A Glimpse into Geriatric Health: Multimorbidity and Drug Adherence Among Rural Elderly in Central India - A Cross-Sectional Study

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Abstract—**Background: Currently, India is home to 122.8 million people aged 60 and over, accounting for 8.6% of the total population. Multimorbidity associated with increasing age is common and is found to be more frequent in resource-poor countries. Therefore, this study aimed to estimate the prevalence of multimorbidity among elderly.**

Objectives:

1. To estimate the prevalence of morbidities among elderly of rural area in central India.

2. To study adherence to drugs and sociodemographic factors of study participants.

Methodology: A cross-sectional study was conducted during December 2023 to April 2025 among 380 elderly of ≥60 years of age. A face- to- face interview was taken and structured questionnaire was used. Data was entered in MS Excel window version 11 and analysed by using Open-Epi Software. Association between two categorical variables was analysed by using Chi-square test.

Results: Among 380 elderly, 62.37% were from 60- 70 years of age group, 54.12% females and 32.37% were underweight. The prevalence of multimorbidity was 43.16%. Most common morbidity was hypertension (58.08%) followed by Diabetes mellitus (46.05%) and musculoskeletal disorders (45.02%). We found low adherence to medication i.e. 58.16%. Being older of age ≥70 years (OR= 5.64), female (OR= 2.22), widow/ widower (OR= 2.29), living alone (OR= 2.11) within broken family (OR= 2.56), financially dependent (OR= 7.62) and underweight (OR= 3.11) were significantly associated with multimorbidity (p <0.05).

Conclusion: The high prevalence of multimorbidity was observed in this study. A more integrative multidisciplinary approach focusing on better management and prevention of multimorbidity among elderly should be implemented.

Index Terms—**Elderly, Multimorbidity, Adherence, Underweight.**

I. INTRODUCTION

India is the most populous country (with over 142.86 crore people) and one of the most populous democracies in the world. Although population aging is a global phenomenon, the number of elderly people in India is growing at a bewildering rate compared to many other countries.

A person aged 60 years or over is considered an elderly person in India. Currently, India is home to 122.8 million people aged 60 and over, accounting for 8.6% of the total population. Of those, 60.27 million are men and 62.53 million are women. According to the United Nations Population Division, India's population aged 60 and over is expected to grow from 8% in 2010 to 19% in 2050.

The specific health and economic problems of the elderly are different from those of the general population. The elderly in this country often suffer from two types of health problems, one is medicinal and the other is psychosocial. Multimorbidity associated with increasing age is common and is found to be more frequent in resource-poor countries where poor adherence to medication was seen. So, it becomes necessary to assess the multimorbidity among elderly as early detection and effective preventive, promotive and curative measures can provide better quality of life.

Therefore, this study was carried out to estimate the prevalence of multimorbidity and to study adherence to medications among elderly.

II. AIM AND OBJECTIVES

1. To estimate the prevalence of morbidities among elderly of rural area in central India.
2. To study adherence to drugs among study participants
3. To study sociodemographic factors of study participants.

III. MATERIALS AND METHODS

Study design: A cross-sectional study
Study setting: Rural area affiliated to tertiary health care centre of central India.
Study population: Elderly persons (≥60 years of age)
Study period was extended from December 2023 to April 2025.
Criteria for participation:
Inclusion criteria: Elderly persons of ≥60 years of age and willing to participate.
Exclusion criteria:
1. Persons <60 years of age.
2. Persons who are critically ill or had terminal illness or with severe cognitive impairment or not able to answer the questions.

Sample size & Sampling technique:
Sample size was estimated using following formula,
      Taking p = prevalence of multimorbidity from the study conducted by
Banjare P et al. Socio-Economic Inequalities in the Prevalence of Multi-Morbidity among the Rural Elderly in Bargarh District of Odisha, India. PLOS ONE. 2014; 9(6): e97832.
Prevalence of multimorbidity p = 57 %
                    q = 100- p = 43%
Level of significance: 95 % (z = 1.96)
Absolute error (e): 5%
Sample size formula $n = z^2 \times pq / e^2$
The sample size came to be 380

Ethical consideration: This study was approved by Institutional Ethics Committee. Informed consent from study participants was taken after establishing rapport and explaining the purpose of study.

