



Prevalence and risk factors of polypharmacy among elderly in India: Evidence from SAGE Data

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Mili Dutta,

International Institute for Population Sciences (IIPS),
Mumbai, India

Lokender Prashad,

Tata Institute of Social Sciences (TISS),
Mumbai, India

Abstract- Population ageing is a result of high life expectancy and declining fertility. Ageing usually accompanied with the chronic illness conditions. Polypharmacy is becoming a common problem among older persons. Polypharmacy increases the risk of drug-related events such as falls, confusion and functional decline. In one of the studies, it was found that elderly commonly used both prescribed and non-prescribed medicine together which get them into the risk of major drug-drug reaction. The aim of the present study is to explore level and pattern and the risk factors of polypharmacy among elderly in India. Present study has utilized the SAGE 2007 data, conducted in India, for the fulfillment of the objectives for 60+ populations. All the analysis has been carried out in SPSS and STATA software. The prevalence of polypharmacy is 4.2% among elderly in India. The present study shows the likelihood of polypharmacy is higher among old old (OR = 1.877, 95% CI = [0.97, 3.61] and it is lower among high wealth quintile elderly (OR = 0.339, 95% CI = [0.14, 0.83]. The study has revealed bad self-rated health (OR = 0.339, 95% CI = [0.14, 0.83], diabetes (OR = 4.205, 95% CI = [2.14, 8.25], depression (OR = 5.987, 95% CI = [2.45, 14.62] and hypertension (OR = 11.629, 95% CI = [5.49, 24.63] as the major risk factors of polypharmacy among elderly in India. Findings of the study will be helpful for the programmes and policymakers,

researchers, academician and social workers who are working in the field of ageing and health.

Index Terms: Ageing, polypharmacy, sage, self-rated health, diabetes, depression, hypertension.

I. INTRODUCTION

Population ageing is a result of high life expectancy and declining fertility. It is now a global phenomenon as in almost every country older population is rapidly increasing. The process of ageing is compressed into two or three decades over a single generation. The number of the aged population is being projected to be around 1.5 billion in 2050, with 80% of them in the developing countries [1].

Ageing usually accompanied with the chronic illness conditions [2]. Higher rates of chronic illness increase the likelihood of taking multiple medications by older people. Polypharmacy is becoming a common problem among older persons [3]. It refers to taking multiple concurrent medications to save the coexisting health problem. In the worldwide, among older persons, 44% of men and 57% of women take five or more medicines per week [4] [5]. Polypharmacy increases the risk of drug-related events such as falls, confusion and functional decline. In one of the studies, it was found that elderly commonly used both prescribed and non-prescribed medicine together which get them into the risk of



major drug-drug reaction [6]. National Health and Nutrition Examination Survey (NHANES III) reveals that nearly 74% of the elderly population in India use prescribed medications. Half of them aged 65-74 use 2 or more prescribed drug and 12% use 5 or more prescribed drug.

II. REVIEW OF LITERATURE

Elderly population is now growing as the rapidest patient population worldwide. The process of ageing involves many changes in the biological, functional, psychological and social factors which vary with the genetic factors and age-related vulnerability of the elderly [7]. Often Ageing comes with the chronic illnesses, comorbidity, disability and social isolation [8] [9]. It is very rare for elderly patients to have accompanied with only one disease [10] [11]. Multimorbidity is ranging from 55 to 98% among the elderly, and it is more among very old, women, low-socioeconomic people [11]. Multimorbidity usually refers to the co-occurrence of more than two diseases [11] [12].

There is no general consensus on the definition of the polypharmacy unless it shows the use of multiple drug use by the individual [13] [14]. This resulted in a several definitions in the literatures. Polypharmacy can be both defined quantitatively and qualitatively [4] [6]. There are many studies which have used minor and major polypharmacy. Minor polypharmacy refers to concurrent use of two to four prescribed medications and major polypharmacy as concurrent use of five or more prescribed medications. [15][16][17]. Polypharmacy refers to prescription and use of multiple medications to deal with concurrent multiple diseases [4] [13] [18].

Inappropriate prescription of medication is very common among elderly, which increases the risk of polypharmacy. The high prevalence of polypharmacy may lead to drug-disease interaction and drug reactions [6]. In another study, it was found that the Physical Component Summary (PCS) score was associated with the degree of polypharmacy. After controlling the other socio-economic factors, this association remained significant. Lower medication was found to be associated with the low quality of life of elderly [19].

