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Demographic Distribution of Polypharmacy Among Outpatients in Tertiary Care Hospital in Mysuru: A Prospective Observational Study

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ABSTRACT

Background: Polypharmacy, commonly defined as the concurrent use of five or more medications, is an important concern among middle-aged and older adults. Multiple medication use may increase the risk of adverse drug events, drug interactions, medication errors and treatment burden.

Objective: To determine the proportion of OPD patients aged 45 years and above exposed to polypharmacy and describe their demographic and clinical characteristics.

Methods: A prospective observational cross-sectional study was conducted from February to July 2026 in the Outpatient Departments of Farookh Academy of Medical Education Hospital & Research Institute, Mysuru. Using convenience sampling, 135 eligible patients aged ≥45 years who were prescribed at least one medication were included. Demographic, clinical and medication-related data were collected through patient interviews and prescription/medical-record review. Polypharmacy was defined as the concurrent prescription of ≥5 medications.

Results: Among 135 participants, 95 (70.4%) were aged 45–59 years and 40 (29.6%) were aged ≥60 years. Females constituted 70 (51.9%) and males 65 (48.1%). Homemakers were the largest occupational group (47; 34.8%), followed by farmers (34; 25.2%).

Conclusion: This study describes the demographic profile of OPD patients aged 45 years and above and evaluates polypharmacy in this population. The final prevalence estimate and subgroup analyses may help identify patients who could benefit from regular medication review and rational prescribing.

Keywords: Polypharmacy; Outpatients; Medication use; Cross-sectional study; Clinical pharmacy; Mysuru.

INTRODUCTION

It is known fact that world is facing a major demographic change. Ageing of Population is an increasing proportion of the elderly in population due to decreased mortality and fertility. Increased life expectancy due to advancements in health and social care, nutrition, and living standards, and better disease prevention policies has ensured a gradual shift in the population structure toward higher age brackets.

Globally, the number of people 60-plus years old grew remarkably from about one billion in 2020 to approximately 1.4 billion by 2030 and 2.1 billion by 2050.

In India's aging population, burden of chronic diseases such as cardiovascular (CVDs) and diabetes are on rise, the findings of Longitudinal Aging Study in India (LASI) demonstrate an enormous burden of cardiovascular diseases, diabetes, and respiratory chronic conditions among adults ages 45 and above which accounts for high rate of morbidity. Findings from LASI India 2019 show a higher rate of multiple chronic conditions in older age group, due to which greater number of middle age and aged population requires ongoing care for managing multiple chronic condition in the health system

The burden of disease among these age group increases substantially in the context of multiple coexisting health problems or "multimorbidity". Multimorbidity can be simply defined as "the co-existence of two or more chronic health conditions "The chronic conditions can occur separately or a variety of factors such as risk of developing a new conditions. For multiple medical needs, each condition will often require a separate course of therapy, and will create a greater use of health services, polypharmacy is generally seen more with higher rate of co morbidities and complexity of management that create various challenges to elderly patients. The increase in chronic disease and multimorbidity has led to an increase in medication use, the health issues in older patients have now demanded a higher medication usage. Long term medication regimen helps manage various chronic diseases; prevent complications and maintain functional status.

Thus it can be concluded, it is essential to assess medication use not only based on the number of prescriptions but complexity of drug regimen, it's use in particular population that is middle -aged and older adults along with the impact on patient centered outcome Polypharmacy refers to the concurrent use of multiple medications by an individual. It is common among the aged population due to the rising prevalence of chronic illnesses and multimorbidity. Patients with chronic illness and multimorbidity often require polypharmacy to manage their conditions and prevent complications. In most cases, polypharmacy can be appropriate for disease control, but the more medications a person takes, the more challenging it can be to manage and the greater the risk of developing medication-related problems.

Appropriate and Inappropriate Polypharmacy:

Existence of polypharmacy in a patient does not necessarily imply that the medications are inappropriate. There is appropriate and inappropriate polypharmacy. Appropriate polypharmacy is evident when a patient needs multiple medications to control several diseases, but these drugs are indicated and effective, their benefits outweigh the risks, and they are regularly reviewed to ensure their appropriateness. In other words, polypharmacy is appropriate when patients get the maximum benefit from the drugs with minimal risk.

On the other hand, polypharmacy is inappropriate when at least one of the prescribed medications is not necessary or ineffective, when the potential risks of the drug outweigh its benefits or when there is therapy duplication or continuation of therapy that should have been discontinued. Therefore, to assess polypharmacy, one must consider the duration of therapy, potential drug interactions, indications for therapy, and benefits v/s risks of the drug. A numerical definition of polypharmacy alone cannot reveal whether polypharmacy is appropriate or not for a patient with multiple morbidities.

