

The complexity of basophobia and aging: covariates and consequences

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Abstract. – OBJECTIVE: The study aim is to determine the drug-induced incidence of basophobia, falls, its' related variables and the consequences among older adults.

PATIENTS AND METHODS: A descriptive, cross-sectional study was adopted with 210 older adult samples. The tool consisted of 6 sections: a standardized, semi-structured questionnaire and physical examination. Descriptive and inferential statistics were used to analyze the data.

RESULTS: Among the study participants, 49% had falls or near falls and 51% had basophobia in the past 6 months. As per final simultaneous regression analysis model of the study, the covariates to activity avoidance were age ($\beta=-0.129$, CI=-0.087 to -0.019), having >5 chronic diseases ($\beta=-0.086$, CI=-1.41 to -1.182), depressive symptoms ($\beta=-0.09$, CI=-0.089 to -0.189), vision impairment ($\beta=-0.075$, CI=-1.28 to -1.56), basophobia ($\beta=-0.26$, CI=-0.059 to -0.415), taking regular antihypertensives ($\beta=-0.096$, CI=-1.21 to -1.56), oral hypoglycemics and insulin ($\beta=-0.17$, CI=-0.442 to -0.971) and sedatives and tranquilizers ($\beta=-0.37$, CI=-1.32 to -1.73). Use of antihypertensives ($p<0.001$), oral hypoglycemics and insulin ($p<0.01$), sedatives and tranquilizers ($p<0.001$) were strongly associated with fall related to activity avoidance.

CONCLUSIONS: The result of this current study suggests that the falls, basophobia and its related activity avoidance among elderly may set in a "vicious cycle" of falls, basophobia, and the numerous negative outcomes such as

functional impairment, a decrease in quality of life, and hospitalization. Preventive strategies such as tittering dosage, home- and community-based exercises, cognitive behavioral therapy, yoga, meditation and sleep hygiene may be the choice to break this vicious cycle.

Key Words:

Activity avoidance, Falls, Near falls, Basophobia, Fear of falling, mSAFFE.

Introduction

Basophobia or fear of falling (FOF) is a concern of functional deterioration of the mechanisms and systems involved in automatism of posture and walking¹. Fear of falling is also defined as a psychological barrier to performing activities of daily living and participating in physical activities². Basophobia can develop with or without a history of previous falls or injuries as a result of a fall³. In the United States, falls were the main cause of visits to emergency departments which leads to injuries⁴. According to recent studies⁵⁻⁷, 3-85% of older persons might suffer from Basophobia. In fact, people with more than 75 years accounts for 20% of all nonfatal home falls that need medical treatment⁸. Further, it has been discovered that a

large majority of those who fall (40-73%), have a fear of falling. Also, up to half of older people who have never fallen, have a fear of falling too, according to research⁹. According to the Profile of Older Americans¹⁰, 2021, the population of adults aged 65 and older, are increasing, and they will surpass their younger counterparts in the next 40 years. The proportion of adult age 65+ represented 17% of the population in the year 2020 which is expected to grow to 22% by 2040.

According to the United Nations' World Population Prospects 2019¹¹, by 2050, one in every six persons in the world will be over the age of 65, up from one in every eleven in 2019. All societies around the world are in the midst of a longevity revolution: some are in the early stages, while others are further along - but all will go through this incredible transformation. Policymakers have a major challenge as a result of the population's growing aging. Preserving and improving the physical and psychological well-being of older people is a critical issue.

Traumatic complications between fallers have accelerated hospitalization rates; additionally, recovery from fall injury is frequently delayed. Because instability in aging is a normal occurrence, a significant proportion of falls, particularly non-traumatic injuries, go unnoticed¹⁰⁻¹³. According to studies¹⁴⁻¹⁶, non-traumatic complication in falls has a deleterious impact on older adults and can sometimes instill fear of fall (FOF) or basophobia in them. Also, basophobia has been linked to negative consequences such as demographic factors, previous falls, reduced activity of daily living, physical health, lower economic resources, the presence of environmental hazards, morbidity, depression, living alone, anxiety, the impact of mood and exercise on fear of falling, decreased social contacts, and the cognitive status of the older adults¹⁷.

The aforementioned unfavorable outcomes may lead to activity self-restriction such as reduced activity of daily living^{12,13}, reduced physical activity which can result in deconditioning, muscular atrophy, and poor balance, all of which can lead to future falls and injury. The fearful older adult narrows their world, resulting in isolation and ultimately physical and functional decline. Overall, falls may result in a post-fall syndrome, and contribute to an increase in the risk of future falls, lowering Quality of Life (QOL) and walking¹.

Furthermore, fear of falling can lead to increased drug usage, loss of confidence, depression, institutionalization, increased care consumption and expense. As a result, the negative cycle of fear of falling is a serious public health

concern because it influences older people decisions about physical and social activity at home and in the community^{4,18,19}. Older adults who are afraid of falling may restrict their movements in order to avoid falling, but this reduces their physical agility, increasing their risk of falling, hence, this relationship is bi-directional.

With over 1.21 billion people, India is the world's second most populous country. According with 2011 population census, the percentage of adults over the age of 60 is 8.6 percent of the total population, and this population is expected to grow to 198 million by 2030^{20,21}. In India, the demographic shift has resulted in an absolute rise in the number of older adults, increasing the burden on the health-care system to add the QOL to the years lived. As per World Health Organization, 2021 global report on falls prevention, citizens aged 65 and up fall about 28-35% per year, and this ratio rises with age and vulnerability level. In India, the incidence of falls among people over the age of 60 has been estimated to vary between 14% and 53%²². One fifth of the 424,000 reported fall-related mortality worldwide in 2004 occurred in India²³.

