International Journal of Community Medicine and Public Health
Halder P et al. Int J Community Med Public Health. 2024 Jun;11(6):2380-2388
http://www.ijcmph.com
pISSN 2394-6032 | eISSN 2394-6040

DOI: https://dx.doi.org/10.18203/2394-6040.ijcmph20241503

Original Research Article

How multimorbidity relates to road traffic accident among older adults and elderly population: insights from longitudinal aging study in India (1st wave)

Pritam Halder[1]*, Aswani Kumar Seth[2], Shubham Kansal[3], Saumyarup Pal[4], Anshul Mamgai[1]

[1]Department of Community Medicine and School of Public Health, Postgraduate Institute of Medical Education and Research, Chandigarh, Punjab, India
[2]Department of Community Medicine, All India Institute of Medical Sciences, Raebareli, Uttar Pradesh, India
[3]Department of Community Medicine, Lady Hardinge Medical College, Delhi, India
[4]Department of Geriatric Medicine, All India Institute of Medical Sciences, New Delhi, India

Received: 25 April 2024
Revised: 18 May 2024
Accepted: 20 May 2024

***Correspondence:**
Dr. Pritam Halder,
E-mail: rynedann@gmail.com

ABSTRACT

Background: Multimorbidity and road traffic accidents increase with increasing age. Supplemented with increasing life expectancy at birth, both multimorbidity and RTAs will contribute significantly to the growing disease burden of the country. The objective of the study was to determine the association between multimorbidity and RTAs among older adults (above 45 years) and the elderly (above 60 years) population in India.
Methods: A secondary data analysis was conducted using the Longitudinal Ageing Study in India (LASI)-1st wave data (April 2017 to December 2018). Participants having at least two chronic health conditions were described as multimorbidity. Road traffic accidents (RTAs) was taken as the outcome variable. Univariate followed by multivariable logistic regression was conducted between the outcome variable and each explanatory variable.
Results: Data extracted consisted of 34704 (51.1%) older adults and 31902 (47.9%) elderly. Multimorbidity was present in 25054 (37.6%) individuals. Among the RTA group, 325 (26.5%) individuals had multimorbidity. The elderly with multimorbidity (at least two) were associated with the RTA with an adjusted odds ratio (CI) of 0.55 (0.45-0.67) and p value of <0.001 in comparison to older adults. Clerical and skilled individuals with multimorbidity were associated with RTA in comparison to unemployed individuals with multimorbidity with an adjusted odds ratio (CI) of 1.40 (1.10-1.79) and p value of 0.007.
Conclusions: The RTA was evident among males aged 45-60 years with multimorbidity. Clerical and skilled individuals with multimorbidity were more prone to RTA. These individuals should be encouraged to take necessary measures to promote healthy living and adhere to them.

Keywords: Older adults, Elderly, Multimorbidity, Road traffic accidents, LASI

INTRODUCTION

India is pacing ahead in demographic and epidemiological transition. The epidemiological transition results in increasing disability-adjusted life years (DALYs) due to non-communicable diseases and injuries. This contributes significantly to the prevalence of multiple chronic conditions in an individual. The presence of two or more chronic conditions in an individual is defined as multimorbidity. Globally, there is an increasing burden of multimorbidity.[1] About one-third of the adult population is prone to suffer from multimorbidity worldwide.[2] In India, the burden ranges from 7.2% to 32.1% among various age groups.[3,4]

Multimorbidity focuses on the interaction of several coexisting diseases and not on a predominant condition. Injuries due to RTAs are one of the leading causes of disease burden worldwide.[5] In 2022, RTAs in India increased by 11.9% compared to 2021.6. Similarly, deaths due to these RTAs increased by 9.4%.[6] About one-third of these accidents are among individuals aged 45 years and above.

The consequences associated with multimorbidity are immense varying from functional decline and disability to poor quality of life.[7] A systematic review and meta-analysis showed that the quality of life score decreases significantly with the addition of a disease.[8] RTAs are also associated with poor quality of life.[9] Negligence of the driver along with other factors like poor health of the pedestrians, condition and types of the roads contributes to road traffic accidents.[10]

Multimorbidity and road traffic accidents increase with increasing age.[6,11] Supplemented with increasing life expectancy at birth, both multimorbidity and RTAs will contribute significantly to the growing disease burden of the country. Many studies were conducted worldwide to assess multimorbidity and RTAs separately but there are limited studies that tried to generate evidence on the relationship between them and more so in Indian settings.

Hence, we aim to determine the association between multimorbidity and RTAs among older adults (45-60 years) and the elderly (above 60 years) population in India.

