ARTIKEL ASLI
Jurnal Penyakit Dalam Udayana
Udayana Journal of Internal Medicine
Volume 6, No. 1: 2022; 15-18

Print ISSN: 2580-2925
Online ISSN: 2580-2933

Comparison handgrip strength, gait speed, activity of daily living between community dwelling and nursing home in population- base elderly at Bali

I Gusti Gede Agung Ngurah[1*], IGP Suka Aryana[2], R.A. Tuty Kuswardhani[2], I Nyoman Astika[2], IB. Putrawan[2], Ni Ketut Rai Purnami[2]

DOI : 10.36216/jpd.v6i1.110

[1]Study Programme of Internal Medicine, Udayana University / Sanglah General Hospital, Denpasar, Bali, Indonesia;
[2]Department of Internal Medicine, Faculty of Medicine, Udayana University/Sanglah General Hospital, Denpasar, Bali, Indonesia;

*Correspondence to:
I Gusti Gede Agung Agung Ngurah;
Study Programme of Internal Medicine, Udayana University / Sanglah General Hospital, Denpasar, Bali, Indonesia;
gungwiradr80@gmail.com

Received : 17 January 2022
Accepted : 15 May 2022
Published : 30 Jube 2022

Background: Age, muscle strength, gait speed, functional activity have correlation to another, because if have decrease of result, it will increase risk to making geriatric syndrome including sarcopenia and frailty, and giving high risk morbidity and mortality elderly, based on that we will compare handgrip strength, gait speed and activity of daily living in elderly people in population in community with population in nursing home because of that has been little explored this problem.

Objective: This study aimed to investigate the comparison handgrip strength, gait speed and activity of daily living between community and nursing home in population-based elderly.

Methods: This is an observational analytic study, data we collect from cross sectional study in community and nursing home. Handgrip strength, gait speed and activity of daily living score were recorded to statistical program; $p<0.05$ was considered as statistically significant.

Results: Sixty two geriatric sample from community and nursing home. We use Mann-Whitney method. There is significant difference of handgrip strength, gait speed and activity of daily living between elderly living in community and elderly living in nursing home. Handgrip strength (17.8+6.6 VS 14.2+6.1; P=0.008), gait speed (0.53 ± 0.187 VS 0.36 ± 0.07; P=0.000) and activity of daily living (19.1 ± 1.8 VS 12.1 ± 4.6; P=0.000).

Conclusion: Our study showed decrease handgrip strength, gait speed and activity of daily living in nursing home versus community dwelling and this can make increase risk severe morbidity and mortality in elderly at Bali.

Keywords: *activity of daily living, community dwelling, elderly, gait speed, handgrip strength, nursing home.*

INTRODUCTION

The population of the elderly in Indonesia is increasing, with the increase in the degree of health and economic of the Indonesian population, where Indonesia is currently at number ninth in the world and number fourth in Asia, with an estimated 8.2% of the 21 billion elderly population in the world, that making Indonesia the largest in Asia is a landmark.[1] Currently the estimated number of elderly people in Bali is 11,510 thousand, with a total population of 4.3 million in 2019 (0.26%).[2] The high population of the elderly it will certainly increase the risk of health problems in the elderly, one of which is fragility, where fragility is the main source of health problems in the elderly today, with an increased risk of falls, hospitalization, disability disorders, poor health related to quality of life and increased mortality.[3] which is generally said, fragility in the elderly will increase vulnerability to various kinds of stressors, due to a decrease in function physiology associated with system organ disorders due to aging, which results in the inability to maintain or restore hemostasis after unstable conditions. for example the ability to adapt or the inability to deal with acute stress. Where frailty phenotype was first introduced by Fried et al in the Cardiovascular Health Study (CHS),[4] fragility is occur from three of five criteria with weaknesses likely decrease power of hands grip strength, gait speed, activity of daily living, and we reported patients with fatigue and unknown weight loss.[5,6] Where fragility conditions will have an impact on quality of life and subsequently the ability to survive, so it is important to note that preventive and anticipatory measures can be taken.[4,7] In addition, it is said that most elderly people prefer to live in community dwelling and nursing home because the transition period when they live in a nursing home can cause a loss of independence, cause a poor quality of life and ultimately disturbed the psychology which only thinks of negative things during living in nursing home.[8]

This study aimed to investigate the average difference between the elderly population in the community (community dwelling) and nursing home, with diagnostic parameters in the form of hand grip strength using a hand dynamometer, so that we get which component is most likely to play a role in

ARTIKEL ASLI
Print ISSN: 2580-2925
Online ISSN: 2580-2933
Jurnal Penyakit Dalam Udayana
Udayana Journal of Internal Medicine
Volume 6, No. 1: 2022; 15-18

the incidence of fragility in both populations.

