A study on burden of falls and associated factors among elderly in a rural block of Tamil Nadu

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University Registration no. 201725054

Certificate

I hereby declare that this dissertation titled 'A study on burden of falls and associated factors among elderly in a rural block of Tamil Nadu' is a bona fide record of my original research. It has not been submitted to any other university or institution for the award of any Degree or Diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.

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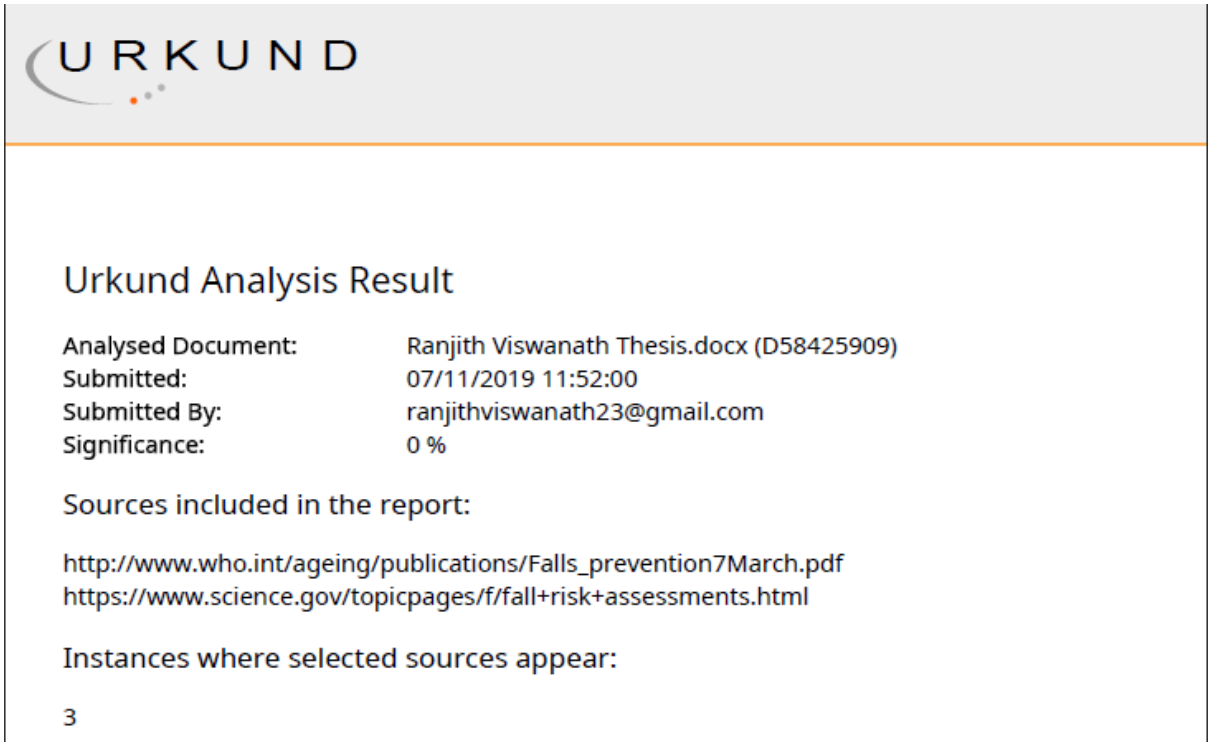

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ACRONYMS

CI- Confidence interval

CHAD- Community Health and Development

CMC- Christian Medical College Vellore

DALY- Disability Adjusted Life Years

HA- Health Aid

ICD- International Classification of Diseases

INR- Indian Rupee

LMIC- Low and Middle Income countries

MMSE- Mini-Mental Status Examination

OR- Odds Ratio

PTCHW- Part Time Community Health Worker

SD- Standard Deviation

STEADI- Stopping Elderly Accidents, Deaths and Injuries

UK- United Kingdom

USA- United States of America

WHO- World Health Organization

SES- Socioeconomic Status

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1. Introduction

Falls are a major problem among the elderly causing increased morbidity and mortality. As a consequence of falls, the elderly are prone to physical injuries, psychological difficulties and social isolation.

The World Health Organisation global report on falls defines falls as “inadvertently coming to rest on the ground, floor or other level, excluding intentional change in position to rest in furniture, wall or other object” (1). A fall can be regarded as one of the external causes of unintentional injury.

Every year an estimated 646,000 deaths occurs due to Falls, making it the second leading cause of death due to unintentional injury, after road traffic accidents. Adults older than 65 years of age are more prone for fatal falls (2).

Over 80% of fall-related fatalities occur in low and middle income countries (LMICs), with regions of the South East Asia and Western Pacific accounting for 60% of these deaths. Though not fatal, approximately 37.3 million falls are severe enough to require medical attention every year. Such falls are responsible for over 17 million disability-adjusted life years (DALYs) lost worldwide (2).

As the world population grows, longevity of the elderly which has been looked upon as the result of technological advancement can now become a burden to many societies (3). As a result of decrease in mortality rates there is an increase in life expectancy, which in turn causes more people living to enter the old age. Investments in sectors like health and nutrition have led to reduction in mortality rates (4). Ageing

is a global burden that does not just have an impact on the elderly. Worldwide the elderly population are on the rise. According to data from World Population Prospects: the 2017 revision, the population of those aged 60 years or over is expected to be more than double by the year 2050 and to triple by the year 2100. The ageing population will increase from 962 million globally in 2017 to 2.1 billion in 2050 and 3.1 billion in 2100 (5).

India's population of 1.31 billion, the second largest globally, comprises 17% of the world's total population(United Nations 2015), and the United Nations Population Division estimates that India's population will in fact overtake China's by 2028. As India's population grows, its expanding share of older adults is particularly notable. Currently, the growth rate of the number of older individuals (age 60 and older) is three times higher than that of the population as a whole (6).

In India the demographic profile is evolving due to these new trends. It is estimated that the population of elderly in India which was 8% in 2015 is expected to rise to 19% of the total population by the year 2050 (7).

Ageing can be a positive experience only if there is active participation by the community to provide social support and good health to the individual. In view of this, the World Health Organisation had adopted the theme 'Active ageing: Good health adds life to years' in the year 2012. The theme focussed on activities and campaigns throughout the world giving emphasis on ageing and health, and also raising awareness of what individuals and governments can do to promote active and healthy ageing (8).

A country is considered as ‘ageing’ when seven percent of the population are aged 60 years and above. India crossed this limit in 2000 and by 2025 it is expected to reach 12.6 percent. This highlights the importance of India’s progression from a young nation to an older nation (9).

The ageing population of India presents with many challenges. Around eighty percent of them live in a rural setting making the healthcare services a major challenge. About fifty percent of the elderly population comprises mainly of females who are at a higher risk for falls. About thirty percent of the elderly population are below the poverty line and are hence at risk of not getting adequate medical care in case they fall. Hence there is an urgent requirement for policy making to avoid dependency of elders (10). The current study is a cross sectional study that aims to estimate the burden of falls among elderly and to identify the association of various risk factors for falls and the impact of falls, among elderly in a southern Indian population. With the results of the study, we hope to provide critical inputs for targeted strategies towards prevention of falls and fall related injuries and hence lessen the associated burden among the vulnerable elderly population.

2. Justification

Around the world there has been an alarming rise in the elderly population due to improvement in technology resulting in increase in human longevity over the years. Considering that the elderly will form a major proportion of the population in the future it is essential to keep them healthy and active and since Global reports shows that one of the major cause of injuries is falls (1), it is necessary to create policies to prevent falls in order to reduce injuries (11).

In 2002, the United Nation convened the Second World Assembly on Ageing in Spain. It had recommended policies to reduce ill health among elders as a major objective. One of the methods to attain this objective is to prevent unintentional injuries by creating fall prevention programmes (12).

Moreover it is also shown that effective measures to prevent falls can be done only by understanding the causes and risks which are multifactorial in nature (13).There is a wide discrepancy between the burden of years lived with disability (YLDs) due to fall among elderly between developed countries (34%) and developing countries(66%)(14).

This could be attributed to the fact that developing countries are facing rapid population ageing where almost 70% of the world's elder population live (15). Whereas in developed countries like the United States (16) and Canada (17), fall prevention strategies have already been implemented. Even though there are many low cost interventions on fall prevention which have been identified, these are mainly implemented in high income countries. In developed countries there is lack of data

and resources to develop fall prevention programs necessary for policy making and hence urgent epidemiological research is required in this field to identify determinants and risk factors contributing to fall related injury (14).

Hence there is a need for research to ascertain the associative factors contributing to falls so that they can be prevented or reduced. It is indeed more important to consider this aspect amongst the elderly as they are more affected by the consequences and complications of falls when compared to the rest of the population.

Prevention of falls is one of the major issues that require adequate consideration at present. The Community Health Department of Christian Medical College, Vellore at present has programs for elderly which include elderly day care centres at two villages Salmanatham and Mottupalayam in Kaniyambadi block with a total population of 1,16,056 and the elderly contribute 14.4% of the total population. At these centres the elderly come for recreational activities and are given health education on medical issues by health aides. Occupational therapy services are also provided by the community health department as part of their primary and secondary healthcare services for elderly. This study would help in identifying those elderly who are at risk of future falls in these villages by using the STEADI Tool for assessing risk of falls. The study will help to identify high risk population who are vulnerable to falls and help in planning interventions to reduce the burden associated with falls in the eldelrly.

3. Objectives

1. To estimate the incidence of falls among elderly (aged 60 years and above) in Kaniyambadi block of Vellore district during the period April 2019 to August 2019.

2. To categorize the elderly population of Kaniyambadi block into various risk categories in terms of experiencing falls in the future.

3. To study the factors associated with falls among elderly in Kaniyambadi block of Vellore district.

4. Literature review

4.1 FALLS: AN EMERGING PROBLEM AMONG THE ELDERLY

Falls are one of the major problems among the older people and considered as one of the “Geriatric Giants”. The earliest published studies on falls were mostly retrospective in design in that they asked the participants whether and/or how many times they fell in a past period – usually 12 months. This approach had only limited accuracy in remembering falls over such a long period. Recent studies have utilized prospective designs, in which subjects are followed up for a period, again usually 12 months, to estimate the incidence of falling. However all these studies indicate a causal process for falls and that they do not occur merely by chance (18). A drastic increase of 300% in pertinent publications dealing with this issue between 1985 and 2005 reflects the magnitude of the problem (19). According to WHO, a fall is an event which results in an individual coming to rest inadvertently on the ground or floor or other lower level (20).

The World Health Organization (WHO) has specified that falls are the second leading cause of deaths due to unintentional injury worldwide. It has also been identified that people above 65 years suffer a greater number of fatal falls and that 80% of fall deaths occurred in low and middle-income countries. The financial losses from fall-related injuries are substantial. The average health care costs per fall for elderly patients who were above 65 years in Finland and Australia were estimated to be above US $ 3,611(200,000 INR) and US $ 1,049(70,000 INR) respectively. This is attributed to

the debilitated state of elderly patients following a fall thus necessitating long term care and sometimes even institutionalisation (20).

Nationally representative standardized data obtained from adults aged 50 years and over who took part in the World Health Organization (WHO) Study on global AGEing and adult health (SAGE) from the year 2010 revealed that falls (excluding road traffic accidents) were accountable for 77% and 85% of years lived with disability (YLDs) in the age group 50-69 and 70 and above respectively. The burden of YLDs in this age group was 66% in developing nations compared to 34% in developed countries. This variation is expected to increase due to two main reasons. The first reason being the rapidly aging population in developing countries while the second reason being the effective fall prevention plans that have been executed in developed countries. Many of the interventions effectuated in developed countries to limit falls are low cost and feasible that can be adopted by LMICs. There is a dearth of epidemiological data on falls in these countries and since the ageing population is on the increase, this is an urgent public health issue needing attention (14). While implementing a program for falls certain aspects need to be considered.

Firstly, the means of defining and classifying fall. Secondly, detailing the prevalence of fall and its relevance with respect to time and place. Thirdly, the reasons for fall, whether due to intrinsic or extraneous causes. Lastly, the impact and consequences following a fall (21). Each of these elements need to be analysed in detail to compare and comprehend the cause of fall among elders, which in turn will help us to judge the severity of the problem and plan interventional strategies needed to subdue it. Community-based falls surveillance and registry systems should be set up to better

understand the nature, prevalence and the trends of unintentional injuries at the state and national level in India.

4.2 DEFINITION OF FALL

The meaning of the term fall is easily understood but when it comes to providing a scientific definition for fall, it becomes complicated. Though various studies have analysed fall prevalence, most of the authors have not stated the definition of fall as there is no single precise definition for fall. This could be one reason for the huge difference in the prevalence of fall reported by different studies (21).It is encoded as E880-E888 according to the International Classification of Diseases-9(ICD-9), and as W00-W19 in ICD-10. These codes include a wide assortment of falls including falls on the same level, upper level, and other unspecified fall.

Kumar et al. in their study employed a simple definition of fall where they stated it as voluntary change in position not due to overwhelming process like trauma, syncope and seizure and designated it as recurrent fall if two or more falls occurred in the past 6 months (22). According to the report of the Kellogg International Work Group on the prevention of falls by the elderly conducted in 1987, a fall is defined as 'unintentionally coming to the ground or some lower level and other than a consequence of sustaining a violent blow, loss of consciousness, sudden onset of paralysis as in stroke or an epileptic seizure' (23).

Buchner et al. in their study conducted in Seattle among elderly aged 68-85 in 1993, defined it as losing your balance such that your hands, arms, knees, buttocks or body touch or hit the ground or floor (24). The FISCIT (Frailty and Injuries: Co-operative

Studies of Intervention Techniques trial) done in 1993 define fall as unintentionally coming to rest on ground, floor or other lower level; excludes coming to rest against furniture, wall, or other structure (25). Tideiksaar in his study done conducted in 2002 defined it as “any event in which a person inadvertently or intentionally comes to rest on the ground or another lower level such as a chair, toilet or bed.” (26).WHO defines a fall as an event which results in an individual coming to rest inadvertently on the ground or floor or other lower level (20).

4.3 EPIDEMIOLOGY OF FALLS

Falls are considered a major threat and a leading cause for morbidity and mortality among the elderly. Geriatrics has evolved, and today, the understanding of the modern “geriatric giants” has evolved to encompass the four new syndromes of frailty, sarcopenia, the anorexia of aging, and cognitive impairment. The so called Modern Geriatric Giants predispose an individual for falls, hip fracture, depression and delirium (27).

Falls are one of the leading causes of death among the elderly population. Falls are responsible for 20%–30% of injuries among the old age group and are responsible for 10%–15% of all emergency department visits (28). In a study conducted in 1999 in the United Kingdom, the cost due to injuries cost by falls per 10 000 population was £300,000 in the 60–64 age group, increasing to £1,500,000 in the ⩾75 age group. These falls cost the UK government £981 million, of which the National Health Service (NHS) incurred 59.2%. Most of the costs (66%) were attributable to falls in those aged ⩾75 years. They were also responsible for 50% of injury-related

hospitalization among people of 65 years and above and hence create a severe socioeconomic burden for the families (29).

In a cohort study done by Tinetti et al. (13) among white and black adults in four different communities: East Boston, Massachusetts; two rural counties in Iowa; New Haven, Connecticut; and segments of five counties in the north-central Piedmont area of North Carolina, the subjects were followed up for 1 year to study the incidence of falls. It showed that at least 32 percent of the elderly population had at least one fall during the follow up period of which 24 percent had serious injuries and 6 percent had fractures. The major risk factors predisposing for falls in the study were sedative use 28.3%; for cognitive impairment, 5.0%; for disability of the lower extremities, 3.8%; for palmomental reflex, 3.0%; for abnormalities of balance and gait, 1.9%; and for foot problems, 1.8% (13).

A study done by Mitchell et al. estimated the prevalence of and risk factors for falling among community-dwelling older adults in Jamaica (30). A two-stage cluster sample design was used to recruit a nationally representative sample of 2,943 older adults. The fall prevalence in the past 6 months was 21.7%. A significantly greater proportion of women, the increasingly old, rural residents, persons with vision problems (including cataracts), and those with key chronic conditions reported falling in this period compared with those without these respective attributes ($p < 0.05$). Majority of falls reported had occurred at home (54.3%), and restriction of activities due to fear of falling was reported by 34.6% of respondents. Logistic regression found sex, area of residence, eyesight problems, cataracts, high blood pressure, and depression to be independent risk factors for falling.

Hip fractures are almost always the result of falls among elderly. The median age for hip fracture is around 80 years (31). Eliminating the environmental hazards, avoidance of drugs that impair balance and managing neuromuscular disorders have a role in preventing hip fractures. Regular exercise and improvement in muscle strength reduces the propensity for falls (31).

In a study done by Sirohi et al. (32) among 456 study participants in a rural area of Haryana in 2017, the prevalence of falls in the past 12 months was 36.6% (95% confidence interval [CI]: 32.1–40.0).The prevalence among women was 40.6% (95% CI: 34.5–46.7) and among men was 31.5% (95% CI: 25.0–37.9). Low socioeconomic status, urgency of micturition, knee pain, visual impairment, hearing impairment, functional disability, and depression were significantly associated with falls. In this study, the prevalence of falls in the past one year was found to be 36.6% (95% CI: 32.1–40.0). It was more in women (40.6%) as compared to men (31.5%). Among these, 77.2% of the participants had a single fall, 9.6% had two falls, while 13.2% reported more than two falls. In most of the cases (59.3%), place of fall was found to be home, 38.9% of the falls had occurred during the afternoon. Majority (71.3%) of the participants were engaged in routine activities such as bathing, urination, or defecation at the time of fall. When the etiology of falls was considered, 38.3% among the fallen had dizziness during the fall. Fifty-four participants (32.3%) had slipped on the road, 35 (21%) tripped on the road. Another recent community based cross sectional study done in Coimbatore, a city in south India by Chacko et al. (33) showed that the prevalence of falls was 26 % and the prevalence of falls increased with age in women but declined with age in men. Of the total falls 50.2% occurred outside home

and the remaining inside home. Most of the falls occurred during ambulation and at the morning hours (39.1%). Age ≥80 years (OR: 3.28, 95% CI: 1.28-5.98) and dizziness (OR: 3.27, 95% CI: 1.00-10.06) were found to be significantly associated with falls.

Joshi, Rajesh Kumar and Avasthi (2003) (34) conducted a cross-sectional survey of 200 subjects over 60 years old (100 each from the urban population of Chandigarh City and the rural population of Haryana State of India), between July 1999 and April 2000. In the study it was found that the distribution of history of fall among elderly people over 60 years old shows that, out of the total sample population, 103 (51.5%) subjects had fallen. Fracture was reported in 21.3%, and other injuries occurred in 79.6% of those who had fallen. Fractures among females (26.4%) were reported more frequently compared with males (16%) and fracture was seen more in urban subjects (29.4%) compared with rural subjects (13.4%). The disability among elderly was assessed using the Rapid Disability Rating Scale – 2 (35). The scale had a score from 18 (no disability) to 72 (if the responses indicating the most severe disabilities and chosen for all items). In their study it was found that those who had fallen once but less than 2 times had a mean score of 24.6 and those who had fallen three or more times had a score of 30.6% (p value: 0.001).

Rekha et al. conducted a study in rural Kerala in 2017 which examined the frequency and correlates of falls among community dwelling older adults (≥60 years) in rural Kerala (36). In the study falls in the previous year was reported by 27%, among them, 20% fell more than once making a total of 74 falls. Injuries were reported among 58% of the fallers. Most frequent cause of fall among the participants was because of

slipping on the floor (25.6%). Most falls happened outdoors (77%).There was no significant difference in the proportion of falls between men (26.1%) and women (27.3%) with a p value of 0.98 and among different age groups with a higher proportion among participants aged below 70 years (33%) than those participants above or equal to 70 years (21.3%) with a p value of 0.09. Most of the falls happened during walking (61.1%), followed by getting up from the cot or chair (11.1%), around the barn or the well (9.3%), on the way to toilet (7.4%), standing (3.7%), walking in the backyard (3.7%), climbing stairs (1.9%) and during bath (1.8%).

In 2017, Pawan et al. (37) conducted a cross sectional study in the state of Telangana in which 71 (13%) subjects reported at least one fall in the past year. Prevalence was higher among women (17%) than men (8%), Sex and age showed significant interaction (p value: 0.04) whereby falls prevalence increased with age among women but decreased among men. Correlates of falls among men included a history of osteoarthritis (OA) (Odds Ratio (OR): 6.91; 95% CI: 1.4–33.1), depression (OR: 9.6; 95% CI: 3.1–30.1), and greater height (OR per 1 standard deviation increase: 2.33; 95% CI: 1.1–5.1). Among women, poor physical performance (OR: 3.33; 95% CI: 1.13–9.86) and history of cardiovascular disease (CVD) (OR: 2.42; 95% CI: 1.01–5.80) were independently associated with falls.

4.4 ETIOLOGY OF FALLS

Prospective cohort studies have revealed that etiology of falls is multifactorial in origin. Falls occur as a result of many risk factors and their interactions between them. Not only traditional factors like poor cognition and arthritis are leading causes for

falls, but normal physiological changes due to ageing itself is a risk factor for falls (38).

4.4.1 BIOLOGICAL RISK FACTORS

The factors which are pertaining to the human body play an essential part as risk factors. These include, age, gender, race and ethnicity, etc. These factors play a crucial role in the etiology of falls and their interaction with behavioural, environmental and medical risk factors increases the risk of falling.

a) Age and Gender

Incidence of falls among elderly is shown to increase with age. This is due to a multitude of reasons. With increasing age there is a decline of cognitive, physical and affective capacities along with increase in comorbidities. According to a study done by Catherine et al. among a population of 4,301 participants aged 60 years and above who had been part of 2012-2013 survey of the English Longitudinal study of Ageing it was shown that in both sexes the risk of falls increased with age (39). According to the study certain sex-specific risk factors were frailty (OR: 1.69, 95% CI: 1.06-2.69) and incontinence (OR: 1.48;95% CI: 1.19-1.85) in women, and older age (OR: 1.02,95% CI: 1.04-1.07), being unable to perform a standing balance test (OR: 3.32,95% CI: 2.09-5.29) and high levels of depressive symptoms (OR: 1.33, 95% CI: 1.05-1.68), in men (39). Stevens et al. in a study conducted among elderly demonstrated that women were more likely to fall and develop a fracture than men (40). In a study by Hendrie et al. it was found that emergency department visits and hospitalizations were twice more among women compared to men in their study (41).

Their study shows that although there was homogeneity between the sexes in the risk factors that were associated with falls, there were several sex-specific risk factors suggesting gender should be taken into account when creating fall-prevention strategies (41).

b) Race and Ethnicity

Even though the relationship between race and ethnicity and falls still remains mainly open for research, the rate of hospitalization for fall related injuries is almost two to four times higher among the Whites than the Asian/Pacific Islander and Hispanics and about 20 % higher than African Americans. This study done by Ellis et al. also showed that Caucasians living in the USA had a higher risk of falling (42).