Several medicines, known as 'fall risk raising pharmaceuticals', have been linked to an increased chance of falling²⁴. A meta-analysis²⁵ of observational studies identified the link between falls and the use of psychotropic, cardiac, and analgesic medications in the older adults. Antihypertensive agents, diuretics, blockers, sedatives and hypnotics, neuroleptics and antipsychotics, antidepressants, benzodiazepines, opioids, and nonsteroidal anti-inflammatory medicines were among the nine pharmacological classes studied. The researchers found a link between falls and the use of sedatives and hypnotics, antidepressants, and benzodiazepines, among which antidepressants shown to have the strongest link to falls. Other medication classes have also been linked to an increased risk of falling such as use of neuroleptics and antipsychotics, as well as nonsteroidal anti-inflammatory medicines, that were judged to have falls ascertainment²⁶. In addition, poly pharmacy is another leading issue among the older adults. Polypharmacy, defined as regular use of at least five medications, is common in older adults and younger at-risk populations and increases the risk of adverse medical outcomes. There are several risk factors that can lead to polypharmacy which include increased risk of falls, overdoses, memory problems, and death.

Though information on the risk of basophobia associated with certain drugs are available, there is no studies done to analyze chronic medication in-

duced risk of basophobia among older adults' population, comparing population under chronic medication vs. who are not taking chronic medication. As a result, the current study sought to determine the drug induced incidence of basophobia, its related variables and the consequences among older adults with or without any chronic medications.

Patients and Methods

Design

A descriptive, cross-sectional study was adopted to determine the complexity of basophobia and aging as well as to identify its covariates and consequences among older adults. The study subjects participated on a voluntary basis.

Population and Setting

The older adults who were aged more than 60 years dwelling in a selected community were the population for the study.

Sample Size and Sampling Process

From June to August 2021, a cross-sectional study was conducted in the Sub-urban field practice area of Poonamallee, Chennai. The Institutional Ethics Committee approved the research protocol. The study population included all older adults above the age of 60. The Urban Health Centre served a population of 14,698 people. As a result, the older population would be around 1,176 with the assumption of the previous studies of 8% of total population as per census. The minimum suggested sample size was 204, was computed by Raosoft online sample size calculator having the overall population of 1,176 older adults' patients, a 95% confidence with margin of error of 5%. The non-probability convenient sampling technique was used to select 210 samples. The inclusion criteria include the older adults who were able to communicate verbally, not hospitalized during the data collection, without any psychological issues – such as mood and anxiety disorders. The older adults who were relatives or visitors at the time of the house visit were not included. Elders who were terminally ill and unwilling to participate in the study were also excluded. People who are wheelchair bound or otherwise completely incapable of walking, as well as the older adults with severe memory problems, were also excluded.

Data Collection Tools/Instruments

The tool consisted of 6 sections: a standardized, semi-structured questionnaire and a physi-

cal examination were used to collect data. Each participant was interviewed by Google docs and physical assessment was carried out in their home. Four research assistants were given training about data collection and physical assessment of the older adults.

Section 1

By Google docs questionnaire, gathered data on socio-demographic characteristics such as age, sex, marital status, living status, number of persons in household and level of education.

Section 2

Google docs checklist of self-reported health conditions such as asthma or chronic bronchitis, pulmonary emphysema, cardiovascular disease, hypertension, neurologic disorder (consequences of) stroke, back problems for at least 3 months or slipped disc, migraine or chronic headache, epilepsy, gastrointestinal ulcer, liver disorder or gallstones, kidney disease (urinary incontinence), joint conditions or arthritis, diabetes mellitus, anemia, cancer, vision limitations, auditory problem, insomnia, and use of walking aids.

Section 3: Medications subscale

Participants were asked to provide a list of their current medications, and they were asked about any side effects they may have experienced.

Section 4: Fear of falling and activity level

The modified survey of activities and fear of falling in the older adults (mSAFFE)²⁶ address fall-related activity avoidance in relation to 17 activities. Each item (i.e., activity) has three response categories (scored 1-3): never, sometimes, or always avoids. The total mSAFFE score ranges from 17 to 51 (higher=worse).

Section 5: Falls

Participants were asked how many times they had fallen in the previous three months. Falls or near falls were defined as landing on the ground or floor, or falling and hitting an object by accident, such as a stairwell or a piece of furniture. Participants were classified as either fallers (coded as 1) or non-fallers (coded as 0).

Section 6

Depressive symptoms were assessed using the short 15-item version of the Geriatric Depression Scale (GDS-15)²⁷. The total GDS-15 score ranged from 0 to 15, with a score of 0-4 indicating the ab-

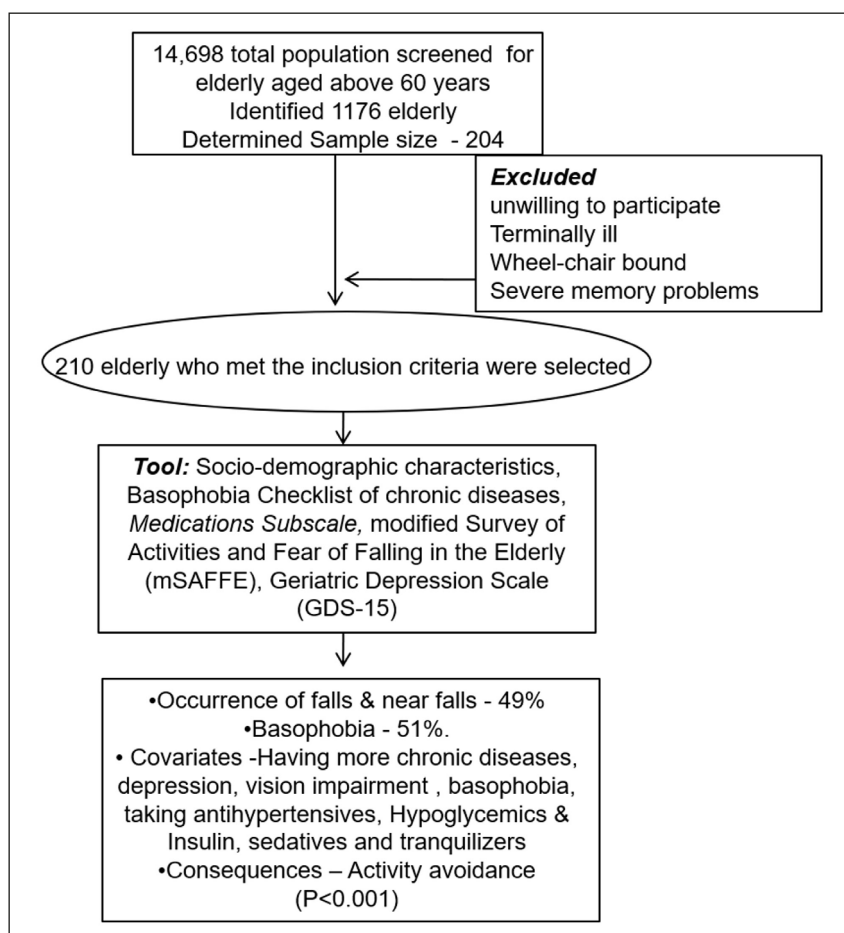


Figure 1. CONSORT flow diagram of the study.

