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Gender differences in the association between elder abuse and pain with depression among older adults in India: insights from a cross-sectional survey

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Abstract

Background This study investigates the association between elder abuse, pain with depression among older adults in India, with a focus on the interacting effect of gender. Elder abuse is a growing public health concern globally, and understanding its connection with pain and depression is crucial for prevention and intervention strategies, particularly in vulnerable demographic groups.

Methods Data were drawn from the nationally representative Longitudinal Ageing Study in India (LASI) survey conducted in 2017-18 with the total sample size of 73,396. Study sample based on individuals aged 60 years and above, consisted 31,902 older adults. This study combines two binary variables pain and depression symptoms into a composite binary variable Pain with depression (Yes/No). Pain was assessed by asking question to the participants whether they are often troubled with pain. Depression was evaluated using the Centre for Epidemiological Studies depression Scale known as (CES-D-10), using four categories of scale options. A range from 0 to 10 of composite score is obtained and individual who score more than 4 were taken as depressed. Logistic regression models and Chi-square test of significance were used to analyse the relationship between elder abuse and pain with depression, while controlling for socio-demographic, functional and behavioural factors. Interaction effects of gender were examined to assess differential abuse risk between older male and female.

Results The analysis revealed that 5.2% of older adults reported experiencing abuse, with a higher prevalence among female. Older adults with pain and depression were significantly more likely to face abuse, with female showing consistently higher odds of abuse compared to male. Specific groups, such as those aged 75 and above, unmarried, uneducated and living in rural areas were at greater risk.

Conclusion The study highlights the strong association between elder abuse, pain with depression, especially among older female. These findings underscore the need for targeted public health interventions among vulnerable groups such as older female, and future research to explore cross- national dynamics and underlying risk factors.

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Keywords Elder abuse, Older adults, Pain with depression, Gender differences, India

Background

Health and medical facilities have improved drastically over the recent few decades, increasing life expectancy globally, and the proportion of older people over age 60 years has now increased [1]. Many developing countries experiencing shift in age structure from young to old, which increases the number and proportion of older people. Between 2015 and 2050, the world's population over the age of 60 will increase significantly from 12 to 22% [2].Consistently increasing number of older adults has brought attention regarding issue of abuse of older people, a serious problem that affects the well-being and dignity of many older people. As the number of elderly people increases, there is a risk of neglect, financial exploitation, emotional abuse and physical harm [3]. Older adults face many mental and physical health challenges as a result of abuse. The prevalence of abuse of the elderly is quite substantial around the world, but its identification, reporting and mitigation are a challenge. Although developed countries recognise abuse of older people as a major concern, research gaps exist in developing countries such as India. The World health organization has declared that elder abuse is a human rights issue and it is a fundamental right of older men and women to be safe and free of violence [4].

The WHO defines elder abuse as the mistreatment of older individuals, involving single or repeated harmful actions or failures to act appropriately within relationships where trust is expected [5]. It includes physical, sexual, psychological, emotional, financial, abandonment, neglect, loss of dignity and respect. While the literature on elder abuse is limited worldwide, the prevalence of elder abuse worldwide is estimated at 15.7%. Category-wise prevalence rates for psychological abuse 11.6%, for financial abuse 6.8%, for neglect 4.2%, for physical abuse 2.6% and for sexual abuse are 0.9% [6].

Existing research explain the key individual and structural factors that contribute to abuse of older people. Cultural factors like age discrimination at family and community level are related to elder abuse [7, 8]. At the individual level, family characteristics and socio-economic status are an important predictor of elder abuse. Particularly education has shown to be a factor in protecting abuse of older people [9, 10]. Some studies have shown a higher incidence of abuse among older women [11] and factors associated with aging such as cognitive impairment, dementia, other chronic diseases, functional limitations [12]. Functional independence is a key aspect of healthy aging. However, age is closely related to functional limitations, high burden of disease, use of health care and high hospital expenditure [13]. Studies have found that ageing related changes like poor health, prevalence of chronic diseases, multimorbidity and functional limitations are highly associated to elder abuse [14]. Dependence on others to meet basic daily needs and high health expenditure increase the vulnerability of elders. Factors such as disabilities and dementia are also linked to abuse of elders [15]. Studies have shown a very close association between age-related disabilities and elder abuse [16].

Pain considered to be a major public health challenge worldwide. One in every five adults globally suffers from any kind of pain, and one out of ten adults is diagnosed with chronic pain every year [17]. Pain is considered a symptom rather than disease, thus lacking any standard definition. Meanwhile, depression in older adults is a public health problem that cannot be ignored [18]. It is also strongly associated with various disease conditions, risk of self-harm, decline in social and cognitive functioning. During last few decades based on large-scale surveys, prevalence of depression is estimated to be around 10 and 15% and it has contributed substantially to the global burden of disease [19]. Recently, India has experienced rapid demographic changes, with an increase in the number of older people depression is a serious challenge to public health. Recent estimates suggest that nearly one in four Indians has multimorbidity, while 3.3% has depression [20, 21]. In Indian scenario, the burden of depression is increasing among older adults and especially among later ages. Depression affects about 46 million people in India and plays an important role in DALYs (disability adjusted life-years) [22]. It is imperative to point out that poor functional health can degrade the mental health status of older adults. Behavioural health issues such as alcohol consumption, smoking, physical activity is also linked with high depressive disorders along with functional health risk factors [23–25].

With the ageing of population, the prevalence of pain with depression among older adults has increased rapidly and has become a serious problem that has seriously affected their health [26]. Studies report prevalence of pain with depression around 30 to 60%, indicating that pain with depression may have common neurological changes [27]. Important neurophysiological overlaps exist between pain and depression [28], as well as psychosocial overlaps, such as cognitive, emotional and behavioural factors [29]. Although pain and depression may have common biological pathways, the mechanisms behind pain and depression are still unknown [30] and the treatment strategy for this disease is not yet defined. Co-occurrence of pain with depression have serious clinical, social and economic challenges. Existing

studies examine the individual relationships between pain, depression and elder abuse [31–33] but very limited studies are available which shows the co-occurrence of pain with depression and how they affect abuse among older adults. This highlight the lack of research investigating the combined impact of pain with depression on elder abuse emphasizing the importance of this study in filling this gap, particularly within the sociocultural context of India, where such evidence is currently scarce.

Gender differentials are key determinants of explaining healthy ageing and problems associated with health. Female tend to have higher life expectancy than male, thus predominantly live with poor health in later stages of life [1, 34]. Consequently, older female is more vulnerable to mental disorders than male [35]. Thus, careful examination of gender differences in the association between elder abuse and pain with depression will emphasize the key components explaining the disparities between older female and male. Moreover, knowing that risk of abuse in older persons increases with depression but the underlying route or mechanism explaining the elder abuse-pain with depression association remains unexplained in the Indian context. Therefore, by deeply examining the social and psychological factors influencing the coexistence of pain with depression, we can better understand these complex diseases and pave the way for more effective interventions.

This study manages to fill a gap in the existing literature by identifying potential association between elder abuse and pain with depression among older adults. Further, the study also analyses gender differential in underlying mechanism between elder abuse and pain with depression. Following hypotheses are proposed: first, elder abuse is positively associated with pain with depression in older male and female in India. Second, interaction effect by gender is positively associated with elder abuse and pain with depression in older male and female in India.