4.4.2 BEHAVIOURAL RISK FACTORS

Behavioural rick factors include those concerning daily choices, habits and human actions. They are mostly modifiable. For example, risky behaviour like the intake of alcohol, use of tobacco and consumption of multiple medications can be modified by intervention.

a) Activities of Daily Living

In a study done by Çinarli et al., it was shown that older adults seeking care in the emergency department who have a higher risk of falls are more dependent in daily living activities and experience lower quality of life. Risk of falling was shown to be negatively correlated with the ability to carry out activities of daily living using the Modified Barthel Index($r = -.50$, p value: <0.001) (43).

b) Eating habits

For healthy ageing eating a healthy balanced diet is essential. If there is a deficiency of proteins, nutrients and vitamins which are necessary for optimum health, the individual will be at higher risk of falls and increased morbidity associated with it. Older persons with low dietary intake of Vitamin D and Calcium may be at increased risk of falls and therefore have a higher incidence of fractures as a consequence (44). Evidence shows that dietary Vitamin D and Calcium increases bone mass among persons with low bone mass density and that it decreases the risk of osteoporosis and falling (45).

c) Alcohol consumption

Consumption of excessive alcohol is shown to be a risk factor for falls. Among older adults it was shown that people who consume 14 or more drinks per week were at increased risk of falls (46). However in a recent study prospective cohort study which involved 2,170 community-dwelling individuals aged ≥60 years recruited in Spain, it was shown that compared with never drinkers, the number of falls was lower in drinkers with Mediterranean drinking pattern (OR: 0.73, 95% CI: 0.56-0.96) i.e. 10–30 g/day in men and 5–15 g/day in women, preferably red wine consumption with low spirits consumption. Also, elderly who followed the Mediterranean drinking pattern showed a lower risk of ≥2 falls (OR: 0.56, 95% CI: 0.34-0.93) and of falls requiring medical care about 0.61 (0.39-0.96) (47).

d) Use of Tobacco

Smoking is known to cause decrease in nutrition and thus resulting in weakness and frailty of an individual. This could inadvertently lead to falls. In a case control study among participants aged 45 years and above it was shown that cigarette smoking was

associated with both outdoor and indoor falls, but the odds were lower and not statistically significant for indoor falls (48). However in a study conducted by Patil et al. in Bengaluru, persons who had habit of smoking were at 2.14 times increased odds of experiencing a fall compared to non-smokers which was statistically significant (49).

e) Fear of Falling

Falls among elderly can have consequences affecting the health and economic situation for a family. Following a fall, the health of the individual is affected physically because of injuries like fracture, disruption of mobility, functional decline and even death. It can also affect the individual psychologically due to depression and fear of fall in the future. Fear of falling and anxiety was also found to be another risk factor for fall (50).

f) Medications

One of the most common and potentially reversible risk factors for falls in the elderly are medications. Psychotropic medications which include antidepressants, benzodiapenes, sedative hypnotics, anticonvulsants, and neuroleptics have been strongly associated with an increased risk of falls in a systematic review conducted by Leipzig et al. (51). In these studies it was shown that the risk of falls increases if more than one psychotropic medication or more than 3-4 medications of any kind were taken. Cardiac medications including vasodilators are commonly believed to be associated with an increased risk of falls but results from a large meta-analysis did not find any association between nitrates or centrally acting anti-hypertensives and falls. The only cardiac drugs that were associated with falls were Digoxin, Diuretics and

Type 1 a antiarrythmic drugs (51). Oral hypoglycaemic drugs have been implicated in the history of falls and predispose an individual to greater risk (52).

g) Use of walking aids

Some elderly who are involved in risk taking behaviours are at increased risk of falls. These behaviours include paying little attention to the environment or not using mobility devices prescribed to them such as a cane or a walker. In a study by Gell at al. among adults aged 65 years and older in the U.S. in 2012, it was shown that the incidence of falls was 1.12(95% CI: 0.97-1.29; p value: 0.56) among elderly who used a cane while the incidence of falls was 1.01(95%CI: 0.84-1.23; p value: 0.64) among elderly who used a walker, nevertheless both these results were statistically insignificant (53).

4.4.3 MEDICAL RISK FACTORS

As the number of comorbidities increases the risk of fall among elderly also substantially increase and hence the etiology of fall and injuries are considered multifactorial (54). Increase in comorbidities predisposes an individual to increased risk of fractures and associated increase in hospital duration.

a) Diabetes

In a prospective cohort study conducted by Maurer et al. among 139 elderly aged 60 years and above in New York, USA, it was shown that the incidence rate for fall among the participants with and without diabetes mellitus was 78% and 30%, respectively (p value: 0.001). On multivariate analysis, only diabetes (adjusted hazard ratio 4.03; 95% CI: 1.96-8.28) and gait and balance (adjusted hazard ratio 5.26; 95% CI: 1.26-22.02) were significantly and independently associated with an increased risk

of falls (52). In a systematic review conducted by Yang et al. involving six studies which involved 14,685 participants among elderly aged 60 years and above it was shown that participants with diabetes was associated with an increased risk of falls of 1.64 (95% CI: 1.27–2.11) compared to people without diabetes (55). In a hospital based study conducted by Yau et al. among 719 elderly in Pennsylvania, it was demonstrated that diabetes was associated with an increased rate of injurious fall requiring hospitalization (hazard ratio: 1.48, 95% CI: 1.12–1.95) in models adjusted for race, age, sex, BMI, and education. In those study subjects using insulin, compared with participants without diabetes, the Hazard ratio was 3.00 (95% CI: 1.78–5.07) (56).

b) Hypertension

In a study done by Diana et al. among 3,544 community-dwelling Austrian women and men aged 60 years and older, it was shown that hypertensive values decreased the risk in women and low blood pressure increased the risk in men. An increase of systolic blood pressure by 10 mmHg and of diastolic blood pressure by 5 mmHg had reduced the risk of falling by 9% (OR 0.91, 95% C.I.: 0.84-0.98) and 8% (OR 0.92, 95% C.I.: 0.85-0.99), respectively. In men, an increased risk of falls was shown in participants with low systolic or low diastolic blood pressure (57). However antihypertensive medications were shown to have an increased risk of serious fall injuries, especially among those with previous fall injuries. The potential harms versus benefits of antihypertensive medications should be weighed in making decisions to continue treatment with antihypertensive medications in older adults with multiple chronic conditions since they are at increased risk of fall (58).

c) Osteoarthritis

In a community based prospective study among elderly aged 70 years and above it was shown that osteoarthritis is also one of the leading causes predisposing to falls among elderly (45). In a recent study conducted by Dore et al. among non-institutionalised African American and white men and women, age 45 years and above, living in rural North Carolina, the results reveal that the odds of falling increased with an increasing number of lower limb symptomatic osteoarthritic joints: those with 1 joint had 53% higher odds, those with 2 joints had 74% higher odds, those with 3–4 osteoarthritic joints had 85% higher odds. This confirms that the risk for falls increases with additional symptomatic osteoarthritis of lower limb joints and shows that symptomatic hip and knee osteoarthritis are important risk factors for fall (59).

d) Depression

Falls and depression have a significant bidirectional relationship. There is a complex interaction between emotional status of an individual and the risk of falls. Excessive fear of falling which is usually associated with depression also increases the risk of falls. A recent meta-analysis summarized the results of 17 prospective studies. The study found the odds ratio for the association of depression with falls to be 1.63 (95% CI: 1.36-1.94) (60).

e) Parkinson's disease

Parkinson's disease predisposes to risk of fall due to increased rigidity and orthostatic hypotension. It was found that presence of Parkinson's disease had an adjusted odds

of 9.5(95% CI: 1.8-50.1) times risk of having two or more falls in a prospective study for falls in 325 community-dwelling persons aged 60 years or older (61).

f) Stroke

One of the other leading neurological causes of falls is stroke. A study on 124 females with a history of stroke suggested that visual spatial problems, impairment in balance through loss of peripheral sensation or cerebellar function, and residual dizziness were all strongly associated with recurrent falls in women with a history of stroke (62).

g) Dementia

Dementia, due to any cause, was a strong predictor of falls, in part due to poor safety awareness about falls (21).Elderly who had impaired cognition had a 2.8 times higher risk of having a fall compared to those who had good cognition (63).

h) Gait and Balance disorders

Normal physiologic changes for ageing causes diminished input from the proprioceptive, visual, and vestibular systems, which may result in alterations of balance. Older adults have difficulty in balance due to age related degeneration in skeletal muscles predisposing them to falls (64). Gait and balance disorders are mostly multifactorial in origin and require a comprehensive assessment to assess contributing factors and targeted interventions. Most changes in gait occurring in elderly are related to underlying medical conditions, particularly as diseases increase in severity, and should not be looked as merely an inevitable consequence of aging (65).

i) Orthostatic hypotension

Older adults are also at risk of orthostatic hypotension due to changes in baroreflex sensitivity and vascular compliance. As a result the older people are at risk of hypotension during reduced cardiac preload or tachycardia which can be induced by drugs (66). A systematic review and meta-analysis of 5646 studies, it was found that orthostatic hypotension was positively associated with falls (OR: 1.73, 95% CI: 1.50-1.99). This highlights the need to investigate orthostatic hypotension treatment to potentially decrease falls among elderly (67).

j) Fractures

Even in short term patients with a history of a fracture have an increased risk for future fractures due to falls. In a prospective study among a population aged 50 years and above whom were followed up for a period of three months it was shown that 15% of them had a new fall incidence and five of them had suffered a fracture (68).

k) Vision

Impairment in distant vision has been identified as a major risk for falls in people residing in assisted care accommodation (69) and independently living in the community (61, 70-72). Studies have also shown that poor visual acuity increases risk of falls when combined with impairment in balance or with both hearing and balance impairments (73). However, some studies have failed to find an association between falls and visual acuity, especially when adjusting for age (13, 74-79). Impaired visual acuity has also been found to be an independent predictor of fall-associated hip fracture in a large case-control study conducted in Auckland, New Zealand (79).

l) Hearing loss

While hearing impairment is not usually considered a risk factor for falls, a recent report in a cohort of older Finnish female twins gave results of a strong association between audiometric hearing loss and incident falls (80). In a study done on participants aged 40 – 69 years, it was shown that for every 10 dB increase in hearing loss, there was a 1.4 fold (95% CI: 1.3–1.5) increased odds of a participant reporting falling over the preceding 12 months (81).

4.4.4 ENVIRONMENTAL RISK FACTORS

Environmental factors usually include the surrounding environment, including hazardous features in public environment and home hazards. These factors themselves are not individual cause of falls rather it is the interplay of an individual's physical condition with the surrounding. Physical environment plays a major role in falls in the elderly. Factors related to the physical environment are responsible for 30% of falls (82). Immediate acute factors like environmental hazards including poor lighting, wet floors, and improper bed height may increase the risk of falls in the nursing home setting (83). In a review of stair related falls done by Startzell et al. showed that stairs have also been considered as risk factor for falls. The same intrinsic factors which apply to falls has also been the same with stair related falls. The most important extrinsic factors with regard to stair related falls include stair design(eg. Stair angle and step height), stair maintenance and footwear (84). In a study done by Carter et al. among elderly aged 70 years above in Australia it was shown that The bathroom was recognised as the most hazardous room, with 66% (n = 279) of bathrooms having at least one hazard (85). In a study conducted by Gill et al. among community dwelling

participants in New Haven, Conneticut it was shown that if the hallway of the house had a trip or slip hazard, the participant was at 5.35 (95% CI: 1.10–26.0) times at higher risk of falling (86). In a study done by Aras et al. in a community based cross sectional study in a rural area in Mangalore, Karnataka using the home safety checklist showed that elderly belonging to joint families significantly keep passage of bedroom to bathroom free from obstacles, use stool to reach high cupboard and keep telephone cords away from walking area(p value: < 0.0005). It was also found that literate elderly walk in room without obstacles, put away things back to its place after using, keep soap reachable during bath, use doormats to wipe feet, and keep stairways in good condition(p value: < 0.05) which are major contributors to environmental risk factors (87). In the study done by Patil et al. in an urban area in Bengaluru, lighting was inadequate in 44.2% of the houses and elderly who lived in houses with poor lighting were 1.09 times (95% CI: 1.04-1.14) increased risk of fall. It was seen that 12% of the houses had slippery floor and elderly were at 1.13 times (1.02- 1.25) risk of fall due to the slippery floor (49). In the study conducted by Chacko et al. in rural Coimbatore, it was shown that poor lighting was the commonest type of fall risk among environmental factors observed in the living room and bedroom. It was found that most of the falls occur due to ambulation to and from the bathroom since most of the houses had bathrooms located outside their house (33). Since falls usually occur indoors it is essential that the home environment is kept safe for avoiding falls. Home hazard assessments indirectly reveal the importance of environmental hazards. They have been successful in reducing the incidence of falls (88).

4.4.5 SOCIOECONOMIC RISK FACTORS

These factors are those related with the social and economic status of the individual as well as the community in which the individual resides. The factors include low education, low income, inadequate housing, limited access to health and lack of social interaction. Studies have shown that there is an association between socioeconomic status and falls. Lower income has an increased risk of falling (89). Elderly especially women who are living alone with insufficient incomes are predisposed to a greater risk of falls. This is likely due to disability, sensory and cognitive limitations while living alone that place them at an increased risk of falls (90). The main reason why socioeconomic factors contribute to fall is poorly understood. Studies suggest that inadequate diet and poor health as a consequence of low income and lack of education, poor access to healthcare facilities can be a precipitating factor (44). A study conducted by Speechley et al. in Canada showed that financial strain was an independent risk factor for fall (91).

4.5 ASSESSMENT OF RISK OF FALLS

There are various tools available for assessing the risk of falls among elderly. The goal of using a fall risk assessment tool is to discriminate high and low risks of fall rather than reducing fall risk. That is to know if an individual at present is highly susceptible to a fall. However, the tool should also be able to minimize the occurrence of fall. In a systematic study assessing various tools for assessing fall risk conducted by Park et al. (92), noted that if a fall risk assessment tool has a high sensitivity, even though the

specificity is low, it achieves the primary goal of using the assessment tool. The various tools that are available include

A. The Peninsula Health – Falls Risk Assessment Tool (PH-FRAT)

The Falls Risk Assessment Tool (FRAT) was developed by the Peninsula Health Falls Prevention Service in 1999. The FRAT has three sections: Part 1 - falls risk status; Part 2 – risk factor checklist; and Part 3 – action plan. The complete tool (including instructions for use) is a complete falls risk assessment tool. However, Part 1 can be used as a falls risk screen (93).The Four item PH-FRAT Tool consisted of Recent Falls, Medications, Psychological status and Cognitive status. The Low Risk had a score of 5-11, while Medium: Risk had a score of 12-15, and High Risk was ranging from 16-20. The 4-item PH-FRAT is a brief, easily administered screening tool for use in subacute and residential aged care facilities.

B. The STRATIFY clinical prediction rule (St. Thomas Risk Assessment Tool in Falling elderly inpatients)

The STRATIFY score is a clinical prediction rule (CPR) derived to assist clinicians to identify patients at risk of falling (94). A simple scoring system was used in which the presence or absence of each risk factor (yes = 1, no = 0) gave a risk score of 0-5 for each patient. This simple risk assessment tool predicted with clinically useful sensitivity and specificity a high percentage of falls among elderly hospital inpatients.

C. Hendrich II Fall Risk Model

It is a specific, valid, and brief instrument to predict fall risk. The Hendrich II model is useful because it is both sensitive (74.9% of high-risk patients were correctly identified) and highly specific (73.9% of patients not at high risk of falling were correctly identified). In the Hendrich II model confusion or disorientation was a given a maximum score of 4. Any score above 5 was considered as high risk of falling among hospitalized patients (95).

D. Falls Risk for Older People in the Community screen (FROP – Com Screen)

This tool is used at the community level on larger number of adults. This tool uses three entities: functional status – Activities of daily living (ADL), fall history in the past 12 months and balance (observed by asking the person to walk a particular distance, turn and sit). The FROP – Com Screen has a scale of 0 – 9 on the basis of which the individual is considered as low risk or high risk (96).

E. STEADI Tool Kit

STEADI (Stopping Elderly Accidents, Deaths, and Injuries), is a fall prevention tool kit that contains an array of health care provider resources for assessing and addressing the risk of fall in clinical settings. A team of researchers at Centers for Disease Control and Prevention's Injury Center reviewed relevant literature and conducted in-depth interviews with health care providers to determine current knowledge and practices related to older adult fall prevention. They developed draft resources based on the American and British Geriatrics Societies' (AGS/BGS) practice, incorporated provider input, and addressed identified knowledge and practice gaps. Draft resources were reviewed by six focus groups of health care providers and

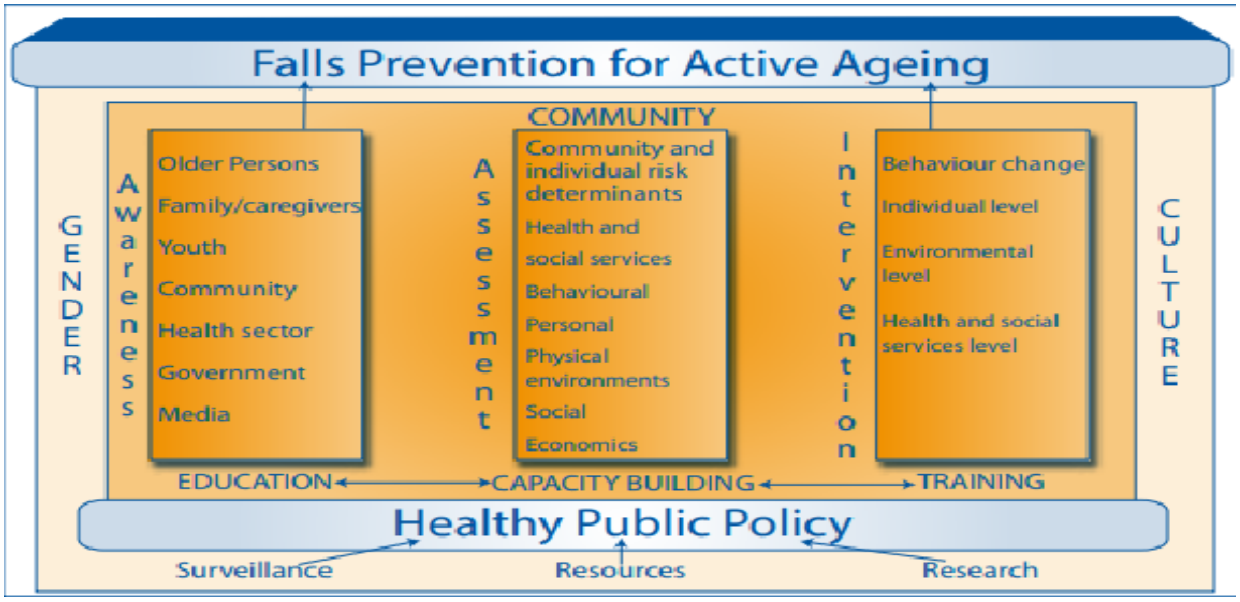
revised. The completed STEADI tool kit, Preventing Falls in Older Patients—A Provider Tool Kit, is designed to help health care providers incorporate fall risk assessment and individualized fall interventions into routine clinical practice and to link clinical care with community-based fall prevention programs (97).

Other commonly used tools for assessing risk of falls include the Ontario Modified STRATIFY (98), the Morse scale (99) and the Downtown index (100). These tools however are used by the clinician or a trained nurse in a hospital setting on elders that present with an acute or sub-acute condition.

4.6 PREVENTION OF FALLS IN ELDERLY

Falls are considered to be predictable and preventable. The WHO has created a fall prevention model based on three closely interrelated factors. These include awareness, assessment and intervention (90) as shown in Fig 4.1. Since the etiology of falls is multifactorial, prevention strategies must be based on a combination of multiple interventions rather than a single method (101). Evidence for fall prevention programmes have been shown in both community settings (102,103) as well as hospital settings (104,105).

Figure 4.1 Fall prevention for Active ageing



Source: WHO Global report on Falls Prevention in Older Age 2007. Available from www.who.int/ageing/publications/Falls_prevention7March.pdf

Multifaceted programs, including vision correction, exercise, adjustment of medication, and environmental modification, appear to be effective in randomised control trials. Individually prescribed programs of balance retraining and muscle strengthening, and also Tai Chi (which combines strength and balance training) have been successful as sole interventions for preventing falls (106). Devices such as hip protectors, which function by reducing the amount of energy absorbed by the bone in the event of a fall onto the hip, was found to be efficacious among frail elderly, with a trial results showing a 60% reduction in hip fractures among those randomized to use the device (107). Several promising strategies such as educational opportunities, exercise programmes, and environmental modification for preventing falls and fractures exist. However, further research is required to assess the effectiveness of these strategies in the Indian context.

5. Materials and methods

5.1 Study setting

This cross-sectional study was conducted in Kaniyambadi block, which is a rural administrative block in Vellore district of Tamil Nadu, India. The Community Health Department of the Christian Medical College (CMC) provides primary and secondary healthcare to this area with a base hospital located in Bagayam, Vellore.

The block is part of the Vellore district of Tamil Nadu. The total population of the block is about one lakh sixteen thousand living in 82 villages. This is mostly a rural block with a major part of its population involved in manual labour and farming activities. There are two medical colleges and three primary health centers providing medical care to the health requirements of the people in the block.

The CHAD program (Community Health and Development program) was initiated in 1982, by the community health department of Christian Medical College, Vellore. The program was developed with the objectives of providing primary healthcare to the residents of Kaniyambadi block and Jawadhi hills, to provide training in community based health care to the medical, nursing and paramedical students and to coordinate and conduct research activities in the community. Apart from these, the CHAD program has been rendering comprehensive combined health services in the block for more than twenty-five years concentrating essentially on the nutrition, maternal and child health, leprosy, tuberculosis, filariasis, rheumatic heart disease, non-communicable diseases like hypertension and diabetes and several other socio-economic development programs applying the concept of primary health care (108).

Under the program, there are grass root employees called Part Time Community Health Workers (PTCHW) whose work is comparable to the Accredited Social and Health Activists (ASHA) in the government system (109). The PTCHW collects and provides information on family events such as birth, death and marriage (108). CHAD also has health aides who look after a population of 3000 to 5000. She collects basic demographic data, immunization, chronic disease data, and vital statistics at the primary level. She also visits antenatal mothers and new-borns and does follow up of patients. If a patient requires further treatment she refers the patient to the base hospital (108). Next in the organization is a public health nurse, who looks after a population of fifteen to twenty thousand. The head of the team is the area doctor who takes care of a population of twenty to thirty thousand. There are entirely 5 public health nurses and 3 area doctors. The CHAD health information system (HIS) functions in a hierarchical manner in which information is transferred from PTCHW to the health aides at the primary level. From them it is passed onto the public health nurses and eventually to the doctor responsible for the area.