sence of depressive symptoms and 5-15 indicating the presence of depressive symptoms (Figure 1). The research assistants were trained adequately, and the informed consent was obtained from each participant. The self-reported questions by the participants were translated into Tamil and back translated into English to maintain the consistency of the tool.

Internal consistency of the tools was assessed to check the reliability of the tools and the overall r is 0.79 and the content validity of the tools were done by experts in the field of Adult and Geriatric Nursing and a Geriatrist.

Ethical Consideration

Official permission from the Medical Director was obtained as well as ethical permission was obtained from the Institutional Ethical Committee, Lourde College of Nursing, with IEC/LCN/2021-12. Consent from the participants were collected before starting the study by explaining the aim of the study, their role, confidentiality of the information and their right to depart from the study at any point of data collection.

Statistical Analysis

The data was processed and analyzed by IBM SPSS Statistics for Windows, version 17.0 (SPSS Inc., Chicago, IL, USA). To determine variables associated with basophobia, bivariate logistic regression analysis was used. Variables with a p -value of 0.25 were regarded potential candidates for multivariable logistic regression analyses. The multiple logistic models included all possible predictors that were significant in the bivariate analysis. Three simultaneous regressions were conducted to find the covariates of the basophobia and activity avoidance such as demographic data, chronic disease status and regular use of medications. The score of mSAFFE on fall-related activity avoidance was served as the dependent variable for the regression models. The statistically significant covariates from the individual regression models were entered into the final regression model to identify the association between basophobia and activity avoidance. p -values lower than 0.05 were considered statistically significant.

Table I. Baseline characteristics of the participants.

Variables	n=210
Age (years) (mean SD)	64.29 (6.13)
Sex (men), n (%)	128 (61)
Education, n (%) (elementary/higher secondary/university)	65 (31)/120 (57)/25 (12)
Social support (from partner/other than partner/none) n (%)	149 (71)/36 (17)/25 (12)
Living alone (yes) n (%)	44 (21)
Fall-related activity avoidance (yes), n (%)	91 (43)
Basophobia (yes), n (%)	107 (51)

SD-Standard Deviation, n-Number of samples.

Results

In the analysis, data of 202 participants only found to be complete and the response rate as 96.2%. Intention to fit analysis was used and the characteristics of all respondents included demographics and fall history. A total of 210 men (61%) and women (39%) between the ages of 60 and 83 (Mean age=64.29, SD 6.13) participated, for a 94.3% response rate. The majority of them had higher secondary school education (57%), 88% had anyone form of social support and 21% of them were living alone. The occurrence of falls and near falls was 49% and the basophobia was 51% among the participants (Table I). About 8% of the sample had depressive symptoms, 73% had the mSAFFE median score of 21-36, 43% had answered yes for the binary question on fall-related

activity avoidance and 51% had fear of falling as well as 49% of the sample had falls and near falls in past 6 months (Figure 2).

Out of a possible 16 common medical conditions (e.g., diabetes, hypertension), 19 samples had more than 5 conditions and 29% said they used a walking aid. Thirty six percent of the samples who did not had the history of fall also had falls or near falls in the last 6 months. Among the participants, 78% of them were taking regular medications for any of their chronic health conditions, 171 of them had anyone form of vision impairment and 35% had hearing problems. The use of regular medications by the older adults is shown in Figure 3. Overall, the most frequently avoided activity among the participants who had the fear of falling as per mSAFFE was “Go to a place with crowds” (83%).

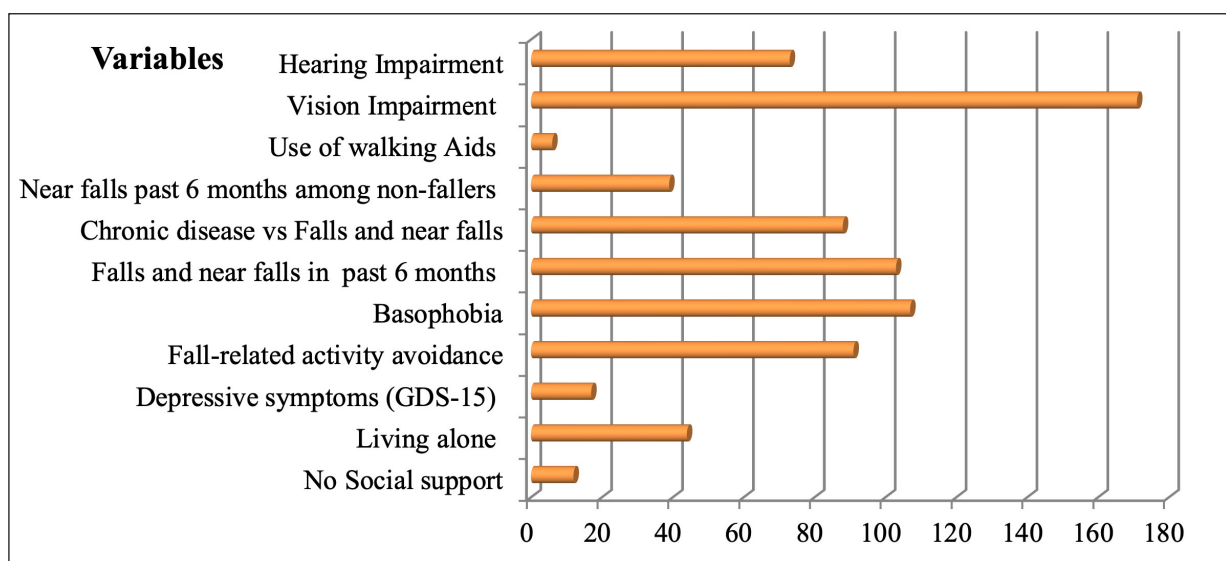


Figure 2. The variables related to basophobia, falls and activity avoidance.