Methods

Data source

This study uses data from the first wave of the Longitudinal Ageing Study in India (LASI) conducted in 2017-18. The LASI is a large-scale nationally representative survey conducted by the International Institute for Population Sciences, Mumbai under the supervision of the Ministry of Health and Family Welfare (MoHFW). The study gathered high-quality data through the use of structured questionnaires and a multi-stage, stratified sampling technique with probability proportional to size. The main objective of the LASI survey is to collect longitudinal information on chronic health conditions, mental health, healthcare utilisation, economic status, welfare programmes, work and employment etc. of older adults in India. The first wave included all individuals aged 45 years and above and their spouses living in the same household. The wave 1 covered all states and union territories with a total sample of 73,396. To investigate the relationship between elder abuse, pain with depression and various socio-demographic, functional health and behavioural health variables, we included samples based on individuals aged 60 years and above. Ultimately, our final analytical sample consisted 31,902 older people.

Variables

Exposure: pain with depression

This study combines two binary variables pain (Yes/No) and depression symptoms (Yes/No) into a composite binary variable Pain with depression (Yes/No). Pain was defined by asking a question to the participants whether they are often troubled with pain. Pain was coded as 1 if they said "Yes," and as 0 if they said "No". Depression was evaluated using the Centre for Epidemiological Studies depression Scale known as (CES-D-10), using four categories of scale options ranging from 1 never or very rare (less than a day) to 4 most of the time (five to seven days). The experiences of participants were asked using ten different questions over the past week: difficulties in concentration, depression, low energy, fear of something, loneliness, problems with things, everything is an effort, joy, hope and satisfaction. On this 10-item scale, initial seven questions were based on negative symptoms and the remaining three on positive symptoms. Therefore, those who respond to negative symptoms (never or very rare [less than a day] and sometimes [1–2 days]) are given zero scores and the remaining two categories are coded as one. However, the score in positive symptoms is reversed. A range from 0 to 10 of composite score is obtained and individual who score more than 4 were taken as depressed.

Outcome: elder abuse

In this study elder abuse was assessed by the question "Have you felt that you were ill-treated in the past year?" The response was recorded as 0 "No", and 1 "Yes".

Socio-demographic variables

Various covariates used in the study are age (60–74, 75 and above), sex (Male, Female), marital status (In union, Not in union), place of residence (Rural, Urban), living arrangement (Alone, with spouse, with others), level of education (No education, less than 5 years, 5–9 years, 10 or more years), mean per capita expenditure (MPCE) quintiles (Poorest, Poorer, Middle, Richer, Richest), religion (Hindu, Muslim, other), caste (SC, ST, OBC, others), number of children alive (0, 1–2, 3 and above), socially active (Rarely, Moderately, Frequently). Older adults subjected to abuse have poor social networks and

often experience loneliness, highlighting the need for active social life [36, 37]. In this study, socially active is measured based on six types of social activities such as Eat out of the house, go to park for relaxing, visit relatives/friends, attend cultural performances, attend religious functions, attend community/organization group meetings. Each social activity variable has 7 categories which are further classified into Rarely (Rarely, Never), Moderately (Once a week, several times a month, at least once a month) and Frequently (Daily, several times a week) to obtain ordinal variable socially active.

Functional health variables

Various functional health covariates are, problem with Activities of daily living (ADL) (No, Yes) [38] & Instrumental activities of daily living (IADL) (No, Yes) [39] (Supplementary file), multimorbidity (No, Yes), trouble sleeping (Never, Occasionally, Frequently), self-rated health (SRH) (Good, Fair, Poor).

Behavioural health

Various behavioural health covariates are, smoking history (Currently smoking, Not currently smoking), alcohol history (Never, Occasional drinker, Weekly drinker, Several times a week), supportive Aid for daily life (No, Yes) and moderate physical activity (Yes, No). Unmet daily living assistance needs in older adults are associated with higher healthcare utilization and adverse psychosocial consequences as well as abuse, highlighting the association between elder abuse and use of supportive aid for daily life [40]. In this study, participants were asked the question "Are you using any aid or supportive device(s) to assist you in the activities of daily living?" to measure binary variable supportive Aid for daily life. High neighbourhood social cohesion and physical activity significantly reduce the likelihood of elder abuse in India [7]. Another question asked were "How often do you take part in sports or activities that are moderately energetic such as, cleaning house, washing clothes by hand, fetching water or wood, drawing water from a well, gardening, bicycling at a regular pace, walking at a moderate pace, dancing, floor or stretching exercises?" to measure the engagement of participants in moderate physical activity, which is further classified into Yes (everyday, more than once a week, once a week, one to three times a month,) and No (hardly ever or never) to obtain binary variable.

Statistical analysis

All statistical analysis was done in Stata v17.0. Descriptive statistics and bivariate estimations were performed to describe the study sample. Age and sex-adjusted prevalence of elder abuse by sociodemographic characteristics, functional health, behavioural health was obtained with percentage prevalence and confidence intervals. Appropriate sampling weight was used in the analysis. Comparison between gender groups was done using independent chi-square tests. Multivariable binary logistic regressions were used to evaluate the association between elder abuse and pain with depression among older people. We, therefore, performed regressions stratified by gender to further investigates the gender differentials in the association. Three different separate models for the overall sample, older men and women were run to quantify the association between elder abuse and pain with depression: an unadjusted model (model 1), an adjusted model (model 2) which only controlled the socio-demographic variables, and another adjusted model (model 3) which controlled functional and health behaviour characteristics.

Results

Socio-demographic, functional health and behavioural health profile of the study participants

Table 1 shows the socio-demographic profiles, functional health, and behaviour of individuals aged 60 years above, about 47% of them are men and the remaining 53% are women. Around (5.2%) of elders faces abuse, among them female face more abuse (5.6%). Female also have high proportion of pain with depression compared to male (male-15% and female-20.5%). A higher proportion (77.3%) of elders are in the age-group 60–74. Female account for (77.8%) in age-group 60–74, while their share greatly declines to (22.2%) above 75 years of age. More than half (56.5%) of elders have no education, where female representation is higher (72.7%) than male (38.6%) in this category. Fairly less (14.2%) older people have 10 or more years of education, out of which female accounts for (6.5%). Male have significantly higher percentage (81.1%) in union than female (44.1%). Approximately (70%) of older people comes from rural background (male-72.1% and female-69.2%). Proportion of female who live alone (8.5%) are higher than male (2.5%), while percentage of male live who live with spouse is (80.4%), almost double than female (43.4%). Male are more socially active (66.7%) than female (61.4%).

Female experienced more problems in ADL (26.3%), and IADL (54.5%) and in sleep (8.4%) than male. However, the prevalence of currently smoking (25.5%) and drinking alcohol (5.7%) was higher in male. About (24.9%) female have multimorbidity in comparison to (21.7%) males. Female are more physically active (66.7%) than male (55.6%), while male use more supportive aid (45.3%) than female (42.7%).