MATERIAL AND METHODS

Population and Study Design

This study used an analytic cross-sectional study with a total sample of 62. The research samples were collected using the consecutive sampling method. The study was conducted in the Pedawa village at Buleleng and nursing home at Tabanan, Bali, Indonesia from September 2019 until November 2019. Registered subjects will be evaluated according to inclusion criteria, subjects recruited after meeting the inclusion criteria that have been set. Inclusion criteria that are intended to include more than or equal to 60 years of age, are willing to participate in the study, exclusion criteria are set to eliminate samples that are disability samples, inability to be interviewed due to socio-linguistic problems and cognitive inability to be included in research this, namely cognitive impairment (screening with a mini mental state exam), patients with walking disabilities.

Subjects that are in accordance with the inclusion criteria will be called for structured interviews by trained interviewers and examined hand grip strength measurements using a hand dynamometer, examinations are carried out in accordance with the recommendations of the American Society of Hands Therapies, where subjects are asked to sit with their elbows bent at an angle of 90º, shoulder adduction, and forearm in a neutral position, the subject is then instructed to take a deep breath and forcefully and quickly press the dynamometer grip while exhaling, the measurement is carried out three times using the dominant hand with 30-minute interval between each measurement and the highest value of the 3 recorded measurements. In this study we categorized the results into low or normal grip strength based on cut-off values < 26 kg in men and <18 kg in women according to the Asian Working Group of Sarcopenia (AWGS),[9] and through walking speed were measured using a walking test constantly 15 feet or equivalent to 4.57 meters in time (meters / seconds) according to the Cardiovascular Health Study, where subjects are instructed to walk at their usual pace, from the time they were stepped on the start line to when they stepped to the finish line . Subjects were given permission to stop during the test and the time was continued until they reached the finish line. The time is recorded in seconds. The walking speed value is calculated by dividing the constant distance of 4.57 m by the time (meters / sec). In this study, walking speed is usually classified into slow and normal speed based on a cut-off value <0.8 m / s as defined in AWGS.[9] Functional status based on the Barthel Index of Activity of Daily Living (ADL) results: very dependent (score 0-4), highly dependency (score 5-8), moderate dependency (score 9-11), mild dependence (score 12-19), not dependency (score 20), but in this study it was only divided into not dependency (score 20) with dependency (score ≤19).[10]

Data were processed using the Statistics Program for Social Science (SPSS) for windows version 23.0. Data with normal distribution are presented in mean ± standard deviation, while data with abnormal distribution are in the median (minimum-maximum value). Descriptive analysis was performed on all data. T-test or Mann-Whitney U test is used to determine the difference in mean between the two groups. A p value of < 0.05 was considered significant.

RESULTS

Subjects involved in this study consisted of 62 samples, consisting of 22 subjects (35%) with male sex and 40 subjects (65%) with female sex, 28 subjects ranging in age from 60 to 69 years (45%), 34 subjects ≥ 70 years (55%), comorbidities include 16 subjects with hypertension (25%), 4 subjects with diabetes mellitus (6%), 4 subjects with heart failure (6%),[11] subjects with osteoarthritis (21%). The basic characteristics of the research subjects can be seen in table 1. This study was conducted on 32 elderly people with an average age of 70.1 ± 9.5 years who are located in the community and 30 elderly people with an average age of 73.7 ± 8.2 years who are located in nursing homes. The composition of the elderly population in the community consists of 13 men (40.6%) and 19 women (59.4%), while in nursing homes as many as 9 people (30%) men, and 21 people (70%) women. There was a difference between grip strength in the population in the community 17.3 ± 6.6 compared to the population of nursing homes 14.2 ± 6.1 (p=0.008). There was a difference in population walking speed in the community 0.53 ± 0.187 compared to population in the nursing home 0.36 ± 0.07 (p=0.000), and differences in the functional status of the population in the community 19.13 ± 1.8 compared to the population in the nursing home 12.1 ± 4.6 (p=0.000). From the above results, the three components are known, so the subjects who live in the community get a better average value than the nursing home Table 2.

