

Polypharmacy - A community-based study on the prevalence and knowledge among the elderly in the rural areas of a tertiary care hospital in coastal Karnataka

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Abstract

Introduction: Polypharmacy, defined as the use of multiple drugs (specifically 5 or more) or more that are medically necessary, is a growing concern for older adults. The unavoidable consequence is that increasingly frail patients are being treated with polypharmacy. This leads to adverse drug reactions and an increase in potentially inappropriate medicines (PIMs). This study was undertaken to assess the prevalence of polypharmacy in the elderly and also to find an association between common geriatric co-morbidities and polypharmacy and also to estimate the prevalence of potentially inappropriate medicines (PIMs).

Objectives: To assess the prevalence of polypharmacy and the appropriateness of medicines in geriatric patients in a tertiary care hospital.

Methodology: This study is a cross-sectional study conducted in the rural field practice areas of Dept. of Community Medicine, FMMC in Mangalore @ Ammunje, Jarandagudde, Badagabellur and Bajpe over a period of 6 days from 1/4/2019 to 6/4/2019. Potentially inappropriate medicines (PIMs) were estimated based on Beer’s criteria.

Results: A total of 130 participants were interviewed. They were selected from the rural field practice areas of a tertiary care hospital in Mangalore. Among the participants 130, there were 64(49.23%) males & 66(50.76%) females. The mean age was 65.21±5.69 years, range – (60 to 87 years).

The average number of drugs taken was 2±1.3 drugs. Numerical polypharmacy, taking more than 5 drugs was present in (3.85%). However, there were no elderly subjects taking more than 10 drugs. According to Beer’s

criteria, 5(3.85%) participants had been prescribed at least one PIM.

Conclusion: Polypharmacy is commonly seen in elderly people. We should therefore take stringent measures, to curb the potentially inappropriate medicines, and adverse reactions of the drugs and also to reduce drug-drug interactions by deprescribing the unwanted drugs.

Keywords: Polypharmacy, geriatric, potentially inappropriate medicines.

Introduction

Appropriate prescribing is the outcome of the decision-making process that maximizes net individual health gains within society's available resources (1)

Polypharmacy, defined as the use of multiple drugs (specifically 5 or more) or more than are medically necessary, is a growing concern for older adults. The unavoidable consequence is that increasingly frail patients are being treated with Polypharmacy. This leads to adverse drug reactions and an increase in potentially inappropriate medicines (PIMs). This study was undertaken to assess the prevalence of Polypharmacy in the elderly and also to find an association between common geriatric co-morbidities and polypharmacy and also to estimate the prevalence of potentially inappropriate medicines (PIMs).

Objectives

To assess the prevalence of polypharmacy and appropriateness of medicines among elderly patients in the rural field practice areas of a tertiary care hospital.

Materials and methods

This study was conducted in the rural field practice areas of Dept. of community medicine of a tertiary care hospital in South India over a period of 6 days from 1/4/2019 to 6/4/2019. Both male and female patients above the age of 60 years residing in the rural field

practice areas of Ammunje, Jarandagudde, Badagabellur and Bajpe were included in the study.

The study protocol was approved by the institutional ethics committee. Data regarding patients' demographics and clinical history and drug history were obtained from the questionnaire used on the study subjects. Vitamins and minerals, herbals, and other alternative medicines were excluded from the study as it was difficult to analyze their appropriateness using the criteria.

If the patients were consuming 5 or more drugs then it was considered polypharmacy. Potentially inappropriate medications were analyzed using Beer's criteria. The study was approved by the institutional ethics committee (IEC approval no FMIEC/CCM/749/2021). Informed consent was taken from the patients before the study was started.

The sample size was calculated using the prevalence rate from the previous studies i.e $P=9.33\%$, Thus the total sample size of the elderly patients was found to be 130.

Statistical analysis

Collected data were analysed by frequency, percentage and Fisher's exact test. Analysis was performed using SPSS 23.0 version.

Results

A total of 130 patients were included in the study. Among them 64(49.23%) were males and 66 (50.76%) were females. The mean age of the patients was 65.21 ± 5.69 years (range 60-87 years). Around 125 (96.15%) were receiving <5 medications and 5 (3.85%) were on 5 or more medications. The mean number of medications used by patients was 2 ± 1.3 (range 1-8).

Table 1 shows the distribution of polypharmacy and potentially inappropriate medication in males and females. Around 4(3.08%) males were on 5 or more medications and 60(46.15%) males were on <5

medications. 1 Female (0.77%) was on 5 or more medications & 65(50%) were on less than 5 medications. 2(1.54%) of males were on potentially inappropriate

medications (PIMs) while 62(47.69%) males were not taking PIMs. 3(2.31%) females were taking PIMs while 63(48.46%) of females were not on PIMs(P=0.648).

