Seroja Husada
Jurnal Kesehatan Masyarakat
(2026), 3 (2): 202–207

THE RELATIONSHIP BETWEEN ALBUMIN LEVELS AND FRAILTY SYNDROME IN OLDER PEOPLE AT THE PADANG KANDIS HEALTH CENTER OF LIMA PULUH KOTA REGENCY

Muhammad Hamda[1], Dwi Yulia[2] , Roza Mulyana[3] , Zelly Dia Rofinda[4] , Yuniar Lestari[5] , Elmatris[6]
[1]Medical Education Program, Faculty of Medicine, Andalas University, Indonesia.
[2,4]Department of Pathology Clinical, Faculty of Medicine, Andalas University, Indonesia.
[3]Department of Internal Medicine, Faculty of Medicine, Andalas University, Indonesia.
[5]Department of Public Health and Community Medicine, Faculty of Medicine, Andalas University, Indonesia.

SUBMISSION TRACK
Submitted : 21 April 2024
Accepted : 1 May 2024
Published : 2 May 2024

KEYWORDS
albumin level, frailty syndrome, older people

CORRESPONDENCE
E-mail: hamda.pitopang@gmail.com

A B S T R A C T
Frailty syndrome is a geriatric syndrome indicated by reduced physical and adaptation abilities caused by decreased body systems and increased vulnerability to various stressors, causing a decrease in someone's physical performance. One of the factors contributing to the frailty syndrome is low albumin levels. Objective: To find the relationship between albumin levels and frailty syndrome in older people. Methods: This was an observational analytic study with a cross sectional design. The sample of this study was older people recorded in the Padang Kandis Health Center working area selected by simple random sampling technique with a sample size of 30 people. This study used secondary data from the parent study and analyzed using the fisher exact test. Results: The results of this study found 50% of older people with low albumin levels experienced frailty syndrome. The results of statistical analysis found a significant relationship between albumin levels and frailty syndrome in older people at the Padang Kandis Health Center of Lima Puluh Kota Regency. Conclusion: There was a relationship between albumin levels and frailty syndrome in older people at the Padang Kandis Health Center of Lima Puluh Kota Regency.

Introduction

Health problems in elderly people are currently getting more attention because their number continues to increase (Sarkar et al., 2021). Globally, the elderly population over 60 years of age reaches 727 million people and is projected to increase to 1.5 billion by 2050 (Ljubicic, 2018). One of the most common problems experienced by elderly people is frailty syndrome. Frailty is a dynamic process in which there is a decline in physical, psychological, and social functioning associated with aging that is detrimental to health (Lekan et al., 2021). According to the World Health Organization (WHO) in the Integrated Care for Older People (ICOPE) guide, frailty syndrome is a major determinant of dependence, chronic disease burden, and quality of life among older people (Palomo et al., 2022).

Clinical conditions of frailty syndrome based on Fried's criteria include unintentional weight loss, fatigue and lack of energy, muscle weakness, low physical activity, and slow walking speed (Gómez-Rubio et al., 2022). Frailty syndrome can be influenced by chronic inflammation either directly or indirectly through physiological systems, such as changes in the metabolic system, changes in energy-regulating hormones, and disorders of the musculoskeletal system. These changes result in the appearance of symptoms based on Fried's criteria. The occurrence of frailty syndrome

can be influenced by genetic factors, poor lifestyle, psychological factors, sociodemographic characteristics (age, gender, education, and economic status), and physical activity. Each aspect may present differently according to gender (Hogan, 2018).

One factor that contributes to the onset of frailty syndrome is albumin. Albumin is a major component of the body's plasma proteins required to maintain oncotic pressure, vascular permeability, acid-base balance, and prevent platelet aggregation. Albumin is often used as an indicator of nutritional status and is an important parameter for assessing the nutritional status of patients with acute and chronic diseases (Eckart et al., 2020).

Research by Vincent et al. (2018) states that low albumin levels are associated with the incidence of frailty. This finding is supported by Yamamoto et al. (2021), who found that lower albumin levels were associated with frailty among 1,368 subjects living in Tanushimaru, Japan. Therefore, further research is needed to determine the relationship between albumin levels and frailty syndrome.