METHODS

A secondary data analysis was conducted using the longitudinal aging study in India (LASI-1st wave) data conducted from April 2017 to December 2018. It was a longitudinal survey conducted in 35 Indian states and union territories (UTs), except Sikkim.

It intended to collect detailed information on the demographic, psychological, social, economic, and health aspects of aging in India. It tried to close the knowledge gap about comprehensive and globally comparable survey data on aging in India. The National Institute on Ageing, the Government of India's Ministry of Health and Family Welfare, and the United Nations Population Fund provided funding for the study.

The University of Southern California, the International Institute for Population Sciences, and the Harvard TH Chan School of Public Health are working together on it. LASI adopted a multistage stratified area probability cluster sampling design to include 72,250 adults for the survey. Face-to-face interview using a pre-validated questionnaire in the local language was used to collect data in the survey. The detailed methodology can be referred to from the LASI-1st wave, India report.[12] The data of 66,606 participants aged above 45 years was used in the study.

Eligibility criteria

Participants providing proper response (yes/ no) to history of at least one RTA within last two years were included in this study. Participants less than 45 years were excluded from this study.

Explanatory variables

The explanatory variables included are multimorbidity, age, gender, minimum education, residence, marital status, monthly per capita expenditure (MPCE) quintile, health insurance availing, occupation, physical activity, self-rated health, tobacco usage and alcohol consumption. The interviewer asked proper questions related to chronic health conditions with dichotomous answers (no/yes)- "Has any health professional ever diagnosed you with the following chronic conditions or diseases?" Participants having at least two chronic health conditions were described as multimorbidity.

Outcome variable

RTA was taken as the outcome variable. The individuals responding 'traffic accident' to 'What is the cause of injury in the last two years?' during the interview conducted during the LASI survey were considered to have undergone RTA.

Statistical analysis

Univariate logistic regression was conducted between the outcome variable and each explanatory variable. To avoid multicollinearity among explanatory variables VIF (variance inflation factor) was applied. VIF >5 indicated a high correlation between a given explanatory variable and other explanatory variables in the model, which might create problems with the regression analysis. Variables with VIF>5 (marital status and self-rated health) were excluded from the final association. $P<0.05$ was considered statistically significant. $P<0.2$ was taken for further multivariable logistic regression. The association was calculated in the overall population and was further categorised as per gender and age groups.

RESULTS

Data extracted consisted of 34704 (51.1%) older adults and 31902 (47.9%) elderly. Around 1228 (1.8%) had any injury in the past 2 years (RTA). Almost half (47.1%) of the adults were illiterate and a majority (75%) were married or were in a live-in relationship.

Only 2.2% of individuals had any health insurance. Physical activity was absent in more than half (61.1%) of the individuals and around 36.1% and 17.8% consumed tobacco and alcohol respectively. A significant difference

was noted among both RTA and non-RTA groups with respect to sex, education, marital status, MPCE quintile, tobacco and alcohol abuse. This is consistent in both older adults and the elderly category (Table 1).

Table 1: Various characteristics of Indian population aged >45 years, 45-60 years and >60 years.