Prevalence of Polypharmacy Worldwide

Polypharmacy has become a prevalent worldwide phenomenon. A 2024 systematic review and meta-analysis that included 122 observational studies and over 57,000,000 older adults as participants reported that the pooled prevalence of polypharmacy was 39.1%. The pooled prevalence for hyperpolypharmacy was 13.3%. The pooled prevalence of polypharmacy was

the highest in Europe (45.8%), followed by Oceania (45.5%) and North America (40.8%), while Asia had the lowest at 29%. Another umbrella review that analyzed 11 meta-analyses concluded that 37% of the general population, 45% of older adults, 48% of outpatients, and 52% of inpatients experienced polypharmacy. This implies that polypharmacy affects many people worldwide, and it is not limited to hospitalized patients.

Prevalence of Polypharmacy in India

Polypharmacy is also a prevalent problem in India, as well. A systematic review and meta-analysis that included 27 studies on older Indian adults revealed that the pooled prevalence of polypharmacy was 49%, while that of hyperpolypharmacy was 31%, and the prevalence of potentially inappropriate medication was 28%. The prevalence rates differed significantly between the northern, southern and northeastern regions of India. 6 Another cross-sectional study conducted among 600 older adults in six cities in India revealed that the prevalence of polypharmacy was 33.7%. Polypharmacy was associated with increased comorbidities, recent transition, and recent hospitalization. The study also reports that 19.7% of the study participants resorted to self-medication

Causes and Risk Factors for Polypharmacy

Age

Polypharmacy prevalence increases with age as older people tend to have more chronic conditions than younger people. They may also require several medications to manage those conditions. A global meta-analysis reported that the prevalence of polypharmacy among people aged 70 years and older is higher than among the younger elderly. In India, advanced age is a risk factor for multimorbidity, which in turn increases medication use.

Multimorbidity

Multimorbidity is a key contributor to polypharmacy. It arises when a patient develops two or more chronic diseases. As a result, the patient may have to take more medications to manage the illnesses. In a recent systematic review of older adults and adults, it was reported that the prevalence of multimorbidity and polypharmacy was high, although it varied between the studies. Multimorbidity increases medication use among Indian older adults, as well, and leads to polypharmacy.

Multiple prescribers

People with chronic illnesses that require multiple medications usually see many clinicians for their conditions. Consequently, each prescriber may prescribe some medications to the patient, increasing the number of drugs. Moreover, polypharmacy arises due to a lack of communication between these prescribers. Therefore, there is likely to be duplication, continuation of medications that should have been discontinued, and use of medications that could have been avoided. 5 This makes multiple prescribers a risk factor for polypharmacy.

Self-medication

Patients often self-medicate, adding more medications to their prescription drugs. Self-medication can involve using old drugs, going to the pharmacy to buy drugs, or following the advice of friends, family members, or other sources. A 2025 systematic review and meta-analysis of 66 Indian studies that explored self-medication practices reported that the pooled prevalence of self-medication was 64.4%. Among the most commonly self-administered

medications were analgesics, antipyretics, antibiotics, and cough medications. A recent study on self-medication practices among older Indians revealed that 19.7% of the study participants self-medicated.

Over-the-counter medicines

The use of OTC medicines can lead to polypharmacy. When patients take these drugs in addition to their prescription drugs, it adds to the burden of medication use. Some of the most common OTC medicines include analgesics, antipyretics, and cough and cold preparations. 79 The use of these medications alongside the prescribed drugs increases the risk of drug-drug interactions and duplication of therapy. and total cost. Based on population aging pattern and epidemiologic changes discussed above this study aim to analyse the use of polypharmacy in middle -aged and older adults by evaluating correlation of polypharmacy with impact on patient centered outcome.

REVIEW OF LITERATURE

1. ***Anjan Khadka et al.*** conducted a cross-sectional study to evaluate prescription patterns and assess the prevalence of polypharmacy among 200 geriatric outpatients attending a tertiary care hospital in Nepal. The authors collected demographic details, disease profiles, and prescription data, and assessed prescribing practices using WHO core prescribing indicators. The study found that the average number of drugs per prescription was 3.42, while polypharmacy was observed in 19% of patients. Hypertension, diabetes mellitus, asthma, and COPD were the most common comorbidities, and amlodipine, metformin, and losartan were among the frequently prescribed drugs. The authors concluded that regular monitoring of prescriptions and promotion of rational prescribing practices are important to reduce inappropriate polypharmacy among elderly patients.

2. Lisa Van Wilder et al. conducted a cross-sectional study to examine the association between polypharmacy and health-related quality of life (HRQoL) as well as psychological distress among patients with chronic diseases in Belgium. The authors analyzed data from 544 adult patients with at least one chronic condition and categorized medication use based on the number of prescribed drugs. HRQoL was assessed using the EQ-5D-5L questionnaire, while psychological distress was measured using the Hospital Anxiety and Depression Scale (HADS). The study found that approximately 40% of participants were exposed to polypharmacy, and patients taking multiple medications reported significantly lower HRQoL scores and higher psychological distress compared to those using fewer medications. The negative association was particularly evident in physical functioning, daily activities, anxiety, and depression domains. After adjustment for confounding factors, polypharmacy remained independently associated with poorer HRQoL and increased psychological distress. The authors concluded that increasing medication burden adversely affects both physical and mental well-being in chronic disease patients and emphasized the importance of regular medication review and optimized prescribing practices.

