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## Study on Pharmaceutical Care in Geriatrics of a Rural Tertiary Care Hospital.

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### ABSTRACT

The physiological alterations and lifestyle modifications in elderly lead to more health issues/ diseases. This leads to Polypharmacy (more than 5 drugs use) and non-compliance to their medications. Hence, the objective of our study was to assess the impact of pharmacist-provided pharmaceutical care service in geriatric patients. This was a prospective, observational and interventional study was conducted in geriatrics over a period of 10 months. Medication Adherence Rating Scale (MARS) method was used to check adherence status of the patient. The obtained results were subjected to descriptive statistical analysis. Among 151 enrolled patients, 73.51% were in the age group of 60-70 years and 3.974% were in the age group of 80-90, among 73.51%, female were more (81.6%), when compared to male (65.3%). The mean age of the total study population was 68.08±6.908. A total of 97 (64.2%) patients had a past medical history. The majority of the elderly patients were diagnosed as Chronic Obstructive Pulmonary diseases (COPD) 10(10.6%), Hypertension (HTN) with Diabetes Mellitus (DM) 9 (4.64%), Fever 5 (3.3%), Anemia 4(2.6%), Acute Gastroenteritis 3 (2%). The polypharmacy (≥5 drugs) was observed in 89.04% patients. 1.98% patients had untreated indications which are part of the types of medication-related problems (MRP). Among 151 enrolled patients, 64.2% of the patients were considered to be Non-adherent. This clearly suggests that the need for continuous pharmaceutical care services in geriatrics was essential and geriatric pharmacist experts are essential/need for the rural society.

**Keywords:** Pharmaceutical care, MARS: Medication Adherence Rating Scale, Medication Adherence, Geriatrics, Beers Criteria.

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## INTRODUCTION

A massive change in the health care worldwide makes an urgent need of an expert professional. Pharmacy profession has evolved through different stages of exploration from value- apothecary, compounding, distribution, clinical pharmacy and pharmaceutical care [1]. Hence, pharmaceutical care philosophy involves in practice, mission, professional mandate, aspiration, safety and its measure of quality.

As per helper strand, Pharmaceutical care is identified as the responsible provision of drug therapy for the purpose of achieving definite outcomes that improve the patient's quality of life [2].

Pharmaceutical care implementation into everyday practice is vital to promote the best therapeutic outcome by pharmacist evaluation in the patient's drug- related needs corresponding to 1. Finding and minimizing of potential drug interaction, 2.Documenting of ADR 3. Provide counseling 4. Execution & Support to the health care professional in their individual therapeutic management. [3]

Geriatrics is the branch of the subspecialty of Internal medicine/general medicine concerned with the clinical, preventive, remedial, and social aspects of illness in the elderly. The term , "elderly" Generally refers to patients aged 65 years or over, but the definition is sometimes extended to include people aged 60 years and above [6]. The physiological changes that occur with aging are progressive and gradually occurring over a lifetime rather than abruptly in a given chronological age[4].

As per 1991 census reports, Geriatrics was 21% of the world population. In India, it was 57 million. The advances in medical technology and important social, financial, health care planning implications, projecting for 2050 illustrate about 324 million i.e.33% of the world population. India has acquired the label of "an aging nation" with the 7.7% of its populations are more than 60 years old, in which 75% of elderly persons were living in rural areas[5-7].

The physiological alterations and lifestyle modifications in elderly leads more health issues/ diseases, intern leads to the use of more drugs/Polypharmacy (more than 5 drugs). Several studies showed DRP was the third to fourth leading cause of death in the elderly and can also cause disability, depression, gait disturbances, and fall [8, 9-11]. It is widely assumed that use of multiple medications is associated with increased risks to patients, thus, the pharmacist's role has been directed at reducing a number of medications in order to reduce the potential for adverse effects and to minimize the costs. Pharmaceutical care requires a comprehensive patient assessment which focuses not only on the drug product but also the net benefit to the patients were deriving from their medications. The process of identifying and resolving DRPs can be quite complex and involve a multitude of factors beyond simply reducing the number of medications Hence, the pharmacist presence in family physician offices, hospitals will help to the physicians to reduce the DRP (Inappropriate medication) and polypharmacy[12].