Prevalence of elder abuse

Table 2 shows the Age and sex-adjusted prevalence of elder abuse by socio-demographic, functional health and behavioural health characteristics. Around (9.49; 95% CI,

Table 1 Socio-demographic and health-related profile of the study sample by gender, LASI 2017–18

Variable	Category	Total ($n=31902$)	Male ($n=15139$)	Female ($n=16763$)	p value
		n (%)	*n* (%)	*n* (%)	
Outcome variable					
Elder abuse	No	29,243 (94.8)	13,851 (95.2)	15,392 (94.4)	< 0.001
	Yes	1609 (5.2)	705 (4.8)	904 (5.6)	
Exposure variable					
Pain with Depression	No	26,196 (82.1)	12,865 (85.0)	13,331 (79.5)	< 0.001
	Yes	5706 (17.9)	2274 (15.0)	3432 (20.5)	
Sociodemographic variables					
Age	60–74	24,646 (77.3)	11,603 (76.6)	13,043 (77.8)	0.769
	75 and above	7256 (22.8)	3537 (23.4)	3720 (22.2)	
Level of education	No Education	18,032 (56.5)	5844 (38.6)	12,188 (72.7)	< 0.001
	Less than 5 years	3648 (11.4)	2199 (14.5)	1450 (8.7)	
	5–9 years	5688 (17.8)	3649 (24.1)	2039 (12.2)	
	10 or more years	4534 (14.2)	3448 (22.8)	1087 (6.5)	
Current marital Status	In union	19,662 (61.6)	12,276 (81.1)	7386 (44.1)	< 0.001
	Not in union	12,240 (38.4)	2864 (18.9)	9376 (55.9)	
Residence	Rural	22,507 (70.6)	10,909 (72.1)	11,597 (69.2)	0.001
	Urban	9395 (29.4)	4230 (27.9)	5165 (30.8)	
Living Arrangement	Alone	1812 (5.7)	381 (2.5)	1430 (8.5)	< 0.001
	With spouse	19,443 (61.0)	12,173 (80.4)	7270 (43.4)	
	With others	10,647 (33.4)	2585 (17.1)	8062 (48.1)	
MPCE quintiles	Poorest	6924 (21.7)	3154 (20.8)	3771 (22.5)	0.013
	Poorer	6926 (21.7)	3228 (21.3)	3698 (22.1)	
	Middle	6682 (21.0)	3271 (21.6)	3411 (20.4)	
	Richer	6122 (19.2)	2910 (19.2)	3212 (19.2)	
	Richest	5247 (16.4)	2577 (17.0)	2670 (15.9)	
Religion	Hindu	26,262 (82.3)	12,435 (82.1)	13,827 (82.5)	0.711
	Muslim	3597 (11.3)	1773 (11.7)	1824 (10.9)	
	Other	2043 (6.4)	931 (6.2)	1111 (6.6)	
Caste	SC	6030 (18.9)	2843 (18.8)	3188 (19.0)	0.223
	ST	2594 (8.1)	1170 (7.7)	1423 (8.5)	
	OBC	14,430 (45.2)	6944 (45.9)	7486 (44.7)	
	Others	8848 (27.7)	4182 (27.6)	4666 (27.8)	
Number of children alive	0	1133 (3.6)	566 (3.8)	567 (3.4)	0.138
	1–2	7396 (23.4)	3421 (23.0)	3974 (23.8)	
	3 and above	23,060 (73.0)	10,898 (73.2)	12,162 (72.8)	
Socially active	Rarely	11,305 (35.4)	4897 (32.3)	6409 (38.2)	< 0.001
	Moderately	20,389 (63.9)	10,101 (66.7)	10,287 (61.4)	
	Frequently	208 (0.7)	141 (0.9)	66 (0.4)	
Functional health					
Problems with ADL	No	24,376 (76.4)	12,023 (79.4)	12,354 (73.7)	< 0.001
	Yes	7526 (23.6)	3117 (20.6)	4409 (26.3)	
Problems with IADL	No	17,175 (53.8)	9554 (63.1)	7621 (45.5)	< 0.001
	Yes	14,727 (46.2)	5585 (36.9)	9142 (54.5)	
Multimorbidity	No	24,440 (76.6)	11,847 (78.3)	12,593 (75.1)	< 0.001
	Yes	7462 (23.4)	3293 (21.7)	4170 (24.9)	
Trouble sleeping	Never	25,067 (78.8)	12,341 (82.2)	12,727 (75.8)	< 0.001
	Occasionally	4369 (13.7)	1717 (11.4)	2652 (15.8)	
	Frequently	2359 (7.4)	949 (6.3)	1411 (8.4)	
SRH	Good	9584 (30.7)	4999 (33.9)	4586 (27.8)	< 0.001
	Fair	14,084 (45.1)	6476 (43.9)	7608 (46.2)	
	Poor	7559 (24.2)	3283 (22.3)	4276 (26.0)	

Table 1 (continued)

Variable	Category	Total (*n* = 31902)	Male (*n* = 15139)	Female (*n* = 16763)	*p* value
		n (%)	*n* (%)	*n* (%)	
Behavioural health					
Smoking History	Currently Smoking	4370 (13.8)	3803 (25.5)	567 (3.4)	< 0.001
	Not Currently Smoking	27,267 (86.2)	11,114 (74.5)	16,152 (96.6)	
Alcohol History	Never	29,462 (92.6)	13,004 (86.4)	16,458 (98.3)	< 0.001
	Occasional drinker	747 (2.3)	653 (4.3)	93 (0.6)	
	Weekly drinker	658 (2.1)	583 (3.9)	75 (0.5)	
	Several times a week	935 (2.9)	817 (5.4)	118 (0.7)	
Supportive Aid for Daily Life	No	17,811 (56.1)	8203 (54.7)	9608 (57.3)	< 0.001
	Yes	13,959 (43.9)	6788 (45.3)	7170 (42.7)	
Moderate physical activity	Yes	19,449 (61.5)	8292 (55.6)	11,157 (66.7)	< 0.001
	No	12,190 (38.5)	6624 (44.4)	5565 (33.3)	

Note: SC: Scheduled caste; ST: Scheduled tribe; OBC: Other backward class; MPCE: Monthly Per Capita Expenditure; SRH: Self-rated health; ADL: Activities of Daily Living; IADL: Instrumental activities of daily living; The sample may differ as all older adults did not give consent for measurement

8.36–10.62) older adults having pain with depression also face abuse. Abuse is more common among adults aged 75 years and above (5.54; 95% CI, 4.44–6.63), Females (5.55; 95% CI, 4.92–6.18), currently unmarried (5.60; 95% CI, 4.79–6.41), living in rural area (5.81; 95% CI, 5.32–6.30), living alone (7.96; 95% CI, 6.10–9.81), had no education (5.88; 95% CI, 5.30–6.46), had no children alive (7.66; 95% CI, 5.26–10.05), socially inactive (6.23; 95% CI, 5.45–6.99), lie in poorest quintile (5.97; 95% CI, 5.17–6.76).

Abuse prevalence is more among adults had problems with ADL (6.89; 95% CI, 5.71–8.07) and IADL (6.92; 95% CI, 6.11–7.73), had multimorbidity conditions (5.17; 95% CI, 4.37–5.96), trouble sleeping (9.23; 95% CI, 7.58–10.88), poor self-rated health (7.57; 95% CI, 6.69–8.45), currently smoking (6.14; 95% CI, 5.03–7.26) and active drinker (5.29; 95% CI, 3.29–7.29).

