Prevalence of frailty and its association with lifestyle factors among elderly in rural Bengaluru

Shilpa K, Norman G

Division of Community Health and Family Medicine, Bangalore Baptist Hospital, Bengaluru, Karnataka, India
Institution where this study was conducted: Division of Community Health and Family Medicine, Bangalore Baptist Hospital, Bengaluru, Karnataka, India

Abstract

Background: There are nearly 10.4 crores elderly in India, with 65% of them living in rural areas. Accessibility to healthcare is limited in rural areas. Primary care physicians deal with a fairly large number of patients from the geriatric age group. With the steady increase in the proportion of elderly, there is a corresponding increase in the prevalence of frailty. Frailty among the elderly leads to increased dependency, adverse health outcomes and mortality. Early identification and targeted interventions by primary care physicians could prevent these adverse outcomes and even reverse its occurrence. Knowledge about environmental and lifestyle influences on frailty would further assist primary care physicians to prevent and manage it optimally. **Methods:** We interviewed 502 participants (>60 years of age) from four taluks of rural Bengaluru. Participants with frailty scores of 3 and above were considered frail, scores of 1-2 were considered prefrail. Association of frailty with lifestyle and environmental factors were tested using the Chi-square test. A value of $P < 0.05$ was considered significant. **Results:** Prevalence of frailty was 24.70% and prefrailty was 62.75%. Elders in age group 60 to 74 years, those living alone or with others (other than the spouse), illiterate, working elders, elderly with less than two diagnosed comorbidities, elderly with low social score and low physical activity were associated with frailty. **Conclusion:** The young old population seems vulnerable to frailty. Health programs aimed at prevention, early detection and treatment of morbidities and frailty will improve their health.

Keywords: Bengaluru, environmental factors, frailty, lifestyle, rural

Introduction

The elderly population is growing worldwide and there are nearly 138 million elderly persons in India in 2021, which is expected to increase by around 56 million by 2031.[1] With the increasing elderly population, concomitant comorbidities and the old age dependency ratio will also rise. The old age dependency ratio is 15.7% in 2021 and is projected to rise to 20.1% by 2031.[1]

Frailty can be defined as a progressive loss of reserve and adaptive capacity associated with an overall deterioration in health.[2] Frailty, an age-related clinical state of increased vulnerability to stressor events, is on the rise in tandem with the unprecedented growth in the world's older adult population. Lower social involvement and quality of life, increased dependency, and higher rates of morbidity, health-care consumption, and mortality come from this increased vulnerability. Frailty further pushes the elderly towards dependency. Family physicians are the first and sometimes the sole contact of care. Hence, they are in a position to assess them, detect and prevent frailty. Frailty must be identified early in order to guide the deployment of therapies to prevent functional decline. It allows for the foreseeing of future disability before the individual becomes disabled.[3]

Access this article online

Quick Response Code:

Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_1679_21

How to cite this article: Shilpa K, Norman G. Prevalence of frailty and its association with lifestyle factors among elderly in rural Bengaluru. J Family Med Prim Care 2022;11:2083-9.

Lifestyle is referred as the characteristics of inhabitants of a region at a specific time and place. It includes day to day behaviors and functions of individuals in job, activities, fun and diet.[4] Lifestyle factors such as physical activity, intellectual stimulation and leisure activities are associated with good physical and mental health. According to WHO, 60% of factors related to individual health and quality of life are correlated to lifestyle.[5] Malnutrition, unhealthy diet, unhealthy habits, substance abuse and sedentary activities are the characteristics of an unhealthy lifestyle. Poor lifestyle is associated with frailty.[6] Several studies have reported adverse lifestyle factors such as low physical activity, low diet quality and smoking being associated with frailty, independent of functional impairment.[6,7] Frailty has five components. i.e., low physical activity, unintentional weight loss, fatigue, slowness and weakness. There are but a few studies and reports on frailty especially among the rural communities in India. This study reports on the prevalence of frailty and its association with lifestyle factors including physical activity, social activity, diet and habits of smoking, tobacco usage and alcohol in a rural population in Karnataka.

Materials and Methods

The study was approved by the Institutional Ethics Committee. The study was registered in Clinical Trial Registry of India (REF/2018/03/019167).