The Department of Community Health operates a computer cell that keeps an electronic database where all the data collected at the primary level are stored. Information regarding the vital statistics, demography of the block, chronic diseases, and immunization are accessible at the computer cell. The list of elderly residents in my study was obtained from the census database of the CHAD health information system (HIS)

5.2 Study Design

The study was planned and implemented as a cross-sectional study, with the interviewer getting in contact with the participants once throughout the study period.

5.3 Study Period

Data collection of the participants was done between April 2019 and August 2019.

5.4 Study frame

Elderly aged 60 years and above residing in Kaniyambadi block.

5.5 Study Participants

Inclusion Criteria: All elderly permanent residents of the block aged 60 years and above.

5.6 SAMPLE SIZE CALCULATION

$n = Z^2 pq / d^2$

Z = 1.96 (constant)

p = prevalence of falls among elderly (based on previous studies) = 26 (33)

q = 100 – p = 74

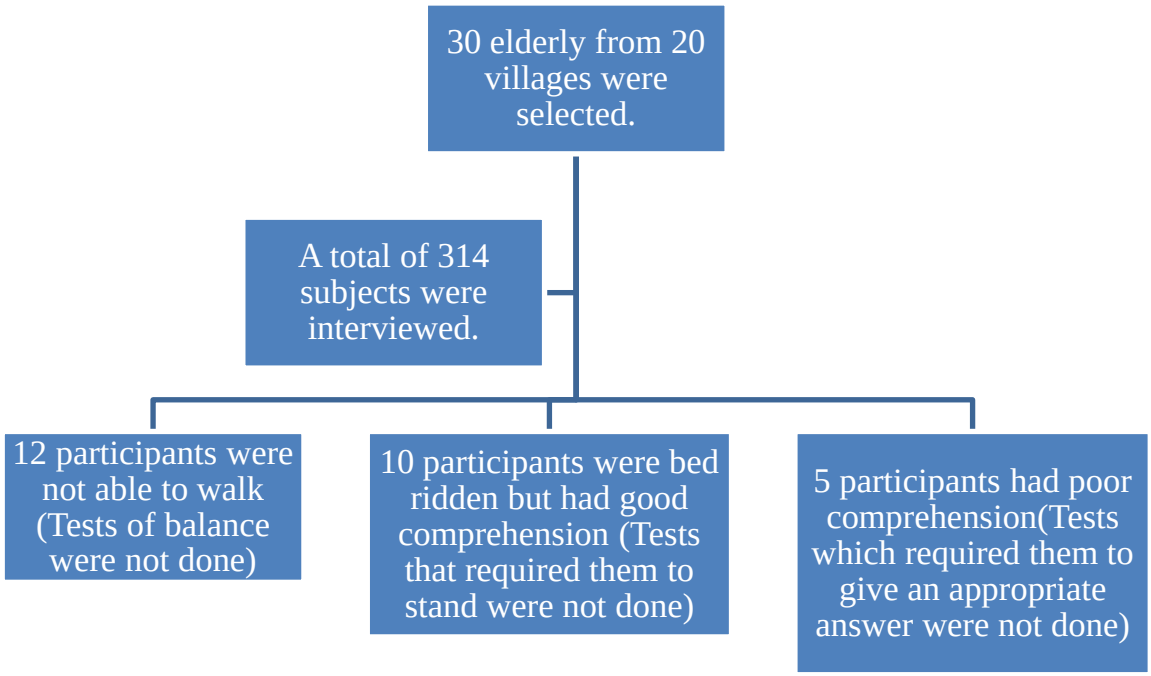
d (absolute precision) = 5

Sample size (n) = [4 x 26 x74/25] = 308

No of villages taken = 20 out of 82 villages were randomly selected

5.7 Sampling strategy

A two stage sampling was employed. In the first stage, 20 villages (clusters) were selected by simple random sampling method from a list of all villages in Kaniyambadi block. In the second stage, a list of 30 elderly above 60 years were selected by simple random sampling technique from each of the above selected villages using the census data maintained in the Health Information System of the department of Community Health, Christian Medical College, Vellore.



5.8 ETHICAL CONSIDERATION

The study was accepted by the Institutional Review Board (IRB Reference Number: 11907 dated 06.03.2019) of the Christian Medical College, Vellore. Consent was taken from the participants prior to the administration of the questionnaire, explaining them about the study purpose and that their refusal to be a part of the study would not

in any way influence their treatment or benefits that they receive from CHAD. No incentives were offered to the participants during the study.

5.9 Collection of Data and Informed Consent

The questionnaire was first made in English, and was then translated into Tamil, the local language by a fluent Tamil speaker. It was then back translated into English to ascertain that the Tamil translation was accurate. The translated version was then used for the pilot study to identify words which were considered to be culturally unacceptable.

In order to recognize the relevant risk factors for fall among elderly, a pilot study was conducted. The information obtained after the pilot study was included in the questionnaire, apart from the demographic details and established risk factors for fall.

A structured questionnaire was administered by the principal investigator to the participants after getting informed consent from the study participants.

5.10 Study Tools

A structured questionnaire was administered to the participant by the principal investigator, assessing the burden of falls and its associated factors, socio demographic factors and medical history.

Anthropometric measurements which included heights and weights of the subjects were collected and using the information, the BMI(Body Mass Index) which is equal to weight in kg divided by height in metre square was calculated.

The BMI of the study participants was categorized based on the WHO classification (110).

BMI	Nutritional status
Below 18.5	Underweight
18.5–24.9	Normal weight
25.0–29.9	Overweight
Above 30.0	Obese

5.10.1 Snellen's chart for testing of Distant Vision Visual Acuity

The normal Snellen chart is printed with eleven lines of block letters. The first line consists of one very large letter, which may be one of several letters, for example E, H, or N. Subsequent rows have increasing numbers of letters that decrease in size. A person taking the test covers one eye from 6 metres or 20 feet away, and reads aloud the letters of each row, beginning at the top. The smallest row that can be read accurately indicates the visual acuity in that specific eye (111).

5.10.2 Jaeger's chart for testing of Near Vision

The Jaeger chart is an eye chart used in testing near vision acuity. It is a card on which paragraphs of text are printed, with the text sizes increasing from 0.37mm to 2.5mm (111). This card is to be held by a patient at a fixed distance from the eye dependent on the J size being read. The smallest print that the patient can read determines their visual acuity.

5.10.3 Mini Mental Status Examination (MMSE) to test Cognition

The MMSE test includes simple questions and problems in a number of areas: the time and place of the test, repeating lists of words, arithmetic such as the serial sevens, language use and comprehension, and basic motor skills (112).

Table 5.1 Interpretation of MMSE (112)

Method	Score	Interpretation
Single Cut off	<24	Abnormal
Range	<21	Increased odds of dementia
	>25	Decreased odds of dementia
Based on Education	<21	Abnormal for Eighth grade Education
	<23	Abnormal for High school education
	<24	Abnormal for College education
Severity	24-30	No Cognitive impairment
	18-23	Mild Cognitive impairment
	0-17	Severe Cognitive impairment

5.10.4 Sphygmomanometer to test for postural hypotension

Postural hypotension is an abnormal fall in blood pressure—of at least 20 mm Hg systolic and 10 mm Hg diastolic—within three minutes of standing upright. Those who had a fall in any of these values were labelled as having presence of postural hypotension (113). Orthostatic hypotension is considered clinically important if the reduction in blood pressure is sustained at or beyond three minutes.

5.10.5 Dix Hallpike test for assessment of Vertigo

The Dix–Hallpike test or Nylen–Barany test is a diagnostic maneuver used to identify benign paroxysmal positional vertigo (BPPV).When performing the Dix–Hallpike test, patients are lowered quickly to a supine position (lying horizontally with the face and torso facing up) with the neck extended 30 degrees below horizontal by the clinician performing the manoeuvre. The participants were labelled as positive if patient reported vertigo or there was clinical observation of nystagmus (114).

5.10.6 Rhomberg test to test proprioception

Romberg's test or Romberg's sign or the Romberg manoeuvre is performed to assess the neurological function for balance. The exam is based on that a person needs at least two of the three following senses to maintain balance while standing: proprioception (the ability to know one's body position in space); vestibular function (the ability to know one's head position in space); and vision (which can be used to monitor and adjust for changes in body position).The study participant was labelled positive if the patient falls when the eyes are closed (115).

5.10.7 A 512 Hz Tuning Fork for assessing hearing capability

Rinne Test Procedure

Rinne Test is done by positioning a 512 Hz vibrating tuning fork on the mastoid bone of the patient.

The patient is then asked to tell when the sound is not heard anymore.

Once the patient says he cannot hear the vibrating tuning fork is then placed 1-2 cm from the auditory canal.

The patient is again asked when the sound is not heard anymore (116).

Interpretation

Normal hearing - Air conduction should be greater than bone conduction and so the patient should be able to hear the tuning fork next to the pinna (outer ear) after they can no longer hear it when held against the mastoid.

Abnormal hearing

A) If the patient is not able to hear the tuning fork after it is moved from the mastoid to the pinna, it means that their bone conduction is greater than their air conduction. This indicates there is something inhibiting the passage of sound waves from the ear canal, through the middle ear apparatus and into the cochlea (i.e., there is a conductive hearing loss).

B) In sensorineural hearing loss the ability to sense the tuning fork by both bone and air conduction is equally diminished, implying they will hear the tuning fork by air conduction after they can no longer hear it through bone conduction. This pattern is the same to what is found in people with normal hearing, but patients with sensorineural hearing loss will indicate that the sound has stopped much earlier. This can be revealed by the person administering the test (with normal hearing) placing the fork close to their own ear after the patient indicates that the sound has subsided, noting that the sound from the fork is still noticeable to a normal ear.

Weber Test Procedure

After placing a vibrating tuning fork either in the middle of the forehead, above the upper lip or on top of the head equi-distant from the patient's ear on top of the thin skin but always in contact with the bone.

The patient is then asked to report to which ear is the sound heard better (116).

Interpretation

A) A normal weber test has a patient reporting the sound heard equally in both sides.

B) In an affected patient, if the defective ear hears the Weber tuning fork louder, the finding indicates a conductive hearing loss in the defective ear.

C) In an affected patient, if the normal ear hears the tuning fork sound better, there is sensorineural hearing loss on the other (defective) ear.

Table 5.2 Interpretation of Tuning Fork Tests (116)

			Weber Test				
			Lateralizes to the Left		No Lateralization	Lateralizes to the Right	
	Condition of Ears		LEFT	RIGHT	BOTH	LEFT	RIGHT
Rinne Test	+	+	NORMAL	Sensorineural Loss	Normal/Sensorineural Loss	Sensorineural Loss	NORMAL
	-	+	Conductive Loss	NORMAL	No Such condition	Combined Loss	NORMAL
	+	-	NORMAL	Combined Loss	No Such condition	NORMAL	Conductive Loss
	-	-	Conductive Loss	Combined Loss	Conductive Loss	Combined Loss	Conductive Loss
	Left	Right		Combined Loss = Conductive and Sensorineural Loss			

5.10.8 Tests for assessing Gait Instability

(a)Timed up and go test

Equipment - A stopwatch

Patients wear their regular footwear and can use a walking aid, if needed. Begin by having the patient sit back in a standard arm chair and identify a line 3 meters, or 10 feet away, on the floor.

Instruct the patient:

When we say “Go”

1. Stand up from the chair.

2. Walk to the line on the floor at your normal pace.

3. Turn.

4. Walk back to the chair at your normal pace.

5. Sit down again.

On the word “Go,” we begin timing

Timing is stopped after patient sits back down.

Record Timing

Interpretation

An older adult who takes ≥12 seconds to complete the TUG is at risk for falling.

(b)Four stage balance test

Equipment - A stopwatch

There are four standing positions that get progressively harder to maintain.

Each position is explained and described to the patient

We stand next to the patient, hold their arm, and help them assume the correct position.

When the patient is steady, we let go, and the time they can maintain the position is recorded

If the patient can hold a position for 10 seconds without moving their feet or needing support, go on to the next position.

If not, STOP the test.

Interpretation

An older adult who cannot hold the tandem stand or the prior two positions for at least 10seconds is at increased risk of falling

(c)Thirty second chair stand test

Equipment - A chair with a straight back without arm rests (seat 17" high), and a stopwatch.

Instruct the patient:

a. Sit in the middle of the chair.

b. Place your hands on the opposite shoulder crossed, at the wrists.

c. Keep your feet flat on the floor.

d. Keep your back straight, and keep your arms against your chest.

e. On “Go,” rise to a full standing position, then sit back down again.

f. Repeat this for 30 seconds

On the word “Go,” begin timing

If the patient must use his/her arms to stand, stop the test.

Record “0” for the number and score.

Count the number of times the patient comes to a full standing position in 30 seconds.

Record the number of times the patient stands in 30 seconds

Normal cut offs

AGE(years)	MEN	WOMEN
60-64	<14	<12
65-69	<12	<11
70-74	<12	<10
75-79	<11	<10
80-84	<10	<9
85-89	<8	<8
90-94	<7	<4

If a patient was found to have less than these values, the subject was considered to be positive for the thirty second chair test. These standards were developed based on the - the Senior Fitness Test (Rikli, R. E., & Jones, C. J. (2001)) (117).

5.10.9 The 5-item Geriatric Depression Scale for assessing Depression

The 5-item Geriatric Depression Scale (GDS) is used as a screening tool for identifying depression in older adults. It can be used within a wide range of settings, and can be used with those that have a medical illness or those with mild to moderate cognitive impairment.

When using the 5-item GDS two or more answers are positive, they are suggestive of depression warranting further assessment (118).

5.10.10 STEADI Tool to assess risk of falling

The STEADI Fall risk questionnaire contains 12 questions that focus on the leading fall risk factors. A positive answer to each question is worth one point, and a score of four or more indicates an increased risk of falling. The answers to specific questions, along with the score, enable providers to identify that patient's key fall risk factors (97). The STEADI tool consists of the following

1. I have fallen in the past	Yes	No
2. I use or have been advised one walker to get around safely	Yes	No
3. Sometimes I feel unsteady when I am walking	Yes	No
4. I steady myself by holding onto furniture when walking at home	Yes	No
5. I am worried about falling	Yes	No
6. I need to push with my hands to stand up from a chair	Yes	No
7. I have some trouble stepping onto a higher platform	Yes	No
8. I often have to rush to the toilet	Yes	No

9. I have lost some feeling in my feet	Yes	No
10. I take some medicine that makes me tired	Yes	No
11. I take medicine to help me sleep	Yes	No
12. I often feel sad or depressed	Yes	No

We have used the original tool and also a modified version by removing the first question of the tool which asked the question about fallen in the past which is the outcome of the study and the cut-off was revised to three or more points indicating as an increased risk of falling. This was then compared with the original risk severity score.

5.11 STATISTICAL ANALYSIS

Data entry was done using Epidata software version 3.1. Data was analysed using the Statistical Package for Social Sciences (software version 23.0 for Windows).

Descriptive analysis was done and the age sex distribution of the study participants was described. All categorical variables were presented as frequency and percentages while all continuous variables were presented as mean and standard deviation. For continuous variables which had asymmetrical distribution medians were estimated. The incidence rates of falls among elderly in the past six months were estimated with 95% CI and Relative risk. The burden of falls in the past six months was calculated as proportions and Pearson's Chi square test with 95% CI estimations was performed to calculate any significant association between age and gender with burden of falls in the past six months. Bivariate analysis to check for associations between risk factors and presence of falls was performed using Pearson's Chi square test and Odd's ratio with 95% CI estimations. Multivariate logistic regression were performed with

variables which were statistically significant like age, education, socioeconomic status, Living status, reported history of arthritis, reported history of hypertension, currently on medications, activities of daily living, presence of depression, cognition status, positive on Rhomberg test, positive on timed up and go test and four stage balance test and the risk of fall using the STEADI tool. The adjusted ORs eith 95% CIs were estimated for each of these variables by adjusting for potential confounders.

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6. Results

6.1 DISTRIBUTION OF SOCIO-DEMOGRAPHIC VARIABLES AMONG THE STUDY POPULATION

Table 6.1.1 Age – Sex distribution of the study population

Age group (years)	Male(n)	Percentage (%)	Female(n)	Percentage (%)	Overall	Percentage (%)
60-69	62	52.1	109	55.9	171	54.5
70-79	40	33.6	59	30.3	99	31.5
>80	17	14.3	27	13.8	44	14.0
Total	119	100	195	100	314	100

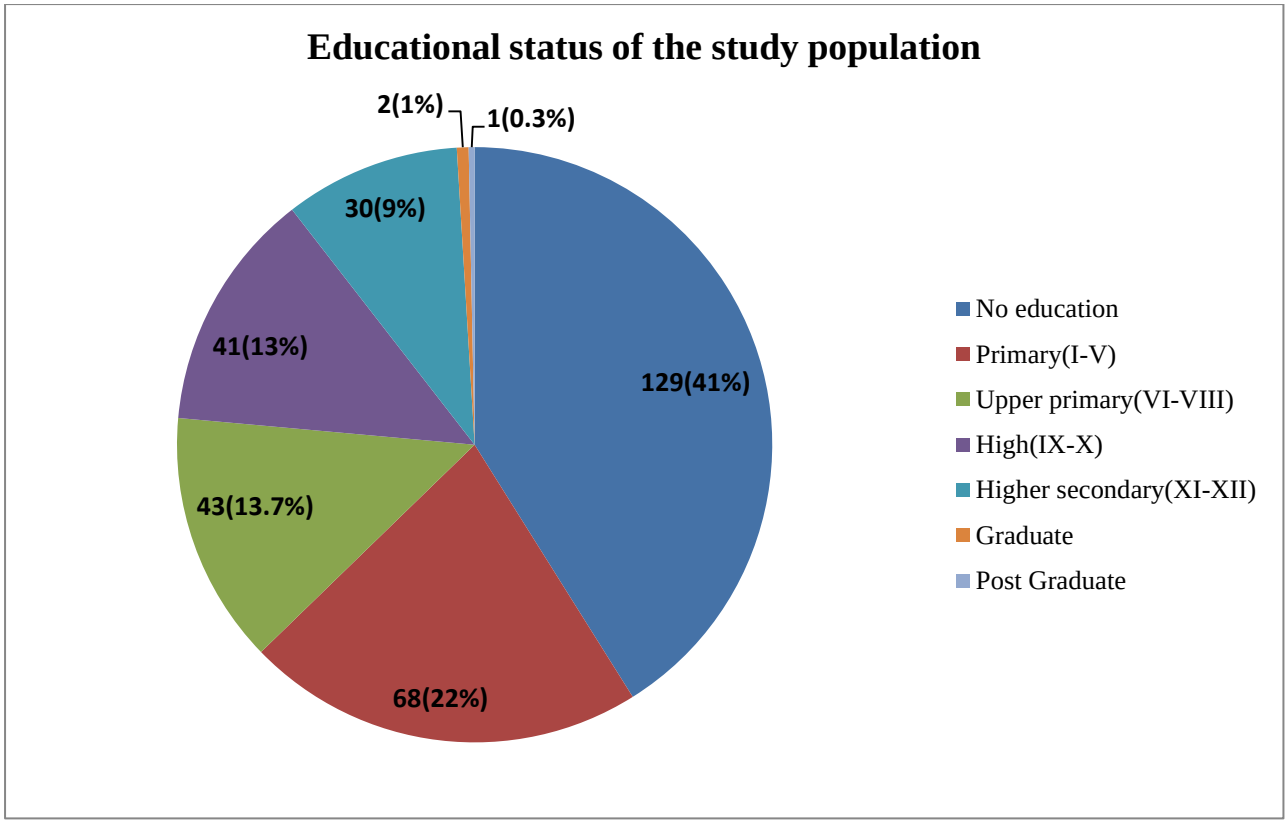
The age of the subjects ranged from 60 to 92 years with a mean age of 69.5 years with a standard deviation of 7.5 years. The median age was 68 years with an interquartile range from 63 to 75 years (Table 6.1.1). Out of the total study participants 62% were females (n = 195) while 38% of the study participants were males (n = 119) (Table 6.1.1). Among the 60-69 years age group, 52.1% (n=62) of them were males and 55.9% (n=109) of them were females. Those participants who were in the age group of 80 years and above, 27 elderly (13.8%) were females while 17 elderly (14.3%) were males (Table 6.1.1).

Table 6.1.2 Socioeconomic status of the study population

Socioeconomic status (B.G.Prasad Score 2019) Per Capita Monthly income (INR)	Frequency (n)	Percentage (%)
Upper(>7008 INR)	49	15.6
Upper middle(3504-7007 INR)	58	18.5
Middle(2102-3503 INR)	54	17.2
Lower middle(1051-2101 INR)	76	24.2
Lower(<1050 INR)	77	24.5
Total	314	100

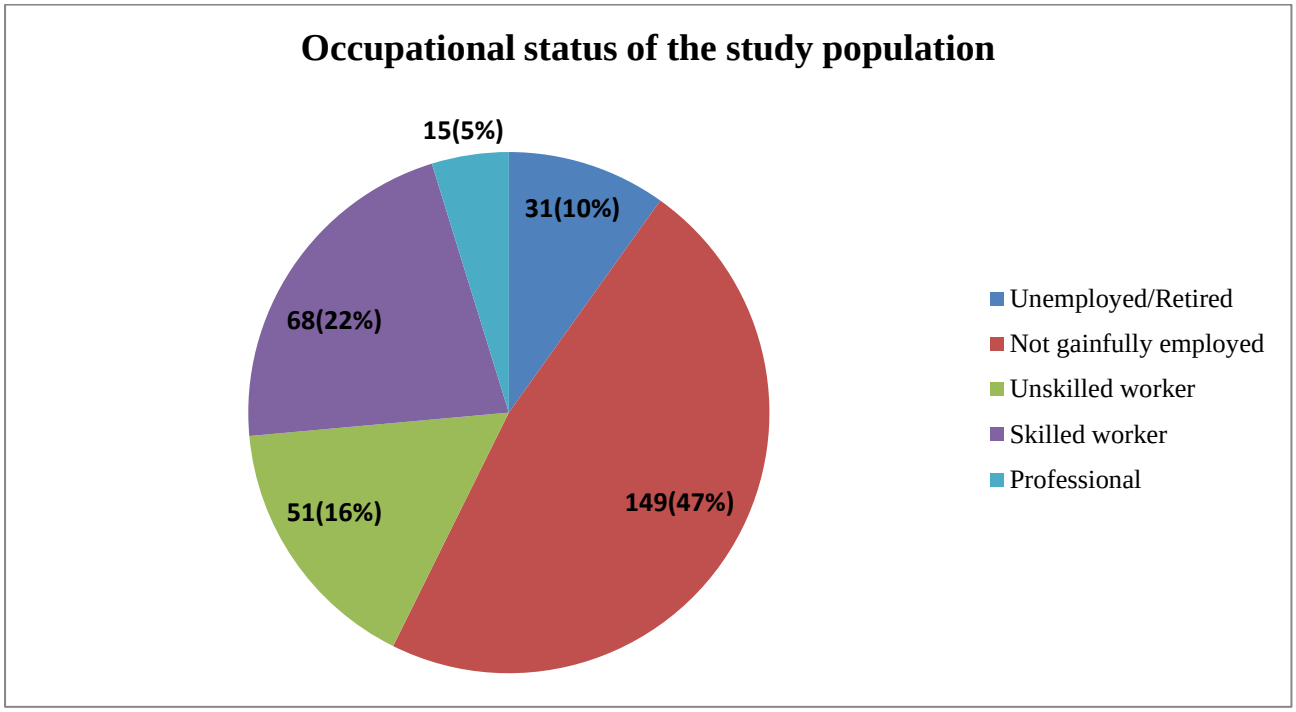
Around 48.7% (n=153) of the study population belonged to the lower middle or lower class while 15.6% (n = 49) belonged to the upper class according to the B.G.Prasad Score 2019 (Table 6.1.2).