Research Method

This study is an observational analytic study with a cross sectional approach. This research was conducted in August 2022. The population in this study were elderly people recorded in the Padang Kandis Health Center working area, Lima Puluh Kota Regency. The sample in this study were elderly people who were present and participated in the study and met the inclusion and exclusion criteria set by the researcher. The minimum sample required is 30 people. The inclusion criteria in this study are the elderly over 60 years of age, willing to be respondents, and compos mentis awareness. Meanwhile, the exclusion criteria are elderly people with dementia.

Data analysis was performed with univariate analysis by looking at the characteristics, distribution and frequency of albumin levels and frailty syndrome. Bivariate analysis using the fisher exact test was carried out to see the relationship between albumin levels and frailty syndrome in elderly people at the Padang Kandis Health Center, Lima Puluh Kota Regency.

This research has received ethical approval from the Research Ethics Commission of the Faculty of Medicine, Andalas University with number 972/UN.16.2/KEP-FK/2022.

Result and Discussion

The study subjects were obtained in total of 40 people who met the inclusion and exclusion criteria. Table 1 presents the frequency distribution of subject characteristics based on gender and age. The results showed that most (87%) of the elderly respondents were female and more than half (60%) of the elderly respondents were between 60-69 years old.

Table 1. Frequency Distribution of Subject Characteristics Based on Gender and Age

Characteristics	Frequency (*f*)	Percentage (%)
Gender		
Man	4	13
Women	26	87
Age		
60-69	18	60
70-79	11	37
≥80	1	3
Total	30	100

Table 2 shows the frequency distribution and percentage of albumin levels. Most respondents with normoalbuminemia reached 20 people (67%). Meanwhile, respondents with hypoalbuminemia only reached 10 people (33%).

Table 2. Frequency and percentage distribution of albumin levels

Albumin Level	Frequency (*f*)	Percentage (%)
Normoalbuminemia	20	67
Hypoalbuminemia	10	33
Total	30	100

Table 3 is the result of the frequency distribution of frailty syndrome. The number of respondents with the frail category was 7 people (23%), the pre-frail category was 7 people (23%), and the highest category was in the robust category as many as 16 people (54%).

Table 3. Frequency and percentage distribution of frailty syndrome

Frailty syndrome	Frequency (*f*)	Percentage (%)
Robust	16	54
Pre-frail	7	23
Frail	7	23
Total	30	100

In table 4, it was found that the highest normoalbuminemia was found in robust, namely 15 people (75%). Meanwhile, the respondents who were included in the highest hypoalbuminemia were frail respondents, namely 5 people (50%). In the data analysis, it was found that the Pearson Chi-Square test did not meet, so the Fisher Exact test was performed and the p value was obtained = 0.001. This shows that there is a significant relationship between albumin levels and frailty syndrome in elderly people at the Padang Kandis Health Center, Lima Puluh Kota Regency.

Table 4. Relationship between albumin levels and frailty syndrome

Albumin Level	Frailty syndrome			Total	p
	Robust	*Pre-frail*	*Frail*		
Normoalbuminemia	15 (75%)	3 (15%)	2 (10%)	20 (100%)	0,001
Hypoalbuminemia	1 (10%)	4 (40%)	5 (50%)	10 (100%)	
Total	16 (54%)	7 (23%)	7 (23%)	30 (100%)	

Characteristics of Research Subjects

The results of univariate analysis in Table 1 show that among 30 elderly people at the Padang Kandis Health Center, Lima Puluh Kota Regency, most respondents were female (87%), while only 13% were male. Based on age, more than half of the respondents (60%) were aged between 60 and 69 years. These findings are consistent with a study conducted by Nurul et al. (2019), which reported that females constituted 67.5% of participants, whereas males accounted for 32.5%. The predominance of elderly women in this study may be explained by the demographic composition of Lima Puluh Kota Regency, where females comprised 57% of the elderly population and males 43% according to the district health profile (Profil Kesehatan Kabupaten Lima Puluh Kota, 2022). Frailty syndrome is more frequently found among women than men. This difference may be related to hormonal regulation, immune responses, and metabolic characteristics. In addition, social factors such as occupation, marital status, and working

environment may also contribute to gender-related differences in frailty prevalence (Dias et al., 2020).