Inappropriate medication use in the elderly population is expected to result in decrease health care quality, by evoking of new symptoms and Nonadherence [13].Medication non-adherence is defined as the inability of the patients (older) to manage their medications and is a widespread problem in geriatrics. The prevalence rate of non-adherence ranges from 40% to 80% of patients (mean of 50%) [14].

The adverse drug effects in the elderly population can be cut and perhaps prevented by the physician anticipating the effects of drug toxicity and understanding how the patient's age and health status will likely affect drug dosing. Drug-drug interaction can occur when two or more drugs are used but usually have no demonstrable adverse consequence [7, 11]. The previous study conducted in this same hospital showed there was the lot of DRP in elderly [15].

A pharmacist intervention/ provision of various pharmaceutical care services to geriatric patients at old age homes/community/hospital helps known to reduce medication-related problems, improvement in Medication adherence status and enhancing the quality of life of geriatric patients[16].

Hence, the present study is carried out in our hospital to know either pharmaceutical care service is essential or not in geriatric patients and how the clinical pharmacist services will help to these patients.

## MATERIALS AND METHODS

### Study Site

The present study was conducted in all medicine departments of Adichunchanagiri Hospital and Research Center, B.G.Nagara.

### Study Design and Period:

The study was a prospective, observational and interventional study, conducted for a period of 9 months after obtaining ethical clearance from Adichunchangiri Hospital & Research Center ethical committee, B.G.Nagara

### STUDY CRITERIA

#### Inclusion Criteria

- Patients of either sex of 60 years and above.
- Patients who are willing to give consent.

#### Exclusion Criteria

- Patients not shown interest to participate
- Unconscious patients (e.g. continuous coma state).

#### Source of Data

- Patient consent form , Patient data collection form , Patient case note/prescription, Lab reports

#### Method and Collection of Data

The prospective and observational study was conducted in geriatric who were satisfying the inclusion criteria after obtaining their written consent from patient/patient caretaker. The medication adherence rating scale (MARS) method was used to check adherence status of the patient. A suitably designed data collection form was used to record all the necessary data including patient demographic details, patient medication history, and a reason for admission, any allergic reaction, medication details and lab investigations. Data collected was evaluated for the category of drug prescribed, indication, safety and efficacy of drugs, any significant interactions, adverse drug reactions (ADRs) by using standard textbooks and software available in the pharmacy practice department. The identified drug-related problems were discussed with the physicians for further management. The data collected was documented and analyzed by using descriptive analysis with SPSS 20 version.

## RESULTS

Table 1: Details on Age wise and Gender wise distribution of Patient

Age category	No. of Patients				Total	
	Male		Female			
	N	%	N	%	N	%
60-70	49	65.3	62	81.6	111	73.51
71-80	21	28.0	13	17.1	34	22.57
81-90	5	6.7	1	1.3	6	3.974
<b>Mean±SD</b>	<b>69.5±7.242</b>		<b>66.67±6.296</b>		<b>68.08±6.908</b>	

Among 151 enrolled patients, 60-70 years were more 73.51% and 3.974% were in the age group of 80-90. Among 73.51%, female were more 81.6%, when compared to males 65.3%. In the age group 71-80 years, 22.51% of the patients were observed among which 28% were male and 17.1% were female. The mean

ages of a male were 69.5±7.242 and female were 66.67±6.296 whereas the mean age of total study population was 68.08±6.908 [Table 1].

A majority of the patients 97 (64.2%) had past medical history, [Table 2].