Figure 6.1.1 Educational status of the study population



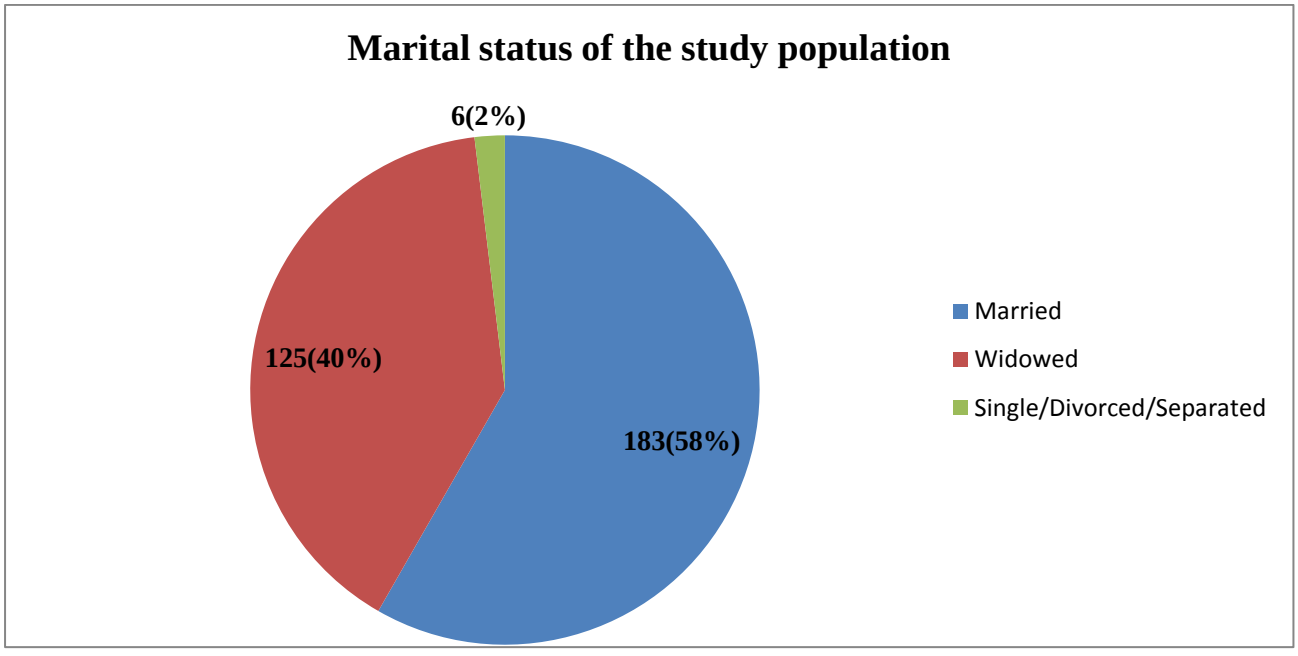
Among the study participants, 41% (n=129) of the study population had no education while only 23.5% (n=74) of them had studied up to high school or beyond (Figure 6.1.1).

Figure 6.1.2 Occupational status of the study population



Majority of the study population were not gainfully employed which accounted for 47% of the total study participants (n=149) which included housewives, while 22 % (n= 68) of them were skilled workers (Figure 6.1.2).

Figure 6.1.3 Marital status of the study population



Nearly 58% (n = 183) of the population were married while 40 % (n = 125) of the subjects were widowed (Figure 6.1.4).

Table 6.1.3 Overcrowding among the study population

Overcrowding (as per Housing Act-1985)	Frequency (n)	Percentage (%)
Present	65	20.7
Absent	249	79.3
Total	314	100

Around 1/5th (20.7%, n=65) of the population were living in houses that were overcrowded as defined by Housing Act – 1985 (Table 6.1.3).

Table 6.1.4 Living status of the study population

Living alone	Frequency (n)	Percentage (%)
Yes	45	14.3
No	269	85.7
Total	314	100

Only 45 participants (14.3%) of the study were living alone (Table 6.1.4).

Table 6.1.5 Status of performing activities of daily living in the study population

Activities of Daily Living	Frequency (n)	Percentage (%)
Independent	294	93.7
Partially dependent	8	2.5
Fully dependent	12	3.8
Total	314	100

Among the population 20 (n = 6.3%) were dependent, out of which the spouse of the individual gave support for 8 participants followed by their children who were the primary care givers for 11 participants, while one participant was aided by her sister (Table 6.1.5).

Table 6.1.6 History of tobacco smoking among the study population and male participants

Smoking history among total population	Previous smoker (%)	Current smoker (%)	Current daily smoker (%)
Yes	34(10.8)	20(6.4)	17(5.4)
No	280(89.2)	294(93.6)	297(94.6)
Total	314(100)	314(100)	314(100)
Smoking history among men	**Previous smoker (%)**	**Current smoker (%)**	**Current daily smoker (%)**
Yes	34(28.6)	20(16.8)	17(14.3)
No	85(71.4)	99(83.2)	102(85.7)
Total	119(100)	119(100)	119(100)

Out of the total study population, 10.8% (n=34) were previous smokers, 6.4% (n=20) were current smokers and 5.4% (n=17) were daily smoker (Table 6.1.6).

While considering only men, 28.6% (n=34) of the men were previous smokers, 16.8% (n=20) were current smokers and 14.3% (n=17) were daily smokers (Table 6.1.6). The mean age at which participants started smoking was 28.5 years (S.D. : 15.3) with an average duration of smoking of 42.5 years (S.D. : 13.6). Majority of the smokers used hand rolled cigarettes (91.6%) while rest of the smokers used manufactured cigarettes (8.4 %).

Table 6.1.7 History of Alcohol consumption among the study population and male participants

Alcohol consumption history	Previous alcohol consumption (%)	Alcohol consumption in the past 1 year (%)	Alcohol consumption in the past 1 month (%)
Yes	36(11.5)	25(8.0)	20(6.4)
No	278(88.5)	289(92.0)	294(93.6)
Total	314(100)	314(100)	314(100)

Alcohol consumption history among men	Previous alcohol consumption (%)	Alcohol consumption in the past 1 year (%)	Alcohol consumption in the past 1 month (%)
Yes	34(28.6)	23(19.3)	19(16)
No	85(71.4)	96(80.7)	100(84)
Total	119(100)	119(100)	119(100)

Out of the total study population 11.5% (n = 36) had consumed alcohol in the past, 8% (n = 25) had consumed alcohol in the past 1 year and 6.4% (n = 20) had consumed alcohol in the past 1 month (Table 6.1.7).

While considering only men, 28.6% (n =34) had consumed alcohol in the past, 19.3% (n = 23) had consumed alcohol in the past 1 year and 16% (n = 19) had consumed alcohol in the past 1 month (Table 6.1.7).

Table 6.1.8 Frequency of alcohol consumption in the past 12 months among the study population

Frequency of alcohol consumption in the past 12 months	Frequency (n)	Percentage (%)
Daily	3	12
5-6 days per week	1	4
1-4 days per week	11	44
1-3 days per month	8	32
Less than once a month	2	8

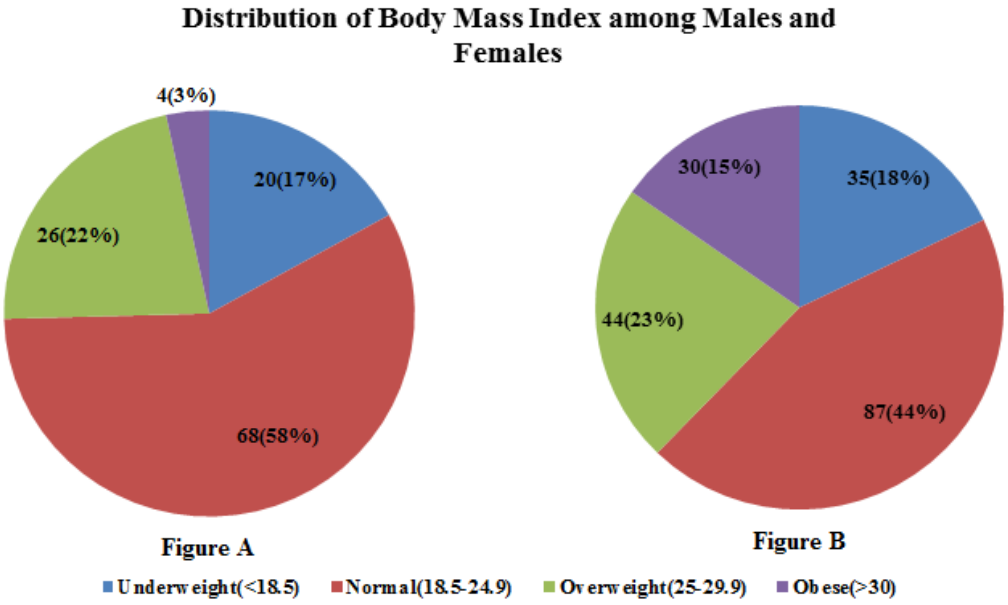
Out of the population who consumed alcohol, 12% (n = 3) of the subjects who consumed alcohol in the past 1 year were taking alcohol daily (Table 6.1.8).

6.2 ANTHROPOMETRY OF THE STUDY POPULATION

The height of the subjects ranged from 132cm to 178cm with a mean height of 154.4 cm (SD: 8.9cm) and with a median (interquartile range) height of 154 cm (148cm-162cm). The weight of the subjects ranged from 30kg to 97kg with a mean weight of

55.4 kg (SD: 13.1kg) and with a median (interquartile range) weight of 55 kg (45kg-64 kg)

Figure 6.2.1 Distribution of Body Mass Index among Males and Females



Among men (Figure A), 68 males (58%) had normal BMI, 26 males (22%) were overweight, 20 males (17%) were underweight and 4 males (3%) were obese. Among women (Figure B), 87 females (44%) had normal BMI, 44 females (23%) were overweight, 35 females (18%) were underweight and 30 females (15%) were obese (Figure 6.2.1).

6.3 INCIDENCE OF FALLS IN THE PAST SIX MONTHS

Table 6.3.1 Incidence of falls in the past six months among the study population

Fall in the past 6 months	Incidence per person months of follow up	95% CI	$\chi 2$ value	p value
Age Group				
60-69 years	0.32	0.25-0.39	188.8	**<0.001**
70-79 years	0.69	0.60-0.78		
>80 years	1.18	1.04-1.32		
Gender			RR	95% C.I.
Female	0.61	0.54-0.68	1.29	0.88 – 1.89
Male	0.47	0.38-0.56		
Overall	0.56	0.50-0.62		

The incidence of falls among the study participants were 0.56 per person months (95% CI: 0.50-0.62) with the highest incidence among the above 80 years age group (1.18 per person months with 95% CI: 1.04-1.32).The incidence of fall among 60 to 69 years age group was 0.32 per person months (95%CI: 0.25-0.39) and incidence of fall among 70 to 79 years age group was 0.69 per person months (95%CI: 0.60-0.78) (Table 6.3.1). The incidence of falls among females were 0.61 per person months (95%CI: 0.54-0.68) and incidence of falls among males were 0.47 per person months (95%CI: 0.38-0.56).Females were 1.29 times at higher risk of fall but this was not statistically significant (Table 6.3.1).

6.4 PROPORTION OF ELDERLY POPULATION WITH HISTORY OF FALL IN THE PAST SIX MONTHS

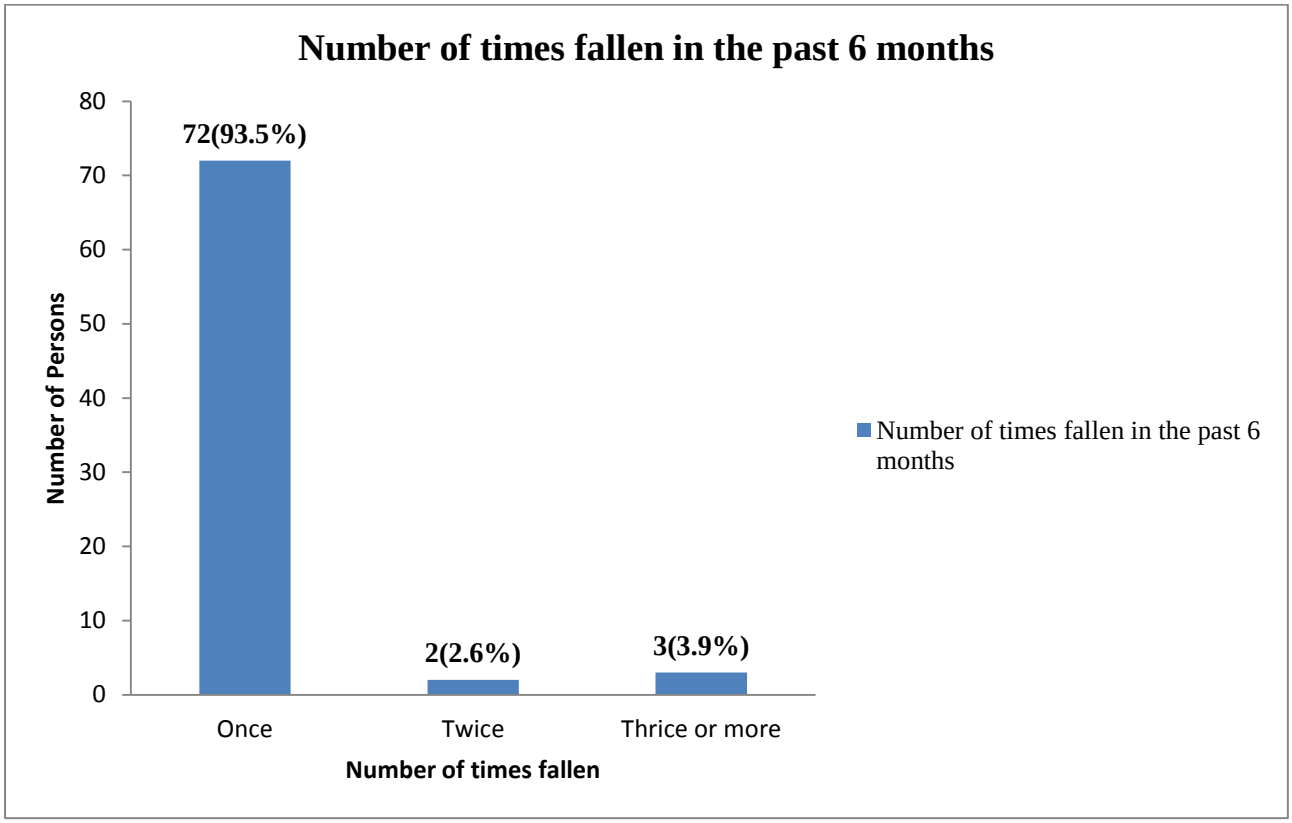
Table 6.4.1 Proportion of elderly with history of fall in the past six months among the study population

Age Group	Frequency (n) and Proportion (%)	95% CI	$\chi 2$ value	p value
60-69 years	27(15.8)	10.2-21.4	17.42	**0.0001**
70-79 years	31(31.3)	22.0-40.6		
>80 years	19(43.2)	28.3-58.1		
Gender				
Male	24(20.3)	12.9-27.7	1.36	0.24
Female	53(27.0)	20.7-33.3		
Overall	24.5	19.7-29.3		

The proportion of elderly with history of falls in the past six months was 24.5% (95% CI: 19.7-29.3) with the highest proportion among the above 80 years age group with 43.2% (95%CI: 28.3-58.1).The proportion of falls among the 60-69 years age group was 15.8% (95%CI: 10.2-21.4) and the proportion among the 70-79 age group was 31.3%(95%CI: 22.0-40.6) respectively. Females had a higher proportion of falls (27%; 95%CI: 20.7-33.3) as compared to males (20.3%; 95%CI: 12.9-27.7) but this was not statistically significant (Table 6.4.1).

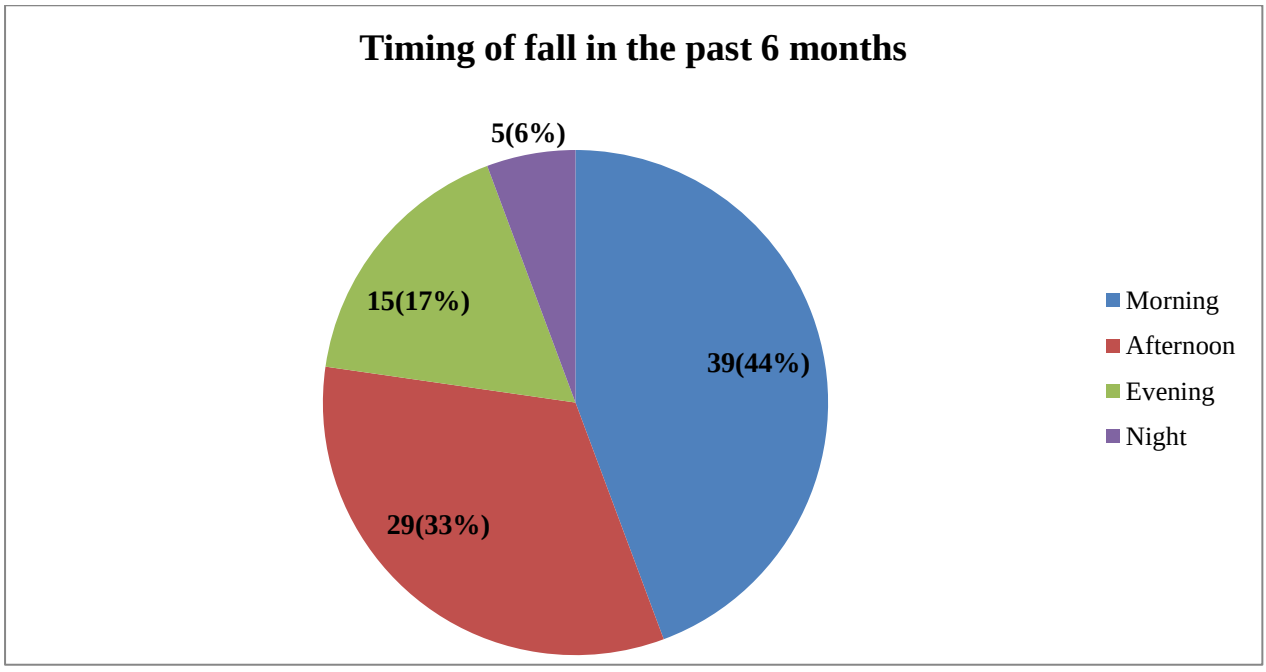
6.5 FREQUENCY OF FALL IN THE PAST SIX MONTHS

Figure 6.5.1 Frequency of fall in the past 6 months among the study population



Among the study participants who fell, 93.5% (n=72) had fallen only once in the past six months while 2.6% (n=2.6%) had fallen twice, 3.9% (n= 3) had fallen thrice or more (Figure 6.5.1).

Figure 6.5.2 Timing of fall in the past 6 months



Out of the total number of participants who had fallen, 39 (44%) participants had fallen in the morning while 29 (33%) had fallen in the afternoon (Figure 6.5.2).

Table 6.5.1 Activity involved at the time of fall in the past 6 months

Activity involved (N=88 falls)	Frequency (n)	Percentage (%)
Moving around	84	95.4
Bathing	2	2.3
Toileting	2	2.3

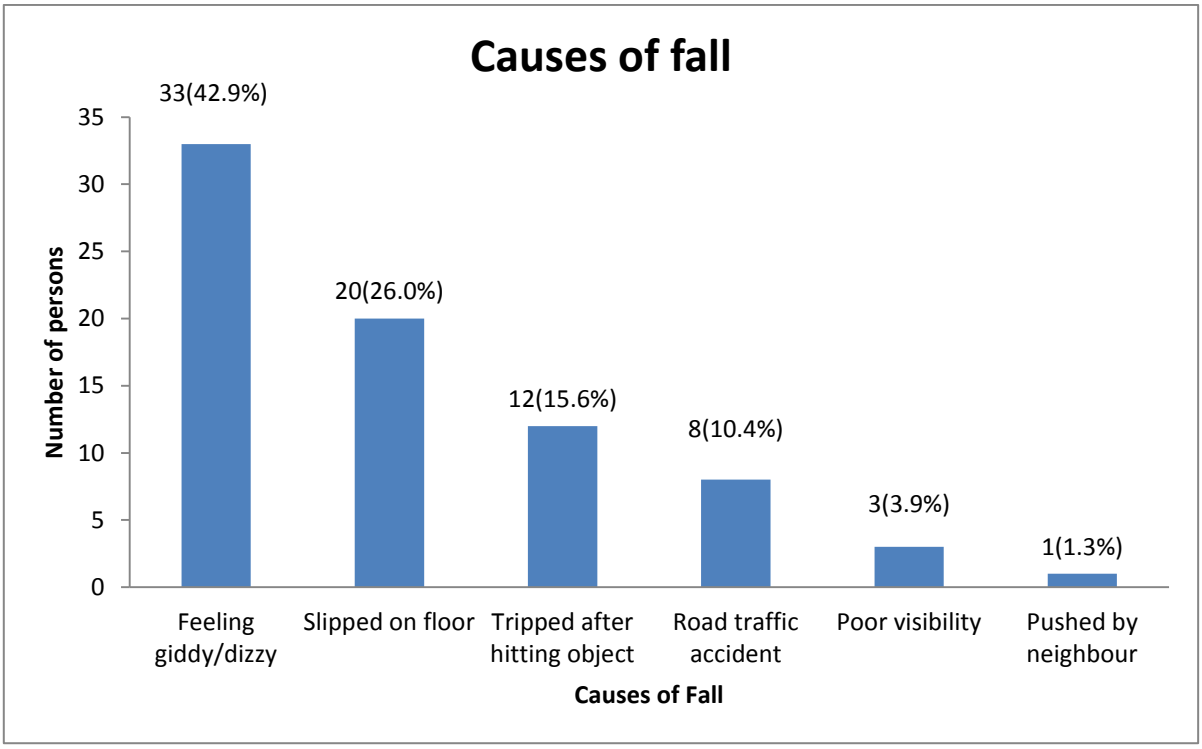
Among the population that had fallen in the past six months, 84(95.4%) of the people were moving around while 2(2.3%) people were bathing and 2(2.3%) people were toileting at the time of fall (Table 6.5.1).

