

Relationship Between Nutrition Status (MNA) and Fall Risk (FRQ) in Elderly Patients

Muhammad Hazmi Sinulingga¹, Dina Aprillia Ariestine²,
Ariantho Sidasuha Purba³

¹Department of Internal Medicine, Faculty of Medicine, University of North Sumatra

²Division of Geriatrics, Department of Internal Medicine, Faculty of Medicine, University of North Sumatra

Corresponding Author: Muhammad Hazmi Sinulingga

DOI: <https://doi.org/10.52403/ijrr.20230776>

ABSTRACT

Background: The process of getting older causes a decrease in physical abilities so that it can trigger an increased risk of falling in the elderly, especially in hospitals. The incidence of falls in the elderly results in a decrease in physical activity and independence of the elderly. Malnutrition in the elderly is one of the causes of high morbidity and hospitalization rates, but malnutrition often goes undetected. To find out the nutritional status of the elderly, you can use the Mini Nutritional Assessment (MNA) which is considered to have a reliable scale and clear boundaries. Fall incident may be caused by disease, inactivity, inadequate nutritional intake, repeated hospitalizations, poor dental hygiene and/or physiological changes such as decreased metabolic rate. The Fall Risk Questionnaire (FRQ) is a tool for assessing the risk of falling in the elderly. Research on the relationship between the risk of falling and the nutritional status of elderly patients is still rare.

Objective: To find out the relationship between nutritional status and the risk of falling in the elderly in Medan City in 2023.

Research Methods: This study used a cross sectional design. The research subjects used were the elderly who went to Padang Bulan Village in January 2023 – June 2023 and met the inclusion and exclusion criteria. The minimum number of samples is 90 people. The study was conducted by distributing the MNA and FRQ questionnaires to the sample. To determine the relationship between nutritional status and the risk of falling in the elderly in the city of Medan, the Fisher's exact test was used and continued with the Somer's D directional

test.

Results: Of the 90 samples, the youngest was 60 years old and the oldest was 90 years with an average age of 65.31 years. Age dominance was found in the age range of 60-70 years as many as 77 people. The smallest body weight is 37.8 kg and the largest is 86.1 kg with an average body weight of 62.08 kg. The shortest height is 133cm and the highest is 171cm with an average sample height of 151.79cm. The smallest BMI is 19.23 and the largest is 34.93 with an average BMI of 26.90. The nutritional status of the sample was found to be normal in 55 people, 6 people at risk of malnutrition and 29 people with malnutrition. The risk of falling in the sample found a low risk of 65 people and a high risk of 25 people. Found a significant relationship between nutritional status and the risk of falling in elderly patients with a value of $p = 0$.

Conclusion: There is a relationship between nutritional status and the risk of falling in elderly patients with a low relationship category range. Decreased nutritional status will increase the risk of falling in the elderly

Keywords: Nutritional status, Risk of falling, Mini Nutritional Assessment, Fall Risk Questionnaire

INTRODUCTION

The process of getting older in old age (elderly) results in a decrease in physical abilities and also independence. This can trigger an increase in the risk of falling in the elderly, especially in hospitals. The high incidence of falls in the elderly results in

losses where there is a decrease in physical activity and independence of the elderly. Every year 1 in 3 elderly patients have a high risk of falling, and this increases with age (Bergland, 2012; Westergren, Hagell and Sjö Dahl Hammarlund, 2014; Pasali and Djoar, 2018).

Each year there are around 4.7 million deaths worldwide due to trauma, and 80% of them occur in developing countries. Traumatic deaths are divided into intentional trauma and accidental trauma. According to research conducted by Shirin et al. in 2005-2015 it was found that deaths due to falls had increased by 21% in the last decade; and the most common causal factors are population size and increasing age (in the elderly) (Wadhvaniya et al., 2017). In Indonesia, the prevalence of fall injuries in people over the age of 55 years reaches 49.4%, and those over 65 years and over 67.1%. The annual incidence of falls among community-dwelling elderly has increased from 25% at age 70 to 35% after age 75. (Noorratri, May Leni and Kardi, 2020).

The relationship between falls and nutritional status can be explained by the frailty process. Frailty can be caused by disease, inactivity, inadequate nutritional intake, repeated hospitalizations, poor teeth, and/or physiological changes associated with aging such as decreased metabolic rate. These various causes can lead to chronic malnutrition and sarcopenia, which can lead to reduced strength and balance disturbances, eventually leading to falls. (Jo et al., 2020).

