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DETERMINING ASSOCIATION OF FRAILTY SYNDROME WITH COMPREHENSIVE GERIATRIC ASSESSMENT IN COMMUNITY DWELLING ELDERLY

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ABSTRACT

BACKGROUND: Frailty is characterized by multisystem dysregulations, leading to a loss of dynamic homeostasis, decreased physiologic reserve, and increased vulnerability for subsequent morbidity and mortality. This is often manifested by maladaptive response to stressors, leading to a vicious cycle toward functional decline and other serious adverse health outcomes. The five frailty criteria are weight loss, exhaustion, low physical activity, slowness and weakness. The sum score of these five criteria classifies people into one of three frailty stages (or groups): not frail (score 0), pre-frail (score 1–2) and frail (score 3–5). Comprehensive geriatric assessment (CGA) was developed as a multidimensional and structured approach aimed at the identification and management of the problems in older adults. High prevalence of frailty indicates the need of routine frailty appraisal as a part of comprehensive geriatric assessment. The CGA contributed to early recognition of frail older people's needs and ensured a care plan and follow up.

PURPOSE: To study the association between the frailty syndrome and comprehensive geriatric assessment in community dwelling elderly.

METHODS: 60 individuals (Mean age = 68.15 ± 6.98 years) were selected based on inclusion and exclusion criteria. All individuals were divided into non frail, pre frail and frail groups as per frailty criteria and then comprehensive geriatric assessment including function, cognition, depression, sensory, nutrition, balance and social isolation were assessed and then scoring was done.

RESULT: The chi square test of independence (level of significance $p<0.05$) was performed to examine the relation between frailty and CGA components. Results indicated no significant association between grades of frailty and fall risk ($\chi^2 = 0.41$), BMI ($\chi 2 = 4.40$), social isolation ($\chi^2 = 0.01$), IADLs ($\chi^2 = 2.07$) whereas significant association was seen between frailty and depression ($\chi^2 = 0.12$), cognition ($\chi 2 = 6.30$), hearing ($\chi^2 = 7.13$), vision ($\chi^2 = 22.55$) & basic ADLs ($\chi^2 = 20.92$).

CONCLUSION: Frailty was significantly associated with cognition, sensory impairments, and basic ADLs components of CGA. Nutrition, depression, fall risk, social isolation and instrumental ADLs of functional impairment components of comprehensive geriatric assessment were not associated with Frailty.

KEY WORDS: Frailty, Comprehensive Geriatric Assessment (CGA)

INTRODUCTION

Frailty is defined as clinically recognizable state of older adults with increased vulnerability resulting from age associated declines in physiologic reserve and function across multiple organ systems, such that ability to cope with every day or acute stressor is compromised.[Kojima,et al,2019] The frailty phenotype defined frailty as distinct clinical syndrome meeting 3 or more of 5 phenotypic criteria: weakness, slowness, low level of physical activity, self-reported exhaustion and unintentional weight loss. [Kojima,et al,2019] Frailty is characterized by multi-system dysregulations, leading to a loss of dynamic homeostasis, decreased physiologic reserve, and increased vulnerability for subsequent morbidity and mortality. This is often manifested by maladaptive response to stressors, leading to a vicious cycle toward functional decline and other serious adverse health outcomes. [Chen,et al,2014]

As frailty is conceptualized as a vulnerable state associated with high risk for increased morbidity and mortality when exposed to a stressor, the frailty syndrome is considered a useful clinical tool for risk stratification in the highly heterogeneous elderly population [Chen,et al,2014]. Identification of older individuals who are frail or at risk of becoming frail with appropriate subsequent evaluation and intervention constitute a cornerstone of geriatric medicine and quality care for ever growing elderly population.[de labra,et al,2018] Frailty can be physical or psychological or a combination of both(veld et al 2015). Frail older people are at an increased risk of negative health outcomes, such as functional decline, falls, institutionalization and mortality [veld,et al,2015].