This community-based cross-sectional study was conducted among 502 elderly people selected from the four taluks of Bengaluru rural district from September 2017 to December 2018. The demographic characteristics of study participants are detailed in Table 1. All patients aged above 60 years old of both genders were invited to participate in the study. The sample size was calculated using a prevalence of frailty of 28% in population above 60 years of age,[8] with an absolute precision of 4% and using the formula $4pq/d^2$. Multistage cluster sampling was done with the village as the unit.

Tool

The study used a questionnaire that consisted of three parts. The first part comprised of demographics (name, age, gender, place, education), environmental factors (living arrangements such as house type and marital status and social support, namely type of family and occupation) and comorbidities. The second part comprised of Fried Frailty criteria defined by Fried LP *et al*.[9] Third part assessed their lifestyle (physical activity using short version of international physical activity questionnaire, social activity, balanced diet considering Mediterranean diet as the ideal diet, habits of smoking, alcohol, betel leaves and tobacco consumption) as mentioned in the Table 2.

We applied Fried *et al*.'s definition as an indicator of frailty, which provided a potential standardized definition for frailty and validated the measurements. The dependent variables were divided into three categories: "non-frailty", "pre-frailty", and "frailty". Participants with three or more of the five criteria were categorized as those exhibiting frailty, with one to two criteria

Table 1: Demographic characteristics of study participants (*n*=502)	
Characteristics	Number (%) statistics
Gender	
Male	274 (54.6)
Female	228 (45.4)
Age (in years)	
60-74	364 (72.5)
75-84	106 (21.1)
>= 85	32 (6.4)
Educational qualification	
Illiterate	286 (57.0)
Literate	216 (43.0)
Occupation	
Not working	98 (19.5)
Working	404 (80.5)
Type of family	
Nuclear	109 (21.7)
Others	393 (78.3)
Marital status	
Living with spouse	306 (61.0)
Living alone/with others (other than the spouse)	196 (39.0)
House type	
Kuccha	60 (12.0)
Pucca	442 (88.0)
Diagnosed comorbidities	
>=2 comorbidities	56 (11.2)
<2 comorbidities	446 (88.8)

Table 2: Lifestyle characteristics	
Lifestyle characteristics	Number (%) statistics
Physical activity	
Good	466 (92.83)
Low*	36 (7.17)
Social activity†	
Good	369 (73.51)
Low	133 (26.49)
Balanced diet	
Yes	302 (60.16)
No	200 (39.84)
Habits	
Alcohol	
Current/Ex	101 (20.12)
Never	401 (79.88)
Smoking	
Current/Ex	126 (25.10)
Never	376 (74.90)
Betel leaves	
Current/Ex	340 (67.73)
Never	162 (32.27)
Tobacco chewing	
Current/Ex	83 (16.54)
Never	419 (83.46)

*Low physical activity is males expending <383 kcal/week, females expending <270 kcal/week.[10]
†Good social score is 5 to 8, low social activity is score <5

as those exhibiting pre-frailty, and with none of the criteria as those exhibiting non-frailty. The five criteria were:

- Unintentional weight loss >4.5 kg in last 1 year or BMI <18.5[11]
- Self-described exhaustion
- Weakness
- Slowness
- Low physical activity.

Here we considered BMI <18.5 as low weight, as most of the elderly in our population did not know their initial weight to calculate the weight loss.[12]

Weakness- grip strength was stratified by sex and BMI and measured using a Jamar handheld dynamometer[9] [Table 3].

Slowness – Participants were timed while walking 15 feet. Stratified by sex and height, men who were <=173 cm tall and required >=7 seconds, or were >173 cm tall and required 6 seconds, were considered slow. Women who were <=159 cm tall and required >=7 seconds, or were >159 cm tall and required 6 seconds, were considered slow.[9]

Physical activity was determined using the short version of International Physical Activity Questionnaire, which was used to calculate kilocalories expended per week. (Number of days of physical activity in a week * duration of activity in minutes * number of kilocalories expended per minute).

Physical activity was said to be low, if men expended <383 kcal/week or women expended <270 kcal/week.[9]

Social activities were categorized based on frequency of activities per month as- all days of the month, most days of the month, some days and none of the days.

