastro protective, HRA- Histamine 2 receptor antagonist, IN- Inulin, IS- Immuno suppressants. LRA- Leukotriene receptor antagonist, LX-Laxatives, MV-Multivitamin, NMA- NMDA Antagonist, NSAIDS-Non steroidal anti-inflammatory drugs, NT- Nitrates, OP- Opioids, PPI-Proton pump inhibitors, SD- Sedative, ST- Statins, SU- Sulfonylureas, TCA-Tricyclic anti-depressants, TD- Thyroid drugs, VA- Vasopressin antagonist, VIT- Vitamins, XD-Xanthine derivatives.

## MAI CRITERIA

MAI criteria is used to find out inappropriateness of medication by analysing the prescription of the study participants a total of 481 drugs were prescribed for 100 participants. 405 drugs were found to be appropriate,

32 drugs were marginally inappropriate and 53 drugs were inappropriate



**Figure 6: Inappropriate medication**

## DISCUSSION

Geriatric age group is a special risk group with respect to drug prescribing. Rationalizing drug prescriptions in the geriatric patients is a complicated task requiring a multistep approach like prior assessment of drug prescribing pattern in the existing setup, identifying problem areas, and suggesting interventions to improve prescribing pattern <sup>[4]</sup>. The present study aimed to evaluate the proportion of geriatric patients receiving polypharmacy, inappropriate medications and the frailty status among residents of old age home.

In a study done by K. B. Rakesh, *et al.*, the prevalence of polypharmacy is 66.2%, and there is no difference in the proportion of polypharmacy among both the genders <sup>[4]</sup>. Polypharmacy can also lead to prescribing cascade where prescription cascade refers to the misinterpretation of adverse effects, drug-drug, drug-disease interactions which can lead to further misdiagnosis and symptoms. Continuous medication reviews reduce the number and frequency of medications in elderly and could serve as a remedial step to reduce polypharmacy <sup>[9]</sup>.

Polypharmacy in the elderly is a result of multiple comorbidities like hypertension, diabetes, cardiac diseases and their complications. HTN (61%) and DM (48%) were seen in majority of geriatric population, being similar to the one seen in a study done by Al Ameriet *al.* <sup>[8]</sup> Out of the 100 prescriptions evaluated 91% patients were found to have more than one comorbidity.

When evaluating drug utilisation for chronic illness, showed high utilisation of medications related to CVS, where CCBs are most frequently used followed by statins and antiplatelet agents. Similar study was conducted by Hasan *et al.*, were most frequently prescribed were statins followed by CCBs <sup>[6]</sup>. Our study shows a high utilisation of drugs related to

cardiovascular system (39.4%) similar to the one reported by Murthy *et al.*, in their study<sup>[8]</sup>.

MAI is designed to allow rating of ten explicit criteria to determine whether the medication given is appropriate. MAI does not detect omitted drugs. The ten criteria of MAI are indication for the drug, drug effectiveness for the patient's condition, correct dosage and directions, practical directions, drug-drug, drug-disease interactions, unnecessary duplication, duration of therapy and cost effectiveness.

Analyzing appropriateness in prescription using MAI found that 32 drugs were marginally inappropriate and 53 drugs were inappropriate. In the study conducted by Lorna Mary west *et al.*, shows 55.1% of the drugs prescribed during the study were inappropriate<sup>[7]</sup>. Inappropriate use of medication among elderly often leads to increased risk of adverse drug events, health care utilisation, mortality and morbidity.

### CONCLUSION

Appropriate prescribing is the outcome of the decision-making process that maximizes net individual health gains within the society's available resources. If a drug has benefits that outweigh the risks, then the use of drug is considered appropriate. The use of medicines in a disease condition is necessary, but unnecessary load of drugs to patient will increase the safety problems. The study shows that analysis of appropriateness in prescription is a fundamental part of drug prescribing in elderly, reducing the number of prescribed drugs.

### MERITS OF THE STUDY

- The study was conducted in Old age home, where participants met the inclusion criteria and many had chronic illnesses.

### LIMITATIONS OF THE STUDY

- Limited duration of the study, impact of inappropriate prescription on patients could not assess.

### FUTURE PROSPECTIVES OF THE STUDY

- The study can be more efficiently carried out in large number of population which will provide sufficient data to identify inappropriateness.

- The significance between polypharmacy and PIM can be analysed.
- Impact of inappropriate prescription can be identified, by analysing ADR, examining laboratory reports.

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