Three main approaches to conceptualize frailty have been distinguished. One approach considers frailty to be a decline in physical functioning. The frailty phenotype, as described by Fried and colleagues (2001) is based on five predefined physical frailty criteria, which are well known and most frequently used by researchers. [veld,et al,2015] The five frailty criteria are weight loss, exhaustion, low physical activity, slowness and weakness. The sum score of these five criteria classifies people into one of three frailty stages (or groups): not frail (score 0), pre-frail (score 1–2) and frail (score 3–5).[veld et al,2015]

Comprehensive geriatric assessment was developed as a multidimensional and structured approach aimed at the identification and management of the problems in older adults [Seematter-Bagnoud and Büla, 2018]. High prevalence of frailty indicates the need of routine frailty appraisal as a part of comprehensive geriatric assessment. Different frailty sub-categories require multicomponent assessment to establish deficits leading to further complications. The CGA contributed to early recognition of frail older people's needs, ensured a care plan and follow up.Positive effects of CGA for frail older patients have been shown in form of improved functional status, increased ability to remain in own housing.[Wilhelmson,et al 2020]

Frailty has been found to be a predictor of mortality, falls, worsening disability, hospitalization, and care home admission in cohorts of elderly people. Most people over the age of 65 years have multimorbidity, the absolute number of people with multiple conditions is greater in people younger than age 65 years.[Hanlon,et al 2018] The CGA process is not limited to evaluation of older individuals global health status, with mere mention of the presence of medical and functional problems, but also includes the identification of patient's resources, capacities, and preferences. [Seematter-Bagnoud and Büla, 2018]
CGA is not limited to assessment only, but also directs a holistic management plan for older person, which leads to tangible management [Briggs, et al, 2017]. Demonstration of the benefits of a structured intervention targeted at older people prior to hospitalization would be extremely valuable and would have significant impact on organization of medical services for adults [Briggs,et al

017].Also as conceptualized in the new public health framework for healthy aging defined by WHO, target groups are defined based on older person's mental, physical and functional capacity. CGA proposes an approach that focuses on function related outcomes and addresses the problem of poor correlation between symptoms and underlying causes in older persons with multiple chronic diseases. [Seematter-Bagnoud and Büla, 2018]

Need of the Study:

No previous studies had been done that established that frailty is useful in primary care. Identification of impairment in function, cognition, depression, sensory, nutrition, fall risk and social isolation have not been done in relation to frailty among community dwelling elderly in previous studies especially in India.

Aims & Objectives:

Aim:
To determine the association between frailty syndrome and comprehensive geriatric assessment in community dwelling elderly.

Objectives:

-To assess level of Frailty among community dwelling elderly
-To examine community dwelling elderly comprehensively (including ,function, cognition, depression, sensory, nutrition, fall risk and social isolation)

METHODOLOGY

STUDY DESIGN- Cross sectional

SAMPLING- Convenience

NATURE OF THE STUDY-Observational **SAMPLE SIZE** -60

PLACE OF DATA COLLECTION- Shahdara, pitampura,Dwarka and some societies of Delhi NCR

SELECTION CRITERIA

Inclusion criteria- Age 60 years and above

- Both males and females

Exclusion criteria- Any diseases like tumor

- Any recent trauma
- mputation
- Any deformity

MEASUREMENT TOOLS –

1. **FRIED PHENOTYPE CRITERIA [het Veld, et al 2015 and Hanlon, et al 2018],(~~A1~~)**
   WEAKNESS- measured by asking the question: "Do you experience difficulties in daily life because of low grip strength?
   SLOWNESS "Can you reach the other side of the road when the light turns green at a zebra crossing?"
   PHYSICAL ACTIVITY-
   - NONE=No PA in last 4 Weeks
   - LOW=Light DIY Activity[e.g watering in lawn]IN PAST 4 WEEKS
   - MEDIUM=Heavy DIY activity [e.g , lawn mowing, digging ,walking for pleasure,or other exercises]in past 4 weeks
   - HIGH=Sternous sports in past 4 weeks