3. Yasaman Zarinfar et al. conducted a cross-sectional study using data from the Bushehr Elderly Health (BEH) Program to evaluate the association between polypharmacy and quality of life among elderly individuals in Southern Iran. The study included 2,399 participants aged above 60 years, and quality of life was assessed using the SF-12 questionnaire. Polypharmacy, defined as the use of five or more medications, was observed more commonly among women than men. The authors found that elderly individuals with polypharmacy had poorer physical and mental quality of life compared to those taking fewer medications, with greater impairment noted in mental health, bodily pain, general health, and vitality domains. The study concluded that polypharmacy is highly prevalent among the elderly population and is associated with reduced quality of life, highlighting the need for regular medication review and rational prescribing practices in geriatric care.

4. Sreelatha Akkala et al. conducted a cross-sectional study using the 2022 Medical Expenditure Panel Survey (MEPS) data to evaluate the association between polypharmacy and health-related quality of life (HRQoL) among adults in the United States. The authors analyzed nationally representative data from adult participants and assessed HRQoL using standardized health status measures while categorizing patients based on the number of medications used. The study found that polypharmacy was significantly associated with

Poorer HRQoL, with affected individuals reporting reduced physical and mental health outcomes compared to those taking fewer medications. Patients with multiple chronic conditions and higher medication burden demonstrated greater impairment in daily functioning and overall well-being. After adjusting for demographic and clinical factors, polypharmacy remained an independent predictor of lower quality of life. The authors concluded that increasing medication burden negatively impacts HRQoL among US adults and highlighted the importance of medication review and rational prescribing to improve patient outcomes.

5. Antimon Tibursi Massawe et al. conducted a hospital-based cross-sectional study to evaluate the association between polypharmacy and health-related quality of life among older adults receiving antiretroviral therapy at a tertiary hospital in Tanzania. The study included older HIV-positive patients aged 50 years and above, and health-related quality of life was assessed using the WHOQOL-HIV BREF questionnaire. The authors assessed medication burden, comorbidities, and treatment patterns, and found that polypharmacy was common among patients receiving antiretroviral therapy due to the presence of multiple chronic conditions. Participants with polypharmacy reported poorer quality of life, particularly in physical, psychological, and social relationship domains, compared to those taking fewer medications. The study concluded that increasing medication burden negatively affects the quality of life of older adults living with HIV and emphasized the importance of medication review and appropriate management of comorbidities to improve patient outcomes.

6. Teddy Novais et al. conducted the M'HEMORRH-AGE study to evaluate polypharmacy and medication regimen complexity among older patients with hemophilia or von Willebrand disease. This multicenter cross-sectional study included elderly patients receiving treatment for inherited bleeding disorders, and the authors assessed the number of medications, comorbidities, and medication regimen complexity using validated assessment tools. The study found that polypharmacy was highly prevalent among older patients due to aging-related comorbidities such as cardiovascular diseases, pain

disorders, and metabolic conditions. Patients with higher medication burden also demonstrated increased medication regimen complexity, which could potentially affect treatment adherence and increase the risk of drug-related problems. The authors concluded that older patients with hemophilia or von Willebrand disease require careful medication review and multidisciplinary management to reduce inappropriate polypharmacy and optimize therapeutic outcomes.

7. Abebe Tarekegn Kassaw et al. conducted a hospital-based cross-sectional study to assess medication regimen complexity and its impact on medication adherence among patients with multimorbidity at a comprehensive specialized hospital in Ethiopia. The authors evaluated patients with multiple chronic diseases by assessing the number of medications, dosing frequency, and additional administration instructions using the Medication Regimen Complexity Index (MRCI), while medication adherence was measured using a validated adherence assessment tool. The study found that patients with higher medication regimen complexity showed lower medication adherence, particularly among individuals taking multiple medications for chronic illnesses such as hypertension, diabetes mellitus, and cardiovascular diseases. The authors also observed that increasing regimen complexity contributed to difficulties in medication management and increased the risk of non-adherence. The study concluded that simplifying medication regimens and conducting regular medication reviews are important strategies to improve adherence and optimize treatment outcomes in patients with multimorbidity.

8. Shaoxi Pan et al. conducted a propensity score-matched study to evaluate the association between polypharmacy and healthcare expenditures among older adults in the United States. The authors analyzed data from older adults using nationally representative healthcare databases and compared healthcare costs between individuals with and without polypharmacy after matching participants based on demographic and clinical characteristics. Polypharmacy was defined as the concurrent use of multiple medications and was found to be highly prevalent among older adults with chronic diseases and comorbidities. The study reported that older adults with polypharmacy had substantially higher total healthcare expenditures, including increased outpatient visits, hospitalizations, emergency care utilization, and prescription medication costs compared to those without polypharmacy. The authors concluded that polypharmacy significantly increases the economic burden on both patients and healthcare systems and emphasized the importance of rational prescribing and medication optimization strategies to reduce unnecessary healthcare expenditures among the elderly population.