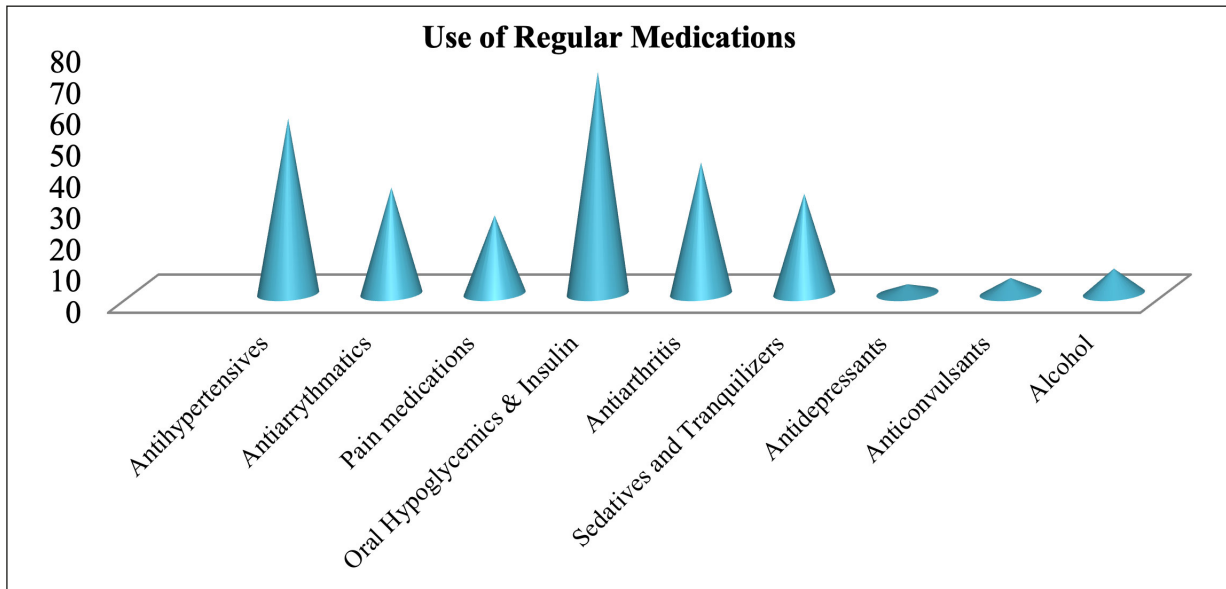


Figure 3. Use of regular medications by the older adults.

The fall-related activity avoidance according to falls history and near falls, fear of falling and chronic disease differed significantly ($p < 0.001$) among the participants (Table II). Subsequent Mann-Whitney tests (Bonferroni correction criterion of $p = 0.025$) showed that fall related activity avoidance was significantly high among the

recurrent fallers. The older adults with basophobia reported significantly more fall-related activity avoidance than those without that, which is shown as the median mSAFFE score of 19 and 30, respectively ($p < 0.001$). The adults who had a greater number of chronic illnesses had greater activity avoidance ($p < 0.001$).

Table II. Fall-related activity avoidance according to a history falls and near falls, basophobia and chronic diseases (N=210).

Variables	Fall-related activity avoidance			
	mSAFFE		Binary question (yes)	
	Median	p	n (%)	p
History of fall and near falls past 6 months		<0.001*		<0.001*
Single fall, n=43	25 (17-31)		21 (23)	
Recurrent falls (>1), n=60	28 (22-35)		43 (47)	
Basophobia		<0.001		<0.001
No, n=103	19 (17-22)		47 (52)	
Yes, n=107	30 (23-35)		44 (48)	
Falls and near falls past 6 months in relation to Chronic disease		<0.001**		<0.001**
I. 2-3 conditions: n=79	18 (37)		12 (13)	
II. 3 -5 conditions: n=62	31 (43)		17 (19)	
III. >5 conditions: n=39	39 (67)		31 (43)	

mSAFFE (modified Survey of activities and fear of falling in the older adults, 17-51, higher = greater avoidance). *Apart from single fall for mSAFFE and single fall-recurrent fall for binary question, all successive unpaired correlations revealed a statistically significant difference (Bonferroni correction criterion of $p = 0.025$). **With the exception of I-II for mSAFFE and I-II and I-III for the binary question, all successive unpaired correlations revealed a statistically significant difference (Bonferroni correction criterion of $p = 0.0083$).

Table III. Regression for covariates of basophobia and activity avoidance as per mSAFFE.

	R ²	B	SE B	β (beta)
Demographics data	0.022			
Age		-0.07	0.19	-0.129*
Sex		0.81	0.36	0.083
Education		0.208	0.17	0.02
Social support		-0.14	0.12	-0.05*
Living alone		0.312	0.42	0.04*
Chronic Disease Status	0.032			
I. 2 - 3 conditions		-0.27	0.37	-0.02
II. 3 - 5 conditions		-1.12	0.314	-0.12*
III. >5 conditions		-0.64	0.27	-0.08*
Depressive symptoms		0.51	0.11	0.09*
Use of walking Aids		0.13	0.13	0.02
Vision Impairment		-0.71	0.29	-0.79*
Hearing Impairment		0.223	0.16	0.57
Fear of falling		-1.38	0.117	-0.26*
Regular medication Use	0.0152			
Antihypertensives		-0.83	0.24	-0.11*
Antiarrhythmics		0.172	0.29	0.03
Pain medications		0.86	0.15	0.187
Oral hypoglycemics and insulin		0.13	0.169	0.057*
Anti-arthritis		-0.579	0.271	-0.91
Sedatives and tranquilizers		-1.13	0.236	-0.37*
Antidepressants		-0.87	0.204	-0.06
Anticonvulsants		-0.08	0.204	-0.016
Alcohol		0.397	0.815	0.041

**p*<0.05 significant; R²-coefficient of determination; B-the unstandardized beta; SE B-standard error for the unstandardized beta.