Variables	Overall population (>45 years)			Older adults (45-60 years)			Elderly (>60 years)		
	Total (n=66606)	Road traffic accident cases (n=1225)	P value	Total (n=34704)	Road traffic accident cases (n=762)	P value	Total (n=31902)	Road traffic accident cases (n=463)	P value
	N (%)	N (%)		N (%)	N (%)		N (%)	N (%)	
Sex									
Male	31039 (46.60)	828 (2.67)	<0.001	15699 (45.24)	527 (3.36)	<0.001	15340 (48.08)	301 (1.96)	<0.001
Female	35567 (53.40)	397 (1.12)		19005 (54.76)	235 (1.24)		16562 (51.92)	162 (1.45)	
Education (minimum)									
Illiterate	31,353 (47.07)	405 (1.29)	<0.001	14,162 (40.81)	205 (1.45)	<0.001	17,191 (53.89)	200 (1.16)	<0.001
Less than primary	7,598 (11.41)	158 (2.08)		3,763 (10.84)	96 (2.55)		3,835 (12.02)	62 (1.62)	
Primary completed	8,761 (13.15)	186 (2.12)		4,948 (14.26)	123 (2.49)		3,813 (11.95)	63 (1.65)	
Middle completed	6,337 (9.51)	155 (2.45)		4,085 (11.77)	114 (2.79)		2,252 (7.06)	41 (1.82)	
Secondary school	5,953 (8.94)	139 (2.33)		3,565 (10.27)	90 (2.52)		2,388 (7.49)	49 (2.05)	
Higher secondary	2,852 (4.28)	92 (3.23)		1,893 (5.45)	66 (3.49)		959 (3.01)	26 (2.71)	
Diploma/ graduate	3,752 (5.63)	90 (2.40)		2,288 (6.59)	68 (2.97)		1,464 (4.59)	22 (1.50)	
Residence									
Rural	43240 (64.92)	777 (1.80)	0.270	22155 (63.84)	479 (2.16)	0.570	21085 (66.09)	298 (1.41)	0.428
Urban	23366 (35.08)	448 (1.92)		12549 (36.16)	283 (2.26)		10817 (33.91)	165 (1.53)	
Marital status									
Unmarried	871 (1.31)	7 (0.80)	<0.001	559 (1.61)	6 (1.07)	0.006	312 (0.98)	1 (0.32)	0.001
Married/ in live -in	49949 (74.99)	1011 (2.02)		29567 (85.20)	679 (2.30)		20382 (63.89)	332 (1.63)	
Widow/ separated/ divorced	15786 (23.70)	207 (1.31)		4578 (13.19)	77 (1.68)		11208 (35.13)	130 (1.16)	
MPCE quintile									
Poorest	13,181 (19.79)	166 (1.26)	<0.001	19.02 (19.02)	100 (1.51)	<0.001	6,580 (20.63)	66 (1.00)	0.001
Poorer	13,403 (20.12)	217 (1.62)		6,830 (19.68)	134 (1.96)		6,573 (20.60)	83 (1.26)	
Middle	13,371 (20.07)	264 (1.97)		6,869 (19.79)	160 (2.33)		6,502 (20.38)	104 (1.60)	
Richer	13,412 (20.14)	282 (2.10)		7,153 (20.61)	180 (2.52)		6,259 (19.62)	102 (1.63)	
Richest	13,239 (19.88)	296 (2.24)		7,251 (20.89)	188 (2.59)		5,988 (18.77)	108 (1.80)	
Health insurance									
No	65121 (97.77)	1185 (1.82)	0.013	33864 (97.58)	735 (2.17)	0.041	31257 (97.98)	450 (1.44)	0.226

Continued.

Variables	Overall population (>45 years)			Older adults (45-60 years)			Elderly (>60 years)		
Yes	1485 (2.23)	40 (2.69)		840 (2.42)	27 (3.21)		645 (2.02)	13 (2.02)	
Occupation									
Unemployed	34,180 (51.32)	470 (1.38)		13,026 (37.53)	186 (1.43)		21,154 (66.31)	284 (1.34)	
Professional and semi-professional	1,597 (2.40)	49 (3.07)	<0.001	1,315 (3.79)	45 (3.42)	<0.001	282 (0.88)	4 (1.42)	0.099
Clerical and skilled	16,683 (25.05)	394 (2.36)		10,747 (30.97)	289 (2.69)		5,936 (18.61)	105 (1.77)	
Unskilled	14,146 (21.24)	312 (2.21)		9,616 (27.71)	242 (2.52)		4,530 (14.20)	70 (1.55)	
Physical activity									
Everyday	15,672 (23.53)	347 (2.21)		10,110 (29.13)	246 (2.43)		5,562 (17.43)	101 (1.82)	
More than once/week	4,559 (6.84)	102 (2.24)		2,837 (8.17)	73 (2.57)		1,722 (5.40)	29 (1.68)	
Once/week	2,396 (3.60)	44 (1.84)	<0.001	1,425 (4.11)	32 (2.25)	0.086	971 (3.04)	12 (1.24)	0.081
1-3 times /month	3,274 (4.92)	66 (2.02)		1,919 (5.53)	44 (2.29)		1,355 (4.25)	22 (1.62)	
Never	40,705 (61.11)	666 (1.64)		18,413 (53.06)	367 (1.99)		22,292 (69.88)	299 (1.34)	
Tobacco abuse									
No	42583 (63.93)	684 (1.61)	<0.001	22932 (66.08)	436 (1.90)	<0.001	19651 (61.60)	248 (1.26)	<0.001
Yes	24023 (36.07)	541 (2.25)		11772 (33.92)	326 (2.77)		12251 (38.40)	215 (1.75)	
Alcohol abuse									
No	54752 (82.20)	907 (1.66)	<0.001	28277 (81.48)	447 (1.93)	<0.001	26475 (82.99)	360 (1.36)	0.003
Yes	11854 (17.80)	318 (1.84)		5427 (17.01)	215 (3.35)		5427 (17.01)	103 (1.90)	

Table 2: Prevalence of comorbidities and multimorbidity among Indian population aged >45 years, 45-60 years and >60 years.