MATERIALS AND METHODS

1. **Study Design**

The study will be a prospective observational cross-sectional study conducted among eligible patients attending the Outpatient Departments (OPDs) of the study hospital.

2. **Study Setting**

The study will be conducted in the Outpatient Departments of Farookh Academy of Medical Education Hospital & Research Institute, Mysuru.

3. **Study Duration**

The study will be conducted over a period of six months, from February 2026 to July 2026.

4. **Study Population**

The study population will comprise OPD patients aged 45 years and above who are prescribed one or more medications during the study period.

5. **Sampling Method**

A non-probability convenience sampling method will be used. Eligible and willing participants attending the OPDs during the study period will be recruited based on accessibility and feasibility.

6. **Sample Size**

As this is a convenience-sampling study, no formal prevalence-based sample-size calculation will be performed. The number of participants recruited will depend on the eligible and consenting patients available during the six-month study period.

7. Inclusion Criteria

- Patients aged 45 years and above.
- Patients attending the OPD during the study period.
- Patients prescribed at least one medication.
- Patients willing to participate in the study.
- Patients providing written informed consent.
- Patients able to communicate and provide responses to the study questionnaires.

8. Exclusion Criteria

1) Inpatients and critically ill patients.

2) Patients with severe psychiatric illness or cognitive impairment that prevents reliable completion of the study questionnaires.

3) Pregnant and lactating women.

4) Patients unwilling to participate.

5) Patients with incomplete prescription or medical records required for medication-regimen assessment

9. Data Collection Tools

1. Structured demographic and clinical data collection form.

2. Medication data collection form for assessment of polypharmacy.

RESULTS

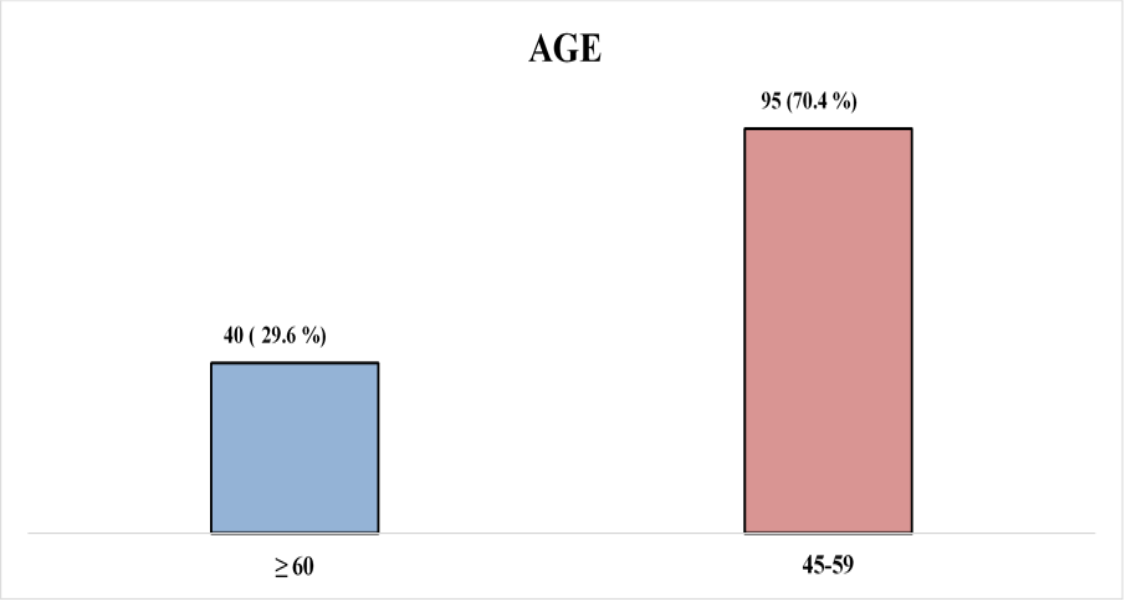
A total of 135 participants from the OPD of a tertiary care hospital who met our inclusion criteria were analyzed**.**

Characteristics of the study population:

Age:

Among the total 135 study participants, 95 (70.4%) belong to the 45-59 years age group, while 40 (29.6%) were 60 years and above. The findings indicate that the majority of the study population was in the 45-59 years age group, accounting for more than two-thirds of the participants