DISCUSSION

From cross-sectional study, subjects with an average age of 70.1 ± 9.5 years were located in the community and subjects with an average age of 73.7 ± 8.2 years in the nursing home, so that is was in accordance with data on life expectancy for the elderly in Indonesia is 70.1 years.[11] Where the subject grew older with ± 70 years of age increasing the risk 2.7 times more likely to experience fragility.[12]

In our study, there was a difference in the strength of hand grip between subjects living in the community, compared to those living in nursing homes, where the grip strength in subjects in the community had a mean value of 17.3 ± 6.6

ARTIKEL ASLI
Jurnal Penyakit Dalam Udayana
Udayana Journal of Internal Medicine
Volume 6, No. 1: 2022; 15-18
Print ISSN: 2580-2925
Online ISSN: 2580-2933

compared to the population of nursing homes 14.2 ± 6.1 (p= 0.008). This is influenced by the age factor where at an older age will have the effect of disruption of the musculoskeletal system, innervation, blood vessels, so that it will affect the function and structure of the hands.[13,14]

In our study, we found that differences in gait speed of subjects in the community were 0.53 ± 0.187 and nursing homes were 0.36 ± 0.07 (p=0.000), although both populations alike experienced a slowdown in gait speed (gait speed <0.8 m / s based on a gait test of 4.57 meters). Based on research conducted by Jung et al, in rural populations that represent the community the results of walking speeds slower than normal values due to comorbidity such as cardiovascular or musculoskeletal neglected,[15] but according to Justin et al that the population residing in nursing homes have slower than normal gait speeds,[16] so that in both populations there has been a decrease in walking speed, and this is the same for both populations, but a lower mean value is obtained in populations living in nursing homes compared to communities, although it has not been able to eliminate comorbid factors that affect both groups of subjects.

In our study the functional status evaluated using the Barthel Index of Activity of Daily Living (ADL), the mean difference in functional status between subjects living in the community was 19.13 ± 1.8 compared to subjects living in nursing homes with 12.1 ± 4.6 (4.6) p=0.000),[17,18] so that it is expected to be able to increase and maintain the functional independence of the subject in carrying out daily activities so as not to experience a decrease in functional status, where all must have a good role health and the subject itself.

From our research, strength of grip, speed of walking and functional status, we get better results in subjects who live in the community than nursing homes. This is estimated because of the better functional status of the sample that is domiciled in the community so that eventually it will increase muscle strength, speed of walking, which is better because it can independently carry out its own activities. So that it is expected that health workers and the patient's family can increase more attention in both populations, especially in populations residing in nursing homes, for this reason prevention efforts are carried out in the form of sports to increase muscle strength, although slowly, specifically in the form of aerobic training and endurance, it is expected can then overcome most of the fragility components, although patience needs to be done.[19] Besides that, nutritional improvement also needs to be considered to increase protein synthesis, so that the ultimate goal is to be able to carry out daily activities independently so that even more severe fragility events can be avoided, preventing earlier or so that it is not worse. So that it can be said physical exercise can alleviate or prevent fragility in the sample, especially those living in nursing homes and also who live in the community.

The limitation of this study was due to small size and limitation location sample and this can't representative of the elderly population at Bali. Future research should be directed to emphasize this issue.

Table 1. Characteristic subject (n 62).

Characteristics	n (%)
Sex	
Women	40 (65)
Man	22 (35)
Age	
60-69 year	28 (45)
≥ 70 year	34 (55)
Functional Status	
No dependency	37 (60)
Dependency	25 (40)
Comorbid	
Hypertension	16 (25)
Diabetes mellitus	4 (6)
Heart Failure	4 (6)
Osteoarthritis	13 (21)

CONCLUSION

There is a mean difference between the elderly who live in the community compared to nursing homes in terms of strength of grip, gait speed and functional status. Where the average results of the elderly who live in the community are better than those living in nursing homes, so we need to more attention to the elderly who live in nursing homes, in the form of prevention efforts to reduce the incidence of fragility and even reduce the morbidity and mortality rate, where efforts

Table 2. Comparison handgrip strength, gait speed, activity of daily living between community dwelling and nursing home.