Table 6.5.2 Distribution of primary place of fall in the past 6 months

Place of fall (N=88 falls)	Frequency (n)	Percentage (%)
Outside home	47	53.4
Surrounding home	23	26.1
Living room	12	13.7
Bathroom	5	5.7
Bedroom	1	1.1

Among the population that had fallen in the past six months, 47(53.4%) of the people fell outside home while 23(26.1%) people fell in the surrounding home and 18(20.5%) people fell inside the house (Table 6.5.2).

Figure 6.5.3 Reported reasons for fall in the past 6 months



Out of the total study participants, 42.9% (n= 33) of the people who had fallen had giddiness at the time of fall, while 20(26%) had slipped on the floor and 12(15.6%) had tripped after hitting an object (Figure 6.5.3).

Table 6.5.3 Injury following a fall in the past 6 months

Injury after fall (N=88 falls)	Frequency (n)	Percentage (%)
Yes	43	48.9
No	45	51.1
Total	88	100

Among the people who had fallen 48.9% (n= 43) of them had sustained any injury (Table 6.5.3)

Table 6.5.4 Type of Injury sustained

Type of Injury (N=43 falls)	Frequency (n)	Percentage (%)
Fractures	8	18.6
Lacerations	1	2.3

Bruises	27	62.8
Abrasions	7	16.3

Among the study participants who had an injury following a fall, 8(18.6%) of the people who had injuries had a fracture due to the fall while a large number (62.8%; n= 27) of people had bruises after a fall (Table 6.5.4).

Table 6.5.5 Primary site of Injury

Primary site (N=43 falls)	Frequency (n)	Percentage (%)
Extremities	36	83.7
Head	5	11.6
Face	1	2.3
External/Others	1	2.3

Among the study participants who were injured, 36(83.7%) of the participants had sustained injuries to one of their extremities (Table 6.5.5).

Table 6.5.6 Treatment taken after Injury

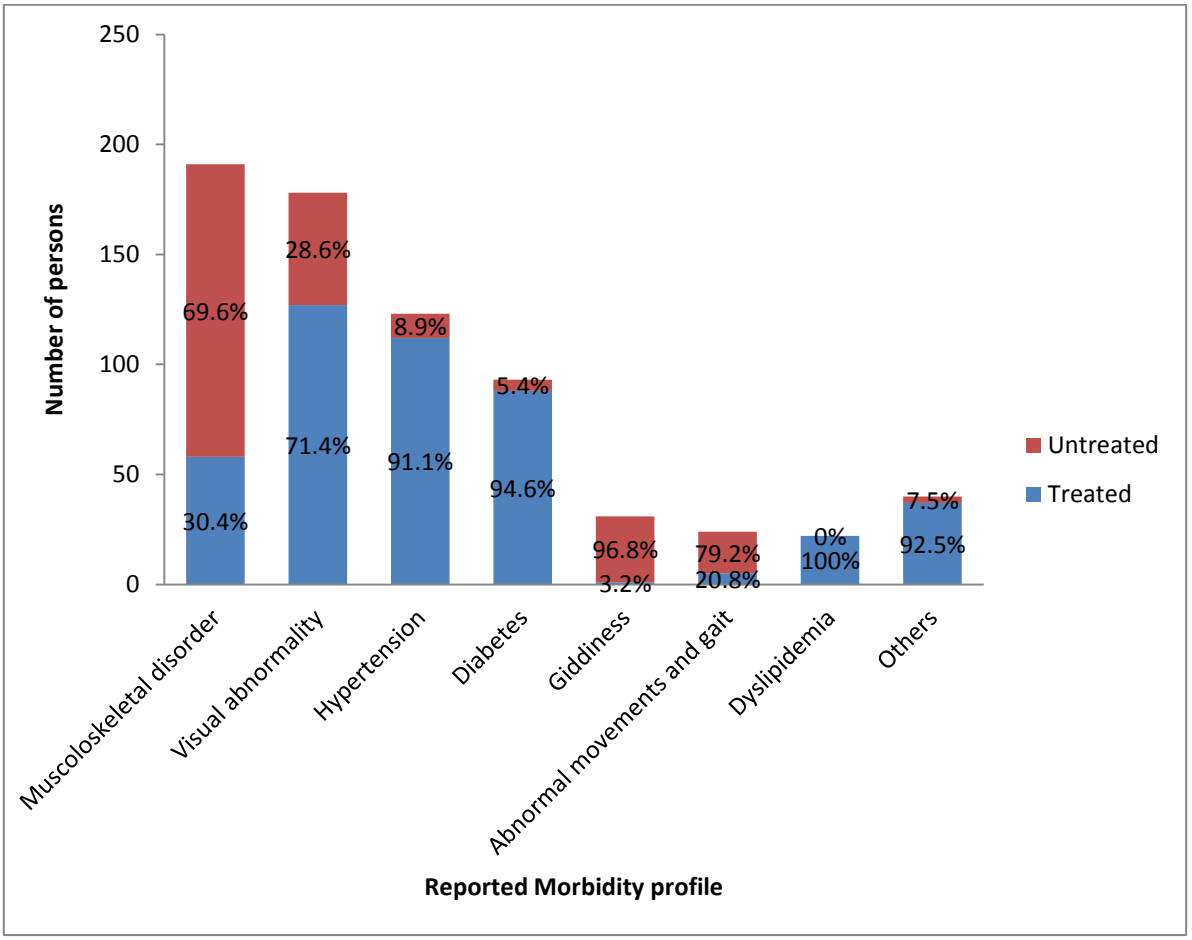
Treatment (N=43 falls)	Frequency (n)	Percentage (%)
Treatment not taken	11	25.6
Treatment taken	32	74.4
Out - patient treatment	22	51.2
Home remedies/First Aid	7	16.2
In – patient treatment	3	7.0

Out of the people who were injured, 11(25.6%) of the participants did not take any treatment (Table 6.5.6) Among the people who had taken treatment which accounted for 74.4% (n = 32), 22(68.7%) had consulted a doctor but did not need hospitalisation,

7(21.9%) had resorted to home remedies while 3(9.4%) needed hospitalisation and needed surgical intervention (Table 6.5.6).

6.6 MORBIDITY PROFILE AS REPORTED BY STUDY PARTICIPANTS

Figure 6.6.1 Reported morbidity profile among the study population



Others*-Stroke, Acid peptic disease, Respiratory disease, Cardiac disease, Seizure, Psychosis, Hypothyroidism, BPH, Anaemia, Uterine Cancer, Silicotuberculosis

Figure 6.6.1 shows the distribution of reported morbidities of the study population of which 60.8% (n=191) had reported musculoskeletal disorders, 56.7% (n= 178) reported visual abnormality, 39.2% (n= 123) had reported to have hypertension, followed by 29.6% (n= 93) reported to have diabetes.

Table 6.6.1 Use of walking aids among various age groups in the study population

Use of walking aids	Frequency (n)	Percentage (%)
None	265	84.4
Walking stick		
60-69 years	7	2.2
70-79 years	15	4.8
>80 years	20	6.4
Walker		
60-69 years	1	0.3
70-79 years	5	1.6
>80 years	1	0.3
Total	314	100

Table 6.6.1 shows that 20 (6.4%) participants who were above 80 years old used a walking stick as a support for walking while 5 (1.6%) participants whose age was between 70-79 years old were using a walker as a walking aid.

6.7 RISK CHARACTERISTICS OF THE STUDY POPULATION WITH RESPECT TO FUTURE FALLS USING THE STEADI RISK ASSESSMENT TOOL

Table 6.7.1 Responses to different components of STEADI Tool

Risk of fall (STEADI Tool)	Yes (%)	No (%)
I have fallen in the past	211(67.2)	103(32.8)
I use or have been advised one walker to get around safely	62(19.7)	252(80.3)
Sometimes I feel unsteady when I am walking	156(49.7)	158(50.3)
I steady myself by holding onto furniture when walking at home	74(23.6)	240(76.4)
I am worried about falling	131(41.7)	183(58.3)
I need to push with my hands to stand up from a chair	191(60.8)	123(39.2)
I have some trouble stepping onto a higher platform	229(72.9)	85(27.1)
I often have to rush to the toilet	46(14.6)	268(85.4)
I have lost some feeling in my feet	104(33.1)	210(66.9)
I take some medicine that makes me tired	53(16.9)	261(83.1)
I take medicine to help me sleep	9(2.9)	305(97.1)
I often feel sad or depressed	163(51.9)	151(48.1)

Table 6.7.1 shows the responses to different components of the STEADI Tool. Among the study participants 67.2% (n= 211) had fallen in the past, 19.7% (n= 62) of the participants were advised to use a walker, while 49.7% (n= 156) reported that they feel unsteady while walking and 23.6% (n= 74) reported that they steady themselves by holding onto furniture when walking at home. Overall, 41.7% (n= 131) were worried about falling, while 60.8% (n= 191) needed to push with their hands to stand up from their chair. Nearly 72.9% (n= 229) participants had trouble stepping onto a

higher platform, 14.6% (n= 46) participants had to rush to the toilet while 33.1% (n= 104) participants reported that they had lost some feeling in their feet. There were 16.9% (n= 53) participants who took some medicine that make them feel tired, 2.9% (n= 9) participants who took medicine to help them sleep, while 51.9% (n= 163) participants reported that they were sad or depressed.

Table 6.7.2 Presence of risk of fall among the study population as assessed by the STEADI tool

Risk score (STEADI Tool)	Frequency (n)	Percentage (%)
Present (4 or more)	195	62.1
Absent (3 or less)	119	37.9

Using the recommended cut-off of four or more provided by the developer of the STEADI Tool, 62.1% (n= 195) were at risk of experiencing fall (Table 6.7.2). The mean of the STEADI score was 4.5.

Table 6.7.3 Presence of risk of fall among the study population as assessed by the modified* STEADI tool

Risk score(STEADI Tool) modified*	Frequency (n)	Percentage (%)
Present	211	67.2
Absent	103	32.8
Total	302	100

Using the modified STEADI Tool with a cut-off of three or more, 67.2% (n= 211) were at risk of experiencing fall (Table 6.7.3). The mean of the modified STEADI score was 3.9.

6.8 PREVALENCE OF FACTORS ASSOCIATED WITH FALLS

Table 6.8.1 Screening for depression among the study participants using the Geriatric Depression scale

Depression	Frequency (n)	Percentage (%)
Present	171	55.3
Absent	138	44.7
Total	309	100

Table 6.8.1 shows that 55.3% (n= 171) of the study participants were screened to be positive for depression using the Geriatric Depression Scale.

Table 6.8.2 Previous history of Fracture among the study participants

Previous history of Fracture	Frequency (n)	Percentage (%)
Present	65	20.7
Absent	249	79.3
Total	314	100

Table 6.8.2 shows that 20.7% (n= 65) of the study participants reported previous history of fracture.

Table 6.8.3 Near vision among the study participants using the Jaeger's Chart

Near Vision	Frequency (n)	Percentage (%)
Normal (less than N-6)	49	15.9
Visual impairment (more than N-6)	260	84.1
Total	309	100

Table 6.8.3 shows that 84.1% (n= 260) of the study participants had impaired near vision.

Table 6.8.4 Distant vision among the study participants using the Snellen's chart

Distant Vision	Frequency (n)	Percentage (%)
Normal(6/6 to 6/12)	157	50.8
Mild(Visual Acquity less than 6/12 to 6/18)	56	18.1
Moderate(Visual Acquity less than 6/18 to 6/60)	66	21.4
Severe(Visual Acquity less than 6/60 to 3/60)	17	5.5
Blindness(Visual Acquity less than 3/60)	13	4.2
Total	309	100

Table 6.8.4 shows that 4.2% (n=13) participants had blindness, 5.5% (n=17) participants had severe visual impairment, 21.4% (n=66) had moderate visual impairment, 18.1% (n=56) had mild visual impairment, 50.8% (n=157) had normal vision.

Table 6.8.5 Level of cognition among the study participants using Mini-mental status examination

Cognition level (MMSE score)	Frequency (n)	Percentage (%)
No cognitive impairment (24-30)	233	75.4
Mild cognitive impairment (18-23)	40	12.9
Severe cognitive impairment (0-17)	36	11.7
Total	309	100

Table 6.8.5 shows that 11.7% (n=36) had severe cognitive impairment, 12.9% (n=40) had mild cognitive impairment, while 75.4% (n=233) had no cognitive impairment.

Table 6.8.6 Postural hypotension among the study participants

Postural hypotension	Frequency (n)	Percentage (%)
Present without symptoms of postural hypotension	35	11.5
Present with symptoms of postural hypotension	6	2.0
Absent	263	86.5
Total	304	100

*- as default postural hypotension is defined as a fall in systolic blood pressure more than 20 mmHg either or a fall in diastolic blood pressure more than 10 mmHg within three minutes of standing when compared with blood pressure from the sitting or supine position.

Table 6.8.6 shows that 13.5% (n=41) of the study participants had postural hypotension.

Table 6.8.7 Presence of Benign Paroxysmal Positional Vertigo (BPPV) among the study participants

BPPV (Dix Hallpike Test)	Frequency (n)	Percentage (%)
Positive	16	5.3
Negative	288	94.7
Total	304	100

Table 6.8.7 shows that 5.3% (n=16) screened were positive for benign paroxysmal positional vertigo.

Table 6.8.8 Presence of Posterior Column Abnormality among the study participants

Posterior Column Abnormality (Rhomberg Test)	Frequency (n)	Percentage (%)
Positive	33	10.9
Negative	271	89.1
Total	304	100

Table 6.8.8 shows that 10.9% (n=33) screened were positive for posterior column abnormality.

Table 6.8.9 Hearing loss among the study participants

Hearing loss	Frequency (n)	Percentage (%)
Nil	51	16.5
Unilateral Conductive hearing loss	32	10.4
Bilateral Conductive hearing loss	166	53.7
Unilateral Sensory neural hearing loss	19	6.1
Bilateral Sensory neural hearing loss	6	1.9
Combined hearing loss	35	11.3
Total	309	100

Table 6.8.9 shows that 10.4% (n=32) of the study participants had unilateral conductive hearing loss, while 53.7% (n=166) had bilateral conductive hearing loss. Nearly 6.1% (n=19) of the study participants had unilateral sensory hearing loss, 1.9% (n= 6) had bilateral sensory hearing loss while 11.3% (n=35) had combined hearing loss.

Table 6.8.10 Presence of Gait instability among the study participants

Timed up and go test	Frequency (n)	Percentage (%)
Positive	97	32.1
Negative	205	67.9
Total	302	100
Four stage balance test	**Frequency (n)**	**Percentage (%)**
Positive	99	32.8
Negative	203	67.2
Total	302	100
30 second chair test	**Frequency (n)**	**Percentage (%)**
Positive	163	54.0
Negative	139	46.0
Total	302	100

Table 6.8.10 shows that 32.1% (n=97) participants were screened positive for the timed up and go test, while 32.8% (n=99) participants were screened positive for the four stage balance test. About half of the participants i.e. 54% (n=163) were screened positive for the 30 second chair test.

6.9 FACTORS ASSOCIATED WITH FALL IN THE LAST SIX MONTHS IN THE STUDY POPULATION

Table 6.9.1 Bivariate analysis to study socio-demographic factors and their association with falls

	Fallen in the past 6 months		Total	OR	95%C.I.	$\chi 2$ value	p value
Gender	Yes	No					
Male	24(20.3%)	94(79.7%)	118(100%)	0.69	0.40-1.19	1.79	0.18
Female	53(27.0%)	143(73.0%)	196(100%)				
Age(years)							
80 and above	19(43.2%)	25(56.8%)	44(100%)	**2.78**	1.43-5.39	9.63	**0.002**
60 to 79	58(21.5%)	212(78.5%)	270(100%)				
BMI							
Overweight /Obese	28(26.9%)	76(73.1%)	104(100%)	1.21	0.71-2.07	0.48	0.49
Underweight /Normal	49(23.3%)	161(76.7%)	210(100%)				
Socioeconomic status							
Lower middle class and below	41(26.8%)	112(73.2%)	153(100%)	1.27	0.76-2.13	0.83	0.36
Middle class and above	36(22.4%)	125(77.6%)	161(100%)				
Living alone							
Yes	17(37.8%)	28(62.2%)	45(100%)	**2.12**	1.09-4.12	4.99	**0.026**
No	60(22.3%)	209(77.7%)	269(100%)				
Activities of Daily Living							
Dependent	8(40.0%)	12(60.0%)	20(100%)	2.17	0.85-5.53	2.77	0.96
Independent	69(23.5%)	225(76.5%)	294(100%)				
Marital status							
Single/separated/ widowed	41(31.3%)	90(68.7%)	131(100%)	**1.86**	1.11-2.34	5.58	**0.018**
Married	36(19.7%)	147(80.3%)	183(100%)				

Education							
Upper primary and below	69(28.8%)	171(71.2%)	240(100%)	**3.33**	1.52-7.30	9.83	**0.002**
High school and above	8(10.8%)	66(89.2%)	74(100%)				
Occupation							
Currently not working	47(26.1%)	133(73.9%)	180(100%)	1.23	0.73-2.07	0.58	0.45
Currently working	30(22.4%)	104(77.6%)	134(100%)				

The various socio-demographic risk factors for falls were tested on chi square test and calculating OR. Analysis showed significant association between age with 19 (43.2%) participants who had falls in the above 80 years age group and 25 (56.8%) participants who did not have falls in the same age group (p value: 0.002).The participants who were living alone had a significant 2.12 times higher odds of experiencing a fall in the past six months as compared to those who were not living alone(p value: 0.026). Similarly participants who were single or separated or widowed had a 1.86 times significantly higher odds of having a fall in the past six months (p value: 0.018). Among the participants those who studied till upper primary or below were at 3.33 times higher odds of experiencing a fall compared to those who studied up to high school and above(p value: 0.002). There was no significant association between male gender, participants who were overweight or obese, participants belonging to lower middle socioeconomic status or below, dependent participants or those who were currently not working with outcome of experiencing a fall in the past six months (Table 6.9.1).

Table 6.9.2 Bivariate analysis to study life style factors and comorbidity and their association with falls

	Fallen in the past 6 months		Total	OR	95%C.I.	χ2 value	p value
Smoking history	Yes	No					
Yes	5(14.7%)	29(85.3%)	34(100%)	0.50	0.19-1.34	1.98	0.16
No	72(25.7%)	208(74.3%)	280(100%)				
Alcohol history							
Yes	7(19.4%)	29(80.6%)	36(100%)	0.72	0.30-1.71	0.57	0.45
No	70(25.2%)	208(74.8%)	278(100%)				
Arthritis							
Yes	48(25.3%)	142(74.7%)	190(100%)	1.11	0.65-1.88	0.14	0.70
No	29(23.4%)	95(76.6%)	124(100%)				
Diabetes mellitus							
Yes	28(30.1%)	65(69.9%)	93(100%)	1.51	0.88-2.61	2.23	0.13
No	49(22.2%)	172(77.8%)	221(100%)				
Hypertension							
Yes	40(32.5%)	83(67.5%)	123(100%)	**2.01**	1.19-3.38	6.99	**0.008**
No	37(19.4%)	154(80.6%)	191(100%)				
Medication History							
Currently on medications	47(29.2%)	114(70.8%)	161(100%)	**1.69**	1.00-2.86	3.89	**0.048**
Currently not on medications	30(19.6%)	123(80.4%)	153(100%)				
Depression							
Present	50(29.2%)	121(70.8%)	171(100%)	**1.87**	1.08-3.22	5.14	**0.023**
Absent	25(18.1%)	113(81.9%)	138(100%)				
Level of cognition							
Severely impaired	15(41.7%)	21(58.3%)	36(100%)	**2.54**	1.23-5.22	6.71	**0.01**
Normal to mildly impaired	60(22.0%)	213(78.0%)	273(100%)				
Postural hypotension							
Present	7(17.1%)	34(82.9%)	41(100%)	0.63	0.27-1.48	1.15	0.28
Absent	65(24.7%)	198(75.3%)	263(100%)				

Bivariate analysis of lifestyle factors and comorbidity with history of fall in the past six months showed that the participants who reported hypertension had a significant 2.01 times higher odds of experiencing a fall in the past six months as compared to those did not report(p value: 0.026). However participants who were currently on any medications were 1.69 times higher odds of having a fall in the past six months compared to those who are not currently on medications (p value: 0.008). Nevertheless participants who were screened to have depression were 1.87 times higher odds of experiencing a fall as compared to those who did not have depression (p value: 0.023). Analysis showed significant association between participants with poor cognition of which there were 15 (41.7%) participants who had falls as compared to 21 (58.3%) participants with poor cognition who did not have falls (p value: 0.01). There was no significant association between history of tobacco smoking, history of alcohol consumption, participants reporting history of arthritis, participants reporting history of diabetes, presence of postural hypotension with outcome of experiencing a fall in the past six months (Table 6.9.2).

Table 6.9.3 Bivariate analysis to study vision, hearing and gait related factors and their association with falls

	Fallen in the past 6 months		**Total**	**OR**	**95%C.I.**	**$\chi 2$ value**	**p value**
Vision impairment							
Vision impaired	69(25.6%)	201(74.4%)	270(100%)	1.89	0.76-4.70	1.92	0.16
Normal	6(15.4%)	33(84.6%)	39(100%)				
Dix Hallpike Test for BPPV							
Positive	3(18.8%)	13(81.2%)	16(100%)	0.73	0.20-2.65	0.23	0.63
Negative	69(24.0%)	219(76.0%)	288(100%)				

	Fallen in the past 6 months		Total	OR	95%C.I.	χ2 value	p value
Rhomberg Test	Yes	No					
Positive	13(39.4%)	20(60.6%)	33(100%)	**2.34**	1.10-4.97	5.05	**0.025**
Negative	59(21.8%)	212(78.2%)	271(100%)				
Hearing loss							
Present	64(24.8%)	194(75.2%)	258(100%)	1.2	0.58-2.48	0.24	0.62
Absent	11(21.6%)	40(78.4%)	51(100%)				
Timed up and go							
Positive	30(30.9%)	67(69.1%)	97(100%)	**1.74**	1.00-3.00	3.95	**0.047**
Negative	42(20.5%)	163(79.5%)	205(100%)				
Four stage balance test							
Positive	33(33.3%)	66(66.7%)	99(100%)	**2.10**	1.22-3.62	7.31	**0.007**
Negative	39(19.2%)	164(80.8%)	203(100%)				
Thirty second chair stand test							
Positive	42(25.8%)	121(74.2%)	163(100%)	1.26	0.74-2.15	0.72	0.39
Negative	30(21.6%)	109(78.4%)	139(100%)				

Bivariate analysis of vision, hearing and gait related factors with history of fall in the past six months showed that the participants who were positive for Rhombergs test had a significant 2.34 times higher odds of experiencing a fall in the past six months as compared to those who were negative (p value: 0.025). However participants who were positive for the timed up and go test were at 1.74 times higher odds of having a fall in the past six months compared to those who were negative (p value: 0.047). The participants who were positive for the four stage balance test were 2.1 times higher odds of experiencing a fall as compared to those who were negative (p value: 0.007). There was no significant association between participants with impaired vision, participants screened positive for BPPV, participants with hearing loss and participants who were screened positive for the thirty second chair test with the outcome of having a fall in the past six months (Table 6.9.3).