EXHAUSTION -over the past 2 weeks, how often have you felt tired or had little energy? How often did you feel that you could not get going?
How often did you feel that everything you did was an effort
WEIGHT LOSS -in the last 1 year, have you lost more than 4.5 kg unintentionally? (i.e. not due to dieting or exercise)"

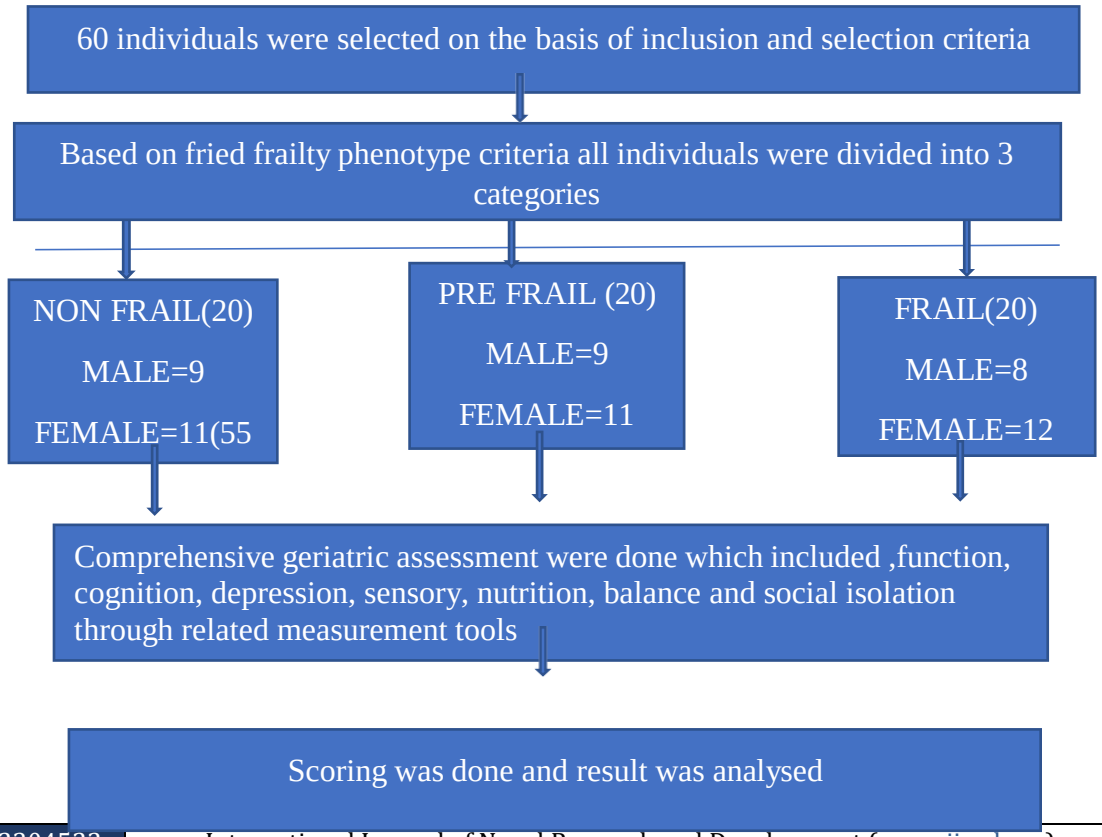
2. **COMPREHENSIVE GERIATRIC ASSESSMENT[Bagnoud,et al 2018][Gibson, et al 2014],(A1)**
   - **FUNCTIONAL IMPAIRMENT-** Physical Self-Maintenance Scale (Activities Of Daily Living, or ADLs)and Instrumental Activities of Daily Living Scale (IADLs)
   - **COGNITIVE IMPAIRMENT-** Mini Cog
   - **DEPRESSION-** Whether over the past 2 weeks, he or she often had little interest or pleasure in doing things?
     Whether he or she has often been bothered by feeling down, depressed, or hopeless?
   - **SENSORY IMPAIRMENT-VISUAL-** Snellens chart
     - **HEARING-** 'Do you have any difficulty with your hearing (without hearing aids)?'
   - **NUTRITIONAL IMPAIRMENT-BODY MASS INDEX (BMI)** - The body mass (weight) and the height of an individual are the attributes used to derive Body Mass Index (BMI) or Quetelet Index. The body mass divided by square of the body height gives BMI and expressed in unites kg/m2, mass is in kilograms and height is in meters. BMI categorizes the person as underweight, normal, overweight or obese
   - **FALL RISK ASSESSMENT**- Time Up and Go test
   - **SOCIAL ISOLATION-** Whether there is somebody available to help in case of emergency or sickness?