**Table 2: Details on distribution of patient medical history**

Response	N	%
No	54	35.8
Yes	97	64.2
Total	151	100.0

Among 151 enrolled patients, 64.9% patients had family income of 2501-5000 INR (40.09-80.15 USD), 22.5% had 5001-10000 (80.16-160.29 USD) and 4% had 10001- 15000 INR (160.31-240.44 USD) and 6.6% had less than 2500 INR (40.07 USD) per month whereas as 2% were not able to disclose their family income [Table 3].

**Table 3: Details on distribution of Family income of Patient per month**

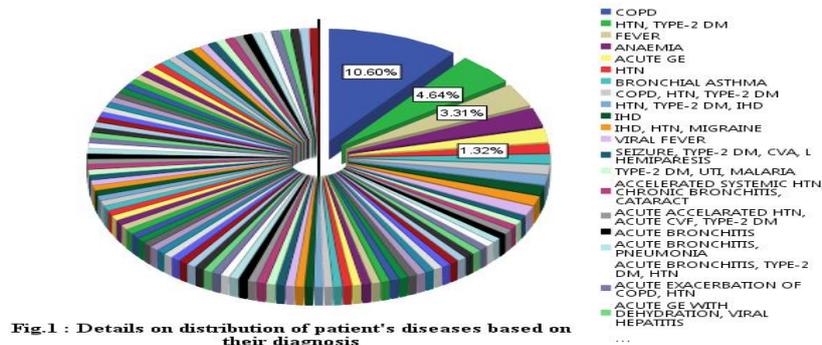
Family income (INR & USD)	N	%
<2500 (40.07 USD)	10	6.6
2501-5000 (40.09-80.15 USD)	98	64.9
5001-10000 (80.16-160.29 USD)	34	22.5
10001-15000(160.31-240.44 USD)	6	4.0
Not willing to disclose	3	2.0
Total	151	100.0

Out of 151 patients, only 35 patients had smoking and alcoholic habits, among which 24(15.9%) were smokers and 4(2.6%) were alcoholic whereas 7(4.6%) were having both smoking and alcoholic habits [Table 4].

**Table 4: Details on distribution of patient's smoking and alcoholic habits**

	N	%
Smoking	24	15.9
Alcoholic	4	2.6
Smoking and Alcoholic	7	4.6
None	116	76.8
<b>Total</b>	<b>151</b>	<b>100.0</b>

The majority of the elderly patients were diagnosed as Chronic Obstructive Pulmonary diseases (COPD) 10(10.6%), Hypertension (HTN) with Diabetes Mellitus (DM) 9 (4.64%), Fever 5 (3.3%), Anemia 4(2.6%), Acute Gastroenteritis 3 (2%). The same number of patients 2 (1.3%) were diagnosed as Ischemic Heart Failure (IHD), Bronchial Asthma (BA). Fewer patients were diagnosed as Seizure, Cataract, congestive cardiac failure (CCF), stroke, Hemiparesis, Pneumonia, CKD, cystitis, Eczema, Parkinsonism, Retinopathy, Neuropathy, Urinary tract infection (UTI), osteoarthritis, Rheumatoid arthritis , Pulmonary Tuberculosis (TB), etc., i.e. 1 (0.7%) were shown in [Figure 1].



Only 16 (10.59%) patients were prescribed with less than 5 drugs and 67 (44.37%) patients were prescribed with 5-7 drugs and more number of patients 68 (45.03%) were prescribed with more than 8 drugs which show that most of the patient had Polypharmacy [Fig. 2].