State-wise prevalence of elder abuse

Table 3 shows the state-wise prevalence (%) of elder abuse among older adults. Elder abuse in India is influenced by socio-cultural, economic, and policy differences across states. Understanding these regional variations is critical for identifying areas with higher vulnerability and tailoring interventions accordingly. The state of Bihar (11.65%) had the highest prevalence of elder abuse among older adults, followed by Karnataka (8.78%) and West Bengal (7.62%). In Bihar, out of 100 participants 12 reported facing abuse. Four Indian states show prevalence more than the national average. Regional variations in elder abuse reflect differences in family dynamics, levels of urbanization, economic inequality, or state-specific policies related to elder care.

The association between elder abuse and pain with depression

Table 4 shows the results of multivariable binary logistic regression models. The table also reports the separate models for the older female and male. In unadjusted analysis (model 1), we found that older adults with pain and depression have a significantly higher probability of abuse. The individuals experienced pain with depression are 2.4 times more likely to face abuse as compared to those who have not experienced pain with depression. These results are significant in all the models. While the odd ratio is significantly higher for older female (UOR: 2.60, 95% CI: 2.05–3.28) than older male (UOR: 2.08, 95% CI: 1.59–2.73). This shows that for the same level of experience of pain with depression, females are 2.6 times more likely whereas males are 2.1 times more likely to face abuse. After adjusting socio-demographic and potential mediators, we found that pain with depression is still significantly associated with a higher probability of abuse among older adults, with odds ratios of (AOR: 1.87, 95% CI: 1.54–2.27) and odds of being abused is significantly higher for older female (AOR: 2.09, 95% CI: 1.60–2.72) than male (AOR: 1.61, 95% CI: 1.21–2.15). Hosmer-Lemeshow goodness of fit test show that model 1 does not fit but after adjustment model 2 and 3 shows good fit. Further sensitivity has also increased in model 2 and 3.

Interaction by gender in association of elder abuse and pain with depression

Table 5 showing models 1, 2 and 3 represent the interaction effects of gender of the older adults in the association of the key variables with elder abuse. In the logistic regression models, we examine the interaction between Pain with Depression and gender to assess whether the relationship between pain with depression and abuse differs between male and female. In model 1 Individuals with pain and depression are over twice as likely to experience abuse (UOR = 2.08; 95% CI: 1.59–2.73) compared to those without pain and depression. This result is statistically significant ($p < 0.001$). The interaction

Table 2 Age and sex-adjusted prevalence of elder abuse among older adults of India, 2017-18

Variable	Category	Adjusted Prevalence	
		(%)	95% CI
Exposure variable			
Pain with Depression	No	4.23	(3.76, 4.70)
	Yes	9.49	(8.36, 10.62)
Sociodemographic variables			
Age	60–74	5.13	(4.66, 5.59)
	75 and above	5.54	(4.44, 6.63)
Sex	Female	5.55	(4.92, 6.18)
	Male	4.84	(4.25, 5.43)
Level of education	No Education	5.88	(5.30, 6.46)
	Less than 5 years	4.6	(3.67, 5.53)
	5–9 years	4.89	(3.67, 6.11)
	10 or more years	3.43	(2.54, 4.32)
Current marital Status	In union	4.97	(4.45, 5.49)
	Not in union	5.6	(4.79, 6.41)
Residence	Rural	5.81	(5.32, 6.30)
	Urban	3.76	(2.89, 4.64)
Living Arrangement	Alone	7.96	(6.10, 9.81)
	With spouse	4.96	(4.43, 5.48)
	With others	5.2	(4.32, 6.08)
MPCE quintiles	Poorest	5.97	(5.17, 6.76)
	Poorer	5.35	(4.55, 6.15)
	Middle	5.66	(4.57, 6.75)
	Richer	4.22	(3.44, 5.01)
	Richest	4.63	(3.21, 6.05)
Religion	Hindu	5.47	(4.96, 5.97)
	Muslim	5.09	(4.08, 6.10)
	Other	2.18	(1.33, 3.03)
Caste	SC	6.71	(5.74, 7.68)
	ST	4.45	(3.25, 5.66)
	OBC	5.2	(4.44, 5.94)
	Others	4.45	(3.80, 5.09)
Number of children alive	0	7.66	(5.26, 10.05)
	1–2	4.5	(3.79, 5.20)
	3 and above	5.33	(4.79, 5.87)
Socially active	Rarely	6.23	(5.45, 6.99)
	Moderately	4.68	(4.15, 5.20)
	Frequently	7.19	(1.96, 12.42)
Functional health			
Problems with ADL	No	4.72	(4.25, 5.19)
	Yes	6.89	(5.71, 8.07)
Problems with IADL	No	3.78	(3.37, 4.20)
	Yes	6.92	(6.11, 7.73)
Multimorbidity	No	5.23	(4.71, 5.75)
	Yes	5.17	(4.37, 5.96)
Trouble sleeping	Never	4.35	(3.93, 4.77)
	Occasionally	8.01	(6.22, 9.80)
	Frequently	9.23	(7.58, 10.88)
SRH	Good	4.04	(3.18, 4.90)
	Fair	4.74	(4.12, 5.36)
	Poor	7.57	(6.69, 8.45)
Behavioural health			
Smoking History	Currently Smoking	6.14	(5.03, 7.26)

Table 2 (continued)

Variable	Category	Adjusted Prevalence	
		(%)	95% CI
	Not Currently Smoking	5.08	(4.60, 5.56)
Alcohol History	Never	5.2	(4.74, 5.66)
	Occasional drinker	5.77	(3.40, 8.15)
	Weekly drinker	5.86	(3.64, 8.07)
	Several times a week	5.29	(3.29, 7.29)
Supportive Aid for Daily Life	No	5.36	(4.90, 5.82)
	Yes	5.03	(4.23, 5.83)
Moderate physical activity	Yes	5.86	(5.26, 6.46)
	No	4.17	(3.41, 4.93)

Note: SC: Scheduled caste; ST: Scheduled tribe; OBC: Other backward class; MPCE: Monthly Per Capita Expenditure; SRH: Self-rated health; ADL: Activities of Daily Living; IADL: Instrumental activities of daily living; The sample may differ as all older adults did not give consent for measurement

Table 3 State-wise prevalence of elder abuse among older adults of India, 2017-18