Variables	Overall population (>45 years)			Older adults (45-60 years)			Elderly (>60 years)		
	Total (n=66606)	Road traffic accident cases (n=1225)	P value	Total (n=34704)	Road traffic accident cases (n=762)	P value	Total (n=31902)	Road traffic accident cases (n=463)	P value
	N (%)	N (%)		N (%)	N (%)		N (%)	N (%)	
Hypertension	19275 (28.94)	339 (1.76)	0.324	8050 (23.20)	175 (2.17)	0.879	11225 (35.19)	164 (1.46)	0.915
Diabetes	8564 (12.86)	189 (2.21)	0.007	3630 (10.46)	113 (3.11)	<0.001	4934 (15.47)	76 (1.54)	0.570
Cancer	442 (0.66)	8 (1.81)	0.963	204 (0.59)	4 (1.96)	0.535	238 (0.75)	4 (1.68)	0.455
Chronic lung disease	3736 (5.61)	97 (2.60)	<0.001	1359 (3.92)	50 (3.68)	<0.001	2377 (7.45)	47 (1.98)	0.026
Chronic heart disease	2396 (3.60)	47 (1.96)	0.650	799 (2.30)	15 (1.88)	0.534	1597 (5.01)	32 (2.00)	0.058
Stroke	1197 (1.80)	17 (1.84)	0.276	353 (1.02)	5 (1.42)	0.315	844 (2.65)	12 (1.42)	0.942
MSD	9687	192	0.258	4052	109	0.022	5635	83	0.881

Continued.

Variables	Overall population (>45 years)			Older adults (45-60 years)			Elderly (>60 years)		
	(14.54)	(1.98)		(11.68)	(2.69)		(17.66)	(1.47)	
Neuropsychiatric disease	1492 (2.24)	32 (2.14)	0.374	643 (1.85)	26 (4.04)	0.001	849 (2.66)	6 (0.71)	0. 066
Dyslipidemia	2310 (3.47)	57 (2.47)	0.022	1126 (3.24)	36 (3.20)	0.020	1184 (3.71)	21 (1.77)	0.345
Thyroid disease	1972 (2.96)	43 (2.18)	0.252	1214 (3.50)	27 (2.22)	0.945	758 (2.38)	16 (2.11)	0.124
Chronic renal failure	488 (0.73)	12 (2.46)	0.306	203 (0.58)	6 (2.96)	0.459	285 (0.89)	6 (2.11)	0.354
Visual impairment	32347 (48.56)	676 (2.09)	<0.001	14718 (42.41)	401 (2.72)	<0.001	17619 (55.26)	275 (1.56)	0.071
Hearing impairment	4764 (7.15)	108 (2.27)	0.023	1527 (4.40)	49 (3.21)	0.006	3237 (10.15)	59 (1.82)	0.062
Atleast one comorbidity	45388 (68.14)	900 (1.98)	<0.001	21311 (61.41)	534 (2.51)	<0.001	24077 (75.47)	366 (1.52)	0.071
Multimorbidity (atleast 2)	25054 (37.62)	516 (2.06)	0.001	10355 (29.84)	298 (2.88)	<0.001	14699 (46.08)	218 (1.48)	0.661
Multimorbidity (atleast 3)	5339 (8.02)	104 (1.95)	0.537	1858 (5.35)	46 (2.48)	0.397	3481 (10.91)	58 (1.67)	0.261
Multimorbidity (atleast 4)	180 (0.27)	4 (2.22)	0.423	55 (0.16)	1 (1.82)	0.659	125 (0.39)	3 (2.40)	0.433

Table 3: Univariate and multivariable logistic regression of road traffic accident and comorbidity/ multimorbidity.

Characteristics	Univariate		Multivariable			
	Crude odds ratio (95% confidence interval)	**P value**	**Adjusted odds ratio (95% confidence interval) Model-1**	**P value**	**Adjusted odds ratio (95% confidence interval) Model-2**	**P value**
No comorbidity	Reference	-	Reference	-	Reference	-
Atleast one comorbidity	1.30 (1.14-1.48)	<0.001	1.46 (1.28-1.66)	<0.001	1.38 (1.20-1.57)	<0.001
Multimorbidity (atleast 2)	1.28 (1.02-1.60)	0.031	1.56 (1.24-1.95)	<0.001	1.43 (1.13-1.81)	0.003
Multimorbidity (atleast 3)	1.35 (1.17-1.56)	<0.001	1.60 (1.39-1.85)	<0.001	1.50 (1.29-1.75)	<0.001
Multimorbidity (atleast 4)	1.46 (0.54-3.96)	0.456	1.83 (0.67-4.99)	0.235	1.72 (0.63-4.69)	0.291

*Model 1=adjusted for age, gender; model 2= adjusted for age, gender, education, residence, MPCE quintile, health insurance, occupation, physical activity, alcohol abuse, tobacco abuse; classification accuracy= 98.16 %; pseudo R2= 0.0315.