IV. METHODOLOGY

A simple random sampling was used for selection of households. Elderly persons of ≥60 years of age present in the household at the time of the house-to-house survey, were interviewed using the face-to-face interview. A predesigned, pretested proforma in a vernacular language (Hindi or Marathi) was used for collection of information regarding sociodemographic characteristics and relevant personal details of the elderly. Socioeconomic status (SES) of the respondents was assessed by Modified BG Prasad Scale (March 2024). Investigation records were reviewed & mentioned in the data sheet. Anthropometric measurements, General & Systemic examination were done.

Operational definitions:
1. Multimorbidity: Multimorbidity was described as coexistence of two or more chronic conditions.
2. Adherence to drugs was classified as:
Adherent- ≥ 95% adherence was considered as regular on medication
Non- adherent- < 95% adherence was considered as irregular on medication
3. Financially independent: A person was considered financially independent if he/she was either earning or were receiving pension.
4. Financially dependent: A person was considered financially dependent if he/she was totally dependent on other family members.
5. Current alcohol/ tobacco users were someone who at the time of survey uses alcohol/ tobacco in any form either daily or occasionally.
6. Past alcohol/ tobacco users were those individuals who were used alcohol/ tobacco in the past but did not used ever in one year preceding the survey.
7. Non- alcohol/ tobacco users were those who had never used alcohol/tobacco in lifetime.

Statistical analysis:
Data was entered in MS Excel window version 11 and analysed by using Open-Epi Software. Descriptive statistics quantitative variables were measured as Mean, Standard Deviation, Range while qualitative variables were presented as Number and Percentage. Bar chart and Pai charts were used to summarise baseline characteristics of the study participants.

Association between two categorical variables was analysed by using Chi-square (x^2) test; p value < 0.05 was considered to be statistically significant, Odds Ratio was calculated.

V. RESULTS

Table 1: Distribution of study participants according to Sociodemographic characteristics (n= 380)			
Variables		Number	Percentage
1. Age (in years)	60- 65	143	37.63
	65- 70	94	24.74
	70- 75	66	17.37
	75- 80	50	13.16
	> 80	27	07.10
2. Gender	Male	174	45.79
	Female	206	54.21
3. Residence	Rural	269	70.79
	Urban	111	29.21
4. Religion	Hindu	239	62.90
	Muslim	33	08.68
	Bauddha	102	26.84
	Sikh	6	01.58
5.Marital Status	Married	249	65.53
	Widow/Widower	131	34.47
6. Type of family	Nuclear	125	32.89
	Joint	69	18.16
	Three Generation	137	36.05
	Broken	49	12.90
7. Education	Illiterate	198	52.11
	Primary	66	17.37
	Middle	25	06.58
	High	43	11.31
	Intermediate	28	07.37
	Graduate	20	05.26
8.Occupation	Unemployed	159	41.84
	Semi-skilled	25	06.58
	Unskilled	13	03.42
	Skilled	58	15.26
	Retired	79	20.79
	Homemaker	46	12.11
9.Socioeconomic Status (Modified BG Prasad scale)	Class I	23	06.05
	Class II	92	24.21
	Class III	136	35.79
	Class IV	87	22.90

	Class V	42	11.05
10. Financial Dependency	Dependent	205	53.95
	Independent	175	46.05
11. Living Status	With Family	268	70.53
	With Spouse	63	16.58
	Alone	49	12.89
12. Type of Diet	Vegetarian	211	55.53
	Mixed	169	44.47
13. BMI	Underweight	123	32.37
	Normal	141	37.11
	Overweight	42	11.05
	Obese	74	19.47

Total 380 participants were enrolled in the study among which 206 (54.21%) were female & 174 (45.79%) were male. Majority were in the age group of 60-65 years 143 (37.63%) followed by 65-70 years 94 (24.74%). The Mean age is 67.96 years & SD is ± 6.04 with minimum age is 60 years & maximum is 85 years (Range 25).