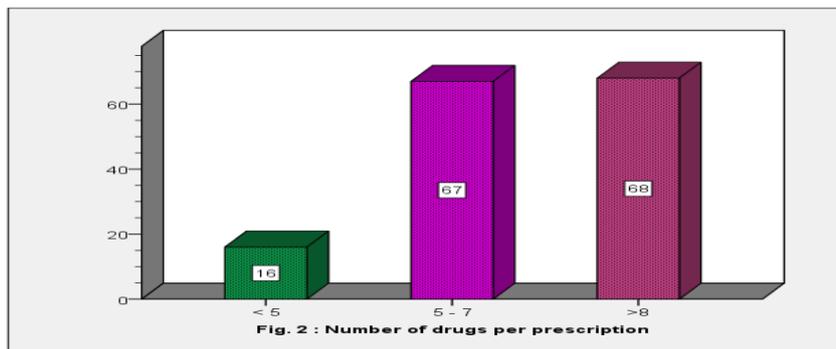


Fig 2: Number of drugs per P<sub>x</sub>

The maximum period of the patients stayed in the hospital was 6-10 days which comprises of 47.68% of patient whereas 'only 1.99% of patient stayed more than 15 days in the hospital [Fig.3].

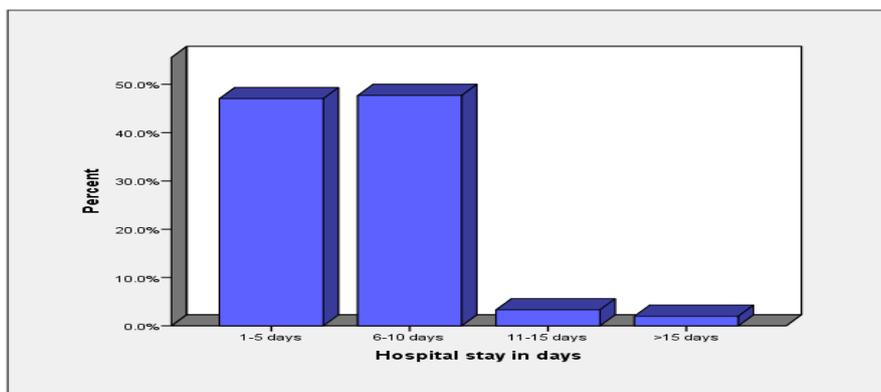


Fig.3: Number of days patient hospital stay

Out of 1149 drugs prescribed to the patients, the majority of the patients were prescribed with gastrointestinal protective agents (GI): 201(17.49%), drugs acting on respiratory system 192(16.71), followed by antimicrobials, cardiovascular drugs i.e., antihypertensive 184(16.01%), antidiabetics 96 (8.35%) were the most commonly prescribed medications shown in Table [5]. Based on Beers criteria, 50 (33.1%) patients received a potentially inappropriate prescription of at least one drug and most of these belong to category A [Table 6] [23]. A total of 1149 formulations were prescribed out of which 50(4.352%) were prescribed inappropriately.

Category of drugs	Number of drugs (%)
Drug acting on Respiratory System	192 (16.71)
Antimicrobial drugs	184 (16.01)
Drugs acting on Gastrointestinal System	201 (17.49)
Cardiovascular drugs	184 (16.01)
Drugs acting on Endocrine System	96 (8.35)
Drugs acting on Hematological System	27 (2.35)
Analgesics & anti-inflammatory drugs	83 (7.22)
Drugs acting on Central Nervous System	29 (2.52)
Vitamins, minerals & dietary supplements	99 (8.61)
Others*	54 (4.7)
<b>TOTAL</b>	<b>1149</b>

\*- Antihistaminic, skeletal muscle relaxants, IVF, Urine Alkaliser, Electrolytes, Immunosuppressant

**Table 6: Frequency of potentially inappropriate medicines in elderly base on Beers Criteria [23]**

Category		Total=50 (33.1%)
<b>A</b>	<b>Generally to be avoided in older adults</b>	
	Alprazolam	2
	Amitriptyline	2
	Aspirin	3
	Clonazepam	1
	Clonidine	1
	Ergot mesylate	1
	Glibenclamide	2
	Hydroxyzine	1
	Hyoscine	2
	Insulin	28
	Nifedipine	3
	Pentazocine	1
Phenobarbitone	1	
Trihexyphenidyl	1	
<b>B</b>	<b>Drugs that exceed maximum recommended daily dose</b>	
Spironolactone	1	
<b>C</b>	<b>To be avoided in combination with specific co- morbidity</b>	Nil

Out of 131 anti-hypertensives, the most commonly prescribed group of antihypertensive drugs was Calcium channel blockers 43 (32.82%), followed by diuretics 40 (30.53%). The least prescribed antihypertensive was vasodilator 2(1.52%) [Table7].