The regression model to predict the demographic variables was statistically significant at R=0.176, R²=0.0217, F=2.78, *p*=0.05. Among the predictor variables, age (β=-0.129, *t*=-3.14, *p*<0.001), social support (β=-0.05, *t*=-2.414, *p*<0.01), and living alone (β=0.04, *t*=3.63, *p*<0.01) were significant. When keeping other demographic characteristics constant, every 10 years of increment in age increases the activity avoidance by 0.07, and people living alone and has less social support been avoiding the fall related activity. (Table III)

The chronic disease status model was statistically significant at R=0.22, R²=0.0318, F=5.16, *p*=0.05. Among the covariates, people with more than 3-5 chronic conditions (β=-0.02, *t*=-2.13, *p*<0.01), with depressive symptoms (β=0.09, *t*=3.106, *p*<0.01), vision impairment (β=-0.05, *t*=-3.64, *p*<0.001), and basophobia (β=-0.05, *t*=-2.32, *p*<0.021), were significantly associated with the activity avoidance.

The regular usage of medications model shows significant differences in predicting the covariates related to drugs and activity avoidance at R=0.493,

R²=0.0231, F=39.16, *p*=0.05. The antihypertensives (β=-0.11, *t*=- 3.256, *p*<0.001), oral hypoglycemics and insulin (β=0.057, *t*=5.61, *p*<0.001), and sedatives and tranquilizers (β=- 0.37, *t*=-10.15, *p*<0.001) as well as those who were taking the combination of 3-4 medications had higher basophobia and activity avoidance (Table III). The covariates as per the final simultaneous regression analysis model were age (β=-0.129, CI=-0.087 to -0.019), having more chronic health conditions (β=-0.086, CI=-1.41 to -1.182), depressive symptoms (β=-0.09, CI=-0.089 to -0.189), vision impairment (β=-0.075, CI=-1.28 to -1.56), fear of falling (β=-0.26, CI=-0.059 to -0.415) taking regular antihypertensives (β=-0.096, CI=-1.21 to -1.56), oral hypoglycemics and insulin (β=-0.17, CI=-0.442 to -0.971), sedatives and tranquilizers (β=-0.37, CI=-1.32 to -1.73). This was statistically significant at R=0.521, R²=0.218, F=38.26, *p*<0.001 indicating that 31% of variance in the basophobia related activity avoidance covariates which indicate that these are strongly associated with the avoidance of activity by the older adults (Table IV).

Table IV. The final simultaneous regression analysis (n=210).

	R ²	B (95% CI)	SE B	β
Demographics data	0.31			
Age		-0.051 (-0.087, -0.019)	0.019	-0.129*
Social support		0.43 (-0.07, 0.101)	0.128	0.05
Living alone		0.312 (0.441, 1.031)	0.42	0.04
Chronic Disease Status				
II. 3 - 5 conditions		-1.16 (-0.051, 0.41)	0.217	-0.012
III. >5 conditions		-0.67 (-1.41, -1.182)	0.207	-0.086*
Depressive symptoms		0.71 (-0.89, -0.189)	0.21	0.09*
Vision Impairment		-0.73 (-1.28, -1.56)	0.38	-0.075*
Fear of falling		-0.078 (-0.059, 0.415)	0.231	-0.26*
Regular medication Use				
Antihypertensives		-0.803 (-1.21, -1.56)	0.241	-0.096*
Oral hypoglycemics and insulin		0.137 (0.442, 0.971)	0.19	0.17*
Sedatives and tranquilizers		-1.43 (-1.32, -1.73)	0.136	-0.37*

*: $p < 0.05$ significant; CI-Confidence Interval.

The fall related activity avoidance was strongly associated with the regular intake of antihypertensives ($p < 0.001$), oral hypoglycemics and insulin ($p < 0.01$) and with sedatives and tranquilizers ($p < 0.001$) even after adjustment for potentially confounding variables such as age, history of medication uses among the older adults (Table V).

Discussion

Due to the evolution of life, ageing makes lots of changes in the motor symptoms of the older adults which leads to retropulsion (gravity center kept backward), posterior instability (tendency to fall backward) and both leading to postural compensation (knees/hips kept flexed and bend forward). Due to the typical anterior/flexed posture, sitting, walking and changes in gait becomes inevitable. This eventually leads to neurological

signs, such as alteration or absence of postural adaptation, present with anxiety/phobia of verticality (afraid to stand up), and loose self-confidence/self-esteem. In addition, the chronic medications make them more prone for the falls, fear of falls and activity avoidance. Hence, this study was undertaken to assess the effect of chronic medications on the empowerment of older adults.

The response rate of this survey was 94.3% with 198 participants completed the survey. The incidence of falls and near falls in past 6 months among older adults was found to be 49% in this study; however, various studies²⁸⁻³¹ conducted in India revealed that the prevalence ranging from 14 to 53%.

According to a study¹⁶ on older adults, who had history of falls have reported basophobia prevalence rates of 32-83% whereas it was only 33-46%, who had not fallen. In the current study, 51% of subjects had basophobia and 49% had falls or near falls in the previous 6 months, which is

Table V. Multiple regression analysis of the relationship of the use of chronic medications and age with fall related Activity Avoidance.

Dependent Variable	Independent Variables	Anti-Hypertensives			Oral hypoglycaemics and Insulin			Sedatives and Tranquilizers		
		R ²	β	p	R ²	β	p	R ²	β	p
Fall related Activity Avoidance	Age	21.8 (0.89)	18.9	0.13	23.1 (1.63)	6.7	0.81	22.1 (0.98)	5.8	0.38
	History of Medication use	29.3 (1.8)	17.5	<0.001	23.4 (0.47)	5.1	<0.01	31.6 (0.83)	9.1	<0.001

*: $p < 0.05$ significant.

consistent with previous reports, but it was slightly higher than the 44.2% reported in a hospital-based study¹⁴. Analogously, a study¹⁵ on older Indian adults found that the prevalence of fear of falling was 38.4% in older adults. This suggests that the basophobia can develop in older adults with or without a history of falls and there is a need to do extensive research on the other predisposing factors such as use of chronic medications.