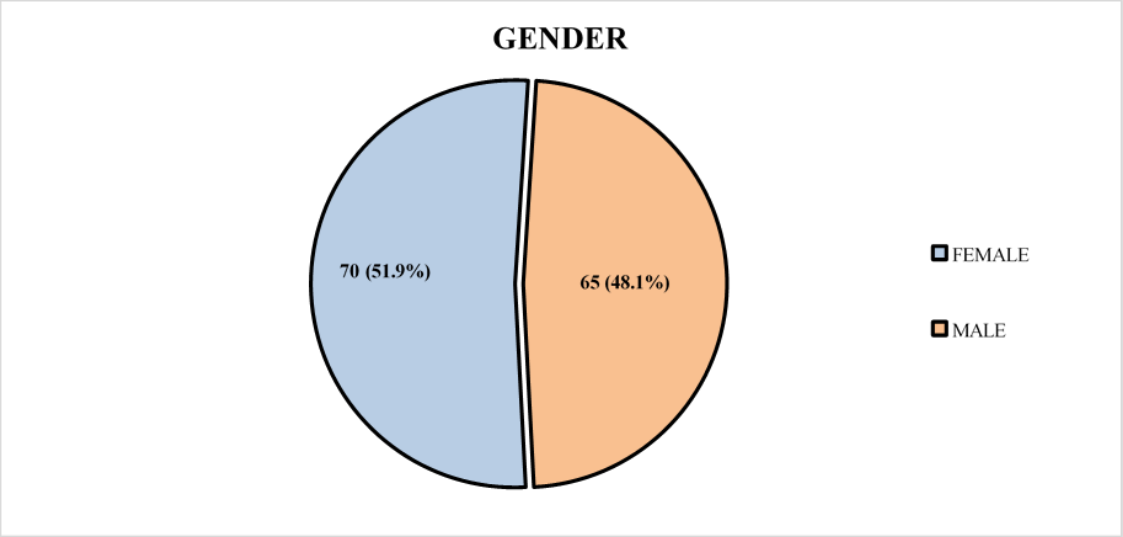
Age (in years)	**frequency (n)**	**Percentage (%)**
≥ 60	40	29.6
45-59	95	70.4
Grand Total	135	100



Gender:

The following table 2 thoroughly depicts the gender profile of the study population. Among the total 135 participants, 70 (51.95) were females and 65 (48.15) were males. The study population showed a slight female predominance, with females constituting a marginally higher proportion than males.

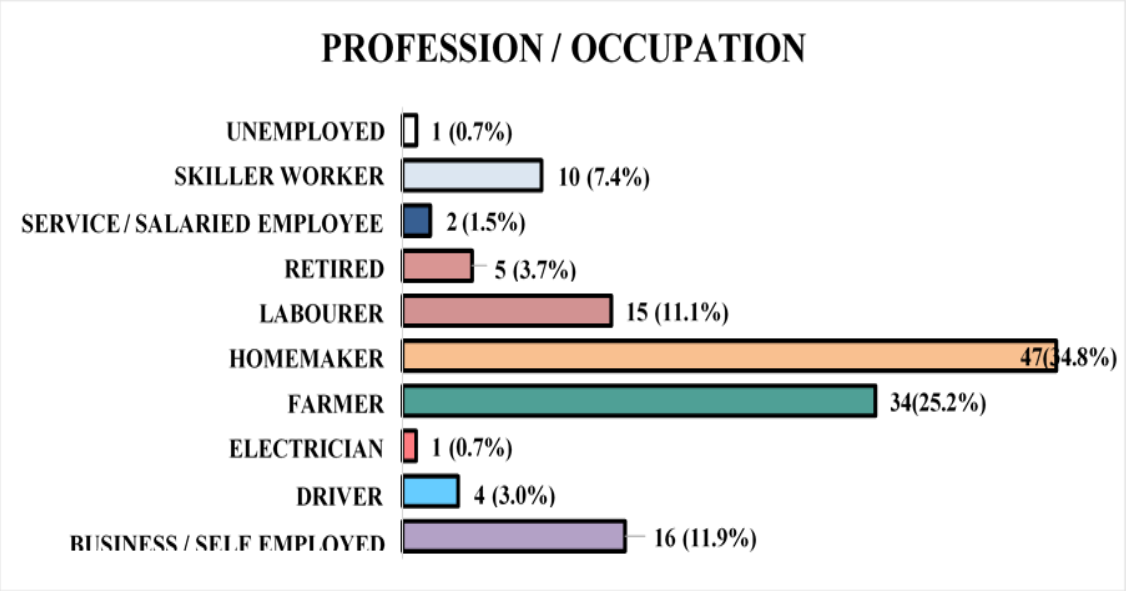
GENDER	**frequency (n)**	**Percentage (%)**
FEMALE	70	51.9
MALE	65	48.1
Grand Total	135	100



Occupation:

Among the total 135 study participants, home makers, constituted the largest occupational group (n=47;34.8%),followed by farmers (34;25.2%).The participants who were engaged in business/self-employment accounted for (n=16;11.9%),while laborers comprised(n=15;11.1%) of the study population. Skilled workers represented (n=10;7.4%),followed by retired individuals (n=5;3.75),drivers (n=4;3.0%),and those employed in service / salaried jobs (n=2;1.5%).Electricians and unemployed individuals each accounted for (n=1;0.7%) participant. Overall, the study population predominantly consisted of homemakers and farmers