Albumin Level

Based on the frequency distribution of albumin levels, a minority of respondents (33%) experienced hypoalbuminemia, while the majority (67%) had normal albumin levels. These findings are consistent with a study conducted by Yang et al. (2021), which reported that 64.9% of geriatric patients had albumin levels above 3.4 g/dL. Similar findings were also reported in a study conducted in Palembang, where 64.3% of elderly patients had normal albumin levels (Aguayo Torrez, 2021).

Hypoalbuminemia is commonly observed in older adults because serum albumin levels tend to decline with increasing age. Previous studies have shown that albumin levels may decrease by approximately 20% in individuals over 70 years old (Arnau-Barrés et al., 2021). In the present study, most respondents belonged to the normoalbuminemia group because the majority were still within the age range of 60–69 years. The mean albumin level among study participants was 3.456 g/dL.

Frailty Syndrome

The frequency distribution of frailty syndrome showed that only a small proportion of respondents were categorized as frail (23%) or pre-frail (23%), while the robust category accounted for the largest proportion (54%). These findings are comparable to those reported by Bhattacharjee et al. (2021), who found that the robust group represented 39% of participants, followed by pre-frail (37%) and frail (24%) groups. Similar results were also reported by Doi et al. (2018), who found proportions of 47% robust, 46% pre-frail, and 7% frail among older adults.

Relationship between Albumin Level and Frailty Syndrome

In this study, seven respondents (23.3%) were categorized as frail. Among them, five had low albumin levels (≤3.4 g/dL), while only two had normal albumin levels. In the pre-frail group, four respondents had low albumin levels and three had normal albumin levels. Conversely, among the 16 respondents classified as robust, only one had low albumin levels, while the remaining fifteen had normal albumin levels.

Bivariate analysis using Fisher's Exact Test yielded a p-value of 0.001. Since the p-value was less than 0.05, it can be concluded that there was a statistically significant relationship between albumin levels and frailty syndrome among elderly people at the Padang Kandis Health Center, Lima Puluh Kota Regency.

These findings are consistent with the study conducted by Rudy et al. (2021), which investigated the correlation between serum albumin levels and frailty among geriatric inpatients and outpatients at Sanglah Hospital, Denpasar. Their study involved 60 elderly participants and found that 43.3% had hypoalbuminemia and 56.7% had normal albumin levels. Among those with hypoalbuminemia, 76.9% experienced frailty, compared with only 32.4% among those with normal albumin levels. Statistical analysis also demonstrated a significant relationship between serum albumin levels and frailty syndrome ($p = 0.001$).

The difference in frailty prevalence between the present study and the Sanglah Hospital study may be explained by differences in study populations. Participants in Sanglah Hospital largely consisted of patients with chronic diseases and more severe health conditions, whereas respondents in Padang Kandis represented a community-based elderly population.

Hong et al. (2019) reported that frailty is closely associated with age, nutritional status, and serum albumin levels. Poor nutritional intake can lead to protein deficiency, resulting in weakness and functional decline. Elderly individuals with low albumin levels are more likely to experience muscle protein breakdown, leading to reductions in body weight and muscle mass. Consequently, muscle weakness develops, reducing physical activity and increasing the risk of frailty syndrome (Nabila et al., 2017).

Conclusion

Based on the results of this study, it can be concluded that there is a significant relationship between albumin levels and frailty syndrome in elderly people at Puskesmas Padang Kandis, Lima Puluh Kota Regency. It is hoped that the elderly need to be educated and how to maintain a healthy lifestyle in improving nutritional status related to decreased albumin levels associated with frailty syndrome.

Acknowledgements

The researcher would like to thank all those who helped in this research.

References

Aguayo Torrez, M. V. (2021). *Gambaran kadar albumin dan hemoglobin pada pasien lanjut usia di Poliklinik Geriatri RSUP Dr. Mohammad Hoesin Palembang periode 2019–2020.*

Arnau-Barrés, I., Pascual-Dapena, A., López-Montesinos, I., Gómez-Zorrilla, S., Sorlí, L., Herrero, M., et al. (2021). *Severe hypoalbuminemia at admission is strongly associated with worse prognosis in older adults with SARS-CoV-2 infection*. Journal of Clinical Medicine, 10(21), 1–9.

Bhattacharjee, M. S., Pal, J., Ghosh, K., Hati, A., Paria, T. K., & Mahato, S. (2021). *Prevalence of frailty syndrome and chronic diseases among the elderly population: A hospital-based study from a tertiary care center*. Bengal Physician Journal, 8(1), 3–8.