This study found no gender difference between fallers and non-fallers, which is consistent with the results of a study³² but in contrast with another study³³. Among the study participants, 8% of them had depressive symptoms, 19% of them have more than 5 chronic health issues and 29% of older adults said they used a walking aid, 78% of them were taking regular medications, 171 of them had vision impairment and 35% had hearing problems. Similar findings were reported that of the eight factors identified, depression and anxiety scores were the two most significant indicators of chronic dizziness, which was associated with fear of falling. Fallers who were afraid of falling were significantly more likely to score above 11 on the Geriatric Depression Scale. Fear of falling is also more common in people who had a history of neurological issues (such as stroke and Parkinson's disease), heart problems, cataracts/glaucoma, visual and intellectual impairments, arthritis, osteoporosis, and acute illness^{34,35}. The majority of older people who start an exercise program cease after six months. As a result, motivation, and social support like verbal encouragement as well as participation from family members or other supportive individuals as per the theory of planned behavior is essential to enhance the mood of the depressed elderly³⁶⁻³⁸.

These medical conditions impair balance and work efficiently, heightening the individual's fear of falling which may hamper the older adults' participation in personal and social activities and reduces their quality of life and increases the risk of successive falls. It highlights the significance of improving the indoor exercise or activity enhancing ambience for the older adults at home as well as in any institution where they are living.

The regression analysis found the significant covariates of evolving basophobia (older age, female gender, more chronic diseases, regular use of medications, depression, vision impairment, taking regular antihypertensives, oral hypoglycemics and insulin, sedatives and tranquilizers and a history of falls) have more significant ramifications for primary prevention strategies. Attempts

to reduce the number of drugs evaluate and treat depression, may reduce further fall risk and risk of developing basophobia³⁹.

The most significant finding of the study reveals that there is no significant relationship with the age and fall related activity avoidance when the age and medication use was kept as independent variables. Nevertheless, the fall related activity avoidance was strongly associated with the use of antihypertensives, ($p < 0.001$), oral hypoglycemics and insulin ($p < 0.01$) and sedatives and tranquilizers ($p < 0.001$) (Table IV). This strongly suggests that the older adults are confident in doing the activities and the age is not the covariate for the basophobia and its related activity avoidance. This may be due to the side effects of the above medications; they get fear of falling and intentionally avoid the activity which is consistent with the findings of a meta-analysis⁴⁰ that nine distinct drug classes have been linked to falls, including sedatives, hypnotics, antidepressants, and benzodiazepines among which the use of antidepressants was the most strongly linked to falls. In a recent prospective cohort study⁴¹ a significant reduction in falls, was demonstrated with withdrawal (discontinuation or dose reduction) of cardiovascular drugs as antihypertensives significantly increase falls⁴². A review of the safety of drug withdrawal in the older adults revealed that withdrawal from cardiovascular and psychotropic drugs can be done safely with adequate follow-up⁴³.

Risk factors must be identified to develop an effective fall prevention program. Several drugs, known as "fall risk increasing drugs", have been linked to an increased risk of falling due to its adverse drug reactions (ADRs). Because usage of drugs is one of the modifiable risk factors, a fall prevention program should include a periodic drug review for older adults. According to the present study results, may be these ADRs, is one of the reasons that the older adults for staying indoors and avoiding activity rather than physically/ socially active. Hence, the inclination to treat the older adults, in this regard, as homogeneous group, will be a misjudgment.

The primary prevention strategies to avoid falls, basophobia and activity avoidance are periodic drug review, reducing or titrating the drug dosage, treatment of vision impairment, educating and developing confidence among older adults with more chronic illnesses and regular medications. Also, raising awareness about the ADRs as well as modifications to wet floors like toilet/bathroom may benefit Indian older adults by lowering their risk

of falling⁴⁴. To decrease the dependence on drugs, strategies such as cognitive behavioral therapy, regular physical activity such as yoga, meditation and sleep hygiene, may help. Activities to improve lower limb strength, balance, stability, and endurance, or Tai Chi exercises^{45,46} to improve lower leg quality, walking speed, adjust control, and physical capacity are essential.

Interventions of several kinds may be used in rehabilitation programs such as single-intervention strategies, which include aerobic exercise, cognitive behavioral therapy, occupational therapy, stopping the prescription of psychoactive medications, prescribing vision or hearing aids, and podiatric therapies. Elderly fall management requires the use of multi-component treatments (MCIs). MCIs are individualized interventions with the goals of reducing the risk of falls and sequelae and providing each patient with a comprehensive evaluation^{47,48}. Rehabilitative outcomes for older patients are typically worse than for subjects who are younger. This is because of a number of factors, including a decreased functional, physical, and cognitive reserve, a higher prevalence of multimorbidity, and the use of many medications^{49,50}.

Conclusions

In conclusion, falls, basophobia and its related activity avoidance are common, significant, and plausibly preventable in older adults who live in the community. Each of this factor such as falls, basophobia and its related activity avoidance is a significant predictor for the other – anyone who has one of them is at risk of developing the other. This, in turn, may set in a “vicious cycle” of falls, basophobia, and the numerous negative outcomes that can result, such as functional impairment, a decrease in quality of life, and hospitalization. Therefore, the information about drug reactions, influence of chronic diseases, and preventive strategies must be available in the community to reinforce their confidence and handle basophobia and activity avoidance.

Ethics Approval

Institution Ethical Committee of Lourde College of Nursing gave an ethical clearance with IEC/LCN/2021-12 dated 28.06.2021.

Informed Consent

Written informed consent was obtained from the participants of the study to publish this paper.

Data Availability

The data presented in this study is available on request from the corresponding author.