RESEARCH METHODS

This study used a cross sectional design. The research subjects used were the elderly who went to Padang Bulan Village in January 2023 – June 2023 and met the inclusion and exclusion criteria. The minimum number of samples is 90 people. The study was conducted by distributing the MNA and FRQ questionnaires to the sample. To determine the relationship between nutritional status and the risk of falling in the elderly in the city of Medan,

the Fisher's exact test was used and continued with the Somer's D directional test.

RESULTS AND DISCUSSION

In this study, 90 respondents met the criteria as research subjects. This number corresponds to the amount required for the significance of the data in the study according to the calculations in the research methods section. All respondents are in the category of geriatric patients with ages above or equal to 60 years. The sample of this study was divided into categories of low and high risk of falling as well as normal nutritional status, the risk of malnutrition and malnutrition were assessed according to the MNA (Mini Nutritional Assessment) and FRQ (Fall Risk Questionnaire) questionnaires.

In this study, age was found, the oldest subject was 80 years old. The mean age of the subjects was 65 years. When classified by age range, 77 subjects (85.6%) are in the age range of 60-70 years, while the remaining 13 subjects (14.4%) are in the range of 71-80 years. In a study by Murphy et al., it was found that the oldest age was 103 years old with an average age of the research subjects, namely 80 years. According to a study by Adly et al., it was found that the average age of the sample was 69 years

In the weight category in this study, the average body weight of the research subjects was 62 kg with a maximum weight value of 86.1 kg and a minimum of 37.8 kg. Research by Murphy et al., showed that the average sample weight was 60 kg with the highest weight being 89 kg and the lowest being 38 kg.

The mean value of height in this study was 151.79 cm. In contrast to the research sample by Kushkestani et al., in Iran, which shows that the average height of the elderly in the sample is 168cm (Kushkestani et al., 2020).

The results of the descriptive analysis showed that the body mass index range of the subjects of this study ranged from 19.23

to 34.93. Murphy et al., showed that the average BMI value in the sample was 23.7, with the highest BMI value being 32.5 and the lowest being 15.5.

In this study, 90 respondents with the results of the MNA questionnaire found 55 subjects (61.1%) with normal nutritional status and 6 people (6.7%) with the risk category of malnutrition and 29 other subjects (32.2%) with malnutrition. This indicates that most of the samples in this study had normal nutritional status. These results are in line with research by Isenring et al., which only divided the sample into groups with MNA scores at risk for malnutrition (BMI<22kg/m²) and not at risk for malnutrition (BMI>22kg/m²). It was found that of the 254 research samples, 10 samples were at risk of malnutrition and 244 samples were not at risk of malnutrition (Isenring, Baker and Kerr, 2013). In the study by Adly et al., (Adly, Abd-El-Gawad and Abou-Hashem, 2020).

An increased risk of falling was found to be associated with decreased BMI, muscle weakness and impaired movement coordination (Ülger et al., 2010). Several studies on elderly individuals in a community who received care found a risk of malnutrition in 15-40% of individuals. Individuals who are classified as malnourished have a 1.65 times the risk of falling compared to individuals who have good nutrition (Visvanathan et al., 2003). Of the patients who came to the fall clinic in Australia, 12.2% of patients were identified as malnourished (Watson, Zhang and Wilkinson, 2010).

From the fall risk assessment using the Fall Risk Questionnaire, it was found that 65 subjects (72.2%) were included in the low-risk category. 25 people (27.8%) other research subjects fall into the category of high risk of falling. This indicates that most of the samples in this study are in the low fall risk category. In a study by McKay et al., it was shown that elderly individuals in the study were dominated by elderly people with a high risk of falling, namely 69 people (82.1%) and a low risk of 15 people (17.9%)

based on the FRQ questionnaire in the study sample. (McKay, Todd-Magel and Copel, 2020).

In this study, the results of the crosstabulation test using the Fisher's Exact test found a p value of 0.002. This number is smaller than the significance limit value set, namely 0.05. This leads to the rejection of hypothesis 0. It can be concluded that there is a statistically significant relationship between Fall Risk and Nutritional Status in elderly patients.