Majority 269 (70.79%) from Rural area, 49 (12.90%) lived in Broken family, 239 (62.90%) were Hindu, 249 (65.53%) were married and 198 (52.11%) were illiterate. Majority 159 (41.84%) were unemployed and 79 (20.79%) retired. As per the Modified BG Prasad scale (March 2023), 136 (35.79%) were from class III followed by 92(24.21%), 87(22.90%), belong to Class II, Class IV respectively.

Majority 268 (70.53%) elderly lived with their family while 49 (12.89%) lived alone and 63 (16.58%) lived with spouse only.205 (53.95%) were financially dependent on their family members while 175 (46.05%) were financially independent. [Table 1]

Fig. 1 Prevalence of Multimorbidity
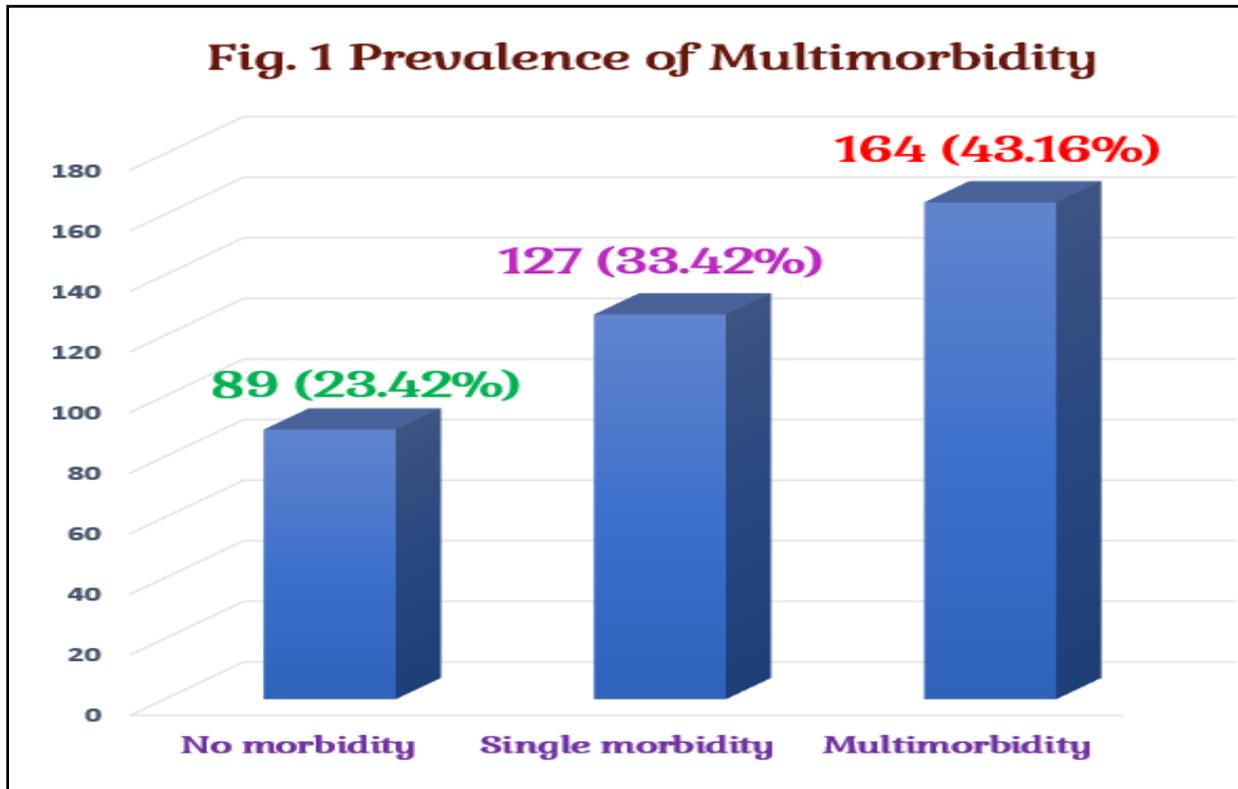
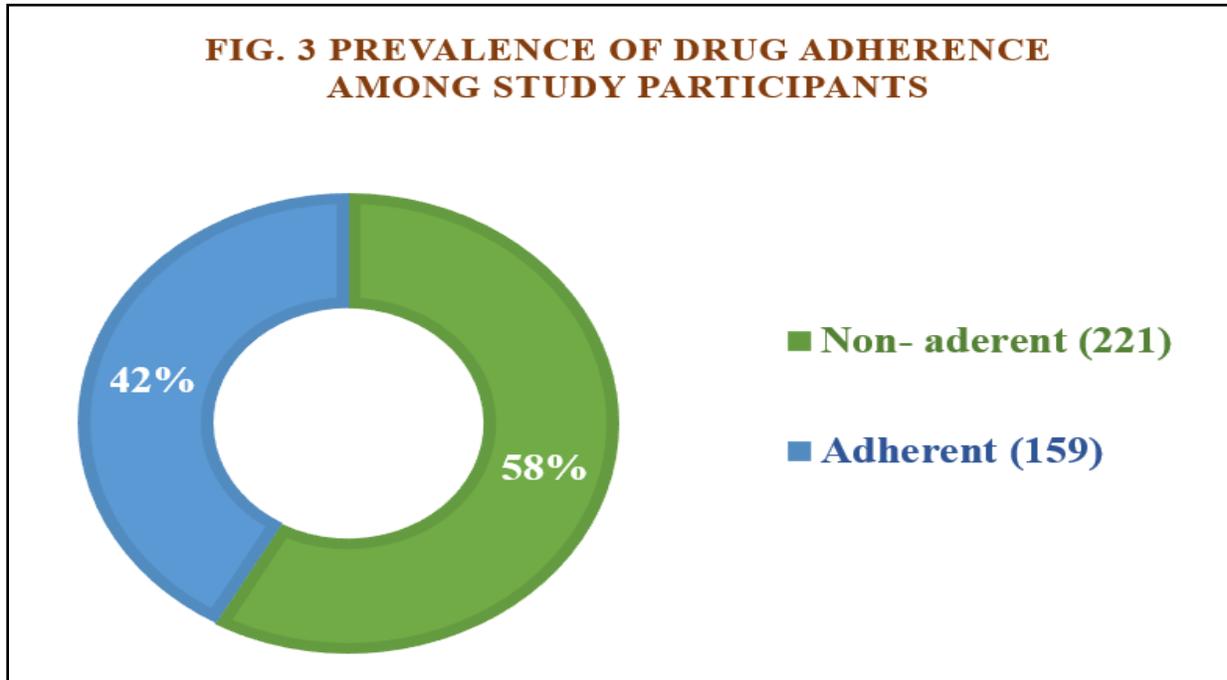| Table 2: Morbidity profile of study participants			