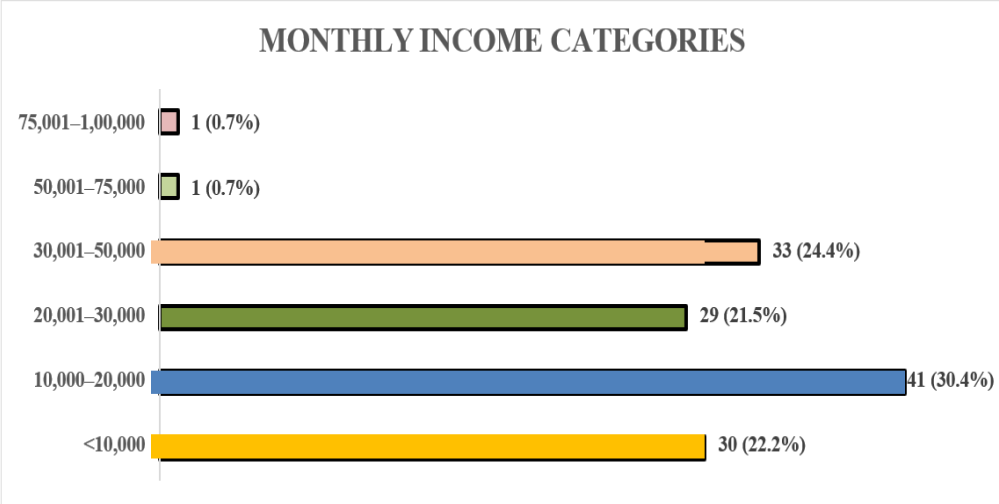
PROFESSION /OCCUPATION	**Frequency (n)**	**Percentage (%)**
BUSINESS / SELF EMPLOYED	16	11.9
DRIVER	4	3.0
ELECTRICIAN	1	0.7
FARMER	34	25.2
HOMEMAKER	47	34.8
LABOURER	15	11.1
RETIRED	5	3.7
SERVICE / SALARIED EMPLOYEE	2	1.5
SKILLER WORKER	10	7.4
UNEMPLOYED	1	0.7
Grand Total	135	100



Income:

Among the 135 participants, the majority of the study population (n=41;30.4%)had a monthly income of Rs 10,000-20,000,followed by (n=33;24.4%)participants with an income of Rs 30,001-50,000 and n=30 (22.2%)participants with an income of ≤ Rs 10,000.A total of 29(21.5%) participants had a monthly income of Rs 20,001-30,000.Only 1(0.7%)participant each belong to the Rs 50,001-75,000 and Rs 75,001-1,00,000 income categories**.**

MONTHLY INCOME	FREQUENCY(n)	PERCENTAGE (%)
<10,000	30	22.2
10,000–20,000	41	30.4
20,001–30,000	29	21.5
30,001–50,000	33	24.4
50,001–75,000	1	0.7
75,001–1,00,000	1	0.7
Grand Total	135	100