State	(%)	95% CI
Bihar	11.65	(9.32, 13.98)
Karnataka	8.78	(5.01, 12.54)
West Bengal	7.62	(5.93, 9.30)
Uttar Pradesh	6.47	(5.27, 7.66)
Jharkhand	5.63	(4.21, 7.04)
Chandigarh	5.55	(2.53, 8.57)
Chhatisgarh	5.54	(3.84, 7.25)
Madhya Pradesh	5.13	(3.80, 6.45)
Arunachal Pradesh	4.22	(1.04, 7.40)
Maharashtra	3.96	(2.80, 5.12)
Delhi	3.48	(1.76, 5.21)
Kerala	3.48	(1.64, 5.31)
Haryana	3.47	(2.16, 4.79)
Daman and Diu	3.39	(1.44, 5.34)
Rajasthan	3.28	(2.04, 4.51)
Dadra and Nagar Haveli	3.16	(1.57, 4.75)
Gujarat	3.04	(1.79, 4.30)
Assam	2.91	(1.55, 4.26)
Odisha	2.86	(1.82, 3.90)
Uttarakhand	2.51	(1.37, 3.65)
Tamil Nadu	2.49	(1.61, 3.37)
Telangana	2.24	(1.23, 3.25)
Punjab	2.14	(1.14, 3.15)
Andhra Pradesh	2.12	(1.16, 3.08)
Jammu and Kashmir	1.97	(0.68, 3.25)
Manipur	1.87	(0.65, 3.08)
Puducherry	1.73	(0.57, 2.90)
Tripura	1.65	(0.33, 2.98)
Goa	1.54	(0.39, 2.69)
Andaman and Nicobar	1.51	(0.17, 2.86)
Himachal Pradesh	1.06	(0.23, 1.88)
Sikkim	1.01	(-0.19, 2.22)
Meghalaya	0.74	(-0.10, 1.59)
Nagaland	0.22	(-0.09, 0.53)
Mizoram	0.19	(-0.18, 0.55)

Note: %: percentage prevalence of elder abuse; CI: Confidence interval

term suggests that female with pain and depression are 25% more likely to experience abuse (UOR: 1.25; 95% CI: 0.87–1.78) compared to male without pain and depression but this result is not significant.

In model 2, after adjusting for sociodemographic variables (age, sex, marital status, place of residence, living arrangement, level of education, mean per capita expenditure (MPCE) quintiles, religion, caste, number of children alive, socially active), the odds of abuse for individuals with pain and depression remain high (AOR: 0.96; 95% CI: 0.79–1.16) and statistically significant. After adjustment, the interaction effect slightly decreases. Older female who reported pain with depression had 1.19 odds of facing abuse (AOR: 1.19; 95% CI: 0.84–1.69) in reference to older male who had no pain with depression but again the results are not significant. Regression analysis also revealed that older adults who are socially active face more abuse (AOR: 1.76; 95% CI: 0.77–4.02).

In model 3, even after adjusting for functional health and behavioural health related factors (problem with ADL & IADL, multimorbidity, trouble sleeping, self-rated health, smoking history, alcohol history, supportive Aid for daily life and moderate physical activity.), individuals with pain and depression are significantly more likely (AOR: 1.60; 95% CI: 1.21–2.13) to experience abuse. Female with pain and depression are 29% more likely (AOR: 1.29; 95% CI: 0.90–1.86) to experience abuse compared to male without pain and depression. Regression analysis also revealed that older adults who have problems in IADL (AOR: 1.65; 95% CI: 1.35–2.01), trouble sleeping (AOR: 1.75; 95% CI: 1.39–2.20) and poor self-rated health (AOR: 1.43; 95% CI: 1.05–1.95) are more susceptible to abuse.

Discussion

This study aims to explain the association between elder abuse, pain with depression and interacting effect of gender among older adults in India, using data from nationally representative LASI survey. The relationship

Table 4 Associations between elder abuse and pain with depression among older adults: logistic regression models

Outcome: Elder abuse	Model 1				Model 2				Model 3				
	UOR	95% CI	Pseudo R^2	HL statistic	Sensitivity (%)	AOR	95% CI	Pseudo R^2	HL statistic	Sensitivity (%)	AOR	95% CI	Pseudo R^2	HL statistic	Sensitivity (%)
Main model															
Pain with Depression	2.39***	(2.01, 2.85)	0.02	0	0	2.28***	(1.91, 2.72)	0.03	0.01	0.1	1.87***	(1.54, 2.27)	0.04	0.22	4.51
Stratiefied models															
Male: Pain with Depression	2.08***	(1.59, 2.73)	0.01	0	0	2.08***	(1.59, 2.74)	0.04	0.07	0.03	1.61***	(1.21, 2.15)	0.03	0.91	4.15
Female: Pain with Depression	2.60***	(2.05, 3.28)	0.02	0	0	2.46***	(1.97, 3.09)	0.04	0.17	0.23	2.09***	(1.60, 2.72)	0.06	0.13	6.04

Note: UOR: Unadjusted Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence interval; Pseudo R^2: Measure of model fitting on the same data, predicting the same outcome; HL: Hosmer-Lemeshow test Statistic

Model 1: Unadjusted model

Model 2: Adjusted for age, sex, marital status, place of residence, living arrangement, level of education, mean per capita expenditure (MPCE) quintiles, religion, caste, number of children alive, socially active.

Model 3: Adjusted for problem with ADL & IADL, multimorbidity, trouble sleeping, self-rated health, smoking history, alcohol history, supportive Aid for daily life and moderate physical activity.

Gender-stratified models were not adjusted for gender.

*$p<0.05$; **$p<0.005$; ***$p<0.001$.

between these factors is complex and their deep understanding is essential because elder abuse and pain with depression is growing public health concern globally. The study explains the factors responsible for elder abuse, their association and how the interaction effect by gender plays a key role in prevention and mitigation of abuse.

In present study a substantial number of older adults face abuse (5.2%), which is appeared to be largely under-reported as elderly people are ashamed of stigmatisation [41]. The lower prevalence (5.2%) observed in this study as compared to global average (15.7%) can largely be attributed to the issue of under-reporting of elder abuse [42]. Elder abuse is considered a highly sensitive topic in Indian society, and discussing such issues is often seen as shameful, especially when abuse involves family members. Older adults generally avoid disclosing their experiences out of fear of social stigma, family dishonour, or retaliation from caregivers. Many elderly individuals normalize abusive behaviour or perceive it as a personal or family matter, leading to reluctance in reporting these incidents. Additionally, a lack of awareness about what constitutes abuse and where to seek help may further contribute to the under-reporting [43]. Our analysis shows that older adults with pain and depression have a significantly higher probability of abuse in India which closely align with the evidence found in a prior study [44]. The positive association of elder abuse and pain with depression is still significant, even after adjusting for socio-demographic factors and potential covariates. Older adults suffering from pain and depression have more than double chances to face abuse in late stages of life. Furthermore, older female faces consistently higher abuse than male, even after adjusting for functional and behavioural health factors which is consistent with the prior gender focused studies [45]. Study highlighted certain demographic groups faces higher prevalence of abuse such as older female, individual in age group 75 and above, having no education, those who are unmarried, those living in rural areas, live alone and socially inactive. Older adults having problems in ADL and IADL, suffer from multimorbidity, had trouble sleeping and actively smoke as well as drink alcohol poses higher risk of elder abuse. The higher prevalence of abuse found among the elderly in rural areas, as compared to urban, may be due to social isolation, poor healthcare infrastructure and lower socioeconomic status, as pointed by various studies [46, 47]. The variation at the national level in the prevalence of elder abuse is an important information for public policy. Awareness of the prevention of elder abuse and intervention specific to a state will be useful, particularly for elderly adults in low socio-economic areas, suffering from chronic diseases and with functional limitations.