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Authors' Contributions

All authors have read and agreed to the published version of manuscript. MHA & FAZ: conceptualization, analysis, methodology, project administration, resources, software, supervision, validation, visualization, writing - original draft writing - review and editing. AER, HMM & ELS: data curation, formal analysis, methodology, project administration, validation, writing Original Draft. KP, NH & EV : data curation, formal analysis, Methodology, project administration, resources, writing review and editing. VVP & AH: Software, supervision, data curation validation writing - review and editing.

Conflict of Interest

There are no conflicts of interest.

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References

- 1) Tinetti ME, Mendes de Leon CF, Doucette JT, Baker DI. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *J Gerontol* 1994; 49: 140-147.
- 2) Jefferis BJ, Iliffe S, Kendrick D, Kerse N, Trost S, Lennon LT, Ash S, Sartini C, Morris RW, Wanamethee SG, Whincup PH. How are falls and fear of falling associated with objectively measured physical activity in a cohort of community-dwelling older men? *BMC Geriatr* 2014; 14: 114-122.
- 3) Birhanie G, Melese H, Solomon G, Fissaha B, Teferi M. Fear of falling and associated factors among older people living in Bahir Dar City, Amhara, Ethiopia- a cross-sectional study. *BMC Geriatr* 2021; 21: 586-596.
- 4) Abyad A, Hammami SO. Fear of Falling in the Elderly - an Emerging Syndrome. *Middle East J Age Ageing* 2017; 14: 16-25.
- 5) Tanjani PT, Ainy E, Akbarpuor S, Soori H. Study of characteristics of falls among Iranian elders. *Saf Promot Injury Prev* 2015; 2: 313-320.

- 6) Lach HW. Incidence and risk factors for developing fear of falling in older adults. *Public Health Nurs* 2005; 22: 45-52.
- 7) Scheffer AC, Schuurmans MJ, Van Dijk N, Van Der Hooft T, De Rooij SE. Fear of falling: measurement strategy, prevalence, risk factors and consequences among older persons. *Age Ageing* 2008; 37: 19-24.
- 8) Tomlinson J, Marques I, Silcock J, Fylan B, Dyson J. Supporting medicines management for older people at care transitions - a theory-based analysis of a systematic review of 24 interventions. *BMC Health Serv Res* 2021; 21: 890.
- 9) Murphy, SL, Dubin JA, Gill TM. The development of fear of falling among community-living older women: Predisposing factors and subsequent fall events. *J Gerontol A Biol Sci* 2003; 58: 943-947.
- 10) 2021 Profile of Older Americans-Publication Date: November 2022. Available from: https://acl.gov/sites/default/files/Profile%20of%20OA/2021%20Profile%20of%20OA/2021ProfileOlderAmericans_508.pdf
- 11) World Population Ageing 2019 Highlights - Department of Economic and Social Affairs Population Division: ST/ESA/SER.A/430, United Nations New York, 2019. Available from: <https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf>
- 12) Agarwalla R, Saikia AM, Pathak R, Islam F, Borah M, Parashar M. A cross sectional study on assessment of falls in community dwelling elderly of Assam. *Natl J Community Med* 2016; 7: 368-371.
- 13) World Health Organization. WHO Global Report on Falls Prevention in Older Age. Available from: http://www.who.int/ageing/publications/Falls_prevention7March.pdf.
- 14) Kumar S, Vendhan G, Awasthi S, Tiwari M, Sharma VP. Relationship between fear of falling, balance impairment and functional mobility in community dwelling elderly. *Indian J Phys Med Rehabil* 2008; 19: 48-52.
- 15) Sebestina AD, Shringarpure A, Karol J. Circumstances and consequences of falls in Indian older adults. *Indian J Occup Ther* 2008; 40: 1-11.
- 16) Tomlinson J, Silcock J, Smith H, Karban K, Fylan B. Post-discharge medicines management: the experiences, perceptions and roles of older people and their family carers. *Health Expect* 2020; 23: 1603-1613.
- 17) Howland J, Lachman ME, Peterson EW, Cote J, Kasten L, Jette A. Covariates of fear of falling and associated activity curtailment. *Gerontologist* 1998; 38: 549-555.
- 18) Zijlstra R, van Haastregt J, Ambergen T, van Rossum E, van Eijk JTM, Tennstedt SL, Kempen GJ. Effects of a multicomponent cognitive behavioral group intervention on fear of falling and activity avoidance in community-dwelling older adults: results of a randomized controlled trial. *Am Geriatr Soc* 2009; 57: 2020-2028.
- 19) Greenberg, Sherry A. Fear of Falling Among High-Risk, Urban, Community-Dwelling Older Adults. University of Pennsylvania 2014; 1295. Available from: <https://repository.upenn.edu/edissertations/1295>
- 20) Ministry of Social Justice and Empowerment, Government of India. National Policy for Senior Citizens; 2011. Available from: <http://www.socialjustice.nic.in/writereaddata/UploadFile/dnp-sc.pdf>
- 21) Government of India Ministry of Statistics and Programme Implementation, Central Statistics Office. Elderly in India; 2016. Available from: http://www.mospi.nic.in/sites/default/files/publication_reports/ElderlyinIndia_2016.pdf
- 22) Dsouza SA, Rajashekar B, Dsouza HS, Kumar KB. Falls in Indian older Adults: A barrier to active ageing. *Asian J Gerontol Geriatr* 2014; 9: 33-40.
- 23) Stewart Williams J, Kowal P, Hestekin H, O'Driscoll T, Peltzer K, Yawson A, Biritwum R, Maximova T, Salinas Rodríguez A, Manrique Espinoza B, Wu F, Arokiasamy P, Chatterji S. Prevalence, risk factors and disability associated with fall related injury in older adults in low and middle income countries: Results from the WHO study on global ageing and adult health (SAGE). *BMC Med* 2015; 13: 147-158.
- 24) de Jong MR, Van der Elst M, Hartholt KA. Drug-related falls in older patients: implicated drugs, consequences, and possible prevention strategies. *Ther Adv Drug Saf* 2013; 4: 147-154.
- 25) Leipzig R, Cumming R, Tinetti M. Drugs and falls in older people: a systematic review and meta-analysis: I. Psychotropic drugs. *J Am Geriatr Soc* 1999; 47: 30-39.
- 26) Lachman ME, Howland J, Tennstedt S, Jette A, Assmann S, Peterson EW. Fear of falling and activity restriction: The survey of activities and fear of falling in the elderly (SAFE). *J Gerontol B Psychol Sci Soc Sci* 1998; 53: 43-50.
- 27) Almeida OP, Almeida SA. Short versions of the geriatric depression scale: a study of their validity for the diagnosis of a major depressive episode according to ICD-10 and DSM-IV. *Int J Geriatr Psychiatry* 1999; 10: 858-865.
- 28) McCarthy K, Ward M, Romero Ortuño R, Kenny RA. Syncope, Fear of Falling and Quality of Life Among Older Adults: Findings from the Irish Longitudinal Study on Aging (TILDA). *Front Cardiovasc Med* 2020; 7: 7.
- 29) Saikia Ashok M, Das AK, Saikia Anjana M. Prevalence and correlates of falls among community-dwelling elderly of Guwahati city, Assam. *Indian J Basic Appl Med Res* 2016; 5: 185-190.
- 30) Mane AB, Sanjana T, Patil PR, Srinivas T. Prevalence and correlates of fear of falling among elderly population in urban area of Karnataka, India. *J Midlife Health* 2014; 5: 150-155.
- 31) Friedman SM, Munoz B, West SK, Rubin GS, Fried LP. Falls and fear of fall-ing: Which comes first? A longitudinal prediction model suggests