Variables		No.	Percentage
1. Presence of morbidity (n=380)	No morbidity	89	23.42
	Single morbidity	127	33.42
	Multimorbidity	164	43.16
2. Number of morbidities (n=291)	1	127	43.64
	2	93	31.96
	≥3	71	24.40
3. Morbidities (n=291)	Hypertension	169	58.08
	Diabetes mellitus	134	46.05
	Asthma	79	27.15
	COPD	98	33.67
	Musculoskeletal disorders	131	45.02
	Chronic Kidney Disease	26	08.93
	CVD	67	23.02
	Cancer	3	01.13
	Tuberculosis	49	16.84
	BPH	43	14.78
	Cataract	137	47.08
	Skin diseases	32	10.99
	Psychological disorders	29	09.97
4. Medication use (n= 291)	≤3	127	43.64
	>3	164	56.36
5. Use of Walking Aid (n= 380)	Yes	113	29.74
	No	267	70.26
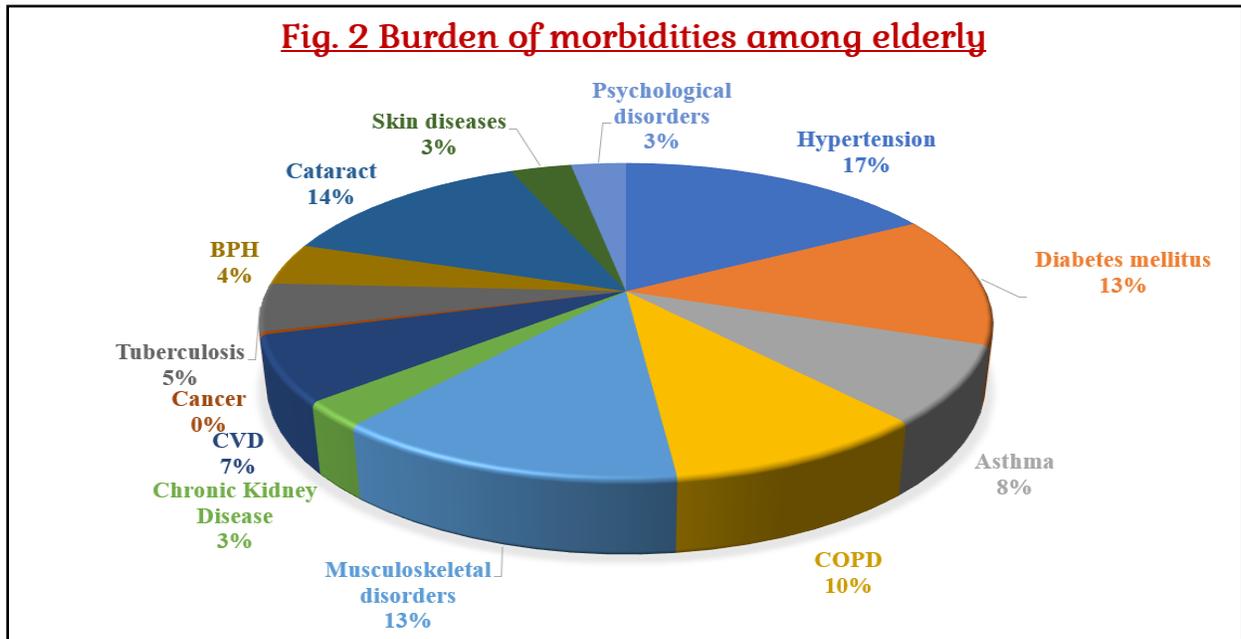
Fig. 2 Burden of morbidities among elderly