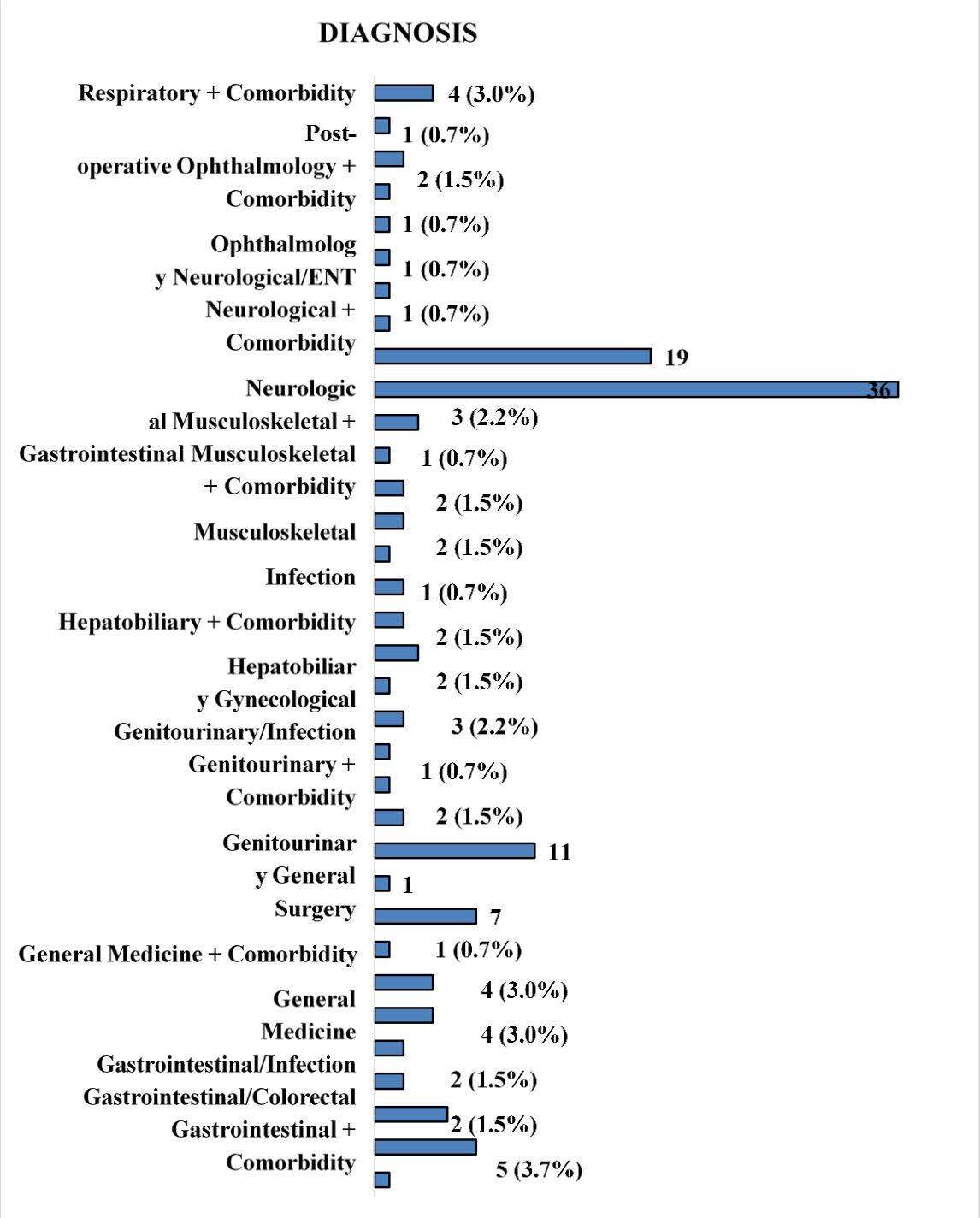


Clinical information of the study population

Diagnosis:

Among the 135 participants, musculoskeletal conditions were the most frequently observed diagnosis category (n=36, 26.7%), followed by musculoskeletal conditions with comorbidity (n=19, 14.1%). Gastrointestinal conditions accounted for 11 participants (8.1%), while cardiovascular and ENT conditions were each observed in 7 participants (5.2%). Cardiovascular conditions with comorbidity were reported in 5 participants (3.7%). Other diagnosis categories constituted smaller proportions of the study population.

DIAGNOSIS CATEGORIES	FREQUENCY (n)	PERCENTAGE (%)
Cardiometabolic	1	0.7
Cardiovascular	7	5.2
Cardiovascular + Comorbidity	5	3.7
Dental	2	1.5
Dermatological	2	1.5
Endocrine	4	3.0
Endocrine + Comorbidity	4	3.0
Endocrine/Metabolic	1	0.7
ENT	7	5.2
ENT/Infection	1	0.7
Gastrointestinal	11	8.1
Gastrointestinal + Comorbidity	2	1.5
Gastrointestinal/Colorectal	1	0.7
Gastrointestinal/Infection	1	0.7
General Medicine	2	1.5
General Medicine + Comorbidity	1	0.7
General Surgery	3	2.2
Genitourinary	2	1.5
Genitourinary + Comorbidity	2	1.5
Genitourinary/Infection	1	0.7
Gynecological	2	1.5
Hepatobiliary	2	1.5



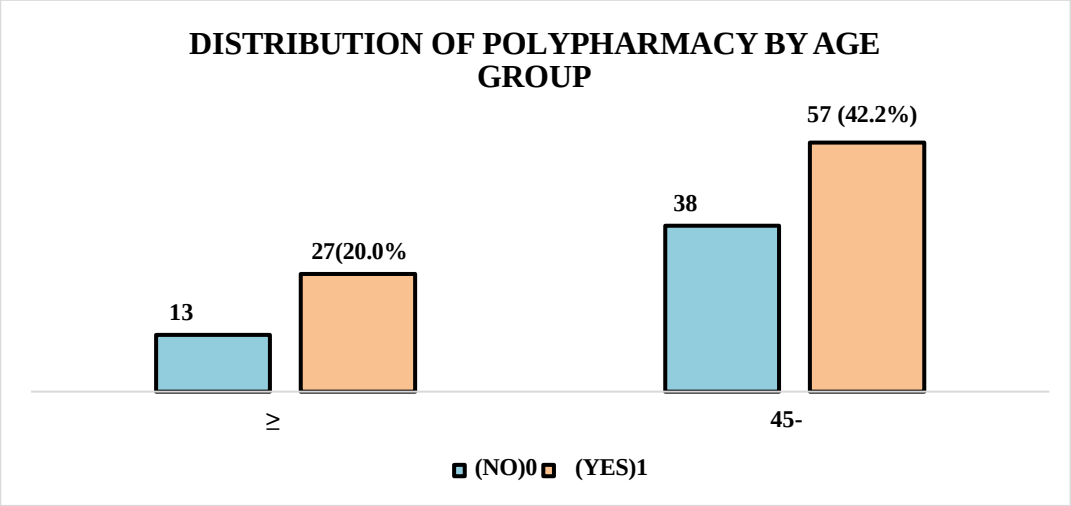
Polypharmacy status of the study population

Age group:

Among the total 135 participants, 84 (62.2%) were receiving polypharmacy, while 51 (37.8%) were not receiving polypharmacy. Among participants aged 60 years and above, 27 out of 40 (67.5%) had polypharmacy, whereas 13 (32.5%) did not. In the 45–59 years age

Group, 57 out of 95 (60.0%) participants had polypharmacy, while 38 (40.0%) did not. Thus, polypharmacy was more frequently observed among participants aged ≥60 years (67.5%) compared with those aged 45–59 years (60.0%).