DEPENDENT VARIABLE- Comprehensive Geriatric Assessment

INDEPENDENT VARIABLE- Frailty

PROCEDURE- All the data were taken through google forms including the consent.[A1]

Study was approved by Institutional Ethical committee



DATA ANALYSIS

Data analysis was done on 60 community dwelling elderly including both males and females using SPSS. Chi square test was used within group to find association of frailty syndrome with comprehensive geriatric assessment among community dwelling elderly. Level of significance was $p < 0.05$.

RESULTS

Table 5.1 Demographic characteristics of community dwelling elderly

Variables	Mean ± SD
Age(years)	68.15±6.98
Gender	M=26 F=34

The table include demographical characteristics of community dwelling elderly including age and gender. Mean and SD of age was calculated.

Table 5.2 Association of Nutrition with Frailty

Group	Normal	Overweight	Obese	Underweight
Non frail	17	1	1	1
Pre frail	12	5	2	1
Frail	13	5	1	1
Percentage	70%	18.3%	8.3%	5%

χ^2 (1,N=6)= 4.40

The chi square test of independence was performed to examine the relation between nutrition and frailty. The result was not significant.

Table 5.3 Association of cognition with frailty

Groups	Impaired	Normal
Non frail	2	18
Pre frail	5	15
Frail	9	11
	26.6%	73.3%

χ^2 (1,N=60) = 6.30

The chi-square test of independence was performed to examine relation between cognition and frailty.The result was significant.

Table 5.4 Association of depression and frailty

Groups	Present	Absent
Non frail	7	13
Pre frail	8	12
Frail	7	13
	36.7%	63.3%

χ^2 (1,N=60) = 0.12

The chi-square test of independence was performed to examine relation between depression and frailty.The result was not significant.

Table 5.5 Association of hearing with frailty

Groups	Affected	Not affected
Non frail	15	5
Pre frail	13	7
Frail	7	13
	58.3%	41.6%

χ^2 (1,N=60) = 7.13

The chi-square test of independence was performed to examine relation between hearing and frailty.The result was significant.

Table 5.6 Association of vision impairment with frailty

Left eye	Affected	Unaffected
Non frail	3	17
Pre frail	2	18
Frail	19	1
	40%	60%
χ^2 (1,N=60) = 37.91 **Right eye**	**Affected**	**Unaffected**
Non frail	6	14
Pre frail	6	14
Frail	19	1
	51.67%	48.33%

χ^2 (1,N=60) = 22.55

The chi-square test of independence was performed to examine relation between vision and frailty.The result was significant.

Table 5.7 Association of fall risk with frailty

Groups	**Present**	**Absent**
Non frail	11	9
Pre frail	13	7
Frail	12	8
	60%	40%

χ^2 (1,N=60) = 0.41

The chi-square test of independence was performed to examine relation between fall risk and frailty. The result was non significant.