Table 6.9.4 STEADI categorization of risk and their association with experiencing a fall in the last six months

Risk of fall(STEADI Tool)	Fallen in the past 6 months		Total	OR	95%C.I.	χ2 value	p value
Present	67(34.4%)	128(65.6%)	195(100%)	5.70	2.80-11.63	26.90	**<0.001**
Absent	10(8.4%)	109(91.6%)	119(100%)				

Table 6.9.4 shows the bivariate analysis between those participants who were positive on the STEADI tool and experiencing a fall in the past six months. Out of the participants who had presence of risk of fall on the STEADI tool, 34.4% (n=67) had fallen in the past six months while participants who had absence of risk of fall on the STEADI tool, 8.4% (n=10) had fallen in the past six months. Bivariate analysis showed that the participants who were at risk of fall as assessed by STEADI tool had a significantly 5.70 times higher odds of experiencing a fall in the past six months as compared to those who had no risk (p value: <0.001).

6.10 MULTIVARIATE ANALYSIS

6.10.1 Association of the outcome of fallen in the past six months with various exposure factors using multivariate logisitic regression

Multivariate analysis using multivariate logistic regression was performed to adjust for potential confounding effects of various exposure variables and experiencing a fall in the past six months. The exposure variables that were included in the model were age 80 years and above, education upto upper primary school and below, lower socioeconomic status, participants living alone, history of arthritis present, history of hypertension present, participants currently on medication, dependent participants, participants screened positive for depression, participants with severely impaired cognition, participants screened positive for Rhombergs test, participants screened positive for timed up and go test, participants screened positive for Four stage balance test, and participants with risk of fall using the STEADI Tool. The outcome variable was history of falling in the past six months among the participants.

The summary estimates of the multivariate logistic regression model looking at fallen in the past six months are presented in Table 6.10.1

Table 6.10.1 Analysis of the outcome of fall in the past six months and its potential risk factors using multivariate logistic regression.

Risk Factor	People with falls in the last 6 months N (%)	Unadjusted OR (95%CI)	Adjusted OR (95%CI)	p value
Age 80 years and above	19(43.2%)	2.78(1.43-5.39)	1.77(0.77-4.06)	0.182
Education upto primary school	69(28.8%)	3.33(1.52-7.30)	2.23(0.94-5.31)	0.070
Belonging to lower socioeconomic status	41(26.8%)	1.27(0.76-2.13)	0.96(0.51-1.81)	0.891
Participants living alone	17(37.8%)	2.12(1.09-4.12)	1.46(0.66-3.22)	0.352
History of arthritis	48(25.3%)	1.11(0.65-1.88)	0.76(0.39-1.46)	0.405
History of Hypertension	40(32.5%)	2.01(1.19-3.38)	**2.29**(1.05-5.00)	**0.037**
Participants currently on any medication	47(29.2%)	1.69(1.00-2.86)	1.14(0.50-2.55)	0.759
Dependent participants	8(40.0%)	2.17(0.85-5.53)	2.30(0.50-10.59)	0.284
Participants screened positive for depression	50(29.2%)	1.87(1.08-3.22)	0.89(0.44-1.78)	0.737
Participants with severely impaired cognition	15(41.7%)	2.54(1.23-5.22)	1.69(0.71-4.05)	0.239
Participants screened positive for Rhomberg Test	13(39.4%)	2.34(1.10-4.97)	1.35(0.57-3.18)	0.497
Participants screened positive for Timed up and go Test	30(30.9%)	1.74(1.00-3.00)	0.77(0.36-1.60)	0.478
Participants screened positive for Four stage balance test	33(33.3%)	2.10(1.22-3.62)	1.05(0.51-2.14)	0.895
At risk of fall (STEADI tool)	67(34.4%)	5.70(2.80-11.63)	**4.27**(1.87-9.78)	**0.001**

Participants who were 80 years and above were found to have 1.77 times higher odds of experiencing a fall (adjusted OR=1.77 (95% CI: 0.77-4.06)) as compared to those who were between 60 to 79 years but this was not statistically significant(p value: 0.182). Participants who studied till upper primary school or below were 2.23 times higher odds of experiencing a fall (adjusted OR=2.23 (95% CI: 0.94-5.31)) as compared to participants who studied at least till high school and above. But this was not found to be statistically significant (p value: 0.070). Participants who were living alone were found to have 1.46 times higher odds of experiencing a fall (adjusted OR=1.46 (95% CI: 0.66-3.22)) as compared to those who were not living alone and this was not statistically significant (p value: 0.352).

After adjusting for various confounding factors mentioned earlier, participants who reported to have hypertension were found to have 2.29 times significantly (adjusted p value:0.037) higher odds of experiencing a fall (adjusted OR=2.29 (95%C.I.:1.05-5.00)) as compared to those who did not report to have hypertension.

Participants who were currently on medications were found to have 1.14 times higher odds of experiencing a fall (adjusted OR=1.14 (95% CI: 0.50-2.55)) as compared to those who are not currently on medications but this was not statistically significant (p value: 0.759).

Participants who were dependent on others for ADL were found to have 2.3 times higher odds of experiencing a fall (adjusted OR=2.30 (95% CI: 0.50-10.59)) as compared to those who are not currently on medications but this was not statistically significant (p value:0.284). Participants who had severe cognitive impairment were

found to have 1.69 times higher odds of experiencing a fall (adjusted OR=1.69 (95% CI: 0.71-4.05)) as compared to those who had mildly impaired cognition or normal cognition but this was not statistically significant (p value:0.239).

After adjusting for various confounding factors, participants who were positive for Rhomberg's test were found to have 1.35 times higher odds of experiencing a fall (adjusted OR=1.35 (95% CI: 0.57-3.18)) as compared to those who were negative for Rhomberg's test but this was not statistically significant(p value: 0.497). Participants who were positive for the four stage balance test were found to have 1.05 times higher odds of experiencing a fall (adjusted OR=1.05 (95% CI: 0.51-2.14)) as compared to those who were negative for the four stage balance test but this was not statistically significant (p value: 0.895).

After adjusting for various confounding factors, participants who fell in the category of high risk according to the STEADI Tool were found to have 4.27 times significantly (adjusted p value:0.001) higher odds of experiencing a fall (adjusted OR=4.27 (95% CI:1.87-9.78)) as compared to those who did not have risk of fall as assessed by the STEADI Tool.

7. Discussion

Falls are one of the leading causes for morbidity and mortality among the elderly, mainly due to the injuries and fractures associated with it. Even in the absence of any injury, falls are responsible for increased dependency, social withdrawal due to fear of falling and burden to the caregivers. Many reports say that a fall is due to a multifactorial entity due to the interaction between the individual and the environment(12). Moreover the Global Burden of Disease report (2010) has reported that fall-related deaths will increase by 55% from 348,000 deaths annually in 1990 to almost 540,000 death (15). More concerning is the fact that this burden was disproportionately distributed as more than 92% of disability adjusted life year (DALY) loss and 82% of fall-related mortality was estimated to be mainly among low- and middle-income countries (LMICs) (119).

A cross sectional study among people aged 60 years and above was conducted in a rural community located in Vellore, Tamil Nadu to estimate the incidence of falls and to identify the major risk factors predisposing for falls. Previously published studies on falls among elderly are mainly from the developed countries where the risk factors may not be comparable and might be different from those prevalent in South East Asian countries like China, Pakistan and India. Hence epidemiological research was required to establish the burden of falls and its main risk factors so appropriate policies and prevention strategies can be implemented in developing countries. This study was aimed as one step forward to filling this wide gap.

In our study, 24.5 % (95% CI: 19.7%-29.3%) of the surveyed elderly (≥ 60 years of age) had experienced a fall in the past six months. This proportion similar to studies done in south India which have documented the prevalence of falls to be 26% in Coimbatore, Tamil Nadu (33) and 29.8% in Bengaluru, Karnataka (49), however this was 10.5 % more than that documented in a multi centric study conducted by Krishnaswamy et al. in 10 Indian states (120). Joshi et al. reported a very high prevalence of 51.5% (34) of fall among elders in Haryana but the recall period for experiencing a fall is not mentioned Other studies in the UK (121) USA (122), and Netherlands (123) have documented the prevalence of falls in the previous 6 months among the elders to be around 35% which is higher than our study population.

The overall incidence of falls in our study was 0.56 falls per person months; higher among women (0.61/person month of follow up) than men (0.47/person month of follow up). In the study conducted by Tripathi et al. among 300 participants residing in the urban, rural and slums areas of Chandigarh, it was found that the incidence of falls was 0.67 fall episodes occurred/person/year. This was very less as compared to our data since my incidence was for every month (124).

Among the elderly who had experienced a fall only five individuals had multiple falls which was very less as compared to the study done by Tripathy et al. (124) in which 48 participants (16%) had multiple falls in one year. The shorter recall duration of six months could be one of the factors for this finding in our study.

Most of the falls occurred during the morning (44%) which is similar to the results seen in D'souza et al. study which was conducted in Manipal and Udupi (125). But the

study conducted by Berg et al. in Oxford, USA (126) had more falls occurring in the afternoon. This could be because in this study the most common cause of fall was due to hurrying too much while walking (31%) which might be a routine activity for them in the afternoon as compared to our study where participants fell most commonly because they were feeling giddy or dizzy (42.9%). We found 6% of falls occurring at night time but others studies had only 1% to 4% (126, 49). This slightly higher difference might be due to other environmental factors like poor lighting in our study area.

In our study, a large number of falls occurred outdoors (79.5%). This is similar findings in the study done by Berg et al. (126) but in contrast Graafmans et al. (127) study done among elderly in Amsterdam, reported that falls occurred more inside the house. This difference may be due to the lesser housing space for elderly in India compared to developed countries. Around half (42.9%) of the study participants fell because they were either feeling giddy or dizzy at the time of fall and about one fourth (26%) had fallen because they slipped on the floor.

Overall 48.9% of the individuals had an injury after a fall and this shows that falls are associated with a lot of morbidity for the elderly. These results were similar to studies done in Karnataka (49) Andhra Pradesh (128) and Kerala (129). The most common injury after a fall was bruiseing (62.8%). 18.6 % of the falls resulted in a fracture which was less compared to the study done by Chacko et al. (33) which reported 23%. Nearly 75% of the people who experienced a fall had to seek medical attention while 3 (9.4%) participants needed hospitalisation and undergo surgery due to a fracture after the fall. This would increase the economic burden on the family especially for

those living in rural areas. Compared to these findings, the study by D'souza et al. (125) showed a higher percentage of elders needing hospitalization (19%). This could be due to the fact that in their study period was two years whereas in our study it was only past 6 months.

The STEADI tool which was used for assessing an individual for risk of fall was very effective in finding subjects who had falls. Participants who were positive according to STEADI tool were at 5.70 times higher risk of having a fall which was statistically significant (95%CI: 2.80-11.63 p value: 0.001). After adjustment for confounders it was found that positive individuals were 4.27 times greater risk and was statistically significant (p value: 0.001). This is in accordance with results from a study done by Lohman et al which showed that participants classified as into high fall risk had 4.76 (95% CI: 3.51, 6.47) times greater odds of falling while during follow-up compared to those with low risk, respectively, when adjusting for health related and sociodemographic risk factors for falls (130). This shows that the STEADI tool is an effective tool for screening and characterising individuals who are at risk of fall. Patients who are found positive can be advised preventive measures and looked for individual risk factor for fall in them so targeted interventions can be undertaken.

Female elders are usually at a higher risk for falls. Many studies have supported this (1, 34,120,131). In our study, even though women were 1.29 times more at risk for fall, this was not statistically significant, however these findings were similar to a study in the USA by Berg et al. (126).The study by Tinetti et al. (13) in the UK also showed women were 1.2 times more at risk for fall but this study only included elders above 75 years of age. There could be an interplay of other medical (high prevalence

of osteoporosis) (45) or social factors (more women living alone compared to men) that might be the reason for a higher fall rate among women.

The incidence of falls among the study participants increased with age with overall incidence of 0.56 falls per person months of follow up with highest incidence among participants aged 80 years and above with 1.18 falls per person months of follow up and it was statistically significant (95%CI: 1.04-1.32). This could be because of frailty, muscle weakness, vision, gait disturbances and increase in comorbidity with increasing age. Elders more than 80 years were 2.78 times at higher risk of falls which was statistically significant at p value: <0.002. Similar results were found in a Canadian survey (44) which reported that the incidence of falls was 35 to 76 per 1000 elders in those aged 60s and 80s respectively. The risk as estimated by Zijlstra et al. (123) in Netherland was 1.79 times higher for those aged above 80 years.

Our study found that people who were living alone were at 2.12 times at higher risk of falling (p value: 0.026).This can be explained by the reason that they are susceptible to other social factor like social isolation like living alone and psychological reasons like fear of falling. Similar findings were seen in studies done by Luukinen et al. (131) which found elders living alone were 1.4 times more likely to fall. Similarly, another study by Wickham et al. (132) reported that elders living alone are at a higher risk (1.7 times) for falls.

Participants who reported having arthritis were only 1.1 times at greater risk which was not found to be significant. This could be because patients who had arthritis restricted their movements within the house and used walking aids as support.

However Hanlon et al. (133) in US and Debbie et al. (54) in their study in Britain had found arthritis to be an independent risk factor for fall.

The present study showed an association with diabetes with persons who reported diabetes to be at 1.5 times greater risk (p value: 0.13). Although this was not statistically significant a study in Finland by Luukinen et al (131) among home dwelling elders found older people with diabetes to experience a fall by 1.7 times as compared to non-diabetics.

The people who reported that they were diagnosed with hypertension were found to be significantly associated with falls in our study. In fact it was the only variable even after adjusting for confounders was found to be significant. The adjusted odds of having a fall was 2.29 (p value: 0.037) among hypertensive patients compared to a non-hypertensive patient. On the contrary previous studies conducted by Hestekin et al. (14) and Blake et al. (121) in their study did not find any significant association between hypertension and fall. This could be explained by the reason that people who reported hypertension were over treated for hypertension and it may contribute to falls due to hypotension caused by the drugs.

People who were screened positive of depression were having 1.87 times higher odds of experiencing a fall as compared to those who were screened negative was found to be statistically significant (p value: 0.023). This could be attributed to lack of social support and nobody to depend which increases the risk. Depressed people are also known to have fear of falling which itself is an independent risk factor for fall. Elderly who are fearful of falling also lack confidence in their ability to manage or prevent falls, which itself can increase the chance of falling again (17).

Our study showed that persons who had poor near vision were 2.13 times greater risk and persons who had poor distant vision were 1.16 times greater risk of falls. Both these values were not statistically significant on univariate analysis. Nonetheless it was found that studies done by Oliver et al. (94) and Skelton et al. (134) report that persons who had poor vision were at greater risk of fall.

Participants who had severely impaired cognition were at 2.54 times higher risk of falls. This result was consistent with the study conducted by Allali et al. (135) in which elderly were chosen from seven countries (Australia, Belgium, France, India, Luxembourg, Switzerland, and the United States). In their study, each group of individuals with cognitive decline, regardless of the severity of decline, presented an increased odds ratio (OR) for falls, with the highest OR for the group with moderate non-Alzheimers Disease dementia (OR 8.23; 95% CI: 5.31–12.76; p value: < .001). These subjects might not be able to comprehend objects and take care of their self and hence at higher risk of tripping or slipping eventually making them prone to a fall. In our study, participants who were positive for Rhomberg's test was 2.34 times at higher risk of falls, while those who came positive in the timed up and go test and four stage balance test were at 1.74 times greater risk and 2.10 times greater risk respectively for falls, and these values were significant.

By using multivariate logistic regression analysis to study association between risk factors and experiencing a fall in the past six months it was found that participants who reported to have hypertension was found to have 2.29 times higher odds of having a fall) while those who were screened positive for risk of fall using STEADI tool was found to have 4.27 higher odds of experiencing a fall after adjusting for age,

education, SES, living alone, history of arthritis, currently on any medications, dependent participants, depression, impaired cognition, participants positive for Rhomberg test, participants positive for Timed up and go test and participants positive for Four stage balance test.

8. Summary and Conclusion

Falls are one of the major problems among the older people and considered as one of the “Geriatric Giants”. The incidence of falls increases with age and frailty level of individuals.

This community based cross sectional study was conducted to estimate the incidence of falls among elderly aged 60 years and above and to study the burden and risk factors associated with falls among elderly aged 60 years and above and to screen elderly into low and high risk of fall in a rural south Indian population.

The incidence of falls among elderly was found to be 0.56 (95%CI: 0.50-0.62) per person months of follow up. The incidence of falls among 60-69 age group, 70-79 age group and above 80 age group were found to be 0.32 (95%CI: 0.25-0.39), 0.69 (95%CI: 0.60-0.78) and 1.18 (95%CI: 1.04-1.32) respectively. Among females the incidence was 0.61 (95%CI: 0.54-0.68) higher than among males the incidence was 0.47 (95%CI: 0.38-0.56).

The proportion of elderly with history of falls in the past six months was 24.5% (95% CI: 19.7-29.3) with the highest proportion among the above 80 years age group with 43.2% (95%CI: 28.3-58.1). The proportion of falls among the 60-69 years age group was 15.8% (95%CI: 10.2-21.4) and the proportion among the 70-79 age group was 31.3% (95%CI: 22.0-40.6) respectively. Females had a higher proportion of falls (27%; 95%CI: 20.7-33.3) compared to males (20.3%; 95%CI: 12.9-27.7) but this was not statistically significant.

Using the STEADI tool, 62.1% (n= 195) of the study population were at risk of experiencing fall in the future.

In this study, older age, living alone, marital status, education, participants who reported to have hypertension, participants currently on medications, participants screened positive for depression, level of cognition, participants positive for Rhombergs test, participants positive for timed up and go test, participants positive for four stage balance test and participant with increased risk of fall using STEADI tool was found to be significantly associated with experiencing falls in the past six months.

On adjusted analysis, those participants who reported having hypertension and those participants screened positive with the STEADI tool was found to be at significantly higher odds of having experienced a fall over the last six months.

The study shows that there is a high incidence and burden of falls among the study participants in a rural south Indian community. About 2/3rd of the elderly are at risk of experiencing falls and warrants preventive measures to be implemented in the community with a major focus on risk factors like hypertension and participants screened positive on the STEADI tool.

Being a cross sectional study on the risk factors for fall, this study provides us with information on factors associated with falls in a rural south Indian population. Also it has helped identify potential individual risk factors like hypertension and age which could serve as predictors of fall. Information obtained from this study could be utilised to design and implement targeted intervention measures directed at preventing falls among high risk elderly people.

9. Limitations

1. As the information about falls was collected based on a six month recall, there is a possibility of recall bias where study participants might forget to recall the minor falls and so findings on the burden of falls can be underreported by the participants.

2. In a few small sized villages with less elderly people it was not possible to get the sample of 16 participants and hence the rest had to be taken from the next chosen village in the list.

3. As the principal investigator belonged to the secondary care hospital with an established primary care program addressing the poor and underprivileged sections of the community, there is a possibility of information bias to happen especially with the reporting of socio-economic information by the study participants.

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11. Annexure 1 – IRB clearance

OFFICE OF RESEARCH
INSTITUTIONAL REVIEW BOARD (IRB)
CHRISTIAN MEDICAL COLLEGE, VELLORE, INDIA

Dr. B.J. Prashantham, M.A., M.A., Dr. Min (Clinical)
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Dr. Anna Benjamin Pulimood, M.B.B.S., MD., Ph.D.,
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Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

April 18, 2019

Dr. Ranjith Viswanath,
Department of Community Health,
Christian Medical College,
Vellore – 632 002.

Sub: **Fluid Research Grant:**
A study on burden of falls and associated factors among elderly in a rural block of Tamil Nadu
Dr. Ranjith Viswanath, PG Registrar, Community Health, Dr. Venkata Raghava Mohan Community Health

Ref: IRB Min. No. 11907 [OBSERVE] dated 06.03.2019

Dear Dr. Ranjith Viswanath,

I enclose the following documents:-

1. Institutional Review Board approval 2. Agreement

Could you please sign the agreement and send it to Dr. Biju George, Addl. Vice Principal (Research), so that the grant money can be released.

With best wishes,

Dr. Biju George
Secretary (Ethics Committee)
Institutional Review Board

NOT TO BE MINISTERED UNTO BUT TO MINISTER
CHRISTIAN MEDICAL COLLEGE
VELLORE
INDIA
Dr. BIJU GEORGE
MBBS., MD., DM.
SECRETARY - (ETHICS COMMITTEE)
Institutional Review Board,
Christian Medical College, Vellore - 632 002.

Cc: Dr. Venkata Raghava Mohan, Dept. of Community Health, CMC, Vellore

Ethics Committee Blue, Office of Research, 1st Floor, Carman Block, Christian Medical College, Vellore, Tamil Nadu 632 002
Tel: 0416 – 2284294, 2284202 Fax: 0416 – 2262788, 2284481 E-mail: research@cmcvellore.ac.in

OFFICE OF RESEARCH
INSTITUTIONAL REVIEW BOARD (IRB)
CHRISTIAN MEDICAL COLLEGE, VELLORE, INDIA

Dr. **B.J. Prashantham,** M.A., M.A., Dr. Min (Clinical)
Director, Christian Counseling Center,
Chairperson, Ethics Committee.

Dr. Anna Benjamin Pulimood, M.B.B.S., MD., Ph.D.,
Chairperson, Research Committee & Principal

Dr. Biju George, M.B.B.S., MD., DM.,
Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

April 18, 2019

Dr. Ranjith Viswanath,
Department of Community Health,
Christian Medical College,
Vellore – 632 002.

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Ref: IRB Min. No. 11907 [OBSERVE] dated 06.03.2019

Dear Dr. Ranjith Viswanath,

The Institutional Review Board (**Blue**, Research and Ethics Committee) of the Christian Medical College, Vellore, reviewed and discussed your project titled "A study on burden of falls and associated factors among elderly in a rural block of Tamil Nadu" on March 06th 2019.

The Committee reviewed the following documents:

1. IRB application format
2. Consent form and Information Sheet (English, Tamil)
3. Questionnaire
4. Cvs of Drs. Ranjith Viswanath, Venkat.
5. No. of documents 1-3.

The following Institutional Review Board (Blue, Research & Ethics Committee) members were present at the meeting held on March 06th 2019 in the New IRB Room, Bagayam, Christian Medical College, Vellore 632 004.

2 of 4

Dr. B.J. Prashantham, M.A., M.A., Dr. Min (Clinical)
Director, Christian Counseling Center,
Chairperson, Ethics Committee.