**Table 7: Quantitative distribution of prescribed Antihypertensive drugs**

Antihypertensives	Number (%)
ACE inhibitors (Enalapril 66.6% and Ramipril 33.33% )	12 (9.16)
Calcium Chanel Blockers (Amlodipine 90.68%, Clonidine 2.32%, Nifedipine 6.97% )	43 (32.82)
Beta Blockers (Atenolol 11.45%)	15 (11.45)
Angiotensin II receptor blockers (Losartan 42.10%, Telmisartan 57.89%)	19 (14.5)
Diuretics (Furosemide 75%,Spironlactone 15%, Hydrochlorthiazide 10%)	40 (30.53)
Vasodilator (Hydrolazine 1.52%)	2 (1.52)
<b>Total</b>	<b>131</b>

The details of medication- related problems showed that 42.4% patients had three or more medical problems and the remaining have fewer problems. Moreover, 79.5% were needed counseling about their medication. Interestingly no ADRs were observed during the study. Drug interactions were reported only in 17.9%. The 33.1% patients had an inappropriate manner of medication prescription, and the remaining 82.1% patients had no inappropriate medication usage [Table 8].

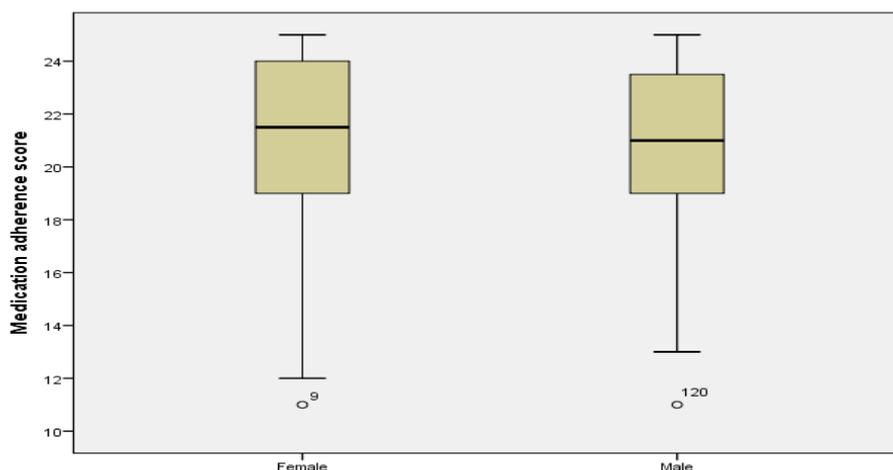
**Table 8: Details on distribution of medication-related problems of patients**

Medical-related problem	Total (N=151)
<b>Three or more medical problems?</b>	
No	87 (57.6%)
Yes	64 (42.4%)
<b>Need for counselling</b>	
No	31 (20.5%)
Yes	120 (79.5%)
<b>ADR</b>	
No	0 (0%)
Yes	151 (100.0%)
<b>Drug interaction</b>	
No	124 (82.1%)
Yes	27 (17.9%)

<b>Inappropriate use of medication</b>	
No	101 (66.9%)
Yes	50 (33.1%)
<b>Untreated Indication (Medication-related problems)</b>	
No	148(98%)
Yes	3(1.98%)

The patients who scored 5 to 22 during medication adherence questionnaire were categorized as Non-adherent while the patients who scored 23 to 25 were categorized as Adherent. Out of 151 patients, 64.2% of the patients were Nonadherent to their medication; the reason behind this may be the multiple disease conditions, polypharmacy and lack of awareness about their treatment. Only 35.8% were found adherent to their medications [Table 9]. The mean score of Female were slightly more (21.21%) than the mean score of the male (20.8%) [Fig. 4]. The medication adherence scoring was done by summation of responses to each item of the questionnaire for each individual patient.