From the results of the directional test, it shows a positive value indicating a unidirectional relationship between one variable and another and values in the low relationship category range (0.2 – 0.399). It can be concluded that the relationship between poor nutritional status can increase the risk category for falling in the elderly. This result is in line with research by Chien and Guo and Tsai and Lai who found that the incidence of falls in the elderly was more common in malnourished individuals. (Chien and Guo, 2014; Tsai and Lai, 2014). Individuals who experience malnutrition tend to have health problems related to nutrition so that it can be a risk factor for falling in the elderly (Beck, Ovesen and Osler, 1999). Previous studies have found that malnutrition also affects muscle mass loss (Ahmed and Haboubi, 2010), balance disorders or both which can be a risk factor for falling in the elderly (Ávila-Funes et al., 2008). Vivanti et al., stated that during the day of hospitalization, deterioration of the patient's nutritional status can occur and active nutritional support can have a positive effect on the patient's nutritional status (Vivanti, Ward and Haines, 2011). Neelemaat et al., stated that the importance of dietary counseling and education in malnourished patients because it can reduce the risk of falling in the next 3 months after discharge from the hospital (Neelemaat et al., 2012).

In other studies, found results that are not in line with this study. Bauer et al., stated that there was no difference in the incidence of falls in malnourished and adequately

nourished elderly patients who were hospitalized (p value = 0.609). In this study, it still did not fully detect the classification of minor injuries and no injuries in the sample clearly.(Adly, Abd-El-Gawad and Abou-Hashem, 2020).

Sarcopenia is a decrease in skeletal muscle mass associated with the aging process which is a major contributor to weakness and is often associated with decreased energy intake (calories), muscle fiber denervation, and oxidative stress. Nutritional status in elderly patients can be a cause of fragility and sarcopenia and a predictor of potential falls in the elderly population. Elderly falls often occur in individuals with undernourished nutritional status. Malnutrition in the elderly is often caused by a combination of absorption disorders, polypharmacy, dysgeusia, dysphagia, poor dental and oral health, lack of access to food.(Esquivel, 2018). The incidence of falls in the elderly is not only influenced by nutrition. The influence of drugs, comorbidities that affect balance, muscle strength also have a role in causing the elderly to fall. Data on comorbidities, patient length of stay, and nutritional status are needed and compared with healthy individuals which are assessed in stages (not just one time) to ensure that the cause of falls in the elderly is not influenced by other factors but comes from the individual's poor nutritional status. elderly(Isenring, Baker and Kerr, 2013).

The advantages of this research are the large number of samples, namely 90, and the inclusion criteria are given limits on individuals who are able to communicate well to avoid the bias effect in the form of unclear message meaning which complicates research analysis.

In this study there are limitations, namely not including other factors that can increase the risk of falling such as DM which can cause diabetic ulcers, peripheral neuropathy due to DM and smoking which can cause Buerger's disease. This study also did not analyze bone disease factors such as osteoporosis, osteoarthritis which can

increase the risk of falling and are especially prone to occur in the elderly.

CONCLUSION

There is a relationship between nutritional status and the risk of falling in elderly patients with a low relationship category range. Decreased nutritional status will increase the risk of falling in the elderly

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: The author acknowledges the contributions of colleagues and institutions; therefore, the authors thank the supervisors and all those who support and contribute to this research.

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

REFERENCE

1. Adly, NN, Abd-El-Gawad, WM and Abou-Hashem, RM (2020) 'Relationship between malnutrition and different fall risk assessment tools in a geriatric in-patient unit', *Aging Clinical and Experimental Research*, 32(7), pp. 1279–1287. doi: 10.1007/s40520-019-01309-0.
2. Ahmed, T. and Haboubi, N. (2010) 'Assessment and management of nutrition in older people and its importance to health.', *Clinical interventions in aging*, 5, pp. 207–216. doi: 10.2147/cia.s9664.
3. Amarya, S., Singh, K. and Sabharwal, M. (2018) 'Ageing Process and Physiological Changes', in *Gerontology*. InTech. doi: 10.5772/intechopen.76249.
4. Budgeti, APM and Djoar, RK (2018) 'The Relationship between Fall Risk and Fear of Falling in the Elderly at Nursing Homes in Surabaya', *Journal of Physical Therapy*, 3(2), pp. 58–111.
5. Ávila-Funes, JA et al. (2008) 'Association of Nutritional Risk and Depressive Symptoms with Physical Performance in the Elderly: The Quebec Longitudinal Study of Nutrition as a Determinant of Successful Aging (NuAge)', *Journal of the American College of Nutrition*, 27(4), pp. 492–498. doi: 10.1080/07315724.2008.10719730.
6. Beck, AM, Ovesen, L. and Osler, M. (1999) 'The "Mini Nutritional Assessment" (MNA)