The activities were
- Visiting others
- Entertaining others at home
- Going out to eat with
- Hobby
- Travelling out of town
- Meeting children/relatives
- Attending gatherings
- Chatting with neighbors.[13]

The activities, if done on all days of month or most of the days of month were being scored one, while lesser than that were scored zero. Total maximum score was eight. A score of zero to four was classified as low social activity, and score of five to eight was classified as good social activity.

Balanced diet - Mediterranean diet was modified to adapt South Indian rural food habits (fish being an infrequent part of the meal) to form a balanced diet i.e., protein (adequate fish/poultry/egg/pulses) + carbohydrates (adequate cereals) – (red meat/sweets).

In rural areas, meals are usually taken two times a day, so cereals are consumed twice a day in sufficient quantity, while in western countries, the quantity is less, but more frequent meals are taken.

Habits- Smoking, alcohol, betel chewing and tobacco chewing were categorized based on frequency of consumption. They were further classified as never and current or reformed habits.

Statistical analysis

Data was analyzed with IBM SPSS version 16 software. Descriptive statistics was shown by tables and figures. Chi-square analysis was done to find the factors associated with frailty. *P* value <0.05 was considered as cut-off for statistical significance.

Results

54.59% were males, 72.52% of total participants were aged between 60 and 74 years. 56.98% were illiterate with 80.47% people still continuing to work. Joint and extended families (other types of families) were common (78.28%) while 39.04% people lived alone/with others (divorced/widowhood/separated/unmarried) with 67% being females. 11.16% had more than one comorbidity.

The prevalence of frailty and prefrailty were 24.70% (95% CI 22.8% to 26.6%) and 62.75% (95% CI 60.5% to 64.8%) respectively [Table 4].

Chi- square analysis showed that the elderly in the age group of 60 to 74 years, living alone or with others (other than the spouse), illiterates, working elders, elderly with less than two diagnosed comorbidities, elderly with low social score and low physical activity were found to be significantly associated with frailty (p < 0.05). The association of lifestyle with environmental factors on frailty is mentioned in Table 5.

Table 3: Grip strength cut-off for frailty	
Grip strength	Cut-off for frailty (kg)
Males	
BMI <=24	<= 29
BMI 24.1-28	<= 30
BMI >28	<= 32
Females	
BMI <=23	<= 17
BMI 23.1-26	<= 17.3
BMI 26.1-29	<= 18
BMI >29	<= 21

Table 4: Prevalence of frailty and prefrailty	
Frailty status	Prevalence
Frailty status	
Frail	124 (24.7)
Pre-frail	315 (62.7)
Non-frail	63 (12.5)

Table 5: Association of lifestyle with environmental factors on frailty			
Characteristics	**Frailty no (%)**	**χ^2**	**P**
Gender			
Female	61 (26.8)	0.94	0.33
Male	63 (23)		
Age			
60-74	68 (54.84)		< 0.001
75-84	40 (32.26)		
85 and greater	16 (12.90)		
House type			
Pucca	106 (24)	1.02	0.31
Kuccha	18 (30)		
Marital status			
Living with spouse	61 (19.9)	9.57	0.0019
Living alone or with others (other than the spouse)	63 (32.1)		
Type of family			
Nuclear	27 (24.8)	0.0004	0.98
Others	97 (24.7)		
Education			
Literate	37 (17.1)	11.68	0.0006
Illiterate	87 (30.4)		
Occupation			
Working	50 (51)	45.35	0.000001
Not working	74 (18.3)		
Diagnosed Comorbidities			
Less than 2	117 (26.2)	5.04	0.024
2 or more	7 (12.5)		
Balanced diet			
Yes	73 (24.2)	0.11	0.73
No	51 (25.5)		
Alcohol			
Current/Ex	25 (24.75)	0.0002	0.98
Never	99 (24.68)		
Smoking			
Current/Ex	32 (25.3)	0.04	0.83
Never	92 (24.46)		
Tobacco			
Current/Ex	16 (19.2)	1.57	0.20
Never	108 (25.7)		
Betel leaves			
Current/Ex	85 (25)	0.05	0.82
Never	39 (24.07)		
Social score			
Good	68 (18.42)	29.46	0.000001
Low	56 (42.1)		
Physical activity			
Good activity	92 (19.7)	85.90	0.000001
Low activity	32 (88.8)		