The findings of this study add more risk factors of elder abuse on and above the existing literature. Past

Table 5 Interaction by gender in association of elder abuse and pain with depression among older adults: logistic regression models

Outcome: Elder abuse	Category	Model 1	Model 2	Model 3
		UOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Pain with Depression	No®			
	Yes	2.08 (1.59, 2.73)	2.05 (1.56, 2.70)	1.60 (1.21, 2.13)
Gender	Male®			
	Female	1.02 (0.81, 1.28)	0.96 (0.79, 1.16)	0.89 (0.68, 1.16)
Interaction: Pain with depression # gender				
Pain with Depression # Gender	No # Male®			
	Yes # Female	1.25 (0.87, 1.78)	1.19 (0.84, 1.69)	1.29 (0.90, 1.86)
Sociodemographic variables				
Age	60–74®			
	75 and above	-	0.99 (0.77, 1.28)	-
Level of education	No Education®			
	Less than 5 years	-	0.85 (0.66, 1.11)	-
	5–9 years	-	1.02 (0.73, 1.41)	-
	10 or more years	-	0.82 (0.56, 1.19)	-
Current marital Status	In union®			
	Not in union	-	0.89 (0.38, 2.07)	-
Residence	Rural®			
	Urban	-	0.74 (0.55, 1.00)	-
Living Arrangement	Alone®			
	With spouse	-	0.59 (0.25, 1.41)	-
	With others	-	0.70 (0.51, 0.97)	-
MPCE quintiles	Poorest®			
	Poorer	-	0.95 (0.77, 1.17)	-
	Middle	-	1.03 (0.80, 1.32)	-
	Richer	-	0.76 (0.60, 0.97)	-
	Richest	-	0.87 (0.58, 1.30)	-
Religion	Hindu®			
	Muslim	-	0.98 (0.76, 1.26)	-
	Other	-	0.38 (0.25, 0.58)	-
Caste	SC®			
	ST	-	0.69 (0.50, 0.96)	-
	OBC	-	0.81 (0.65, 1.01)	-
	Others	-	0.74 (0.59, 0.94)	-
Number of children alive	0®			
	1–2	-	0.68 (0.46, 1.01)	-
	3 and above	-	0.74 (0.51, 1.09)	-
Socially active	Rarely®			
	Moderately	-	0.91 (0.75, 1.10)	-
	Frequently	-	1.76 (0.77, 4.02)	-
Functional health				
Problems with ADL	No®			
	Yes	-	-	1.02 (0.80, 1.28)
Problems with IADL	No®			
	Yes	-	-	1.65 (1.35, 2.01)
Multimorbidity	No®			
	Yes	-	-	0.81 (0.66, 0.99)
Trouble sleeping	Never®			
	Occasionally	-	-	1.59 (1.20, 2.11)
	Frequently	-	-	1.75 (1.39, 2.20)
SRH	Good®			
	Fair	-	-	1.06 (0.80, 1.40)
	Poor	-	-	1.43 (1.05, 1.95)

Table 5 (continued)

Outcome: Elder abuse	Category	Model 1	Model 2	Model 3
		UOR (95% CI)	AOR (95% CI)	AOR (95% CI)
Behavioural health				
Smoking History	Currently Smoking®			
	Not Currently Smoking	-	-	0.86 (0.69, 1.08)
Alcohol History	Never®			
	Occasional drinker	-	-	1.10 (0.70, 1.72)
	Weekly drinker	-	-	1.06 (0.71, 1.60)
	Several times a week	-	-	1.01 (0.67, 1.53)
Supportive Aid for Daily Life	No®			
	Yes	-	-	0.93 (0.76, 1.13)
Moderate physical activity	Yes®			
	No	-	-	0.64 (0.52, 0.79)

Note: Note: UOR: Unadjusted Odds Ratio; AOR: Adjusted Odds Ratio; CI: Confidence interval

Model 1: Unadjusted model

Model 2: Adjusted for age, sex, marital status, place of residence, living arrangement, level of education, mean per capita expenditure (MPCE) quintiles, religion, caste, number of children alive, socially active

Model 3: Adjusted for problem with ADL & IADL, multimorbidity, trouble sleeping, self-rated health, smoking history, alcohol history, supportive Aid for daily life and moderate physical activity

Models 1, 2 and 3 include # interaction effects of pain with depression by gender, adjusted for all covariates

researches showed that depression significantly increased the risk of elder abuse among older adults. A study focusing on clinical depression and its severity highlighted that depression can be identified as risk factor for elder abuse and also consequences of elder abuse [48]. Our study provides further confirmation that depression is a robust correlate of elder abuse and consistently align with the past research.

Studies have revealed that pain significantly affects all segments of individual's life i.e., trouble sleeping, physical activity, performing household duties, walking, socially active, maintain dependency free lifestyles and eventually lead to depression [49, 50]. Few micro-level researches have been conducted to estimate the prevalence of chronic pain [51, 52] among Indian adults and risk factors of pain associated among specified sample population [53, 54]. Pain with depression is not considered together as a comorbidity and lacks a proper standard definition. Pain and depression together taken as comorbid condition shows prevalence in clinical observations [55].

Our study primarily focuses on cross linkages between effect of pain with depression and its combined impact on elder abuse. In harmony with previous researches [56], the current study has also found significantly increased odds of elder abuse in female who suffer from pain with depression. The interaction analysis in the study also documented that the magnitude of the association between elder abuse and pain with depression was higher in female than in male. Female suffer from pain with depression faces high prevalence of abuse, while those males who do not suffer from pain with depression face less abuse. This association remained significant even after controlling for other socio-demographic, functional and behavioural health factors. Regression analysis confirm that after controlling for covariates older adults who are socially active, who have problems in IADL, trouble sleeping and poor self-rated health are more susceptible to abuse. These findings align with past studies that takes into account detrimental effects of elder abuse.

Therefore, a more precise comprehension of the prevalence of pain and depression among older adults in India, along with the underlying interconnections and mechanisms, will facilitate more accurate policy formation and health treatment of this prevalent condition. This study suggests a need for public health intervention that should incorporate integrated mental health and pain management programs for older adults, focusing on early detection and treatment of co-occurring pain and depression. Examples include community-based screening programs and mental health support initiatives delivered through primary care centres and old age homes. Sensitization campaigns should aim to reduce the stigma associated with reporting elder abuse, especially among individuals experiencing pain and depression. These campaigns could be disseminated through senior citizen groups, healthcare providers, and local community organizations to providing gender-sensitive counselling and strengthening women's social support networks.

Our study has few limitations, which should be acknowledged before interpreting the results. The single-item question used in LASI "Have you felt that you were ill-treated in the past year?" has certain limitations. The question relies on the respondent's subjective perception of "ill-treatment," which can vary significantly based on individual experiences, cultural norms, and

social expectations. The term "ill-treated" is broad and may not explicitly capture specific forms of abuse (e.g., physical, emotional, financial), potentially underestimating the prevalence of elder abuse. The study focused solely on older adults in India, which may limit the generalization of the findings to other cultural contexts. Different countries may have different social norms, health systems and support networks that can influence the prevalence and effects of abuse of older adults. Future research should take into account cross-national studies to further explore these dynamics. No causal relationship was established due to the cross-sectional study design. Socially and culturally stigmatised sensitive questions such as elder abuse and pain with depression with self-reported nature can be subjected to under-reporting and recall biases. More comprehensive measures for abuse of the elderly should be developed and validated, especially in the context of the elderly in India. Future research will explore the role of mental health, social support, and economic conditions as potential mediators or moderators in relationship between abuse and pain with depression. Understanding these dynamics can help to develop targeted interventions to mitigate the negative effects of abuse. Finally, cross-national studies that compare the prevalence and impact of elder abuse in different countries are valuable. Such research could help identify global and cultural factors influencing abuse of older people, thereby providing better and more effective intervention strategies around the world. However, this study finds strength in results based on large-scale, nationally representative survey in India.