- strategies for primary secondary prevention. *J Am Geriatr Soc* 2002; 50: 1329-1335.
- 32) Talarska D, Strugała M, Szewczyk M, Tobias S, Michalak M, Wróblewska I, Wieczorowska-Tobis K. Is independence of older adults safe considering the risk of falls? *BMC Geriatr* 2017; 17: 66.
 - 33) Pereira CLN, Vogelaere P, Baptista F. Role of physical activity in the prevention of falls and their consequences in the elderly. *Eur Rev Aging Phys Act* 2008; 5: 51-58.
 - 34) Fletcher PC, Hirdes JP. Restriction in activity associated with fear of falling among community-based seniors using home care services. *Age Ageing* 2004; 33: 273-279.
 - 35) Andersson AG, Kamwendo K, Appelros P. Fear of falling in stroke patients: relationship with previous falls and functional characteristics. *Int J Rehabil Res* 2008; 31: 261-274.
 - 36) Jancey J, Lee A, Howat P, Clarke A, Wang K, Shilton T. Reducing Attrition in Physical Activity Programs for Older Adults. *J Aging Phys Act* 2007; 15: 152-165.
 - 37) Lucidi F, Grano C, Barbaranelli C, Violani C. Social-Cognitive Determinants of Physical Activity Attendance in Older Adults. *J Aging Phys Act* 2006; 14: 344-359.
 - 38) Yardley L, Donovan-Hall M, Francis K, Todd C. Attitudes and Beliefs That Predict Older People's Intention to Undertake Strength and Balance Training. *J Gerontol B Psychol Sci Soc Sci* 2007; 62: 119-125.
 - 39) Patil SS, Suryanarayana SP, Dinesh R, Shivraj NS, Murthy NS. Risk factors for falls among elderly: A community-based study. *Int J Health Allied Sci* 2015; 4: 135-140.
 - 40) Woolcott JC. Meta-analysis of the Impact of 9 Medication Classes on Falls in Elderly Persons. *Arch Intern Med* 2009; 21: 169.
 - 41) van der Velde N, Stricker B, Pols H, van der Cammen T. Risk of falls after withdrawal of fall-risk-increasing drugs: a prospective cohort study. *Br J Clin Pharmacol* 2007; 63: 232-237.
 - 42) Bergland A, Wyller TB. Risk factors for serious fall related injury in elderly women living at home. *Inj Prev* 2004; 10: 308-313.
 - 43) Iyer S, Naganathan V, McLachlan A, Le Couteur D. Medication withdrawal trials in people aged 65 years and older: a systematic review. *Drugs Aging* 2008; 25: 1021-1031.
 - 44) Lord SR, Menz HB, Sherrington C. Home environment risk factors for falls in older people and the efficacy of home modifications. *Age Ageing* 2006; 35: 55-59.
 - 45) Brouwer B, Musselman K, Culham, E. Physical function and health status among seniors with and without a fear of falling. *J Gerontol* 2004; 50: 135-141.
 - 46) Warr P, Butcher V, Robertson I. Activity and psychological well-being in older people. *Aging Ment Health* 2004; 8: 172-183.
 - 47) Guirguis-Blake JM, Michael YL, Perdue LA, Coppola EL, Beil TL. Interventions to Prevent Falls in Older Adults: Updated Evidence Report and Systematic Review for the US Preventive Services Task Force. *JAMA* 2018; 319: 1705-1716.
 - 48) Giovannini S, Onder G, van der Roest HG, Topinkova E, Gindin J, Cipriani MC, Denking MD, Bernabei R, Liperoti R. SHELTER Study Investigators. Use of antidepressant medications among older adults in European long-term care facilities: A cross-sectional analysis from the SHELTER study. *BioMed Cent Geriatr* 2020; 20: 310.
 - 49) Onder G, Giovannini S, Sganga F, Manes-Gravina E, Topinkova E, Finne-Soveri H, Garms-Homolová V, Declercq A, van der Roest HG, Jónsson PV. Interactions between Drugs and Geriatric Syndromes in Nursing Home and Home Care: Results from Shelter and IBenC Projects. *Aging Clin Exp Res* 2018; 30: 1015-1021.
 - 50) Sherrington C, Fairhall NJ, Wallbank GK, Tiedemann A, Michaleff ZA, Howard K, Clemson L, Hopewell S, Lamb SE. New Cochrane Review Assesses the Benefits and Harms of Exercise for Preventing Falls in Older People Living in the Community. *Saudi Med J* 2019; 40: 204-205.