Table 1: Distribution of (i) poly pharmacy and (ii) potentially inappropriate medication in males & females.

	Poly Pharmacy				P value
	Present	%	Absent	%	
Male	4	3.08	60	46.15	0.370
Female	1	0.77	65	50	
	PIMs				
	Present	%	Absent	%	
Male	2	1.54	62	47.69	0.648
Female	3	2.31	63	48.46	

PIM: Potentially inappropriate medication

Table 2: shows the socio-demographic profile of patients

	Poly Pharmacy		No poly pharmacy		P value
	>5 drugs		<5 drugs		
	No.	%	No.	%	
Age in yrs.					0.644
60-70	4	3.08	88	67.70	
>70	1	0.77	37	28.46	
Sex					0.204
Males	4	3.08	60	46.15	
Females	1	0.77	65	50	
Education					0.079
PG	0	0	1	0.770	
UG	0	0	2	1.54	
Higher secondary	0	0	5	3.85	
Secondary	0	0	17	13.08	
Primary	4	3.08	35	26.92	
Uneducated	1	0.77	65	50	
Employment status					0.156
Employed	0	0	50	38.5	
Unemployed	5	3.85	75	57.69	

Type of family					
Nuclear	2	1.54	61	46.92	
Joint	3	2.31	64	49.2	0.699
No of family members					
<5 members	2	1.54	59	45.4	
>5 members	3	2.31	66	50.8	0.752
Per capita income					
>Rs.2,250/-	2	1.54	59	45.4	
<Rs.2,250	3	2.31	61	50.8	0.752
Socio-economic status					
Rs. 6,140/- &above	0	0	16	12.30	
Rs. 3070- 6139	0	0	29	22.3	
Rs. 1842- 3069	2	1.54	32	24.61	0.355
Rs. 921- 1841	3	2.31	29	22.3	
Below Rs. 921	0	0	19	14.61	
Type of ration card					
APL	3	2.31	113	86.92	
BPL	2	1.54	12	9.23	0.089
Co-morbidities					
DM	1	0.77	36	27.7	
HTN	1	0.77	41	31.53	0.086
TB	1	0.77	0	0	
Joint pain	2	1.54	34	26.15	
Arthritis	0	0	0	0	
Any other disease	0	0	7	5.38	
Substance abuse					
Alcohol	0	0	18	13.84	0.762
Smoking	3	2.31	37	28.5	
Chewing tobacco	0	0	37	28.5	
Beetle leaf	2	1.54	33	25.4	

Continued from Table 2

Difficulty in opening the tablets package					
Yes		0	0	9	6.92
No		5	3.85	116	89.23
					0.534

Difficulty in swallowing large tablets					
Yes	0	0	4	3.08	
No	5	3.85	121	93.07	0.685
Do you take liquid formulations					
Yes	0	0	4	3.08	
No	5	3.85	121	93.07	0.685
If yes do you tend to mismatch the dose					
Yes	0	0	5	3.85	
No	5	3.85	120	92.3	0.648
Difficulty to remember tablet names					
Yes	5	3.85	61	46.92	0.006(S)
No	0	0	64	49.23	
Awareness about the reason behind taking tablets					
Yes	5	3.85	118	90.76	
No	0	0	7	5.38	0.586
Are there any adverse effects due to any of the these drugs					
Yes	2	1.54	5	3.85	
No	3	2.31	120	92.3	0.023(S)

Continued from Table 2:

If yes please specify the side effects					
Side effects	0	0	5	3.85	
Are you able to remember the time of the drug to be taken					
Yes	5	0	117	90	
No	0	3.85	8	6.15	0.559
Are you allergic to any drugs prescribed lately					
Yes	0	0	8	6.15	
No	5	3.85	117	90	0.559
If yes specify the drug					
Amplip	0		4	3.08	
Vestige	0		4	3.08	

BMI					
Underweight<18.50	2	1.54	16	12.3	0.040(S)
Normal range18.5-24.99	2	1.54	92	70.76	
Overweight>/ 25.00	0	0	0	0	
Pre-obese- 25-29.99	0	0	15	11.53	
Obese class I- 30.0-34.99	1	0.77	2	1.54	
Obese class II- 35-39.99	0	0	0	0	
Obese class III->44	0	0	0	0	

Age–distribution

When the age group of the patients were considered, 4 patients (3.08%) belonged to the 60-70 years age group who were on 5 or more medications. 88(68.70%) patients were on less than 5 medications .1 patient (0.77%) belonged to the above 70 years age group who were on polypharmacy and 37 patients (28.46%) were not on polypharmacy (P value = 0.644).