Dr. Anna Benjamin Pulimood, M.B.B.S., MD., Ph.D.,
Chairperson, Research Committee & Principal

Dr. Biju George, M.B.B.S., MD., DM.,
Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

Name	Qualification	Designation	Affiliation
Dr. Biju George	MBBS, MD, DM	Professor, Haematology, Research), Additional Vice Principal , Deputy Chairperson (Research Committee), Member Secretary (Ethics Committee), IRB, CMC, Vellore	Internal, Clinician
Dr. B. J. Prashantham	MA(Counseling Psychology), MA(Theology), Dr. Min(Clinical Counselling)	Chairperson, Ethics Committee, IRB. Director, Christian Counseling Centre, Vellore	External, Social Scientist
Mr. C. Sampath	BSc, BL	Advocate, Vellore	External, Legal Expert
Ms. Grace Rebekha	M.Sc., (Biostatistics)	Lecturer, Biostatistics, CMC, Vellore	Internal, Statistician
Mr. Samuel Abraham	MA, PGDBA, PGDPM, M.Phil, BL	Sr. Legal Officer, CMC, Vellore	Internal, Legal Expert
Dr. John Jude Prakash	MBBS, MD,	Professor, Clinical Virology, CMC, Vellore	Internal, Clinician
Dr. Rekha Pai	BSc, MSc, PhD	Associate Professor, Pathology, CMC, Vellore	Internal, Basic Medical Scientist
Dr. Premila Abraham	M.Sc. Ph.D	Professor, Department of Biochemistry, CMC, Vellore	Internal Clinician
Mrs. Sophia Vijayananthan	MSc Nursing	Addl. Deputy Dean CMC, Vellore	Internal, Nurse
Rev. Joseph Devaraj	BSc, BD	Chaplaincy Department, CMC, Vellore	Internal, Social Scientist
Dr Sneha Varkki	MBBS, DCH, DNB	Professor, Paediatrics, CMC, Vellore	Internal, Clinician
Mrs. Pattabiraman	BSc, DSSA	Social Worker, Vellore	External, Lay Person

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Dr. Biju George, M.B.B.S., MD., DM.,
Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

Dr. Jayaprakash Muliyil	BSC, MBBS, MD, MPH, Dr PH (Epid), DMHC	Retired Professor, CMC, Vellore	External, Scientist & Epidemiologist
Mrs. Nirmala Margaret	MSc Nursing	Addl. Deputy Nursing Superintendent, College of Nursing, CMC, Vellore	Internal, Nurse
Dr. Asha Solomon	MSc Nursing	Associate Professor, Medical SurgicalNursing, CMC, Vellore	Internal, Nurse
Dr. Santhanam Sridhar	MBBS, DCH, DNB	Professor, Neonatology, CMC, Vellore	Internal, Clinician
Dr. Ajith Sivadasan	MD, DM	Professor, Neurological Sciences, CMC, Vellore	Internal, Clinician
Dr. Barney Isaac	M.B.,B.S.,D.N.B (Respiratory Diseases)	Associate Professor, Pulmonary Medicine, CMC, Vellore	Internal, Clinician
Dr. Winsely Rose	MBBS, MD (Paed)	Professor, Paediatrics, CMC Vellore,	Internal, Clinician
Dr. Thomas V Paul	MBBS, MD, DNB, PhD	Professor, Endocrinology, CMC, Vellore	Internal, Clinician
Dr. Vivek Mathew	MD (Gen. Med.) DM (Neuro) Dip. NB (Neuro)	Professor, Neurology, CMC, Vellore	Internal, Clinician

We approve the project to be conducted as presented.

Kindly provide the total number of patients enrolled in your study and the total number of Withdrawals for the study entitled: "A study on burden of falls and associated factors among elderly in a rural block of Tamil Nadu" on a monthly basis. Please send copies of this to the Research Office (research@cmcvellore.ac.in).

Fluid Grant Allocation:
A sum of 53,800/- INR (Rupees Fifty Three Thousand Eight Hundred Only) will be granted for 12 Months.

Yours sincerely,

Dr. Biju George
Secretary (Ethics Committee)
Institutional Review Board

Dr. BIJU GEORGE
MBBS., MD., DM.
SECRETARY - (ETHICS COMMITTEE)
Institutional Review Board
Christian Medical College
VELLORE

IRB Min. No. 11907 [OBSERVE] dated 06.03.2019

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March 18, 2019.

Dr. Ranjith Viswanath,
Department of Community Health,
Christian Medical College,
Vellore – 632 002.

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Ref: IRB Min. No. 11907 dated 06.03.2019

Dear Dr. Ranjith Viswanath,

The Institutional Review Board (**Blue**, Research and Ethics Committee) of the Christian Medical College, Vellore, reviewed and discussed your project titled "A study on burden of falls and associated factors among elderly in a rural block of Tamil Nadu" on March 06th, 2019. I am quoting below the minutes of the meeting.

The Committee raises the following queries:

1. Is there any other reliable method of estimating age
2. If comprehension is an exclusion, will you exclude them
3. How many will you see in a day
4. Objective no 2 and 3 sound similar
5. Department information in information sheet
6. Contact details needed
7. Tamil version needs modifications

Drs. Ranjith Viswanath and Venkata Raghava Mohan were present during the presentation of the proposal and satisfactorily responded to the queries raised by the Members. After discussion, it was resolved to **ACCEPT the proposal after receiving the suggested modifications and answers to the queries.**

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Deputy Chairperson,
Secretary, Ethics Committee, IRB
Additional Vice-Principal (Research)

Note: 1. Kindly HIGHLIGHT the modifications in the revised proposal.
2. Keep a covering letter and point out the answer to the queries.
3. Reply to the queries should be submitted within 3 months duration the time of the thesis/ protocol presentation, if not the thesis/protocol has to be resubmitted to the IRB.
4. The checklist has to be sent along with the answers to queries.

Email the details to research@cmcvellore.ac.in and send a hard copy through internal dispatch to Dr. Biju George, Addl. Vice-Principal (Research), Principal's Office, CMC.

Yours sincerely,

Dr. Biju George
Secretary (Ethics Committee)
Institutional Review Board.

NOT TO BE MINISTERED UNTO BUT TO MINISTER
Dr. BIJU GEORGE
MBBS., MD., DM.
SECRETARY - (ETHICS COMMITTEE)
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Christian Medical College, Vellore - 632 002
CHRISTIAN MEDICAL COLLEGE
VELLORE
INDIA

Cc: Dr. Venkata Raghava Mohan, Department of Community Health, CMC, Vellore

IRB Min. No. 11907 dated 06.03.2019

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12. Annexure 2 – Questionnaire – English

Serial No.: _____ **Village**: _____

ID No.: _____ **Respondent**: Self / Wife / Son / Daughter / Others

Date: _____ **Respondent's Name**:_____

I. DEMOGRAPHICS

1. Name: **2. Age:**

3. Gender: 1. Male 2. Female 3. Others

4. Height: _ _ _ . _ **5. Weight: _ _ _ . _**

6. Address: _____

7. Religion: 1.Hindu 2. Christian 3.Muslim 4.Other

II.SOCIOECONOMIC DETAILS

8. Family income per month:

9. Number of members in the household:

10. Per capita monthly income

11. Participant's education:

12. Participant's occupation:

13. Highest Education in the Family:

14. Highest Occupation in the Family:

15. Marital Status of Respondent: 1.Single 2.Married

3. Divorced/Separated 4.Widowed

16. Number of rooms in the house - _____

17. Do you live alone?

YES NO

18. Are you able to do these activities on your own?

	INDEPENDENT	PARTIALLY DEPENDENT	FULLY DEPENDENT
Bathing			
Dressing			
Moving around			
Toileting			
Feeding			
Grooming			

19. If dependent on others who provides you support?

	Please tick if multiple people
Brother	
Sister	
Son	
Daughter	
Neighbors	
Relatives	

III. HISTORY OF FALLS

20. Have you experienced a fall in the past 6 months?

YES NO

IF NO FALLS SKIP TO SECTION IV

21. If YES how many times have you fallen?

Number of times - _____

22. At what time of the day did you have a fall?

	Morning(6.00a.m. -11.59p.m.)	Afternoon(12.00p.m.-5.59p.m.)	Evening(6.00p.m.-11.59p.m.)	Night(12.00p.m.-5.59a.m.)
First fall				
Second Fall				
Third Fall				
Fourth fall				

23. What activity were you involved in when you experienced a fall?

	Bathing	Dressing	Toileting	Moving around	Feeding	Others
First fall						
Second fall						
Third fall						
Fourth fall						

24. Can you list the locations where you have fallen?

	Living room	Bathroom	Bedroom	Kitchen	Surrounding home	Outside home
First fall						
Second fall						
Third fall						
Fourth fall						

25. How did you fall?

a. I got tripped after hitting object

b. I slipped on the floor

c. I was feeling giddy / dizzy

d. I couldn't see while walking and fell

e. Other reasons, specify _____

26. After a fall did you have an injury?

YES NO

IF NO INJURY SKIP TO SECTION IV

27. If Yes what type of injury?

	Bruise	Abrasion	Laceration	Fracture	Others
First Fall					
Second Fall					
Third Fall					
Fourth Fall					

28. Where was the site of Injury?

	Head	Face	Chest	Abdomen	Extremity	External or Others
First Fall						
Second Fall						
Third Fall						
Fourth Fall						

29. After an injury what did you do immediately?

	Call for help	Was lying alone till caregiver noticed	No treatment was taken	Sought for treatment
First Fall				
Second Fall				
Third Fall				
Fourth Fall				

30. What treatment did you take after a fall?

	Home remedies/First Aid	Consulted a doctor without admission	Admitted in Hospital	Intervention done if admitted in Hospital	Others
First Fall					
Second Fall					
Third Fall					
Fourth Fall					

IV.PAST HISTORY

31. Do you suffer from any of the following diseases?

	Duration	Treated	Not Treated
1. Osteoarthritis			
2. Diabetes Mellitus			
3. Hypertension			
4. Depression			
5. Visual defect			
6. Wearing glasses			
7. Cataract			
8. Giddiness			
9. Abnormal involuntary movements			
10. Abnormal gait			
11. Stroke			
12. Others – Specify			

32. Do you consume any of the following?

	Yes	No
A.Tobacco		
B.Alcohol		
C.Other Substance Abuse Drugs Specify-_____		

33. If Yes to 32 A, Answer the following –

A. Do you currently smoke daily?	Yes	No
B. How old were you when first started smoking daily?	Yes	No
C. Do you remember how long ago it was?	_____Years	
D. On an average how many of the following do you smoke daily?	_____Manufactured Cigarettes _____Hand rolled Cigarettes _____Pipes full of Tobacco _____ Cigars,Cheroot,Cigarillos ___Others, If others Specify- _____	

34. If Yes to 32 B, Answer the following –

A. Have you consumed an alcoholic drink in the past 12 months?	Yes	No
B. During the past 12 months how frequently have you had at least one alcohol drink	Daily 5-6 days per week 1-4 days per week 1-3 days per month Less than once a month	1 2 3 4 5
C. Have you consumed an alcoholic drink in the past 30 days?	Yes	No
D. During the past 30 days on how many occasions did you have at least one alcoholic drink?	_____	
E. During the past 30 days, when you drank alcohol, on average, how many standard alcoholic drinks did you have during one drinking occasion?	_____	
F. During the past 30 days, what was the largest number of standard alcoholic drinks you had on a single occasion, counting all types of alcoholic drinks together?	_____	
G. During the past 30 days, how many times did you have for men: five or more for women: four or more standard alcoholic drinks in a single drinking occasion?	_____	

35. Are you on any regular medications for your chronic illness?

YES NO

36. If yes, List the medications?

Drug	Class of Drug	Duration

37. Do you use any of the following aids for walking?

a. Cane

b. Walker

c. Others

d. None

V.RISK FACTOR ASSESSMENT FOR FALLS

38. Are you basically satisfied with your life?

YES NO

39. Do you often get bored?

YES NO

40. Do you often feel helpless?

YES NO

41. Do you prefer to stay at home, rather than going out and doing new things?

YES NO

42. Do you feel pretty worthless the way you are now?

YES NO

TOTAL SCORE - _____

43. Any history of Osteoarthritis?

YES NO

44. Any history of Previous Fracture?

YES NO

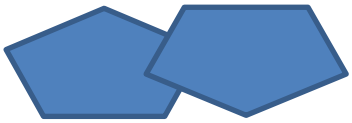
45. If yes, when did you have the Fracture?

_____years

46. Testing of Visual Acquity.

	Right Eye	Left Eye
Near Vision		
Distant Vision		

47. Mini Mental status Examination to test Cognition.

S No	Question	Max Score	Patient Score
A	"What is the year? Season? Date? Day of the week? Month?"	**5**	
B	"Where are we now: State? County? Town/city? Hospital? Floor?"	**5**	
C	"Name these three objects."	**3**	
D	"I would like you to count backward from 100 by sevens."	**5**	
E	"Earlier I told you the names of three things. Can you tell me what those were?"	**3**	
F	"Name these two objects."	**2**	
G	Please repeat this sentence – I am going to hospital for seeing my friend.	**1**	
H	Take this piece of paper in your right hand, fold it in half, and put it on the floor.	**3**	
I	Here is a piece of paper. Please read this and do what it says.	**1**	
J	"Make up and write a sentence about anything."	**1**	
K	Copy this Design 	**1**	

TOTAL SCORE - _____

48. Postural Hypotension.

Blood pressure at supine position

First reading = _____mmHg

Second reading = _____mmHg

Average reading = _____ mmHg

Blood pressure at standing position at 3 minutes

First reading = _____mmHg

Second reading = _____mmHg

Average reading = _____ mmHg

Associated symptoms

PRESENT ABSENT

49. Dix Hallpike Test for Assessment of Vertigo

POSITIVE NEGATIVE

50. Rhomberg Test

POSITIVE NEGATIVE

51. Hearing Test

a. RINNE

POSITIVE (Air conduction more than bone conduction)

NEGATIVE (Bone conduction more than air conduction)

b. WEBER

52. Test for assessing Gait Instability

a. Timed up and go Test

TIME - _____ Seconds

b. Four stage Balance Test

- Stand with your feet side-by-side.

  TIME - _____ Seconds

- Place the instep of one foot so it is touching the big toe of the other foot.

  TIME - _____ Seconds

- Place one foot in front of the other, heel touching toe.

  TIME - _____ Seconds

- Stand on one foot.

  TIME - _____ Seconds

c. 30-Second Chair Stand Test

SCORE - _____

VI.STEADI TOOL

53. I have fallen in the past

Yes No

54. I use or have been advised one walker to get around safely

Yes No

55. Sometimes I feel unsteady when I am walking

Yes No

56. I steady myself by holding onto furniture when walking at home

Yes No

57. I am worried about falling

Yes No

58. I need to push with my hands to stand up from a chair

Yes No

59. I have some trouble stepping onto a higher platform

Yes No

60. I often have to rush to the toilet

Yes No

61. I have lost some feeling in my feet

Yes No

62. I take some medicine that makes me tired

Yes No

63. I take medicine to help me sleep

Yes No

64. I often feel sad or depressed

Yes No

13. Annexure 3 – Questionnaire – Tamil

வினாப்பட்டியல்

எண்: _____ கிராமம்: _____

பங்குபெறுபவரின் பெயர்: _____ தேதி: _____

ஆய்வு எண்: _____

I. **விவரங்கள்:**

1. **பெயர்:** 2. **வயது:**

3. **பாலினம்**: 1. ஆண் 2. பெண் 3. மற்றவை

4. **உயரம்:** 5. **ஏடை**

6. **முகவரி**

7. **மதம்:** 1. இந்து 2. கிறிஸ்துவர் 3. முஸ்லிம் 4. மற்றவை

II. சமூக பொருளாதார நிலை:

8. **குடும்பத்தின்** மாத வருமானம்:

9. குடும்ப உறுப்பினர்களின் எண்ணிக்கை:

10. ஓவ்வொருவரின் மாத வருமானம்:

சமூக பொருளாதார மதிப்பெண்கள் (பி.சி. பிரசாத் அளவு, 2017)

11. பங்குபெறுபவரின் படிப்பு:

12. பங்குபெறுபவரின் வேலை:

13. குடும்ப உறுப்பினர்களின் அதிக படிப்பு:

14. குடும்ப உறுப்பினர்களின் உத்தியோக உயர்வு:

15. பங்குபெறுபவரின் திருமணம் பற்றிய விவரம்:

1. திருமணமாகாதவர் 2. திருமணமானவர் 3. விவாகரத்து/பிரிந்து வாழ்தல் 4. விதவை

16. **வீட்டு அறைகளின் எண்ணிக்கை ∴ வீட்டின் பரப்பளவு சதுர அடியில்**:

17. தனியாக வாழ்பவரா :

ஆம் / இல்லை

18. கீழ்காணும் வேலைகளை தாங்களாகவே செய்ய முடிகிறதா?

	தனியாக	பகுதியாக சார்ந்து இருத்தல்	முழுவதும் சார்ந்து இருத்தல்
குளிப்பதற்கு			
உடை அணிவதற்கு			
வெளியில் செல்வதற்கு			
கழிவறை செல்வதற்கு			
சாப்பிடுவதற்கு			
தன்னடக்கம்			

19. **சார்ந்தவரானால்** யார் உங்களுக்கு உதவிச் செய்வார்?

	நிறைய பேர் என்றால் டிக் குறியிடவும்
அண்ணன் / தம்பி	
அக்கா / தங்கை	
மகன்	
மகள்	
அண்டை வீட்டார்	
உறவினர்கள்	

III. கீழே விழுந்ததைப் பற்றிய விவரங்கள்:

20. கடந்த ஆறு மாதங்களில் நீங்கள் கீழே விழுந்த அனுபவங்கள் உண்டா?

ஆம் / இல்லை (கீழே வீழவில்லை என்றால் பகுதி **III**-க்கு செல்லவும்)

21. ஆம் என்றால் எத்தனை தடவை வீழுந்தீர்கள்?

எத்தனை முறை:_____

22. எந்த சமயத்தில் நீங்கள் விழுந்தீர்கள்?

	காலை (6 மணி முதல் 11:59 வரை)	மதியம் (12 மணி முதல் 5.59 வரை)	சாயந்திரம் (6 மணி முதல் 11.59 வரை)	இரவு (12 மணி முதல் 5.59 வரை)
முதலில் கீழே விழுந்தது				
இரண்டாம் தரம் கீழே விழுந்தது				
மூன்றாவது தரம் கீழே விழுந்தது				
நான்காவது தரம் கீழே விழுந்தது				

23. கீழே விழும்போது என்ன வேலை செய்து கொண்டு இருந்தீர்கள்?

	குளிக்கும் போது	உடை மாற்றும் போது	கழிவறை செல்லும்போது	வெளியில் செல்லும்போது	உணவு உட் கொள்ளும்போது	மற்றவை
முதலில் கீழே விழுந்தது						
இரண்டாம் தரம் கீழே விழுந்தது						
மூன்றாவது தரம் கீழே விழுந்தது						
நான்காவது தரம் கீழே விழுந்தது						

24. நீங்கள் எங்கே கீழே விழுந்தீர்கள்?

	வரவேற்பு அறை	குளியல் அறை	படிக்கை அறை	சமையல் அறை	வீட்டை சுற்றி	வீட்டிற்கு வெளியில்
முதலில் கீழே விழுந்தது						
இரண்டாம் தரம் கீழே விழுந்தது						
மூன்றாவது தரம் கீழே விழுந்தது						
நான்காவது தரம் கீழே விழுந்தது						

25. எப்படி விழுந்தீர்கள்?

a) பொருள் தட்டி தடுக்கி விழுந்தேன்

b) தரையில் **வழுக்கி** விழுந்தேன்

c) தலை சுற்றி கீழே விழுந்தேன்

d) கீழே பார்க்காமல் நடந்து கீழே விழுந்தேன்

e) மற்றவை குறிப்பிடவும் _____

26. கீழே விழுந்தப் பிறகு காயம் ஏதெனும் ஏற்பட்டதா? ஆம் / இல்லை

(இல்லை என்றால் பகுதி III-க்கு செல்லவும்)

27. ஆம் என்றால் எந்த வகையான காயம்? காயத்தின் கடுமையை மதிப்பீடு செய்தல்?

a) சிராய்ப்புக் காயம்

b) சிராய்ப்பின் விளைவுகள்

c) இடுப்பு எலும்பு முறிவு

d) மணிக்கட்டு எலும்பு முறிவு

e) உடைந்த விலா எலும்பு முறிவு

f) முதுகெலும்பு முறிவு

g) மற்றவை, குறிப்பிடுக_____

28. காயம் ஏற்பட்டவுடன் நீங்கள் உடனடியாக என்ன செய்தீர்கள்?

a) உதவிக்கு அழைத்தீர்கள்

b) உங்களை கவனிக்கும் வரை அப்படியே இருந்தீர்கள்

c) சிகிச்சை எதுவும் எடுக்கவில்லை

d) சிகிச்சை எடுத்துக் கொண்டேன்

29. கீழே விழுந்தப் பிறகு நீங்கள் எந்த மாதிரி சிகிச்சை பெற்றுக் கொண்டீர்கள்?

	வீட்டிலிருந்த படியே சிகிச்சை /முதலுதவி	மருத்துவமனை யில் அனுமதிக்காமல் மருத்துரைகலந துஆலோசித்தோம்	மருத்துவமனையில் அனுமதிக்கப்பட்டது	மருத்துவமனையில் அனுமதிக்கப் பட்டிருந்தால் எந்த மாதிரியான **சிகிச்சை அளித்தார்கள்**	மற்றவை
முதலில் கீழே					

விழுந்தது					
இரண்டாம் தரம் கீழே விழுந்தது					
மூன்றாவது தரம் கீழே விழுந்தது					
நான்காவது தரம் கீழே விழுந்தது					

III. கடந்த கால பிண்ணனி

30. கீழே குறிப்பிடப்பட்டுள்ள ஏதெனும் நோய்களால் அவதிப்பட்டார்களா?

	காலம்	சிகிச்சை	சிகிச்சை பெறவில்லை
1. **கீல்வாதம்**			
2. **நீரிழிவு நோய்**			
3. குருதி அழுத்தம்			
4. மன அழுத்தம்			
5. கண் பார்வை குறைவு			
6. கண்ணாடி அணிதல்			
7. கண் புரை			
8. தலை சுற்றல்			
9. இயல்பற்ற இயக்கங்கள்			
10. இயல்பற்ற முறையில் நடக்கும் பாணிகள்			
11. பக்கவாதம்			
12.மற்றவை குறிப்பிடுக			

31. கீழே காணப்படுவகையில் நீங்கள் **ஏதேனும் எடுத்துக்கொள்கிறீர்களா?**

	இல்லை	ஆம்	கால அளவு	அளவு
சாராயம்				
புகையிலை				
முக்கியமான தவறாக பயன்படுத்தக் கூடிய மருந்துகள்				

32. நீண்ட காலமாக நீங்கள் மருந்துகள் தொடர்ந்து எடுத்துக் கொண்டு இருக்கிறீர்களா?