Table 4: Association of road traffic accident and comorbidity/multimorbidity with respect to gender and age-group.

Gender	Univariate		Multivariable	
	Crude odds ratio (95% confidence interval)	**P value**	**Adjusted odds ratio (95% confidence interval)**	**P value**
Male (n=31039)				
No comorbidity	Reference	-	Reference	-
Atleast one comorbidity	1.35 (1.16-1.56)	<0.001	1.42 (1.21-1.67)	<0.001
Multimorbidity (atleast 2)	1.30 (0.99-1.72)	0.063	1.46 (1.09-1.96)	0.011
Multimorbidity (atleast 3)	1.40 (1.18-1.66)	<0.001	1.54 (1.28-1.85)	<0.001
Multimorbidity (atleast 4)	0.58 (0.08-4.16)	0.585	0.74 (0.10-5.37)	0.766

Continued.

Gender	Univariate		Multivariable	
Female (n=35567)				
No comorbidity	Reference	-	Reference	-
Atleast one comorbidity	1.33 (1.06-1.67)	0.014	1.27 (0.99-1.61)	0.051
Multimorbidity (atleast 2)	1.40 (0.96-2.04)	0.079	1.35 (0.91-1.99)	0.141
Multimorbidity (atleast 3)	1.46 (1.14-1.87)	0.003	1.41 (1.08-1.83)	0.010
Multimorbidity (atleast 4)	3.34 (1.04-10.70)	0.043	3.03 (0.93-9.83)	0.065
Age group				
45-60 years (n=34704)				
No comorbidity	Reference	-	Reference	-
At least one comorbidity	1.48 (1.27-1.74)	<0.001	1.48 (1.26-1.74)	<0.001
Multimorbidity (at least 2)	1.48 (1.06-2.02)	0.019	1.52 (1.09-2.11)	0.014
Multimorbidity (at least 3)	1.71 (1.44-2.03)	<0.001	1.78 (1.48-2.14)	<0.001
Multimorbidity (at least 4)	1.07 (0.15-7.76)	0.947	1.25 (0.17-9.13)	0.827
>60 years (n=31902)				
No comorbidity	Reference	-	Reference	-
At least one comorbidity	1.23 (0.98-1.54)	0.072	1.18 (0.93-1.49)	0.174
Multimorbidity (at least 2)	1.35 (0.97-1.87)	0.073	1.24 (0.88-1.76)	0.215
Multimorbidity (at least 3)	1.20 (0.94-1.53)	0.139	1.13 (0.87-1.46)	0.360
Multimorbidity (at least 4)	1.96 (0.61-6.27)	0.257	1.79 (0.56-5.82)	0.326

Gender: Adjusted for age, gender, education, residence, MPCE quintile, health insurance, occupation, physical activity, alcohol abuse, tobacco abuse; classification accuracy= 98.88%; pseudo R2=0.0175
Age: Adjusted for age, gender, education, residence, MPCE quintile, health insurance, occupation, physical activity, alcohol abuse, tobacco abuse; classification accuracy= 98.55%; pseudo R2= 0.0371

Table 5: Univariate and multivariable logistic regression of baseline characteristics of adults aged > 45 years with multimorbidity (atleast 2) and road traffic accidents (classification accuracy=97.94 %).

Characteristics	Univariate			Multivariable		
	Crude odds ratio (95% Confidence interval)	P value	Pseudo R2	Adjusted odds ratio (95% confidence interval)	P value	Pseudo R2
Age (years)						
45-60	Reference	-		Reference	-	
>60	0.51 (0.43-0.61)	<0.001	0.0114	0.55 (0.45-0.67)	<0.001	
Gender						
Male	Reference	-		Reference	-	
Female	0.43 (0.36-0.52)	<0.001	0.0174	0.51 (0.41-0.65)	<0.001	
Education (minimum)						
Illiterate	Reference	-		Reference	-	
Less than primary	1.65 (1.22-2.22)	0.001		1.34 (0.99-1.82)	0.056	
Primary completed	1.72 (1.30-2.26)	<0.001		1.30 (0.98-1.73)	0.071	
Middle completed	2.02 (1.50-2.71)	<0.001	0.0096	1.39 (1.02-1.89)	0.039	
Secondary school	2.09 (1.57-2.77)	<0.001		1.40 (1.03-1.90)	0.029	0.0381
Higher secondary	2.24 (1.55-3.22)	<0.001		1.34 (0.91-1.99)	0.138	
Diploma/ Graduate	2.02 (1.46-2.80)	<0.001		1.19 (0.82-1.74)	0.354	
Residence						
Urban	Reference	-		Reference	-	
Rural	1.01 (0.85-1.20)	0.909	<0.0001	1.02 (0.84-1.23)	0.875	
MPCE quintile						
Poorest	Reference	-		Reference	-	
Poorer	1.52 (1.05-2.20)	0.026		1.47 (1.02-2.13)	0.041	
Middle	1.77 (1.24-2.52)	0.002	0.0041	1.67 (1.17-2.39)	0.005	
Richer	1.86 (1.32-2.62)	<0.001		1.67 (1.18-2.37)	0.004	
Richest	2.00 (1.43-2.81)	<0.001		1.77 (1.25-2.50)	0.001	
Health insurance						

Continued.