Discussion

Frailty plays a major role in health status of the elderly. The elderly who are frail are at a higher risk of adverse health outcomes and mortality. Frailty is a reversible condition and its early identification by primary care physicians through community-based screening can help prevent adverse outcomes through targeted interventions like cognitive training and physical exercise.[14,15]

The prevalence of frailty among the elderly living in rural Bengaluru was 24.70% and prefrailty was 62.75%. A study done in rural Tanjavur[8] found a prevalence of 28%, while another study done by Kashikar *et al.*[16] reported a prevalence of frailty to be 26% and prefrailty was 63.6%, which are very similar to our findings. Another study done in rural west Bengal[17] reported a prevalence of 38.8% which was higher than what we found. A recent meta-analysis on prevalence of frailty in low-income middle-income countries (LMICs) reported a higher prevalence

of frailty (12.3%) and pre-frailty (55.3%) in LMICs compared with high-income countries (8.2%, 43.9%).[18] The differences in prevalence of frailty could be attributed to the cultural diversity and individual subjectivity that could have played a role on the responses to the questionnaire and performance assessment. The Fried criteria consider self-reported exhaustion as one of the criteria for frailty. Since perception of exhaustion varies among individuals and is subjective, this might have contributed to the varying prevalence of frailty.

Advancing age has been shown to be associated with increased prevalence of frailty,[8,17,19] but we found that the proportion of frailty among elders aged between 60 to 74 years (young old) was highest as compared to groups aged 75 to 84 years (middle old) and 85 years and older (old old). There is progressive, universal deterioration in physiological systems with ageing, which supports the hypothesis of frailty being higher in advanced age groups. However, our study mostly consisted of participants belonging to the age group of 60 to 74 years working in agricultural fields, living in rural areas with poor health infrastructure and poor social security like old-age pension, occupational injury and sickness benefit, as it is an unorganized sector. There is no cut-off age as retirement in this sector. The poor among the "young old" group may continue to work to meet their basic needs, till their physical capacity permits. This physical work might expose them to higher risk of fall, injuries and increased risk of diseases, thus increasing the risk of frailty among the working elderly of this age group.

Contrary to expectation, this study found that having less than 2 comorbidities was associated with frailty. This might be because many of them may have undiagnosed morbidities,[10] due to them seeking healthcare only when they fall ill. Some of them said that they have never been to a hospital in their lifetime.

Environmental factors, such as social support (type of family and occupation) and living arrangement (type of house and marital status) were assessed. The type of house or type of family did not show any increased risk of frailty.

Elders living alone or with others (other than the spouse), those with a low social score and elders who are currently working had a significant association with frailty. In a study reported by Kashikar Y *et al.*,[16] frail and pre-frail individuals reported higher levels of social isolation. The younger population from rural areas migrates to urban areas for education or employment. The elders are left alone in their homes and them, (especially those without a spouse) are lonely and have poor social interaction. Less frequent social contact with friends is shown to have higher odds of frailty.[20]

Kendhapedi KK *et al.*[8] and Dasgupta *et al.*[17] reported that illiteracy had higher odds of frailty. Lower level of frailty was associated with higher level of education as reported by Biritwum RB *et al.*[21] Lack of formal education limits the job availability,

thereby ending up in low-paying physical jobs which makes them vulnerable to injuries, falls and diseases. Literacy empowers them through behavioral change, improved cognition and better health literacy.[22] Thus elders with low educational level have higher odds of frailty.[23]

Elders with lower physical activity have higher odds of developing frailty. Frailty worsens over time in elders with sedentary behavior.[24] Low physical activity combined with excessive sedentary behavior is also associated with frailty.[25] Frailty in turn leads to increased physical dependence. It is a vicious cycle which should be broken by being physically active and reducing sedentary behavior.

Lifestyle factors such as habits (alcohol/smoking/tobacco/betel leaves) and balanced diet do not seem to affect the risk of developing frailty in our study. Smoking (current/past)[26,27] and alcoholism were predictors of frailty in studies by Strawbridge *et al.*[26] and Peter Hanlon *et al.*[7] Smoking, alcohol was associated with malnutrition in elderly in Taiwan,[28] while none of the habits or balanced diet influenced frailty.