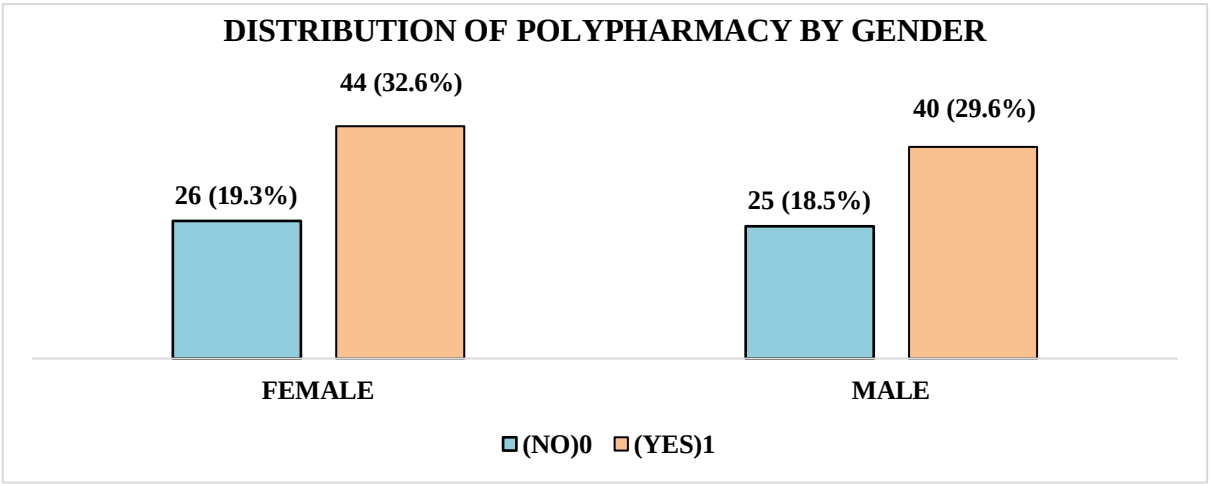
POLYPHARMACY	≥ 60 age	45-59 age	Total Count
(NO)0	13 (9.6%)	38 (28.1%)	51 (37.8%)
(YES)1	27 (20.0%)	57 (42.2%)	84 (62.2%)
Grand Total	40 (29.6%)	95 (70.4%)	135 (100.0%)



Polypharmacy according to gender

Among the 135 participants, 84 (62.2%) were receiving polypharmacy, while 51 (37.8%) were not. Among the participants with polypharmacy, 44 (32.6%) were females and 40 (29.6%) were males. Among those without polypharmacy, 26 (19.3%) were females and 25 (18.5%) were males. Overall, females constituted 51.9% (n=70) and males 48.1% (n=65) of the study population. Polypharmacy was observed in both genders, with a slightly higher number of female participants with polypharmacy.

POLYPHARMACY	FEMALE	MALE	Total Count
(NO)0	26 (19.3%)	25 (18.5%)	51 (37.8%)
(YES)1	44 (32.6%)	40 (29.6%)	84 (62.2%)
Grand Total	70 (51.9%)	65 (48.1%)	135 (100.0%)



DISCUSSION

Data regarding the demographic details of patients in our study showed that the majority of the patients 70.4% were between 45-59 years age and 29.65% of the patients were ≥60 years. Percentage of female subjects included in our study was 51.9% and male subjects was 48.1%.Polypharmacy was observed in 62.2% of participants who were taking ≥ 5 medications which was lower than the prevalence reported by the study conducted by **Ruangritchankul et al.** where 74.8% of the participants showed polypharmacy. The differences could be due to older age, occurrence of comorbidities and the consideration of excessive polypharmacy. Even though there is a slight difference in the proportion of polypharmacy, it is still crucial indicating that polypharmacy is a major concern in OPD and require regular medication review and pharmacist involvement.

CONCLUSION

This study describes the demographic profile of 135 OPD patients aged 45 years and above attending a tertiary care hospital in Mysuru. Most participants were aged 45–59 years, females were slightly more represented than males, and homemakers and farmers formed the largest occupational groups. The final estimate of polypharmacy prevalence and its distribution across age groups and diagnoses will provide information on medication-use patterns in this outpatient population and may support the need for regular medication review and rational prescribing.

FUTURE DIRECTIONS

a. Future studies can include larger sample and multiple hospital or different healthcare settings to enhance the generalizability of the findings.

b. Prospective or longitudinal studies can assess how changes in medication burden or polypharmacy affects HRQoL, MRCI and economic burden over time. Therefore, providing evidence regarding temporal relationships.

c. Future studies can assess different components of economic burden such as, indirect cost, and intangible costs, in addition to CHE.

d. Future studies can carry out and assess interventional study on whether pharmacist-led interventions aimed to reduce inappropriate polypharmacy and medication regimen complexity can improve health-related quality of life and reduce economic burden.

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