ஆம் / இல்லை

33. ஆம் என்றால், மருந்துகளை பட்டியலிடவும்?

மருந்து	மருந்தின் பிரிவு	அளவு

34. நீங்கள் நடப்பதற்கு எதாவது உபகரணங்களை உபயோகிக்கீறிர்களா?

1. கைத்தடி
2. வாக்கர்
3. மற்றவை

IV. விழுந்ததற்கான அபாய காரணிகளை கொண்டு மதிப்பீடு செய்தல

35. அடிப்பலடயில் உங்கள் வாழ்க்கையில் திருப்தியோக உள்ளீர்களோ ?

ஆம் / இல்லை

36. நீங்கள் அடிக்கடி சலிப்படைகறீர்களா?

ஆம் / இல்லை

37. நீங்கள் அடிக்கடி ஆதரவற்றது போல் உணர்கிறீர்களோ?

ஆம் / இல்லை

38. நீங்கள் வெளியே சென்று புதிய காரியங்களை செய்வதை காட்டிலும், வீட்டிலேயே இருப்பதை விரும்புகிறீர்களா?

ஆம் / இல்லை

39. நீங்கள் இப்போது இருக்கும் நிலை பற்றி சிறந்த மதிப்பில்லாது உணர்கிறீர்களோ ?

ஆம் / இல்லை

மொத்த மதிப்பெண்கள்:_____

40. மூட்டு வீக்கத்திற்கான பிண்ணனி காரணங்கள் உண்டா?

ஆம் / இல்லை

41. 5 வருடங்களுக்கு முன்பு எலும்பு முறிவு எதெனும் ஏற்பட்டுள்ளதா?

ஆம் / இல்லை

42. கண் பரிசோதனை

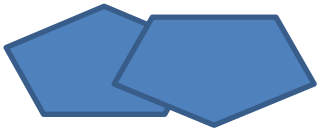
கிட்ட பார்வை

துர்ர பார்வை

43. மன ஆற்றலை கண்டறிய சின்னதாக அறிவாற்றல் குறித்த பரிசோதனை

1. எந்த வருடம்? ஏந்த பருவ காலம்? ஏந்த தேதி? வுாரத்தின் எந்த நாள்? மாதம்?
2. நாம் இப்போழுது எங்கு இருக்கின்றோம்: மாநிலம்? நாடு? நுகரம்? மருத்துவமனை? தரை?
3. மூன்று பொருட்களின் பெயர்களை குறிப்பிடவும்?
4. 7ம் வரிசைப்படி 100லிருந்து 1 வரை பின்னோக்கிய நிலையில் தங்கள் சொல்ல வேண்டும் (93, 86, 79, 72இ 65…..)
5. முன்பு மூன்று பொருட்களின் பெயர்களை சொல்ல சொன்னேன். அதுவெல்லாம் என்ன என்று கூற முடியுமா?
6. இந்த இரண்டு பொருட்களின் பெயர்களை குறிப்பிடவும்
7. சொல்வதை திரும்ப சொல்லவும்: “மருத்துவமனையில் இருக்கும் என்னுடைய நன்பணை பார்க்க போகிளேன்”
8. வலது கையினால் தாளை எடுத்து, பாதியாக மடித்து, தரையில் போடவும்

9. இந்த தாளை வாங்கிக் கொள்ளவும். அதில் இருப்பதை வாசித்து அதன்படி செய்யவும் (“கண்ணை மூடிவும்” என்று எழுத வேண்டும்)
10. எதையாவதை குறித்து சொற்தொடர்களை அமைக்கவும்
11. இந்த **வரைப்படத்தின்** எடுக்கவும்



மொத்த மதிப்பெண்: _____

44. **பிந்தய உயர்** இரத்தஅழுத்தநிலை

படுத்தநிலையில் உள்ள இரத்தஅழுத்தநிலை

முதல் குறிப்பு = _____mmHg

இரண்டாம் குறிப்பு = _____mmHg

சராசரியான குறிப்பு = _____mmHg

45 நிமிடங்களில் நின்ற நிலையில் இரத்த அழுத்த நிலை

முதல் குறிப்பு = _____mmHg

இரண்டாம் குறிப்பு = _____mmHg

சராசரியான குறிப்பு = _____mmHg

தொடர்புடைய அறிகுறிகள்

தற்போது இல்லை

46. தலை சுற்றலுக்கான டிக்ஸ் ஆல்பைக் பரிசோதனை கொண்டு மதிப்பீடு செய்தல்

உறுதி இல்லை

47. ரோம்பர்க் பரிசோதனை

உறுதி இல்லை

48. காது கேட்கும் திறன் குறித்த பரிசோதனை

1. ரேன்னி

   உறுதி (எலும்பு போகும் வழி காற்று போகும் வழி அதிகமாக உள்ளது)

   இல்லை (காற்று போகும் வழி எலும்பு போகும் வழி அதிகமாக உள்ளது)

2. வீபர்

49. உறுதியான நடையில்லாமல் இருப்பதைப் பற்றிய பரிசோதனை

1. குறித்த நேரத்திற்கான பரிசோதனைக்கு செல்லுதல்

   மணி:_____ நொடிகள்

2. நான்கு பகுதியான மீதி பரிசோதனை

- கால்களில் ஊன்றி பக்கவாட்டில் நின்று காட்டவும்

  மணி:_____ நொடிகள்

- ஒரு கால் மற்றொரு காலில் உள்ள பெரு விரலில் தொடுமாறு நிற்கவும்

  மணி:_____ நொடிகள்

- ஒரு குதிங்கால் மற்றொரு கால் விரல்களை தொடுமாறு நிற்கவும்

  மணி:_____ நொடிகள்

- ஒற்றை காலில் நிற்கவும்

  மணி:_____ நொடிகள்

3. 30 நொடிகள் நாற்காலி போன்று நின்று பார்க்கும் பரிசோதனை

   மதிப்பீடுகள்

50. கூட்டம் கூடும் இடத்தில்

    இருப்பேன் இல்லை

V. ஸ்டேடி (ஆய்வு) கருவி

51. கடந்த காலத்தில் நான் விழுந்தேன்

ஆம் / இல்லை

52. நான் கவனமாக நடப்பதற்கு வாக்கர் வைத்து நடக்க அறிவுறித்தப்பட்டுள்ளேன்

ஆம் / இல்லை

53. சில நேரங்களில் நான் நடக்கும் போது தடுமாறுகிறது

ஆம் / இல்லை

54. வீட்டில் நடக்கும் போது மேஜை அல்லது நாற்காலியை பிடித்துக் கொண்டு நடப்பேன்

ஆம் / இல்லை

55. கீழே விழுந்து விடுவேன் என்பதைப் பற்றி கவலையாக உள்ளேன்

ஆம் / இல்லை

56. நாற்காலியிலிருந்து எழுந்திருக்கும் போது கையை வைத்து தள்ள வேண்டி உள்ளது

ஆம் / இல்லை

57. உயர்ந்த நடைமேடையில் காலடி எடுத்து வைக்கும் போது தொந்தரவாக உள்ளது

ஆம் / இல்லை

58. அடிக்கடி **கழிவறை**க்குவெகமாகசெல்லவேண்டியுள்ளது

ஆம் / இல்லை

59. என் காலில் சில உணர்வுகளை இழந்ததுப் போல காணப்பட்டேன்

ஆம் / இல்லை

60. நான் சில மாத்திரைகளை சாப்பிடுவதால் எனக்கு சோர்வு ஏற்படுகிறது

ஆம் / இல்லை

61. நான் நன்கு தூங்குவதற்கு மருந்தை சாப்பிடுகிறேன்

ஆம் / இல்லை

62. நான் சோகமாகவோ அல்லது கவலையாகவோ காணப்படுவேன்

ஆம் / இல்லை

14. Annexure 4 – Information Sheet – English

INFORMATION SHEET- English
A STUDY ON THE BURDEN AND RISK FACTORS OF FALLS AMONG ELDERLY IN RURAL SOUTH INDIA - A Community based cross sectional study in Southern India

Information sheet- adults

We are doing a study on the burden and risk factors of falls among elderly. We are inviting you to be a participant in this study. The following information is provided to inform you about this study and your participation in it. Please read this information carefully and feel free to ask any questions you may have about this study and information given below. You will be given a copy of this information sheet and you will be given an opportunity to ask questions, and your questions will be answered. Your participation in this research study is voluntary. You are also free to withdraw from this at any time. Your withdrawal will not affect any of your treatment or benefit you receive from our institution (CMC Vellore and CHAD hospital)

Purpose of the study:

Falls are the second leading cause of accidental or unintentional injury deaths worldwide.Each year an estimated 646 000 individuals die from falls globally of which over 80% are in low- and middle-income countries. Adults older than 65 years of age suffer the greatest number of fatal falls. This study will help us know the burden and risk factors of falls among elderly and create preventive measures for it.

Methods to be followed:

A questionnaire will be administered to you wherein we will ask you questions about your personal details. We will also ask a few details about your medical conditions. We will also assess the various risk factors for the cause of falls if you had a fall in the past six months.

Approximate duration of study: 9 months (January 2019 to September 2019)

Expected cost: There will be no cost to you

Descriptions of the discomforts, inconveniences, and / or risk that that can be reasonably expected as a result of participation in this study:

Some of the questions we ask about you and your illness may be uncomfortable for you since there are some personal questions.

Unforeseeable risk: There are no unforeseeable risks to you or your relative

Compensation in case of study-related injury:

We do not expect any injury related to this study and hence will not be compensating you monetarily.

Anticipated benefits from this study:

Assessing effectiveness of the current preventive and treatment protocols used for assessing falls and to assess the risk factors for falls among elderly.

Alternative treatment available: Not applicable.

Compensation for participation: We will not be giving you money to answer questions or be a part of this study

Circumstances under which the principal investigator may withdraw you from the study participation:

If you wish not to answer the questions or if you do not want us to come to your house regarding this, you can withdraw from this study.

What happens if you choose to withdraw from study participation:

The information you give us will not be used by us and it will be destroyed.

Contact information:

If you have any questions about this research study or possibly, please feel free to contact:

Dr. Ranjith Viswanath 0416-2284207, Mobile- 8129623357,

email-ranjithviswanath23@gmail.com or Dr.Venkata Raghava Mohan 0416-2284207

Department of Community Health
Christian Medical College
Bagayam
Vellore 632002
Tamilnadu, India
Email: chad@cmcvellore.ac.in
Phone: 091- 416- 2284207 Fax: 091-416 - 2262268

Confidentiality:

All efforts, within reason, will be made to keep your personal information, in your research Record, confidentially.

Privacy: Your information may be shared with government and Institutional Review Board of Christian Medical College

15. Annexure 5 – Information Sheet – Tamil

தகவல் தாள்

தென்னிந்திய கிராமப்புறங்களில் வாழும் வயதானோர் மத்தியில் கீழே விழுவதின் தாக்கம் மற்றும் அபாய காரணிகளில் குறித்த ஆய்வு

ஆய்வு பற்றிய தகவல்:

முதியோர்களிடையே விழுவதின் ஆபத்து மற்றும் ஆபத்து காரணிகளைப் பற்றி நாங்கள் ஒரு ஆய்வு செய்கிறோம். இந்த ஆய்வில் பங்கேற்பாளராக உங்களை அழைக்கிறோம். இந்த ஆய்வு மற்றும் அதில் உங்கள் பங்கு பற்றி தயவுசெய்து கீழே கொடுக்கப்பட்டுள்ள தகவலை கவனமாக வாசித்து, இந்த ஆய்வு பற்றி ஏதேனும் சந்தேகங்களைக் கேட்கலாம். இந்த தகவலின் நகல் உங்களுக்கு வழங்கப்படும், நீங்கள் கேள்விகளைக் கேட்பதற்கு வாய்ப்பளிக்கப்படுவீர்கள், உங்கள் கேள்விகளுக்கு பதில் கிடைக்கும். இந்த ஆய்வுப் படிப்பில் உங்கள் பங்கு தானாகவே உள்ளது. நீங்கள் எப்போது வேண்டுமானாலும் பின்வாங்கலாம். அதனால் எங்கள் மருத்துவமனையிலிருந்து(CMC/CHAD) நீங்கள் பெறும் சிகிச்சை அல்லது நன்மைகளை பாதிக்காது.

ஆய்வின் நோக்கம்:

உலகளாவிய ரீதியில் தற்செயலான காயம் சார்ந்த இறப்புகளுக்கு தடுக்கி விழுதல் இரண்டாம் முக்கிய காரணியாகும். ஒவ்வொரு வருடமும் கிட்டத்தட்ட 646 000 நபர்கள் உலகளாவிய ரீதியில் இறக்கின்றனர், இதில் 80 சதவீத நபர்கள் நடுத்தர வருவாய் உள்ள நாடுகளில் வசிப்பவர்கள் ஆவர். அதில் 65 வயதிற்கு மேற்பட்ட வயோதிகர்களும் அடங்குவர். இந்த ஆய்வு வயதானோர் மத்தியில் கீழே விழுவதின் தாக்கம் மற்றும் அபாய காரணிகளில் குறித்த தெரிந்து கொள்வதற்கும், அதற்கான தடுப்பு நடவடிக்கைகளை உருவாக்குவதற்கும் உதவும்.

பின்பற்றும் முறைகள்:

உங்களுடைய தனிப்பட்ட விவரங்களைப் பற்றி கேள்விகளைக் கேட்கும் ஒரு கேள்வித்தாளை உங்களுக்கு வழங்கப்படும். உங்களுடைய மருத்துவ நிலைமைகள் பற்றிய சில விவரங்களை நாங்கள் கேட்போம். நீங்கள் கடந்த ஆறு மாதங்களில் வீழ்ச்சி ஏற்பட்டால், வீழ்ச்சி காரணமாக பல்வேறு ஆபத்து காரணிகளை மதிப்பீடு செய்வோம்.

ஆய்வின் தோராயமான காலம்: 9 மாதங்கள் (ஜனவரி 2019 முதல் செப்டம்பர் 2019 வரை)

எதிர்பார்க்கப்படும் விலை: உங்களுக்கு எந்த செலவும் இருக்காது

இந்த ஆய்வில் பங்கெடுத்ததன் விளைவாக நியாயமாக எதிர்பார்க்கக்கூடிய இடையூறுகள், அசௌகரியங்கள், மற்றும் / அல்லது அபாயங்களின் விவரங்கள்:

சில தனிப்பட்ட கேள்விகள் இருப்பதால் நாங்கள் உங்களைப் பற்றியும் உங்கள் நோயைப் பற்றியும் கேட்கும் சில கேள்விகள் உங்களுக்கு சங்கடமாக இருக்கலாம்.

எதிர்பார்க்க முடியாத ஆபத்து: உங்களுக்கோ உங்கள் உறவினர்களுக்கோ எதிர்பாராத விதமான அபாயங்கள் இல்லை

ஆய்வு தொடர்பான காயம் விஷயத்தில் இழப்பீடு:

இந்த ஆய்வு தொடர்பான எந்தவொரு காயமும் நாங்கள் எதிர்பார்க்கவில்லை, எனவே நீங்கள் பணமாக்க முடியாது.

இந்த ஆய்வில் எதிர்பார்க்கப்பட்ட நன்மைகள்:

நடப்பு தடுப்பு மற்றும் சிகிச்சை நெறிமுறைகளின் செயல்திறனை மதிப்பிடுதல் மற்றும் வீழ்ச்சிக்கான அபாய காரணிகளை மதிப்பீடு செய்வதற்கு பயன்படுத்தப்படும் வயோதிபர்கள்.

மாற்று சிகிச்சை கிடைக்கவில்லை: பொருந்தாது.

பங்கெடுப்பிற்கான இழப்பீடு:

கேள்விகளுக்கு பதிலளிக்க அல்லது இந்த ஆய்வின் ஒரு பகுதியாக இருப்பதற்கு உங்களுக்கு பணம் கொடுக்க மாட்டோம்

முதன்மை ஆராய்ச்சியாளர் ஆய்வு பங்கேற்பிலிருந்து உங்களை விலக்கிக் கொள்ளக்கூடிய சூழ்நிலைகள்:

நீங்கள் கேள்விகளுக்கு பதில் கூற விரும்பவில்லை என்றால் அல்லது இதைப் பற்றி உங்கள் வீட்டிற்கு வர விரும்பவில்லையெனில், நீங்கள் இந்த ஆய்வில் இருந்து விலகலாம்.

நீங்கள் ஆய்வு பங்களிப்பிலிருந்து விலக்க விரும்பினால் என்ன நடக்கும்:

நீங்கள் எங்களுக்கு வழங்கிய தகவல் எங்களால் பயன்படுத்தப்படாது, அது அழிக்கப்படும்.

தொடர்பு தகவல்:

Dr.ரஞ்சித் விஸ்வநாதன் 0416-2284207

தொலைபேசி எண் - 8129623357

மின்னஞ்சல் - ranjithviswanathan23@gmail.com அல்லது

Dr.வெங்கட் ராகவ மோகன் 0416-2284207

கம்யூனிட்டி மருத்துவ துறை

கிறிஸ்தவ மருத்துவ கல்லூரி ,பாகாயம்

வேலூர் - 632002

தமிழ்நாடு ,இந்தியா .

இரகசியத்தன்மை:

உங்கள் தனிப்பட்ட தகவலை, ஆராய்ச்சிப் பதிவில், இரகசியமாக வைத்திருக்க, அனைத்து முயற்சிகளும், காரணத்திற்காக செய்யப்படும்.

தனியுரிமை:

உங்கள் தகவல் அரசாங்கத்துடன் மற்றும் கிரிஸ்துவ மருத்துவ கல்லூரியின் நிறுவன மறுஆய்வு வாரியத்துடன் பகிரப்படலாம்.

16. Annexure 6 – Consent Form – English

Informed Consent Form for Subjects

Study Title: A STUDY ON THE BURDEN AND RISK FACTORS OF FALLS AMONG ELDERLY IN RURAL SOUTH INDIA

Study Number: _____

Subject's Initials: _____

Subject's Name: _____

Date of Birth / Age: _____

(Subject)

(i) I confirm that I have read and understood the information sheet dated _____ for the above study and have had the opportunity to ask questions. [ ]

(ii) I understand that my participation in the study is voluntary and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected. [ ]

(iii) I understand that ***the Sponsor of the clinical trial, others working on the Sponsor's behalf (delete as appropriate)***, the Ethics Committee and the regulatory authorities will not need my permission to look at my health records both in respect of the current study and any further research that may be conducted in relation to it, even if I withdraw from the trial. I agree to this

access. However, I understand that my identity will not be revealed in any information released to third parties or published. [ ]

(iv) I agree not to restrict the use of any data or results that arise from this study provided such a use is only for scientific purpose(s). [ ]

(v) I agree to take part in the above study. [ ]

Signature (or Thumb impression) of the Subject/Legally Acceptable

Date: _____/_____/_____

Signatory's Name: _____

Signature:

Or

Representative: _____

Date: _____/_____/_____

Signatory's Name: _____

Signature of the Investigator: _____

Date: _____/_____/_____

Study Investigator's Name: _____

Signature or thumb impression of the Witness: _____

Date: _____/_____/_____

Name & Address of the Witness: _____

Contact Information:

Dr. Ranjith Viswanath 0416-2284207, Mobile- 8129623357,

email-ranjithviswanath23@gmail.com or Dr.Venkata Raghava Mohan 0416-2284207

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Email: chad@cmcvellore.ac.in
Phone: 091- 416- 2284207 Fax: 091-416 - 2262268

17. Annexure 7 – Consent Form – Tamil

ஆய்வில் பங்கேற்பவர்க்கான தகவலளிக்கப்பட்டதற்கான இணக்கப்படிவம்

தென்னிந்திய கிராமப்புறங்களில் வாழும் வயதானோர் மத்தியில் கீழே விழுவதின் தாக்கம் மற்றும் அபாய காரணிகளில் குறித்த ஆய்வு

***ஆய்வு எண்(S.No.)*: _____**

***பங்கேற்பவரின் பெயர்(Name)*:_____**

i. _____/_____/_____ தேதியிட்ட, மேல் சொல்லப்பட்ட ஆய்வுக்கான தகவல் படிவத்தை படித்து புரிந்துகொண்டேன் எனவும் கேள்விகேட்க எனக்கு வாய்ப்பளிக்கப்பட்டதெனவும் நான் உறுதி அளிக்கிறேன்.

ii. இந்த ஆய்வில் எனது பங்கெடுப்பு தன்னிச்சையான செயல் எனவும் இந்த ஆய்விலிருந்து எந்த நேரத்திலும் எந்த காரணமும் அழிக்காமல் எனது மருத்துவ கவனிப்புக்கோ சட்ட உரிமைக்கோ எந்தவித பாதிப்புமின்றி விலகிக்கொள்ள எனக்கு முழு சுதந்திரம் உண்டு எனவும் எனக்கு புரிகிறது

iii. நான் இந்த ஆய்விலிருந்து விலககிக்கொண்டாலும், இந்த ஆய்விற்கு வழங்குபவர்க்கோ, அவர் சார்பில் வேலை பார்க்கும் மற்றவர்களுக்கோ நெறிமுறைகள் குழு மற்றும் ஒழுங்குமுறை ஆணையாளர்களுக்கோ எனது ஆவணங்களை இந்த ஆய்வின் காரணமாகவோ இது சம்மந்தமான கூடுதலான ஆராய்ச்சி காரணமாகவோ பார்வையிட எனது அனுமதி தேவையில்லை என்பது எனக்குப்புரிகிறது . இந்த அணுக்கத்திட்கு எனக்கு சம்மத. எனினும், எனது அடையாளம் மூன்றாம் நபர்களுக்கு தெரிவிக்கப்படும் எந்த தகவலிலும் வெளிப்படுத்தப்படவோ அல்லது பிரசுரிக்கப்படவோ மாட்டாது எனவும் எனக்கு புரிகிறது.

iv. இந்த ஆய்விலிருந்து கிடைத்த தகவல் மற்றும் முடிவுகளின் பயன்பாடு அறிவியல் ஆராய்ச்சி நோக்கங்களில் இருக்கும் வரையில், நான் அதனை தடுக்காமலிருக்க சம்மதிக்கிறேன்.

v. நான் இந்த ஆய்வில் பங்கெடுக்க எனக்கு சம்மதம்.

கையெழுத்திட்டவர் பெயர் *(Name)*: _____

பங்கேற்பவரின் கையெழுத்து /பெருவிரல் அடையாளம்:

_____

பிரதிநிதியின் கையெழுத்து: _____

ஆய்வாளரின் கையெழுத்து(Interviewer's signature): _____

தேதி ___/___/____

ஆய்வாளரின் பெயர்(Name) : _____

சாட்சியின் கையெழுத்து / *பெருவிரல் அடையாளம்:*

_____

தேதி ___/___/____

சாட்சியின் பெயர் மற்றும் முகவரி: _____

தொடர்பு தகவல்:

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கம்யூனிட்டி மருத்துவ துறை

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தமிழ்நாடு ,இந்தியா .