Medication adherence category	N	%
<b>Non adherent (5-22)</b>	<b>97</b>	<b>64.2</b>
<b>Adherent (23-25)</b>	<b>54</b>	<b>35.8</b>
<b>Total</b>	<b>151</b>	<b>100.0</b>



**Fig. 4: Details on distribution of patients on Medication Adherence**

**COST-OF-ILLNESS ANALYSIS**

The Mean ± SD total direct cost of the study population which was expended during the treatment was 3468.0915 ± 4641.86551INR (55.59-74.41 USD) with the maximum and least total medical cost of 50000 INR (801.47 USD) and 135 INR (2.16 USD) [Table 10].

	Minimum	Maximum	Mean ± SD
Total Medicine Cost	70.00	34470.00	1553.78 ± 3023.43
Lab Test Charges	.00	7715.00	954.72±898.43
Hospital Chgarges	.00	10000.00	285.00±1321.1
<b>Direct Medical Cost(Med cost+Hospcost+Lab cost)</b>	<b>85.00</b>	<b>42200.00</b>	<b>2794.06±4041.23</b>
Travel Expenses	.00	880.00	125.23±112.082
Food Expenses	.00	2200.00	477.81±417.81
Other Expenses	.00	278.00	4.47±29.78
<b>Direct Non-Medical Cost (Travelcost+Food+Other)</b>	<b>.00</b>	<b>2300.00</b>	<b>605.80±471.57</b>
<b>Total Direct Cost</b>	<b>135.00</b>	<b>50000.00</b>	<b>3468.09±4641.86</b>

Patient feedback Questionnaire results showed Majority of the patients were satisfied with the service provided by the clinical pharmacist trainee whereas most of the enrolled patients were not aware of Pharmaceutical care.

Among 151 enrolled patient, a total of 66.22% patients were agreed for Q.10, followed by 62.2% for Q.2, 53.64% for Q.4, 52.98% for Q.6, 49% for Q.1, 46.35% for Q.3 and Q.5, 45.03% for Q.7, 41.06% for Q.8 and only 3.11% agreed for Q.9 whereas 11.92%, 9.93%, 7.28% patients were strongly agreed for Q.10, Q.6 and Q.2 respectively. The detail of questionnaire is mentioned in table11.

**Table 11: Details on distribution of Patient Feed back**

Responses	Totally disagree	Disagree	Either agree or disagree	Agree	Strongly agree
Q. 1 I received adequate information about how I should use my drugs	3(1.98%)	9(5.96%)	58(38.41%)	74(49.0%)	7(4.63%)
Q. 2 The Pharmacist appear interested in helping me with the use of my drug	1(0.66%)	6(3.97%)	39(25.82%)	94(62.2%)	11(7.28%)
Q. 3 Pharmacist"s explanation about my health was helpful	2(1.32%)	4(2.64%)	68(45.03%)	70(46.35%)	7(4.63%)
Q .4 I learnt about the need to carry out the treatment prescribed by my doctors	0(0%)	17(11.25%)	45(29.80%)	81(53.64%)	8(5.29%)
Q .5 I improved my knowledge about the drugs I use	0(0%)	12(7.94%)	63(41.72%)	70(46.35%)	6(3.97%)
Q. 6 I am satisfied with the service received	0(0%)	8(5.29%)	48(31.78%)	80(52.98%)	15(9.93%)
Q. 7 Pharmacist"s assistance to use your medication?	1(0.66%)	16(10.59%)	60(39.73%)	68(45.03%)	6(3.97%)
Q.8 Pharmacist"s orientations about how should you take your medication?	1(0.66%)	11(7.28%)	69(45.69%)	62(41.06%)	8(5.29%)
Q. 9 I learnt to understand about the side effects of the drugs I use	26(17.21%)	71(47.02%)	49(32.45%)	5(3.11%)	0(0%)
Q. 10 Pharmacist"s replies to your questions	1(0.66%)	4(2.64%)	28(18.54%)	100(66.22%)	18(11.92%)