Dias, L. S., Ferreira, A. C. G., Junior, J. L. R. S., Conte, M. B., & Rabahi, M. F. (2020). *Prevalence of frailty and evaluation of associated variables among COPD patients*. International Journal of Chronic Obstructive Pulmonary Disease, 15, 1349–1356.

Doi, T., Makizako, H., Tsutsumimoto, K., Hotta, R., Nakakubo, S., Makino, K., et al. (2018). *Association between insulin-like growth factor-1 and frailty among older adults*. Journal of Nutrition, Health and Aging, 22(1), 68–72.

Eckart, A., Struja, T., Kutz, A., Baumgartner, A., Baumgartner, T., Zurfluh, S., et al. (2020). *Relationship of nutritional status, inflammation, and serum albumin levels during acute illness: A prospective study*. American Journal of Medicine, 133(6), 713–722.

Gómez-Rubio, P., Trapero, I., Cauli, O., & Buigues, C. (2022). *Salivary IL-6 concentration is associated with frailty syndrome in older individuals*. Diagnostics, 12(1).

Hogan, D. B. (2018). *Models, definitions, and criteria for frailty*. In Conn's Handbook of Models for Human Aging (2nd ed., pp. 35–44). Elsevier.

Hong, X., Yan, J., Xu, L., Shen, S., Zeng, X., & Chen, L. (2019). *Relationship between nutritional status and frailty in hospitalized older patients*. Clinical Interventions in Aging, 14, 105–111.

Lekan, D. A., Collins, S. K., & Hayajneh, A. A. (2021). *Definitions of frailty in qualitative research: A qualitative systematic review*. Journal of Aging Research, 2021, 1–20.

Ljubicic, M. (2018). *Victimization of older people: Analysis of archive documentation on abuse of older people by their families*. Belgrade: Gerontological Society of Serbia.

Nabila, T., Desiana, & Kurnia, B. (2017). *The relationship of serum albumin levels with handgrip strength on cancer patients in RSUD dr. Zainoel Abidin Banda Aceh*. Jurnal Ilmiah Kedokteran Medisia, 2(1), 35–41.

Nurul, I., Hasani, R., Heriansyah, H., Nasrullah, N., & Masdiana, M. (2019). *Faktor yang berhubungan dengan kejadian sindrom frailty pada penderita DM tipe 2 lansia di RSUD Syekh Yusuf Gowa*. Media Keperawatan Politeknik Kesehatan Makassar, 10(2), 11.

Palomo, I., García, F., Albala, C., Wehinger, S., Fuentes, M., Alarcón, M., et al. (2022). *Characterization by gender of frailty syndrome in elderly people according to frail trait scale and Fried frailty phenotype*. Journal of Personalized Medicine, 12(5), 1–12.

Profil Kesehatan Kabupaten Lima Puluh Kota. (2022*). Profil Kesehatan Kabupaten Lima Puluh Kota Tahun 2022.*

Rudy, P. S. P., Kuswardhani, R. T., Aryana, I. G. P. S., Astika, N., Putrawan, I. B. P., & Purnami, N. K. R. (2021). *Correlation between albumin serum and frailty in geriatric inpatient and outpatient clinic at Sanglah Hospital Denpasar*. Intisari Sains Medis, 12(3), 897–900.

Sarkar, S. M., Dhar, B. K., Crowley, S. S., Ayittey, F. K., & Gazi, M. A. I. (2021). *Psychological adjustment and guidance for ageing urban women. Ageing International.*

Vincent, J. L., Dubois, M. J., Navickis, R. J., & Wilkes, M. M. (2018). *Hypoalbuminemia in acute illness: Is there a rationale for intervention?* Annals of Surgery, 237(3), 319–334.

Yamamoto, M., Adachi, H., Enomoto, M., Fukami, A., Nakamura, S., Nohara, Y., et al. (2021). *Lower albumin levels are associated with frailty measures, trace elements, and an inflammation marker in a cross-sectional study in Tanushimaru.* Environmental Health and Preventive Medicine, 26(1), 1–8.

Yang, X., Jiang, Y., Li, J., Yang, M., Liu, Y., Dong, B., et al. (2021). *Association between frailty and albuminuria among older Chinese inpatients*. Journal of Nutrition, Health and Aging, 25(2), 197–200.