Conclusion

This study highlights the significant association between elder abuse, pain with depression and the interacting effect of gender among older adults in India, using data from the LASI survey. The findings indicate that older adults experiencing pain and depression face a substantially higher risk of abuse, with female particularly vulnerable, even after accounting for socio-demographic and behavioural health factors. Specific demographic groups, such as older female, individuals aged 75 and above, those with limited education, and those living in rural areas, are identified as more susceptible to abuse. These results emphasize the need for targeted interventions that address the co-occurrence conditions of pain and depression, considering the gender disparities in abuse. While the cross-sectional design and self-reported data pose limitations, this study provides crucial insights for informing public health strategies aimed at reducing elder abuse. Future research should further explore mediating factors and cross- national comparisons to enhance intervention approaches. Elder abuse must be recognised as a key public health issue and appropriate methods, policies and practices must be designed to tackle this issue. Lowering prevalence of elder abuse will have a positive impact on both the physical as well as mental health outcomes in late stages of life. Policy-makers in India have a major challenge in dealing this issue, as India have low resources; however, enhancing the public policy debate for inclusion and identifying the factors responsible for the prevalence of elder abuse and how to address it within the ambit of policy formulation and health policy planning would be a way forward.

Abbreviations

WHO	World health organisation
DALY	Disability adjusted life-years
MPCE	Monthly per capita expenditure
LASI	Longitudinal Ageing Study in India
MoHFW	Ministry of Health and Family Welfare
CESD	Centre for epidemiological studies depression scale
ADL	Activities of daily living
IADL	Instrumental activities of daily living
SRH	Self-rated health

Supplementary Information

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Supplementary Material 1

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Author contributions

HSG and AK conceived and designed the research paper. HSG done Formal analysis. Original draft prepared by HSG and AK. All authors read and approved the final manuscript.

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Data availability

The data are available at the Gateway to Global Aging Data (www.g2aging.org) and at the International Institute for Population Sciences (www.iipsindia.ac.in/content/LASI-data).

Declarations

Ethics approval and consent to participate

The study was approved by the Indian Council of Medical Research (ICMR) Ethics Committee in January 2017 and written or oral informed consent was obtained from the participants. All methods were carried out in accordance with relevant guidelines and regulations and in accordance with the World Medical Association Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Authors' information