Table 5.8 Association of social isolation with frailty

Groups	**Present**	**Absent**
Non frail	1	19
Pre frail	1	19
Frail	1	19
	5%	95%

χ^2 (1,N=60) = 0.01

The chi-square test of independence was performed to examine relation between social isolation and frailty. The result was non-significant.

able 5.9 Association of functional impairment with frailty

Basic ADLS	**High**	**Moderate**	**Low**
Non frail	15	4	1
Pre frail	5	10	5
Frail	2	10	8
	36.6%	40%	23.3%
χ^2 (1,N=60) = 20.92			
Instrumental ADLS	**High**	**Moderate**	**Low**

Non frail	16	3	1
Pre frail	14	4	2
Frail	12	5	3
	70%	20%	10%

χ^2 (1,N=60) = 2.07

The chi-square test of independence was performed to examine relation between basic ADLs and frailty. The result was significant. The chi-square test of independence was performed to examine relation between instrumental ADLs and frailty. The result was non significant.

Discussion

The study investigated that the association of frailty with comprehensive geriatric management in community dwelling elderly . The components taken for comprehensive geriatric assessment were function(basic & instrumental), cognition, depression, sensory(vision ,hearing), nutrition, balance and social isolation .The study showed that there is no association between nutrition and frailty. There is no association between depression and frailty. there is association between cognition and frailty. There is association between hearing and frailty. There is association between vision and frailty. There is no association between fall risk and frailty. There is no association between social isolation and frailty. There is association between basic ADLs and frailty. There is no association between instrumental ADLsand frailty.

By reviewing various outcome measures BMI is chosen for nutrition,self reported questions for depression,mini-cog for cognition,self reported question for hearing, snellens chart for vision,time up and go test for fall risk,self reported question for social isolation,physical self maintence scale for ADLs. Frailty is measured by frailty phenotype criteria.All the measurement tools were chosen after investigating their reliability,validity and merits.

The data was collected during the period of lock down because of corona pandemic disease. Therefore,all the data was collected through google forms including vedio call also.The population taken under this research ~~project~~ is majorly of Delhi NCR.

woo et al in year 2018 concluded that neither nutrition nor frailty are topic that majority of doctors in a day to day clinical practice and researchers are familiar with or engage in as field of research. Yet with population aging all over the world ,much needs to be done to raise awareness of clinical importance of nutrition and frailty,in addition to chronic disease prevention and management.

In this study it was observed that the among the total population of community dwelling elderly taken in this study,it was found that only 30% of the individuals came under categories other than the normal.One of the major cause of more percentage of normal population could be that the individuals were under care of their families. They were getting the proper diet and medications. Also,only BMI score was considered as outcome measure for nutrition.More reliable tools can also be considered in future studies to elaborate the relationship between nutrition and frailty.

Also, In this study it was observed that among total population approximately 36 percent individual are at risk of or suffered from depression but when associated with frailty the results were non- significant which showed that the depression did not depend on frailty.

Natalie et al in year 2017 concluded that Social engagement is critical to retaining a high quality of life in old age and women in particular are at high risk of depression. Also, Matthew lohman et at in year 2014 in their study concluded that the correlation between frailty and depression in late life is substantial. The association between the two constructs cannot be fully explained by symptom overlap, suggesting that psychological vulnerability may be an important component of frailty.

Veronese et al in year 2017 concluded that among older community dwellers, frailty and pre frailty did not

predict the onset of depression during 2 years of follow up.