Sex–distribution

When the sex distribution of the patients was considered, it was seen that there were 4 males (3.08%) who was on 5 or more medications while 60 males (46.15%) were on less than 5 medications. Among the females, 1 patient (0.77%) was on more than 5 medications, while 65 females (50%)were on less than 5 medications (P=0.204).

Education

Education among these patients was studied. Among the patients who were on more than 5 medications, there were only 4 patients (3.08%) who studied up to the primary level and 1 patient (0.77%) was uneducated. Among the patients who were on less than 5 medications, 1 patient (0.77%) was educated up to post-graduate level, 2(1.54%) studied up to graduate level, 5(3.85%) studied till higher – secondary, 17 (13.08%) were till secondary level, 35(26.92%) studied

upto primary level and 65 patients (50%) were uneducated (P=0.079).

Employment status

The employment status revealed that among patients taking 5 or more medications, none of them was employed at the time of the study, while 5 (3.85%) of them were employed previously and currently unemployed. Among the patients who were on less than 5 medications, it was seen that 50 (38.5%) of them were currently employed, and 75 (57.69%) of them were currently unemployed (P=0.156).

Type of family

When the type of family was considered, patients who were on polypharmacy showed that 2 families (1.54%) belonged to nuclear families and 3(2.31%) were joint families. Among non-polypharmacy patients, 61 families (46.92%) were nuclear families, and 64(49.92%) were joint families (P=0.699).

No. of family members

The number of family members showed that among polypharmacy patients, 2 (1.54%) families were having 5 members and 3(2.31%) of them were having more than 5 members. Among non-polypharmacy patients, 59(45.4%) of them were having <5 members in their families, and 66(50.8%) were having>5 members (P=0.752)

Per capita income

Per capita income of the patients shows that among the polypharmacy patients 2(1.54%) people were having >Rs.2,250 as their per capita income and 3 (2.31%) people were having <Rs.2,250 as their per capita income. Among non-polypharmacy patients 59(45.4%) of them had >Rs.2,250 as per capita income and 66(50.8%) of them had <Rs.2,250 per capita income (P=0.752).

Socio-economic status

Socio-economic status among the patients revealed that among polypharmacy patients none of them had their socio-economic status in the range of Rs.6,140 and above, or Rs.3,070- Rs.6,139. 2(1.54%) people belonged to the range of Rs.1,842 – Rs.3,069, while 3(2.31%) people belonged to the socio-economic status of Rs.921 – Rs.1841 group. There was no one earning below Rs. 921 (P=0.355).

Type of ration card

The type of ration card used among the patients showed that, among polypharmacy patients, 3(2.31%) had APL cards and 2 (1.54%) had BPL cards. Among non-polypharmacy patients, 113 (86.92%) had APL cards and 12(9.23%) had BPL cards (P=0.089).

Co-morbidities

The elderly people were suffering from various co-morbidities. Among the polypharmacy patients, 1(0.77%) person was having DM, 1(0.77%) HTN, 1 (0.77%) TB, 2(1.54%) had joint pain. Among the non-polypharmacy patients, 36(27.7%) suffered from DM, 41(31.53%) HTN, 34(26.15%) suffered from joint pain and 7(5.38%) had arthritis, and 7(5.38%) had other conditions like breathlessness, IHD, acid-peptic disease, back pain, vertigo, asthma, tinea, cough and cataract (P=0.086).

Substance abuse

Among the polypharmacy patients, 3 (2.31%) were smokers, and 2 (1.54%) used beetle leaf. Among non-polypharmacy patients, 18(13.84%) of them were alcoholics, 37 (28.5%) were smokers, 37 (28.5%) were tobacco chewers, and 33(25.4%) of them used beetle leaf (P=0.762).

Other difficulties

• Difficulty in opening the tablets package

Among the polypharmacy patients, all 5 (3.85%) told that they had no difficulty in opening the tablets package, among non-polypharmacy patients, 9 (6.92%) of them had difficulty opening the tablets package while 116 (89.23%) of them did not (P=0.534)

• Difficulty in swallowing large tablets

Among the polypharmacy patients, none of them had any difficulty in swallowing large tablets but among the non-polypharmacy patients, 4(3.08%) of them had difficulty in swallowing large tablets while 121(93.07%) did not have any difficulty (P=0.685)

• Do you take any liquid formulations?

None of the polypharmacy patients took any liquid formulations. But among the non-polypharmacy patients, 4(3.08%) of them took liquid formulations and 121(93.07%) did not (P=0.685).