III. NEED FOR THE STUDY

Use of inappropriate medication among elderly patients is a major public health concern. It is accompanied with the detrimental effect on the elderly. It is estimated to be the fifth major cause of death. Polypharmacy can lead to affect the quality of life of the elderly. There are very few studies in the predictors of polypharmacy among elderly in India. The aim of the present study is to explore level and pattern and the risk factors of polypharmacy among elderly in India.

IV. OBJECTIVE

- To assess the prevalence of polypharmacy among elderly in India.
- To find out the pattern of polypharmacy by different socio-demographic characteristics.
- To explore the risk factors of polypharmacy.

V. METHODOLOGY

Present study has utilized the SAGE data for the fulfillment of the objectives for 60+ populations. In India in 2007, The International Institute for Population Sciences, Mumbai with the help of World Health Organization, Geneva conducted the Study on Global Ageing and Adult Health (SAGE). It is a global longitudinal study, and it has conducted in six countries including China, India, Ghana, Mexico, Russia and South Africa. This survey has been conducted in India in six states- Assam, Karnataka, Maharashtra, Rajasthan, Uttar Pradesh and West Bengal. It has included 11,230 respondents out of which 4,670 were persons aged 18-49 (3,625 women and 1,045 men) and 6,560 respondents with persons aged 50-plus (3,256 women and 3,304 men). A total number of 3618 elderly (aged 60 years and above) has been interviewed in this survey.

A. Measures



a. Dependent variable

Polypharmacy: In the present study polypharmacy is taken as use of 4 or more than four medications concurrently [19].

b. Key independent variable

Other characteristics of elderly are also measured: sex (male and female), Education (no education, less than primary, primary education completed, secondary education completed, high school education and college/university and above), wealth quintile (poor, medium, rich), self-rated health (good, moderate, bad), currently working (working, non-working), diagnosed with diabetes, depression and hypertension.

B. Statistical Analyses

All the analysis has been carried out in SPSS and STATA software.

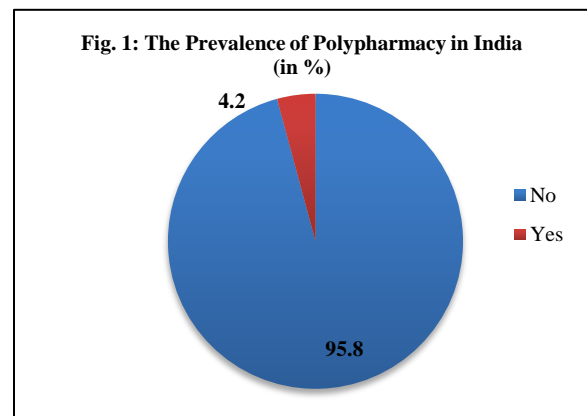
VI. RESULTS

The present study has 3618 elderly (60 years and more) out of which 1920 (53.07%) are male and 1698 (46.93%) are female. More than three-fifth of the elderly is currently married followed by widowed that is around one-third of the elderly. 'Other castes' consists for more than three-fourth of the elderly population. According to the religion more than 85% of the elderly are Hindu. More than half of the elderly people have no education.

A. Prevalence of polypharmacy and pattern by different socio-economic characteristics of elderly

The figure 1 shows the prevalence of polypharmacy in India which is 4.2% which is large proportion of elderly in India. The table 2 shows the percent distribution of polypharmacy by different socio-demographic characteristics, self-rated health and some morbidity conditions. The table 1 depicts the high prevalence of polypharmacy among male (5.3%) than the female (3.0%). The highest prevalence of polypharmacy is among old old (70-79). The highest proportion of polypharmacy is

found among elderly in the urban area (7.5%) than the rural area. The prevalence of polypharmacy increases with the increase in the education level and it is highest among elderly having college/ university level education (12.6%). Higher proportion of polypharmacy is found among high wealth quintile elderly (6.4%) whereas it is lower among middle wealth quintile elderly (5.4%). According to the self-perceived self-rated health, the prevalence of polypharmacy is higher among elderly having bad self-rated health (5.8%) and it is lowest among elderly having good self-rated health (1.5%). Higher proportion of currently non-working (6.9%) elderly than the currently working elderly (1.9%). Prevalence of polypharmacy among elderly diagnosed with diabetes, depression and hypertension is 21.4%, 12.8% and 11.1% respectively.