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References

1. World Health Organization. World report on ageing and health [Internet]. Geneva: World Health Organization. 2015 [cited 2024 Jun 30]. Available from: https://iris.who.int/handle/10665/186463
2. World Health Organization. Ageing and Health [Internet]. 2022. Available from: https://www.who.int/news-room/fact-sheets/detail/ageing-and-health
3. Pillemer K, Burnes D, Riffin C, Lachs MS. Elder abuse: global situation, risk factors, and prevention strategies. Gerontologist. 2016;56(Suppl 2):S194–205.
4. Krug EG, Mercy JA, Dahlberg LL, Zwi AB. The world report on violence and health. Lancet. 2002;360(9339):1083–8.
5. World Health Organization. Abuse of Older People [Internet]. 2024. Available from: https://www.who.int/news-room/fact-sheets/detail/abuse-of-older-people
6. Yon Y, Mikton CR, Gassoumis ZD, Wilber KH. Elder abuse prevalence in community settings: a systematic review and meta-analysis. Lancet Glob Health. 2017;5(2):e147–56.
7. Chang ES, Levy BR. Protective effects of neighborhood community factors on elder abuse in India. J Elder Abuse Negl. 2021;33(1):1–16.
8. Pillemer K, Burnes D, MacNeil A. Investigating the connection between ageism and elder mistreatment. Nat Aging. 2021;1(2):159–64.
9. Chokkanathan S. Factors associated with elder mistreatment in rural Tamil Nadu, India: a cross-sectional survey. Int J Geriatr Psychiatry. 2014;29(8):863–9.
10. Skirbekk V, James K. Abuse against elderly in India– The role of education. BMC Public Health. 2014;14:336.
11. Jeon GS, Cho SI, Choi K, Jang KS. Gender differences in the prevalence and correlates of elder abuse in a Community-Dwelling older population in Korea. Int J Environ Res Public Health. 2019;16(1):100.
12. Laumann EO, Leitsch SA, Waite LJ. Elder mistreatment in the united States: prevalence estimates from a nationally representative study. J Gerontol B Psychol Sci Soc Sci. 2008;63(4):S248–54.
13. Tomita A, Leyna GH, Kim HY, Moodley Y, Mpolya E, Mogeni P, et al. Patterns of Multimorbidity and their association with hospitalisation: a population-based study of older adults in urban Tanzania. Age Ageing. 2021;50(4):1349–60.
14. Sathya T, Premkumar R. Association of functional limitations and disability with elder abuse in India: a cross-sectional study. BMC Geriatr. 2020;20(1):220.
15. Dong X, Simon M, Beck T, Evans D. Decline in cognitive function and elder mistreatment: findings from the Chicago health and aging project. Am J Geriatr Psychiatry Off J Am Assoc Geriatr Psychiatry. 2014;22(6):598–605.
16. Sathya T, Selvamani Y, Nagarajan R. Elder abuse/mistreatment and associated covariates in India: results from the longitudinal aging study in India wave 1, 2017–2018. Epidemiol Health. 2022;44:e2022017.
17. Goldberg DS, McGee SJ. Pain as a global public health priority. BMC Public Health. 2011;11(1):1–5.
18. Lépine JP, Briley M. The increasing burden of depression. Neuropsychiatr Dis Treat. 2011;7(Supplement 1):3–7.
19. Lopez AD, Mathers CD, Ezzati M, Jamison DT, Murray CJL. Global and regional burden of disease and risk factors, 2001: systematic analysis of population health data. Lancet Lond Engl. 2006;367(9524):1747–57.
20. Pati S, Swain S, Hussain MA, Akker M, van den, Metsemakers J, Knottnerus JA, et al. Prevalence and outcomes of Multimorbidity in South Asia: a systematic review. BMJ Open. 2015;5(10):e007235.
21. Sagar R, Dandona R, Gururaj G, Dhaliwal RS, Singh A, Ferrari A, et al. The burden of mental disorders across the States of India: the global burden of disease study 1990–2017. Lancet Psychiatry. 2020;7(2):148–61.
22. Sagar R, Selvakumar N. Prevalence of depression in Indian adolescents. Indian J Pediatr. 2021;88(5):427–8.
23. Breslau N, Peterson EL, Schultz LR, Chilcoat HD, Andreski P. Major depression and stages of smoking. A longitudinal investigation. Arch Gen Psychiatry. 1998;55(2):161–6.
24. Chaiton MO, Cohen JE, O'Loughlin J, Rehm J. A systematic review of longitudinal studies on the association between depression and smoking in adolescents. BMC Public Health. 2009;9:356.
25. Ferreira VR, Jardim TV, Sousa ALL, Rosa BMC, Jardim PCV. Smoking, alcohol consumption and mental health: data from the Brazilian study of cardiovascular risks in adolescents (ERICA). Addict Behav Rep. 2019;9:100147.
26. Wang XQ, Peng MS, Weng LM, Zheng YL, Zhang ZJ, Chen PJ. Bibliometric study of the comorbidity of pain and depression research. Neural Plast. 2019;2019:1–16.
27. Wang Y, Bernanke J, Peterson BS, McGrath P, Stewart J, Chen Y, et al. The association between antidepressant treatment and brain connectivity in two double-blind, placebo-controlled clinical trials: a treatment mechanism study. Lancet Psychiatry. 2019;6(8):667–74.
28. Serafini RA, Pryce KD, Zachariou V. The mesolimbic dopamine system in chronic pain and associated affective comorbidities. Biol Psychiatry. 2020;87(1):64–73.
29. Goesling J, Clauw DJ, Hassett AL. Pain and depression: an integrative review of Neurobiological and psychological factors. Curr Psychiatry Rep. 2013;15(12):421.
30. Fang X, Yang C, Li S, Zhan G, Zhang J, Huang N, et al. Brain-derived neurotrophic factor-TrkB signaling in the medial prefrontal cortex plays a role in the anhedonia-like phenotype after spared nerve injury. Eur Arch Psychiatry Clin Neurosci. 2020;270(2):195–205.
31. Zanjani F, RURALITY, ALCOHOL, AND OPIOID USE AS, PRECURSOR TO ELDER ABUSE. Innov Aging. 2019;3(Suppl 1):S762–3.
32. Yalçın Gürsoy M, Uçan Yamaç S. Elder abuse, depression, anxiety, and stress in community-dwelling older adults. Psychogeriatr Off J Jpn Psychogeriatr Soc. 2024;24(2):336–44.
33. IsHak WW, Wen RY, Naghdechi L, Vanle B, Dang J, Knosp M, et al. Pain and depression: A systematic review. Harv Rev Psychiatry. 2018;26(6):352–63.
34. Jacobzone S. Ageing and Care for Frail Elderly Persons: An Overview of International Perspectives [Internet]. Paris: OECD; 1999 Apr [cited 2024 Oct 1]. Available from: https://www.oecd-ilibrary.org/content/paper/313777154147
35. Zunzunegui MV, Alvarado BE, Guerra R, Gómez JF, Ylli A, Guralnik JM, et al. The mobility gap between older men and women: the embodiment of gender. Arch Gerontol Geriatr. 2015;61(2):140–8.
36. Koga C, Hanazato M, Tsuji T, Suzuki N, Kondo K. Elder abuse and social capital in older adults: the Japan gerontological evaluation study. Gerontology. 2020;66(2):149–59.
37. Salminen-Tuomaala M, Tiainen J, Paavilainen E. Older adults affected by Abuse-What about their mental health and social participation?? A mixed methods study. Behav Sci Basel Switz. 2024;14(3):188.
38. Katz S, Ford AB, Moskowitz RW, Jackson BA, Jaffe MW, STUDIES OF ILLNESS IN THE AGED. THE INDEX OF ADL: A STANDARDIZED MEASURE OF BIOLOGICAL AND PSYCHOSOCIAL FUNCTION. JAMA. 1963;185:914–9.
39. Lawton MP, Brody EM. Assessment of older people: self-maintaining and instrumental activities of daily living. Gerontologist. 1969;9(3):179–86.
40. Huang J, Qian X, Choi EPH, Chau PH. The consequences of unmet needs for assistance with daily life activities among older adults: A systematic review. Med Care Res Rev MCRR. 2024;81(4):295–310.
41. Nagpaul K. Elder abuse among Asian Indians: traditional versus modern perspectives. J Elder Abuse Negl. 1997;9(2):77–92.
42. Dow B, Gahan L, Gaffy E, Joosten M, Vrantsidis F, Jarred M. Barriers to disclosing elder abuse and taking action in Australia. J Fam Violence. 2020;35(8):853–61.
43. Moore S. The sound of silence: evidence of the continuing under reporting of abuse in care homes. J Adult Prot. 2019;22(1):35–48.
44. Yunus RM, Hairi NN, Choo WY, Tan MP, Hairi F, Sooryanarayana R, et al. Elder abuse and chronic pain: Cross-Sectional and longitudinal results from the preventing elder abuse and neglect initiative. J Am Geriatr Soc. 2018;66(6):1165–71.
45. Roberto KA, Hoyt E. Abuse of older women in the united States: A review of empirical research, 2017–2019. Aggress Violent Behav. 2021;57:101487.
46. Okojie OH, Omuemu VO, Uhunwangho JI, Prevalence. Pattern and predictors of elder abuse in Benin City, Edo State, Nigeria: an urban and rural comparison. West Afr J Med. 2022;39(2):183–92.
47. Pak M. The prevalence and associated risk factors of elder abuse among older people applied to the family health center in the rural district of Turkey. Soc Work Health Care. 2020;59(4):236–56.

48. Dong X, Chen R, Chang ES, Simon M. Elder abuse and psychological Well-Being: A systematic review and implications for research and Policy - A Mini review. Gerontology. 2012;59(2):132–42.
49. Breivik H, Collett B, Ventafridda V, Cohen R, Gallacher D. Survey of chronic pain in Europe: prevalence, impact on daily life, and treatment. Eur J Pain Lond Engl. 2006;10(4):287–333.
50. Tsai LC, Chen SC, Chen YC, Lee LY. The impact of physical pain and depression on sleep quality in older adults with chronic disease. J Clin Nurs. 2022;31(9–10):1389–96.
51. Dureja GP, Jain PN, Shetty N, Mandal SP, Prabhoo R, Joshi M, et al. Prevalence of chronic pain, impact on daily life, and treatment practices in India. Pain Pract Off J World Inst Pain. 2014;14(2):E51–62.
52. Saxena AK, Jain PN, Bhatnagar S. The prevalence of chronic pain among adults in India. Indian J Palliat Care. 2018;24(4):472–7.
53. Darivemula SB, Goswami K, Gupta SK, Salve H, Singh U, Goswami AK. Work-related neck pain among desk job workers of tertiary care hospital in new Delhi, India: burden and determinants. Indian J Community Med Off Publ Indian Assoc Prev Soc Med. 2016;41(1):50–4.
54. Durlov S, Chakrabarty S, Chatterjee A, Das T, Dev S, Gangopadhyay S, et al. Prevalence of low back pain among handloom weavers in West Bengal, India. Int J Occup Environ Health. 2014;20(4):333–9.
55. Walker AK, Kavelaars A, Heijnen CJ, Dantzer R. Neuroinflammation and comorbidity of pain and depression. Pharmacol Rev. 2014;66(1):80–101.
56. Roepke-Buehler SK, Simon M, Dong X. Association between depressive symptoms, multiple dimensions of depression, and elder abuse: A cross-sectional, population-based analysis of older adults in urban Chicago. J Aging Health. 2015;27(6):1003–25.

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