Characteristics	Univariate			Multivariable		
	Crude odds ratio (95% Confidence interval)	P value	Pseudo R2	Adjusted odds ratio (95% confidence interval)	P value	Pseudo R2
No	Reference	-		Reference	-	
Yes	1.42 (0.91-2.21)	0.120	0.0004	0.92 (0.59-1.46)	0.736	
Occupation						
Unemployed	Reference	-		Reference	-	
Professional and semi-professional	2.79 (1.88-4.17)	<0.001	0.0148	1.47 (0.94-2.27)	0.088	
Clerical and skilled	2.28 (1.85-2.81)	<0.001		1.40 (1.10-1.79)	0.007	
Unskilled	1.77 (1.41-2.23)	<0.001		1.11 (0.86-1.44)	0.418	
Physical activity						
Everyday	Reference	-		Reference	-	
More than once/week	1.10 (0.75-1.62)	0.627	0.0040	1.13 (0.77-1.67)	0.527	
Once/week	1.04 (0.66-1.66)	0.854		1.15 (0.72-1.83)	0.554	
1-3 times /month	0.82 (0.52-1.28)	0.376		0.93 (0.59-1.45)	0.742	
Never	0.66 (0.53-0.82)	<0.001		0.98 (0.78-1.23)	0.851	
Tobacco usage						
No	Reference	-		Reference	-	
Yes	1.37 (1.14-1.64)	0.001	0.0043	1.05 (0.86-1.30)	0.619	
Alcohol consumption						
No	Reference	-		Reference	-	
Yes	1.71 (1.39-2.10)	<0.001	0.0046	1.09 (0.86-1.38)	0.473	

Multimorbidity was present in 25054 (37.6%) individuals whereas among the RTA group 325 (26.5%) individuals had multimorbidity. There was a significant difference ($p<0.05$) among both RTA and non-RTA groups in the prevalence of chronic lung disease. Among the overall population, a significant difference was noted in the prevalence of diabetes, chronic lung disease, dyslipidaemia, visual impairment and hearing impairment. Among the elderly, there was no significant difference in the occurrence of multimorbidity in both RTA and non-RTA groups (Table 2).

When adjusted for age and sex, multimorbidity was associated with RTA. Multimorbidity (at least two morbidities) was associated with RTA with an adjusted odds ratio of 1.56 (1.24-1.95) and $p<0.001$. No association was noted among individuals with at least four morbidities and RTA. Similar findings were obtained when adjusted for other variables like education, residence, MPCE quintile, health insurance, physical activity, alcohol abuse and tobacco abuse along with age and sex (Table 3).

As per gender-wise association between multimorbidity and RTA, in males, a significant association between multimorbidity (at least two morbidity) and RTA was noted with an odds ratio of 1.46 (1.09-1.96) and a p value of 0.011 (Table 4).

In older adults, multimorbidity is significantly associated ($p<0.05$) with RTA with an adjusted odds ratio of 1.52 (1.09-2.11) for at least two morbidities and 1.78 (1.48-2.14) for at least three morbidities. For the elderly, no significant association is noted (Table 4).

The elderly with multimorbidity (at least two) were associated with the RTA with an adjusted odds ratio (CI) of 0.55 (0.45-0.67) and p value of <0.001 in comparison to older adults. Similarly, females with multimorbidity in comparison to males was associated with RTA with an adjusted odds ratio (CI) of 0.51 (0.41-0.65) with a p value of <0.001. In comparison to the poorest MPCE quintile individuals with multimorbidity, a significant association was noted among other categories of MPCE quintiles with multimorbidity and RTA. Clerical and skilled individuals with multimorbidity were associated with RTA in comparison to unemployed individuals with multimorbidity with an adjusted odds ratio (CI) of 1.40 (1.10-1.79) and p value of 0.007. No significant association was noted among individuals with multimorbidity doing physical activity and RTA (Table 5).

DISCUSSION

The study using the data obtained in LASI (1st wave) determined the association between multimorbidity and road RTA among older adults and the elderly. Almost equal proportions of the individuals were in the 45-60 years and above 60 years age group and around 1.8% of individuals were found to have a road traffic accident.