Strengths

We conducted a community-based study in rural Bengaluru, which is one of the very few studies done in South India. Even though there are studies reported from rural areas of India on frailty, very few have looked at the influence of environmental and social factors on frailty.[16,17] Our study demonstrates importance of targeting young old population (60-74 age group) to prevent and reduce frailty in them.

Limitations

- Our study does not evaluate mental status like depression, anxiety and poor cognition status, which are quite common in elderly.
- Self-reported exhaustion (one of the criteria for frailty) is subjective.
- Physical activity is higher in our area, as it was conducted in rural villages where the elderly are engaged in agricultural activities, even with advancing age. Hence very few reported lower physical activity.

Implications for future

Sixty five percent of India's population lives in rural areas.[29] The increasing numbers of the elderly and the concomitant rise in the prevalence of frailty would put an enormous burden on the already overstretched health services and also have an impact on the cost of healthcare provision. Unfortunately, neither is our healthcare system nor health care professionals are equipped or competent enough to manage the elderly patients. Effective change right from health policy making to preparedness of health care systems as well as sensitization and training of health care professionals in the prevention and multi-dimensional management of frailty will help in providing better care to this vulnerable group.

Conclusion

With the continuous increase in the elderly population, the prevalence of frailty is expected to rise. prevalence of frailty in this elderly rural population studied is 24.70%. The young old population (60-74 years) seems to be more vulnerable to frailty as compared to other elder age groups. Illiteracy, living alone or with others, working elderly, and lifestyle characteristics such as low physical and social activities are all found to be associated with frailty. Primary care physicians will be better equipped to detect, manage and prevent frailty if they are cognizant of the social and environmental factors that influence frailty among their elderly patients.

Ethical approval

"All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards."

Informed consent

All "Informed consent was obtained from all individual participants included in the study.

Conflicts of interest

There are no conflicts of interest.

References

1. NSO, Elderly in India, National Statistical Office, Ministry of Statistics & Programme Implementation, Government of India, New Delhi. 2021. Available from: https://ruralindiaonline.org/hi/library/resource/elderly-inindia-2021/. [Last accessed on 2021 Dec 14].

2. Diez-Ruiz A, Bueno-Errandonea A, Nuñez-Barrio J, Sanchez-Martín I, Vrotsou K, Vergara I. Factors associated with frailty in primary care: A prospective cohort study. BMC Geriatr 2016;16:91.

3. Abellan van Kan G, Rolland Y, Bergman H, Morley JE, Kritchevsky SB, Vellas B. The I.A.N.A Task Force on frailty assessment of older people in clinical practice. J Nutr Health Aging 2008;12:29-37.

4. Farhud DD. Impact of lifestyle on health. Iran J Public Health 2015;44:1442-4.

5. The WHO cross-national study of health behavior in school-aged children from 35 countries: Findings from 2001-2002. J Sch Health 2004;74:204-6.

6. Brinkman S, Voortman T, Kiefte-de Jong JC, van Rooij FJA, Ikram MA, Rivadeneira F, *et al.* The association between lifestyle and overall health, using the frailty index. Arch Gerontol Geriatr 2018;76:85-91.

7. Hanlon P, Nicholl BI, Jani BD, Lee D, McQueenie R, Mair FS. Frailty and pre-frailty in middle-aged and older adults and its association with multimorbidity and mortality: A prospective analysis of 493 737 UK Biobank participants. Lancet Public Health 2018;3:e323-32.

8. Kendhapedi KK, Devasenapathy N. Prevalence and factors associated with frailty among community-dwelling older people in rural Thanjavur district of South India: A cross-sectional study. BMJ Open 2019;9:e032904.

9. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, *et al.* Frailty in older adults: Evidence for a phenotype. J Gerontol A Biol Sci Med Sci 2001;56:M146-56.

10. Natarajan S, Mistry TA, Asnani U. Evaluation of the prevalence of comorbidities in patients reporting for dentoalveolar surgeries. Indian J Dent Res 2019;30:860-3.

11. Auyeung TW, Lee JS, Leung J, Kwok T, Woo J. The selection of a screening test for frailty identification in community-dwelling older adults. J Nutr Health Aging 2014;18:199-203.