- and the “Determine Your Nutritional Health” Checklist (NSI Checklist) as predictors of morbidity and mortality in an elderly Danish population', *British Journal of Nutrition*, 81(1), pp. 31–36. doi: 10.1017/S0007114599000112.
7. Bergland, A. (2012) 'Fall risk factors in community-dwelling elderly people', *Norsk Epidemiology*, 22(2 SE-). doi: 10.5324/nje.v22i2.1561.
 8. Burns, E. and Kakara, R. (2018) 'Deaths from Falls Among Persons Aged ≥ 65 Years - United States, 2007-2016', *MMWR. Morbidity and mortality weekly report*, 67, pp. 509–514. doi: 10.15585/mmwr.mm6718a1.
 9. Cederholm, T. et al. (2017) 'ESPEN guidelines on definitions and terminology of clinical nutrition.', *Clinical nutrition (Edinburgh, Scotland)*, 36(1), pp. 49–64. doi: 10.1016/j.clnu.2016.09.004.
 10. Chien, MH and Guo, HR (2014) 'Nutritional status and falls in community-dwelling older people: A longitudinal study of a population-based random sample', *PLoS ONE*, 9(3), pp. 1–9. doi: 10.1371/journal.pone.0091044.
 11. Dahlan, S. (2016) 'Determining sample size', *Steps to make a research proposal in the field of medicine and health*. 2nd ed. Jakarta: Sagung Seto, pp. 80–98.
 12. Engelheart, S. and Brummer, R. (2018) 'Assessment of nutritional status in the elderly: a proposed function-driven model.', *Food & nutrition research*, 62. doi: 10.29219/fnr.v62.1366.
 13. Esquivel, MK (2017) 'Nutritional Assessment and Intervention to Prevent and Treat Malnutrition for Fall Risk Reduction in Elderly Populations', *American journal of lifestyle medicine*, 12(2), pp. 107–112. doi: 10.1177/1559827617742847.
 14. Esquivel, MK (2018) 'Nutritional Assessment and Intervention to Prevent and Treat Malnutrition for Fall Risk Reduction in Elderly Populations', *American Journal of Lifestyle Medicine*, 12(2), pp. 107–112. doi: 10.1177/1559827617742847.
 15. Guerreiro, C. et al. (2022) 'Determining the Profile of People with Fall Risk in Community-Living Older People in the Algarve Region: A Cross-Sectional, Population-Based Study', *International Journal of Environmental Research and Public Health*, 19(4). doi: 10.3390/ijerph19042249.
 16. Guigoz, Y. and Vellas, B. (2021) 'Nutritional Assessment in Older Adults: MNA® 25 years of a Screening Tool & a Reference Standard for Care and Research; What Next?', *Journal of Nutrition, Health and Aging*, 25(4), pp. 528–583. doi: 10.1007/s12603-021-1601-y.
 17. Isenring, E., Baker, J. and Kerr, G. (2013) 'Malnutrition and falls risk in community-dwelling older adults', *Journal of Nutrition, Health and Aging*, 17(3), pp. 277–279. doi: 10.1007/s12603-012-0408-2.
 18. Julius, M. et al. (2017) 'Malnutrition as a Fall Risk Factor', *Federal practitioner : for the health care professionals of the VA, DoD, and PHS*, 34(2), pp. 27–30.
 19. Kushkestani, M. et al. (2020) 'The Physical Activity and Fall Risk Among Iranian Older Male Adults', *The Open Nursing Journal*, 14(1), pp. 159–167. doi: 10.2174/1874434602014010159.
 20. McKay, MA, Todd-Magel, C. and Copel, L. (2020) 'Factors associated with the risk for falls in PACE participants', *Geriatric Nursing*, 41(5), pp. 571–578. doi: 10.1016/j.gerinurse.2020.03.002.
 21. Neelemaat, F. et al. (2012) 'Short-term oral nutritional intervention with protein and vitamin D decreases falls in malnourished older adults', *Journal of the American Geriatrics Society*, 60(4), pp. 691–699. doi: 10.1111/j.1532-5415.2011.03888.x.
 22. Noorratri, ED, Mei Leni, AS and Kardi, IS (2020) 'Early Detection of the Risk of Falling in the Elderly at the Kentingan Elderly Posyandu, Jebres District, Surakarta', *GEMASSIKA: Journal of Community Service*, 4(2), p. 128. doi: 10.30787/gemassika.v4i2.636.
 23. Phelan, EA et al. (2015) 'Assessment and management of fall risk in primary care settings.', *The Medical clinics of North America*, 99(2), pp. 281–293. doi: 10.1016/j.mcna.2014.11.004.
 24. Rubenstein, LZ (2006) 'Falls in older people: epidemiology, risk factors and strategies for prevention.', *Age and aging*, 35 Suppl 2, pp. ii37–ii41. doi: 10.1093/ageing/afl084.
 25. Rubenstein, LZ et al. (2011) 'Validating an evidence-based, self-rated fall risk questionnaire (FRQ) for older adults.'