The prevalence of multimorbidity was 43.16%. The most common morbidly was found to be hypertension 169 (58.08%) followed by diabetes mellitus 134 (46.05%) and musculoskeletal disorders 131 (45.02%). Among 291 study

participants, 127 (43.64%) had at-least one morbidity, 93(31.96%) had two morbidity and 71(24.40%) had more than or equal to three morbidities. [Table 2]

Table 3. Lifestyle characteristics of study participants (n=380)			
Variables		No.	Percentage
1.Tobacco use	Current	147	38.68
	Never	168	44.21
	Past	65	17.11
2. Alcohol use	Current	89	23.42
	Never	225	59.21
	Past	66	17.37

One hundred forty- seven (38.68%) and 89(23.42%) were current tobacco users & current alcohol users respectively. [Table 3]

FIG. 3 PREVALENCE OF DRUG ADHERENCE AMONG STUDY PARTICIPANTS

Non- aderent (221)
Adherent (159)

Table 4. Association between Sociodemographic characteristics, risk factors with Multimorbidity among study participants (n= 380)					
Variables	Multimorbidity		OR	95% CI	p
	Present	Absent			
Age (in years)					
≥70 (143)	98	45	5.64	3.587, 8.876	0.0000
<70 (237)	66	171			
Gender					
Female (206)	107	99	2.22	1.46, 3.37	0.0002
Male (174)	57	117			
Religion					
Hindu (239)	104	135	1.04	0.683, 1.584	0.9397
Others (141)	60	81			