The present study showed that older adults reported 1.5 times higher cases of RTA in comparison to the elderly in India. This was similar to the reports published in India

on RTAs which reported that of all accidents 16.9% was among older adults whereas among the elderly, it was around 7.9%.[6] A study in South Korea reported that one-third of the accidents happened among 41to 60-year-olds due to safety infringement and violations.[13] The adjusted odds of RTA among the elderly with multimorbidity was 0.55 in comparison with older adults with multimorbidity. The elderly spend most of their time at home and are prone to other injuries like falls.[14]

The present study also found that males had more than twice the proportions of RTA than females. The Global Burden of Disease Study 1990-2017 also reported that not only the incidence of RTA but also deaths associated with RTA are higher among males.[15] Time spent outside the house is more common among males and hence they are more prone to exposures leading to RTA. It is also to be noted that most of the vehicles are driven by males which further increases their chances of RTA.[16] Almost equal proportions of RTA were reported among unemployed and skilled individuals in the present study. The probable reason is that most of the RTA in India are among pedestrians and drivers.[6] Interestingly, the odds of RTA among skilled individuals with multimorbidity was 1.4 higher than those who are unemployed having multimorbidity.

There is an increasing burden of chronic diseases in India. The LASI data set too resonates with this fact. Around one-third of the individuals have hypertension, about 12% have diabetes and around 6% have chronic lung disease. It is not surprising to note that about 50% suffer from visual impairment. The RTA among the individuals with these morbidities is proportionately distributed. A study conducted by Gummidi et al in rural India also reported similar findings.[17] The visual impairment obtained in the present study was much higher than the proportions reported in other studies.[18] LASI was a comprehensive study survey conducted throughout the country where this was conducted in one of the districts of North India.

As the number of morbidities among older adults and the elderly increases, there should be an expected increase in the incidence of RTA. The picture was the same until three morbidities and thereafter increase in morbidity number was not associated with RTA among these individuals when adjusted for other variables. The proportion of individuals with more than three morbidities was also low. The three common morbidities present among these individuals were visual impairment, hypertension and diabetes. A study conducted by Piyasena et al reported that there was a 46% higher risk of RTA among individuals with visual impairment.[19] The control rates of both diabetes and hypertension are very poor owing to an increase in complications of these morbidities like stroke, myocardial infarction.[20] Many studies conducted among drivers have reported an increase in RTA incidence among drivers with hypertension and diabetes.[21-23]

The present study showed that multimorbidity was associated with RTA. Age-related loss of tendon reflex and ambulatory instability are common in old age.[24] Overall there is a decrease in normal neurological function and a more prominent decrease is reported in the Achilles tendon reflex.[25] It is to be noted that most decline is reported in lower limb reflexes. These superimposed with the multi-morbidity make these elderly prone to RTA.

The strength of our study was that we used the data of a national-level survey with good generalisability and appropriate methodology. It was the first of a kind, where we tried to ascertain the association between multimorbidity and RTAs. The limitation of this study was embedded inside its correctional nature. Temporality and causation cannot be established. Due to the self-reported style of the questionnaire, there were higher chances of 24-hour recall bias and social desirability bias.

CONCLUSION

RTA was evident among males aged 45-60 years with multimorbidity. These individuals contribute significantly to the development of the country. Multimorbidity among them can be prevented by appropriate screening. These individuals should be encouraged to take necessary measures to promote healthy living and adhere to them.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Moffat K, Mercer SW. Challenges of managing people with multimorbidity in today's healthcare systems. BMC Fam Pract. 2015;16(1):129.
2. Chowdhury SR, Das D, Sunna TC, Beyene J, Hossain A. Global and regional prevalence of multimorbidity in the adult population in community settings: a systematic review and meta-analysis. eClin Med. 2023;57:101860.
3. Prenissl J, De Neve JW, Sudharsanan N, Manne-Goehler J, Mohan V, Awasthi A, et al. Patterns of multimorbidity in India: A nationally representative cross-sectional study of individuals aged 15 to 49 years. PLOS Glob Public Health. 2022;2(8):0000587.
4. Patel P, Muhammad T, Sahoo H. The burden of disease-specific multimorbidity among older adults in India and its states: evidence from LASI. BMC Geriatr. 2023;23:53.
5. Vos T, Lim SS, Abbafati C, Abbas KM, Abbasi M, Abbasifard M, et al. Global burden of 369 diseases and injuries in 204 countries and territories, 1990–2019: a systematic analysis for the Global Burden of Disease Study 2019. Lancet. 2020;396(10258):1204-22.