B. Risk factors of polypharmacy among elderly in India

Table 2 presents results of multivariate logistic models estimated to examine the predictors of polypharmacy among elderly. The result of the multiple logistic regression reiterate that the likelihood of polypharmacy is more among old old elderly (70-79) (OR = 1.877, 95% CI = [0.97, 3.61] than the young old elderly (60-69). Elderly having less than primary education (OR = 4.430, 95% CI = [1.78, 11.02] is strongly and significantly more likely to have polypharmacy than the elderly with no education. The likelihood of polypharmacy is more



among elderly completed primary school (OR = 2.611, 95% CI = [0.99, 6.89] than the elderly with no education. The likelihood of polypharmacy is significantly lower among high wealth quintile (OR = 0.339, 95% CI = [0.14, 0.83] than the poor wealth quintile elderly. Elderly having bad self-rated health (OR = 3.523, 95% CI = [1.24, 10.02] are more likely to have polypharmacy than the elderly having good self-rated health. The likelihood of polypharmacy is strongly and significantly more among elderly diagnosed with diabetes, Depression and Hypertension. The odds of having polypharmacy is more among elderly diagnosed with hypertension (OR = 11.629, 95% CI = [5.49, 24.63] followed by depression (OR = 5.987, 95% CI = [2.45, 14.62] and diabetes (OR = 4.205, 95% CI = [2.14, 8.25].

V. DISCUSSION AND CONCLUSION

The present study shows the prevalence of polypharmacy is 4.2% among elderly in India. The study has shown higher proportion of polypharmacy among male, old old (70-79), urban, college/university level educated, high wealth

quintile, bad self-rated health, currently non-working. According to socio-demographic characteristics, the study reveals the more likelihood of polypharmacy among old old (70-79). The elderly having high wealth quintile are significantly less likely to have polypharmacy. Bad self-rated health is found to be a major predictor of polypharmacy among elderly. The present study has revealed diabetes, depression and hypertension as the major risk factors of polypharmacy among elderly in India. The present study findings are supporting the evidences found in the previous studies [6] [20].

The present study has shown polypharmacy as the emerging public health concern among elderly in India. The study has revealed bad self-rated health, diabetes, depression and hypertension as the major risk factors of polypharmacy among elderly in India. There should be concern given to the optimal use of medication and to improve the good communication among elderly patient and the health providers. Findings of the study will be helpful for the programmes and policymakers, researchers, academician and social workers who are working in the field of ageing and health.



Table1. Percent Distribution of Polypharmacy among Elderly by Selected Socio-Demographic Characteristics, Self- rated health and Morbidity Conditions

Variables	Percentage	N
Sex		
Male	5.3	46
Female	3.0	31
Age		
Youngest old (60-69)	2.2	37
Old Old (70-79)	8.1	33
Oldest old (80+)	1.9	7
Place of Residence		
Urban	7.5	35
Rural	2.5	42
Education		
No education	2.1	26
Less than primary	7.8	18
Primary school completed	3.1	12
Secondary school completed	4.6	8
High school completed	10.5	5
College/University and above	12.6	8
Wealth Quintile		
Poor	6.4	20
Middle	5.4	27
High	9.2	30
Self-rated health		
Good	1.5	6
Moderate	4.0	34
Bad	5.8	37
Current Working Status		
Working	1.9	11
Non-Working	6.9	42
Diabetes		
No	1.9	42
Yes	21.4	35
Depression		
No	3.5	55
Yes	12.8	22
Hypertension		
No	0.9	12
Yes	11.1	65

Table2. Logistic Regression Results: Likelihood Estimates of Polypharmacy among Elderly in India.

	Odds Ratio	95% CI
Sex		
Male [®]		
Female	1.217	[0.56, 2.65]
Age		
Youngest old (60-69) [®]		
Old Old (70-79)	1.877*	[0.97, 3.61]
Oldest old (80+)	0.554	[0.15, 2.08]
Place of Residence		
Urban [®]		
Rural	0.560	[0.27-1.17]
Education		
No education [®]		
Less than primary	4.430***	[1.78-11.02]
Primary school completed	2.611*	[0.99, 6.89]
Secondary school completed	2.143	[0.68, 6.73]
High school completed	0.913	[0.22, 3.87]
College/University and above	2.673	[0.72, 9.99]
Wealth Quintile		
Poor [®]		
Middle	1.102	[0.49, 2.48]
High	0.339**	[0.14, 0.83]
Self-rated health		
Good [®]		
Moderate	1.907	[0.70, 5.23]
Bad	3.523**	[1.24, 10.02]
Current Working Status		
Working [®]		
Non-Working	1.944	[0.87, 4.35]
Diabetes		
No [®]		
Yes	4.205***	[2.14, 8.25]
Depression		
No [®]		
Yes	5.987***	[2.45, 14.62]
Hypertension		
No [®]		
Yes	11.629***	[5.49, 24.63]

Note: [®] Reference category , * (p<0.10), ** (p<0.05), *** (p<0.01),



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