**DISCUSSION**

The Mean age of the studied population was 68.08±6.908 and 90 years was the maximum age. The majority (73.51%) of the patients were within the age group of 60-70 years. This may be because most of the people had chronic problems and physical inability due to increasing of age. As this study was done in the rural area most of the people were farmer and labor, so most of the family member of the patient may be busy in working due to which the elderly patient may feel loneliness. The majority of the elderly patient were alone in the hospital which showed that there is the lack of support and care. The study was done by Ramanath et al. also showed that most (77.9%) of the patient were from the age group of 60-70 years.

Interestingly the Mean ± SD of a female was less than the male patients as female are more prone to medical problems because of their physiology compared to male.

As this study was conducted in a rural tertiary care hospital most (64.9%) of the study population had the family income less than 5000 INR (80.25 USD) per month because most of the people were illiterate, farmer or labor worker.

The past medical history details of 64.2% elderly patients showed that most common diseases were COPD, DM, HTN, asthma, IHD, and CCF, and most of them were unable to remember their past medical or medication history. The reason behind this may be age progress, less awareness about their disease condition. The cause of the high DM, HTN, and COPD may be hereditary influences or social habits alcohol and smoking are one of the precipitating factors. The results of another study conducted by Ramanath et al.[15], also showed 19.1% patient had past medication history and the common disease were DM, HTN, COPD etc.

The most commonly observed diseases are COPD (10.6%), DM and HTN (5.9%). This is similar to the studies conducted by Maheshkumar et al.[19] which showed 39.13% were cardiovascular disease and 25% were endocrine disease and A Harugeri et al. which showed HTN(41.5%), DM (34%) and COPD (18.5%). Fever, Acute GE, asthma, anemia, osteoarthritis, urinary tract infection and rheumatoid arthritis are general problems. Few patients showed that there is a need of a dose adjustment with spironolactone in the present study.

The polypharmacy ( $\geq 5$  drugs) was observed in 89.04% patients. This may be because of most of the patients had more than two co-morbidities, symptomatic treatment or for preventing complication. The study of Rahmawati et al. [17], and Hurugeri A et al.[18] showed 2-10 drugs were prescribed to 31 patients and 1-12(2.9%) drug were prescribed to the individual patient respectively. This may be the reason for the patients to stay long period in hospital. The maximum period of the patients stayed in the hospital was 6 – 10 days which comprises of 47.68% of patient whereas only 1.99% of patient stayed more than 15 days in the hospital because the patients were diagnosed to have three or more diseases.

Inappropriate prescribing can be defined as prescribing medications outside the bounds of accepted medical standards [20].

In this study, a total of 1149 formulations were prescribed to 151 patients for different diseases. Drugs acting on Gastrointestinal system (17.49%), followed by drugs acting on respiratory system (16.71%), antimicrobials and antihypertensives (16.01%) were the most commonly prescribed medications. This result was unlikely compared to Veena et al. [20] studies in which it is shown that antimicrobial (16.94%), followed by GI protective agent (13.93%) and antihypertensive (9.98%).

Beers criteria are the very frequently used method for evaluating the appropriateness of prescribing in elderly. It was developed in 1999 and recently updated in 2012. In the present study, according to Beers criteria, it was revealed that 33.1% of the patients received potentially inappropriate prescription which is 4.35% of the total drugs prescribed in 151 patients [23]. This is similar to Veena et al. [20] study in which 23 (21.69%) patient was prescribed with inappropriate medications and another study by A Harugeri et al which showed 26.4% patients were prescribed to inappropriate medications.