6. Road accidents in India. Available at: https://morth.nic.in/sites/default/files/RA_2022_30_Oct.pdf. Accessed on 1 April 2024.
7. Clinical Key. Fact sheet: Aging with multimorbidity: A systematic review of the literature. Available at: https://www.clinicalkey.com/#!/content/playContent/1-s2.0-S1568163711000249?returnurl=https:%2F%2Flinkinghub.elsevier.com%2Fretrieve%2Fpii%2FS1568163711000249%3Fshowall%3Dtrue&referrer=https:%2F%2Fpubmed.ncbi.nlm.nih.gov%2F. Accessed on 1 April 2024.
8. Makovski TT, Schmitz S, Zeegers MP, Stranges S, van den Akker M. Multimorbidity and quality of life: Systematic literature review and meta-analysis. Ageing Res Rev. 2019;53:100903.
9. Kenardy J, Heron-Delaney M, Warren J, Brown E. The effect of mental health on long-term health-related quality of life following a road traffic crash: results from the UQ SuPPORT study. Injury. 2015;46(5):883-90.
10. Wilmut K, Purcell C. The nature of the risk faced by pedestrians with neurodevelopmental disorders: A systematic review. Accid Anal Prev. 2021;149:105886.
11. Khan MR, Malik MA, Akhtar SN, Yadav S, Patel R. Multimorbidity and its associated risk factors among older adults in India. BMC Pub Health. 2022;22(1):1-8.
12. International Institute for Population Sciences (IIPS) NP for, Health Care of Elderly (NPHCE), MoHFW HTHCS of, (USC) PH (HSPH) and the U of SC. Longitudinal Ageing Study in India (LASI) wave 1, 2017–18, India report. 2020. Available at: https://www.iipsindia.ac.in/sites/default/files/LASI_India_Report_2020_compressed.pdf. Accessed on 1 April 2024.
13. Ashraf I, Hur S, Shafiq M, Park Y. Catastrophic factors involved in road accidents: Underlying causes and descriptive analysis. PLoS One. 2019;14(10):0223473.
14. Al-Aama T. Falls in the elderly. Can Fam Physician. 2011;57(7):771-6.
15. India State-Level Disease Burden Initiative Road Injury Collaborators. Mortality due to road injuries in the states of India: the Global Burden of Disease Study 1990-2017. Lancet Pub Health. 2020;5(2):86-98.
16. Morth NIC. Fact sheet: Road transport year book. Available at: https://morth.nic.in/sites/default/files/RTYB_Publication_2019_20%20(1).pdf. Accessed on 1 April 2024.
17. Gummidi B, Gautam V, John O, Ghosh A, Jha V. Patterns of multimorbidity among a community-based cohort in rural India. J Multimorb Comorb. 2023;13:26335565221149623.
18. Malhotra S, Vashist P, Kalaivani M, Gupta N, Senjam SS, Rath R, et al. Prevalence and causes of visual impairment amongst older adults in a rural area of North India: a cross-sectional study. BMJ Open. 2018;8(3):018894.
19. Piyasena P, Olvera-Herrera VO, Chan VF, Clarke M, Wright DM, MacKenzie G, et al. Vision impairment and traffic safety outcomes in low-income and middle-income countries: a systematic review and meta-analysis. Lancet Glob Health. 2021;9(10):1411-22.
20. Seth AK, Kansal S, Salve HR, Gupta S, Kumar R, Misra P. The role of noncommunicable disease clinics in improving control of hypertension and diabetes among adults residing in rural Ballabgarh, Haryana. Cureus. 2023;15(4):37283.
21. Marshall SC, Man-Son-Hing M. Multiple chronic medical conditions and associated driving risk: a systematic review. Traffic Inj Prev. 2011;12(2):142-8.
22. Rainio J, Sulander P, Hantula L, Nuutinen J, Karkola K. Diseases and motor vehicle fatalities in Finland in 2001 and 2002. Traffic Inj Prev. 2007;8(3):321-8.
23. Ahmed AA. Hypoglycemia and safe driving. Ann Saudi Med. 2010;30(6):464-7.
24. Baudry S, Penzer F, Duchateau J. Input-output characteristics of soleus homonymous Ia afferents and corticospinal pathways during upright standing differ between young and elderly adults. Acta Physiol (Oxf). 2014;210(3):667-77.
25. Taams NE, Drenthen J, Hanewinckel R, Ikram MA, van Doorn PA. Age-related changes in neurologic examination and sensory nerve amplitude in the general population: aging of the peripheral nervous system. Neurology. 2023;101(13):1351-8.

Cite this article as: Halder P, Seth AK, Kansal S, Pal S, Mamgai A. How multimorbidity relates to road traffic accident among older adults and elderly population: insights from longitudinal aging study in India (1st wave). Int J Community Med Public Health 2024;11:2380-8.