	COMMUNITY		NURSING HOME		P Value
	Mean	Standard Deviation	Mean	Standard Deviation	
Handgrip Strength	17.8	6.6	14.2	6.1	0.008
Gait Speed	0.53	0.187	0.36	0.7	0.000
Activity of daily living	19.1	1.8	12.1	4.6	0.000

ARTIKEL ASLI

Print ISSN: 2580-2925
Online ISSN: 2580-2933

Jurnal Penyakit Dalam Udayana
Udayana Journal of Internal Medicine
Volume 6, No. 1: 2022; 15-18

can be done, among others, in the form of physical exercise, endurance and appropriate nutrition.

CONFLICT OF INTEREST

The authors report no conflicts of interest regarding this study.

ETHICS CONSIDERATION

Ethics approval has been obtained from the Ethics Committee of Oksibil Regional Public Hospital, Papua, prior to the study being conducted.

FUNDING

None.

AUTHOR CONTRIBUTIONS

All authors equally contribute to the study from the conceptual framework, data acquisition, data analysis, and reporting the study results through publication.

REFERENCES

1. Siti setiati, purwita wijaya laksmi, Aryana IGPS, et al. frailty state among indonesia elderly: provalence, associated factors, and frailty state transition. *BMC Geriatric.* 2019;19:182.
2. Proyeksi penduduk kabupaten/kota provinsi bali 2010-2020 *Badan pusat statistik*.2015:13.
3. Massel MC, graham Je, reistetter TA, et al. Frailty and health related quality of life in older Mexican American. *Health Qual Life Outcomes.* 2009;7:7.
4. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. Lancet. 2013 Mar 2;381(9868):752-762.
5. Xujio C, Genxiang M,seal XL. Frailty syndrome : an overview. *Clin interv aging.* 2014;9:433-441.
6. Setiati S dan rizka A. Kerapuhan dan sindrom gagal pulih. *Buku ajar ilmu penyakit dalam edisi keenam.* Jakarta: Interna publising; 2014. h. 3725-3730.
7. Martono HH. Kerapuhan dan gagal pulih: Buku ajar geriatri edisi ke tiga. Jakarta: penerbit FK UI; 2004. h. 349-59.
8. Drageset J, Natvig GK, Elide GE, et al. Difference in helath-related quality of life between older nursing home residents without cognitive impairment and the general population on Norway. *J clin Nurs.* 2008;17:1227-1236.
9. Chen Kl, Liu LK, Woo J, et al. Sarcopenia in Asia: consensus report of the Asian working group for sarcopenia. *J Am Med Dir Assoc.* 2014;15: 95-101.
10. Collin C, Wade DT, Davies S, et al. The Barthel ADL Index: a relibility study. *Int Disability Study.* 1988;10: 61-63.
11. Badan perencanaan Pembangunan Nasional, Badan pusat statistik, United nations Population Fund. Proyeksi penduduk Indonesia 2010-2035. *BPS-Statistics Indonesia.* 2013;255.
12. Eyigor S, Kutsal YG. Duran E, et al. Frailty prevalence and related factor in the older adult- Frail TURK project. *Age (Dordr).* 2015;37:9791.
13. Robert HC,Derison HJ, Martin HJ, et al.A review of the measurement of grip strength in clinical and epidemiological studies wards a standarized approach,. A*ge Ageing.* 2011;40:23-24.
14. Carmeli E, Patish H, Coleman R. The aging hand. *J Gerontol A Biol Sci Med Sci* .2003;58:146–152.
15. Jung hW, Jang II-Y, Lee CK, et al. Usual gait speed is association with frailty status, institutionalization, and mortality in community-dwelling rural older adult: a longitudinal analysis of the aging study of Pyeongchang rural area. *Clin Interv Aging.* 2018;13:1079-1089.
16. Justin W L, Hugh S, Elaine M, et al. Prevalence and risk factor for low habitual waling speed in nursing home residents: An observational study. *Arch Phys med Rehabil.* 2015;06:1993-1999.
17. Chih C, Hsiu C, I ling C, et al. Lower barthel Index is associated with high risk of hospitalization-requiring pnemonia in long term care facilities. *Tohoku J Exp Med.* 2015;236:281-288.
18. Fried LP, Tangen CM, Walston J, et al. Frailty in older adult: evidence for a phenotype. *J Gerontol Biol Sci Med Sci.* 2001;56:146-156.
19. Aguirre LE, Vilareal DT. Physical execise as theraphy for fraity. *Nestle Nutrinst Inst workshop ser.* 2015;83:83-92.