• If yes, do you tend to mismatch the dose

All 5 (3.85%) polypharmacy patients said that they did not mismatch the dose.

Among the non-polypharmacy patients, 5 (3.85%) of them mismatched the dose and 120(92.3%) of them did not mismatch the dose (P=0.648).

• Difficulty remembering tablet name

All of the polypharmacy patients said that they had difficulty remembering the tablet names which was statistically significant (P=0.006). But among the non-

polypharmacy patients, 61(46.92%) of them said that they had difficulty remembering tablet names, while 64(49.23%) of them said that they had no difficulty in remembering tablet names.

• **Awareness about the reason behind taking tablets**

All of the 5(3.85%) polypharmacy patients said that they were aware of the reason behind taking tablets. Among the non-polypharmacy patients, 118(90.76%) were aware and 7(5.38%) of them had no awareness (P=0.586).

• **Are there any adverse effects due to any of these drugs?**

2 (1.54%) of the polypharmacy patients had experienced adverse effects due to these drugs, which was statistically significant (P=0.023) while 3(2.31%) of them had no adverse effects. Among the non-polypharmacy patients, 5(3.85%) of them experienced adverse effects, and 120(92.3%) of them did not experience any adverse effects.

• **If yes, please specify the side effects**

There were no side effects seen in the polypharmacy patients. However, in the non – polypharmacy patients, 5(3.85%) people had side effects. The common side effects were drowsiness nausea, hypotension, giddiness and itching on the face and feet.

• **Are you able to remember the time of the drug to be taken?**

All of the polypharmacy patients knew about the time of the drug to be taken. However, among the Non-polypharmacy patients, 117(90%) patients knew the time of drug was to be taken while 8(6.15%) of them did not know the time to take the drugs (P=0.559).

• **Are you allergic to any drugs prescribed lately?**

None of the polypharmacy patients was allergic to the drugs prescribed lately. Among the non-polypharmacy

patients, 8 (6.15%) of them were allergic while 117 (90%) of them were not (P=0.559)

• **If yes, specify the drugs**

4 of the non-polypharmacy patients were allergic to amp lip& 4 of them were allergic to vestige drugs.

Body mass index

Among the polypharmacy patients, 2 (1.54%) were underweight, 2 (1.54%) were in the normal range of BMI and only 1(0.77%) belonged to obese class I. Among the Non-polypharmacy patients, 16(12.3%) of them were underweight,92(70.76%) belonged to the normal range of BMI, 15(11.53%) were pre-obese, and 2 (1.54%) belonged to obese- class I. This was statistically significant (P=0.040).

What does this study add?

- Polypharmacy leads to difficulty in remembering the drug names.
- Polypharmacy results in adverse drug events.
- Polypharmacy has an impact on the body mass index. Patients who are obese and are on polypharmacy, will in turn have to take more drugs due to obesity leading to diseases like hypertension and diabetes. This will result in a prescription cascade and harmful drug interactions.

Discussion

Our study aimed to evaluate the proportion of elderly patients receiving polypharmacy in the rural field practice areas of Dept. of community medicine of a tertiary care hospital. In our study, polypharmacy was defined as receiving 5 or more medications. Our study included patients aged above 60 years. Our study showed 3.85% of the geriatric patients were receiving 5 or more medications. In a study done by Rakesh et al (1) the prevalence of polypharmacy was 66.2% which was higher than our study.

Around 5 patients (3.85%) were receiving PIMs in our study, based on Beer's criteria. In a study done by Rakesh et al (1), 36 patients (8.45%) were receiving PIMs which was higher than our study. Prescribing of inappropriate medications to the elderly is low in our study probably because of good knowledge, attitude and practice among the treating physicians.

When considering the socio-demographic profile of the patients, in our study there were 4 elderly patients (3.08%) in the age group of 60-70 years who were taking 5 or more medications and 88 people (67.70%) who were on less than 5 medications. There was 1 patient (0.77%) who was on polypharmacy above 70 years of age and 37 patients (28.46%) were on less than 5 medications.

When the sex distribution of the patients was considered in our study there were 4 males (3.08%) and 1 female (0.77%) were on polypharmacy; 60 males (46.15%) and 65 females (50%) were on less than 5 medications. In a study done by Akshaya and Padmanabh (2), there were 476 (63.4%) males and 275(36.6%) females.