When cognition and frailty were associated with each other significant results were found which means that cognition and frailty are related to each other. A prospective cohort study with1,751 community dwelling elderly over a 5 year period showed that frailty and cognitive impairment were predictors of mortality rate in elderly and coexistence of these two of the diseases is even more harmful. [john,et al,2017]

In another study it was concluded that there is statistically significant association between frailty and cognition .cognitive deficits has been identified as a risk factor for frailty syndrome.[Pereira,et al,2019]

In a study it was found that physical frailty was more strongly associated with adverse health issues, but sensory frailty was much more common. Sensory frailty should be explored further as important target of intervention to improve health outcomes for older people both clinical and population level.[Arnadottir ,et al2020]

In this study two components or sensory impairment were taken that are vision and hearing.It was found that the results were statistically significant between vision and frailty as well as hearing and frailty.

liljas, et al in year 2017 concluded that non frail people who experienced poor vision have increased risk of becoming pre frail or frail over 4 years. In another study it was concluded that the visual impairment may be an important, yet understudied risk factor for frailty.

In a study it was concluded that hearing impairment in pre frail older adults was associated with greater risk of becoming frail, independent of covariates, suggesting that hearing impairment may hasten the progression of frailty. [Liljas, et al,2017]

In this study it was found the result was found insignificant between frailty and fall risk. When we studied the TUG score categorically, most of the population are at the fall risk.the major cause of insignificant result can be all the individuals included were above the age of 60 years. Non frail individuals were also found at fall risk.

In a study it was found that falls are prevalent in the elderly population and there is an urgent need for public health strategies to decrease their incidence and identify those who are at risk. [Kojima,et al 2017]

In a study it was found that frailty group had the highest fall risk in this cohort of older adults living in a community-dwelling facility. Therefore, it is important to assess the frailty status among older adults as it can be a predictor for fall risk. -is assessment will therefore lead to a reduction in the rate of disability and death in the community.[Chittrakul, et al 2020]

Also in another study it was found that a concept of frailty including psychological and cognitive markers is associated with both multiple falls and fractures. However, frailty is not superior to falls history for the selection of old persons at increased risk of recurrent falls.[Vries et al 2013]

One another study suggested that there is evidence that falls are associated to the frailty in the elderly. Other factors may influence this association, such as age, sex, data collection instrument of the studies, place where they live and the process of senescence.[Fhon et al2016]

In this study the result between social isolation and frailty was found insignificant. The reason may be it was self-reported data there may be some discrepancies present or we can say that the feeling of social isolation does not depends on aging it my come at any age and also the population taken in this study majorly live with their family members.

In a study it was found that among independent community-dwelling older adults who are not physically frail, those who are socially frail may be at greater risk of developing physical frailty in the near future. Social frailty may precede (and lead to the development of) physical frailty.[Makizako,et al 2018]

Also, in this study the result between basic ADLs and frailty was significant and between instrumental ADLs and frailty was insignificant. There was self-reported data there are chances of discrepancy in the outcomes and it was a crossectional study so tracking the individual for long time is tough.

A systematic review meta-analysis quantitatively showed that frail older people are at higher risks of disabilities. These results are important for all related parties given population aging worldwide. Interventions for frailty are important to prevent disability and preserve physical functions, autonomy, and quality of life.[Kojima et al 2017]

One study results show an association between frailty and disability among elderly people in rural areas. Therefore, prevention should occur at the pre-frailty stage of a person's life to prevent further disability. Also, disability welfare programs should be provided to elderly people who present with frailty.[Choi,et al ,2019]

LIMITATIONS

The sample size was very small. One of the major limitation was that data collection was done during the lockdown and pandemic times due this only virtual contact was possible between the investigator and sample population.

UTURE SCOPE

This study showed that some components of comprehensive geriatric assessment including cognition, sensory impairments and basic ADLs components had association with the frailty. Future studies could be done to investigate more factors associated with frailty to formulate a better treatment and assessment plan for patients. Also ,Other measurement tools which need physical appearance of the individuals can be added in future studies to reduce the chances of error.

CONCLUSION

1. Frailty was significantly associated with cognition, sensory impairments and basic ADLs of components of comprehensive geriatric assessment.

2. Nutrition, depression, fall risk, social isolation and instrumental ADLs of functional impairment components of comprehensive geriatric assessment were not associated with Frailty.

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