Benzodiazepines (1.98%), TCAs (1.98%), long-acting sulfonylureas (1.98%), insulin (18.5%) according to sliding scale was prescribed to 50 patients which should be avoided in elderly patients according to the Beers criteria. Benzodiazepines can cause hangover effects, the concomitant increase in falls and long-acting sulfonylureas such as glibenclamide and insulin can cause hypoglycemia. Among geriatric patients, dizziness, postural hypotension, constipation are found commonly with tricyclic antidepressants. Counseling elderly patients and their family members may help in improving their mood rather than drug therapy for depression. This is similar to Veena et al.[20] study in which Benzodiazepine(6%), Tricyclic antidepressant (3.77%) and Glibenclamide (1.88%) were prescribed to elderly .

The most commonly prescribed group of antihypertensive drugs were calcium channel blockers (32.82%), followed by diuretics (30.53%). This is just opposite to the study conducted by Veena et al.[20] in their study CCBs (37.73%), diuretics (41.5%) were prescribed for hypertension. Dihydropyridine CCBs reduce stroke by 10% compared to other active therapies[22].

Because of the physiological and anatomical changes, elderly patients may have one or more medical problems. This study show 42.4% had three or more medical problems; this is similar to study of Ramanath et al. [15] in their study 24.5% patient had three or more medical problems. The increased co-morbid conditions lead to polypharmacy and increased hospital stay.

As geriatric patients were not aware of their medical conditions and medications and were unable to remember the information provided by other health professionals this study showed that majority of patients (79.5%) needed patient counseling.

Interestingly, there was no adverse drug reaction found in this study. However, there was 17.9% of drug-drug interaction observed in this present study. The drug-drug interaction may be due to the polypharmacy. The drug interaction in this study is more in compared to another study [15] where only 8% drug interaction was found. Among 151 enrolled patients, 1.98% patients had untreated indications (Medication-related problems) which are one of the types of medication-related problems this is less in compared to the result of the study done by Ramanath et al. [15] they had observed 83.4% MRPs.

The majority (64.2%) of the study population were nonadherent to their medications and only 35.8% patients adhered to their medications. This is similar to the study conducted in Old Age Home settings by Ramesh A et al [21]. in Karnataka, India which showed that only 13.3% of the patients were adhered to their medication. The reason behind noncompliance to the medication may be the multiple disease condition , polypharmacy or inability to remember the treatment regimens. This shows that there is the need for counseling.

The cost illness analysis of the study population showed that the direct medical cost was 2794.0670 ± 4041.23477 INR (44.79 ± 64.78 USD) with the least and maximum direct medical cost of 85 INR (1.36 USD) and 42200 INR (676.44 USD) whereas the direct non-medical cost of the study population was 605.8079 ± 471.57782 INR (9.71 ± 7.56 USD) with the maximum direct non-medical cost of 2300 INR (36.87 USD).

The total direct cost of the study population which was expended during the treatment was 3468.0915 ± 4641.86551 INR (55.59-74.41 USD) with the maximum and least total medical cost of 50000 INR (801.47 USD) and 135 INR (2.16 USD). The cost of illness treatment was less when compared with urban hospital setup because of the rural area charitable hospital which is the good thing for the rural people to take care of their health.

The patient's satisfaction with the pharmacist-provided services was assessed by multi-items questionnaire i.e ten items questionnaire showed well acceptable. The Mean ± SD for nine-item scale was 31.76 ± 3.324. The majority (13.24%) of the patients was agreed and 1.68% was strongly agreed with the service provided by the clinical pharmacist trainee whereas the remaining patients were not aware of Pharmaceutical care. From this, it can be concluded that there are scope and need for pharmaceutical care services in the present study site.

## CONCLUSION

This study highlights the majority of the elderly people had a past medical and medication history leads to prescribing more medications leads to polypharmacy and chance of inappropriate medications. This study also showed that nonadherence, the cost of treatment of their disease is also one of the problems which shown to a need of pharmaceutical care services like patient counseling & economic prescribing suggestions to the prescriber. Hence, this study clearly suggests that Pharmaceutical care services concepts of are essential in rural elderly populations to reduce the medication related issues.

**Conflict of interest:** The author's doses do not have any conflicts

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