Among the 130 patients, there were 4 people (3.08%) who had studied till primary level and 1 person (0.77%) were uneducated and were on polypharmacy. In the non-polypharmacy group, 1 patient (0.77%) had completed his post-graduation, 2 (1.54%) were undergraduates, 5(3.85%) had studied till higher secondary, 17 (3.08%) till secondary level, 35 (26.92%) till primary level and 65 people (50%) were uneducated. In a study done by Li Min Lim et al (3), there were 326(26%) patients who had studied till primary level, 538 (43%) who had completed secondary education and 388 (31%) who had attended higher secondary schools. This was higher than our study.

When the type of ration card was considered, which also shows the socio-economic status, among the polypharmacy patients there were 3(2.31%) of the patients who were above the poverty line and 2(1.54%) below the poverty line. Among the non-polypharmacy patients, there were 113(86.92%) were above the poverty line and 12 (9.23%) of them were below the poverty line.

In a study conducted by Rebecca Goldsmith et al (4), there were 947 (73.6%) of patients who were above the poverty line and 339 (26.4%) who were below the poverty line. This was higher than in our study.

In our study among the polypharmacy patients, 1 patient (0.77%) had diabetes, 1 patient (0.77%) had hypertension, 1 person (0.77%) was suffering from TB, and 2 people (1.54%) had joint pain. Among the non-polypharmacy patients, 36 (27.7%) had diabetes, 41 (31.53%) had hypertension, 34 (26.15%) had joint pain, 7(5.38%) had arthritis and 7(5.38%) were having other diseases like ischaemic heart disease, acid – peptic disease, vertigo, asthma and tinea and symptoms like breathlessness, back pain, cough and cataract.

In a study done by Ayman Al-Dahshan et al (5) among polypharmacy patients 3439(82.4%) had diabetes, and 3693 (80%) had hypertension. This was higher than in our study. Among the Non-polypharmacy patients, 737 (17.6%) had diabetes, and 2 922(20%) had hypertension. This was lower than in our study.

In our study among the polypharmacy patients, 5 patients (3.85%) had difficulty remembering the tablet names. Among the non-polypharmacy patients, 61 patients (46.92%) had difficulty remembering tablet names. This was statistically significant (P=0.006).

In a study done by Viktoria S Wurmbach et al (6) 5(10.4%) patients out of 48 had difficulty in

remembering the tablets names and had complexities like similar drug names and similar drug appearance.

In our study, among the polypharmacy patients 2 patients (1.54%) out of 5 polypharmacy patients complained of adverse drug effects and 3 patients did not. Among the non-polypharmacy patients, 5 patients (3.85%) had adverse drug effects and 120 (92.3%) patients did not complain of adverse drug events. This was statistically significant ($P=0.023$).

In a study done by Yelbeneh Abayneh Aseefa (7) in Ethiopia, 44 patients (17.3%) had serious drug interactions and 195 (76.5%) had significant drug interactions, while 115(45.1%) had minor drug interactions.

When the body mass index was considered in our study we found that among the polypharmacy patients, 2 people (1.54%) had normal weight and 1 person (0.77%) belonged to obese class I. This was statistically significant ($P=0.040$). In a study done by Ayman Al-Dahshan et al (5) at Qatar among the polypharmacy patients, 63 (70%) were underweight, 4154(75%) had normal weight and 1941 (79.5%) were obese.

In our study, among the non-polypharmacy patients, 16(12.3%) were underweight, 92 (70.76%) had normal weight, 15(11.53%) were pre-obese and 2(1.54%) belonged to obese- class I. This was also statistically significant. ($P=0.040$)

But, in the study done by Ayman Al-Dahshan et al (5) among the non - polypharmacy patients 27 (30%) were underweight, 151 (25%) had normal weight and 500 (20.58%) were obese.

Since body mass index is statistically significant with polypharmacy in our study, we can infer that the polypharmacy patients who are obese are at risk of hypertension and diabetes and they in turn have to take

still more drugs for these diseases and this may result in prescription cascade, leading to potentially inappropriate medications and drug-drug interactions.

Limitations of the study

Our study was conducted on a small population and was restricted to the field practice areas of our department of community medicine only. Hence a better understanding of detailed prospective elderly community-based studies involving a larger population are necessary to control polypharmacy and reduce drug-to-drug interactions.

Conclusion

Around 3.85% of patients were on polypharmacy. A few of the patients received drugs which are to be avoided as per Beer's criteria. Inappropriate prescription is observed in the elderly population.

A large number of elderly patients revealed that they had difficulty remembering the drug names. Also, they complained of the adverse effects of the drugs they were consuming. It was evident from our study that the body-mass index had an impact on polypharmacy. This is because the obese patients were, in turn, vulnerable to non-communicable diseases like hypertension and diabetes and had to be prescribed more drugs which leads to a prescription cascade and to increased drug-to-drug interactions.

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