Marital Status					
Widow/ Widower (131)	74	57	2.29	1.49, 3.531	0.0002
Married (249)	90	159			
Residence					
Rural (269)	117	152	1.05	0.6703, 1.639	0.9265
Urban (111)	47	64			
Education					
Illiterate (198)	88	110	1.12	0.743, 1.676	0.6712
Others (182)	76	106			
Socioeconomic class					
III, IV, V (165)	116	149	1.09	0.6978, 1.692	0.7986
I, II (115)	48	67			
Type of family					
Broken (49)	31	18	2.56	1.378, 4.771	0.0038
Others (331)	133	198			
Living Status					
Alone (49)	29	20	2.11	1.143, 3.876	0.0230
With family/ with spouse (331)	135	196			
Occupation					
*Not Working (284)	132	152	1.74	1.07, 2.819	0.0332
Working (96)	32	64			
Financial Dependency					
Dependent (205)	131	74	7.62	4.742, 12.24	0.0000
Independent (175)	33	142			
Diet					
Vegetarian (211)	93	118	1.09	0.7228, 1.637	0.7646
Mixed (169)	71	98			
BMI					
Underweight (123)	76	47	3.11	1.989, 4.849	0.0000
Others (257)	88	167			
Adherence to drugs					
Non- adherent (221)	116	105	2.55	1.663, 3.925	0.0000
Adherent (159)	48	111			

*Not Working includes Retired, Housewife and Unemployed

Elderly, who were ≥70 years was 5.64 times more prone for developing multimorbidity as compare to those who were <70 years of age (95% confidence interval [CI]: 3.587-8.876, p= 0.0000).

Female (OR= 2.22), Widow/ Widower (OR= 2.29), living alone within Broken family (OR= 2.56) had more chances of developing multimorbidity as compared others. (p< 0.05)

Elderly who were not working (OR= 1.74), financially dependent on other family members (OR= 7.62) were also prone for developing multimorbidity. Risk factors like underweight (OR= 3.11), Non-adherent to drugs (OR= 2.55) were also significantly associated with multimorbidity (p< 0.05).

VI. DISCUSSION

Total 380 participants were enrolled in the study among which 206 (54.21%) were female. Majority were in the age group of 60-65 years 143 (37.63%) followed by 65-70 years 94 (24.74%). The Mean age is 67.96 years & SD is ± 6.04 (Range 25). Majority 269 (70.79%) from Rural area, 49 (12.90%) lived in Broken family, 239 (62.90%) were Hindu, 249

(65.53%) were married and 198 (52.11%) were illiterate. Majority 159 (41.84%) were unemployed and 79 (20.79%) retired. As per the Modified BG Prasad scale (March 2023), 136 (35.79%) were from class III followed by 92(24.21%) belong to Class II. Majority 268 (70.53%) elderly lived with their family while 49 (12.89%) lived alone. 205 (53.95%) were financially dependent on their family members. Similar findings were seen in studies conducted by Sahu P et al, Kundu J et al, Chobe M et al, Srinivas M et al, Patel S et al, Prabhakar T et al, Sarkar A et al [1, 2, 6, 7, 8, 11, 14].

The prevalence of multimorbidity was 43.16%. The most common morbidly was found to be hypertension 169 (58.08%) followed by diabetes mellitus 134 (46.05%) and musculoskeletal disorders 131 (45.02%). Among 291 study participants, 127 (43.64%) had at-least one morbidity, 93(31.96%) had two morbidity and 71(24.40%) had more than or equal to three morbidities.

This study found Being older of age ≥70 years (OR= 5.64), female (OR= 2.22), widow/ widower (OR= 2.29), living alone (OR= 2.11) within broken family (OR= 2.56), financially dependent (OR= 7.62) and underweight (OR= 3.11) were significantly associated with multimorbidity (p <0.05). Similar findings were seen in studies conducted by Sahu P et al, Kundu J et al, Chobe M et al, Srinivas M, Patel S et al, Prabhakar T et al, Marmamula S et al, Bhattacharyya K et al [1, 2, 6, 7, 8, 11, 12].

VII. CONCLUSION

The prevalence of multimorbidity was 43.16%. Most common morbidity was hypertension followed by Diabetes mellitus and musculoskeletal disorders. Factors such as being older of age ≥70 years, female, widow/ widower, living alone within broken family, financially dependent and underweight were significantly associated with multimorbidity (p <0.05). Thus a more integrative multidisciplinary approach focusing on better management and prevention of multimorbidity among elderly should be implemented.

VIII. ACKNOWLEDGMENTS

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