12. Frailty Pattern among the Elderly Rural Women of India-Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/The-Five-Criteria-Used-as-an-Indicators-of-Frailty_tbl1_325170215. [Last accessed on 2020 Mar 23]

13. Clare L, Wu YT, Teale JC, MacLeod C, Matthews F, Brayne C, *et al.* Potentially modifiable lifestyle factors, cognitive reserve, and cognitive function in later life: A cross-sectional study. PLoS Med 2017;14:e1002259.

14. Santos-Eggimann B, Sirven N. Screening for frailty: Older populations and older individuals. Public Health Rev 2016;37:7.

15. Apóstolo J, Cooke R, Bobrowicz-Campos E, Santana S, Marcucci M, Cano A, *et al.* Effectiveness of interventions to prevent pre-frailty and frailty progression in older adults: A systematic review. JBI Database System Rev Implement Rep 2018;16:140–232.

16. Kashikar Y, Nagarkar A. Prevalence and determinants of frailty in older adults in India. Indian J Gerontol 2016;30:364–81.

17. Dasgupta A, Bandyopadhyay S, Bandyopadhyay L, Roy S, Paul B, Mandal S. How frail are our elderly? An assessment withTilburg frailty indicator (TFI) in a rural elderly population of West Bengal. J Family Med Prim Care 2019;8:2242-8.

18. Siriwardhana DD, Hardoon S, Rait G, Weerasinghe MC, Walters KR. Prevalence of frailty and prefrailty among community dwelling older adults in low income and middle income countries: A systemic review and meta analysis. BMJ Open 2018;8:e018195.

19. Siriwardhana DD, Weerasinghe MC, Rait G, Falcaro M, Scholes S, Walters KR. Prevalence of frailty in rural community dwelling older adults in Kegalle district of Sri Lanka: A population based cross sectional study. BMJ Open 2019;9:e026314.

20. Chon D, Lee Y, Kim J, Lee KE. The association between frequency of social contact and frailty in older people: Korean frailty and aging cohort study (KFACS). J Korean Med Sci 2018;33:e332.

21. Biritwum RB, Minicuci N, Yawson AE, Theou O, Mensah GP, Naidoo N, *et al.* Prevalence of and factors associated with frailty and disability in older adults from China,

Ghana, India, Mexico, Russia and South Africa. Maturitas 2016;91:8-18.

22. Brigola AG, Alexandre TDS, Inouye K, Yassuda MS, Pavarini SCI, Mioshi E. Limited formal education is strongly associated with lower cognitive status, functional disability and frailty status in older adults. Dement Neuropsychol 2019;13:216-24.

23. Hoogendijk EO, van Hout HP, Heymans MW, van der Horst HE, Frijters DH, Broese van Groenou MI, *et al.* Explaining the association between educational level and frailty in older adults: Results from a 13-year longitudinal study in the Netherlands. Ann Epidemiol 2014;24:538-44.

24. Peterson MJ, Giuliani C, Morey MC, Pieper CF, Evenson KR, Mercer V, *et al.* Physical activity as a preventative factor for frailty: The health, aging, and body composition study. J Gerontol A Biol Sci Med Sci 2009;64:61-8.

25. da Silva VD, Tribess S, Meneguci J, Sasaki JE, Garcia-Meneguci CA, Carneiro JAO, *et al.* Association between frailty and the combination of physical activity level and sedentary behavior in older adults. BMC Public Health 2019;19:709.

26. Strawbridge WJ, Shema SJ, Balfour JL, Higby HR, Kaplan GA. Antecedents of frailty over three decades in an older cohort. J Gerontol B Psychol Sci Soc Sci 1998;53:S9-16.

27. Kojima G, Iliffe S, Walters K. Smoking as a predictor of frailty: A systematic review. BMC Geriatr 2015;15:131.

28. Poda GG, Hsu CY, Rau HH, Chao JC. Impact of socio-demographic factors, lifestyle and health status on nutritional status among the elderly in Taiwan. Nutr Res Pract 2019;13:222–9.

29. World Bank staff estimates based on the United Nations Population Division's World Urbanization Prospects: 2018 Revision. Available from https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=IN. [Last accessed on 2021 Dec].