- Journal of safety research, 42(6), pp. 493–499. doi: 10.1016/j.jsr.2011.08.006.
26. Sharif, SI et al. (2018) 'Falls in the elderly: assessment of prevalence and risk factors.', *Pharmacy practice*, 16(3), p. 1206. doi: 10.18549/PharmPract.2018.03.1206.
 27. Su, W. -T. et al. (2020) 'Geriatric Nutritional Risk Index as a Screening Tool to Identify Patients with Malnutrition at a High Risk of In-Hospital Mortality among Elderly Patients with Femoral Fractures-A Retrospective Study in a Level I Trauma Center', *International journal of environmental research and public health*, 17(23), p. 8920. doi: 10.3390/ijerph17238920.
 28. Sugiyono (2010) *Statistics for Research*. Bandung: Alfabeta.
 29. Sukriang, N. and Somrak, K. (2021) 'Correlation between mini nutritional assessment and anthropometric measurements among community-dwelling elderly individuals in rural southern Thailand', *Journal of Multidisciplinary Healthcare*, 14, pp. 1509–1520. doi: 10.2147/JMDH.S315652.
 30. Taberna, DJ, Navas-Carretero, S. and Martinez, JA (2019) 'Current nutritional status assessment tools for metabolic care and clinical nutrition.', *Current opinion in clinical nutrition and metabolic care*, 22(5), pp. 323–328. doi: 10.1097/MCO.0000000000000581.
 31. Tsai, AC and Lai, M.-Y. (2014) 'Mini Nutritional Assessment and short-form Mini Nutritional Assessment can predict the future risk of falling in older adults - results of a national cohort study.', *Clinical nutrition (Edinburgh, Scotland)*, 33(5), pp. 844–849. doi: 10.1016/j.clnu.2013.10.010.
 32. Ülger, Z. et al. (2010) 'Comprehensive assessment of malnutrition risk and related factors in a large group of community-dwelling older adults', *Clinical Nutrition*, 29(4), pp. 507–511. doi: 10.1016/j.clnu.2010.01.006.
 33. Vance, E. et al. (2018) 'Nutritional Status and Falls: a Mini Review', *NeuRA*, (6), pp. 1–10.
 34. Visvanathan, R. et al. (2003) 'The nutritional status of 250 older Australian recipients of domiciliary care services and its association with outcomes at 12 months', *Journal of the American Geriatrics Society*, 51(7), pp. 1007–1011. doi: 10.1046/j.1365-2389.2003.51317.x.
 35. Vivanti, A., Ward, N. and Haines, T. (2011) 'Nutritional status and associations with falls, balance, mobility and functionality during hospital admission', *Journal of Nutrition, Health and Aging*, 15(5), pp. 388–391. doi: 10.1007/s12603-010-0302-8.
 36. Wadhvaniya, S. et al. (2017) 'Epidemiology of Fall Injury in Rural Bangladesh', *International journal of environmental research and public health*, 14(8), p. 900. doi: 10.3390/ijerph14080900.
 37. Watson, S., Zhang, ZK and Wilkinson, TJ (2010) 'Nutrition risk screening in community-living older people attending medical or falls prevention services', *Nutrition and Dietetics*, 67(2), pp. 84–89. doi: 10.1111/j.1747-0080.2010.01424.x.
 38. Westergren, A., Hagell, P. and Sjö Dahl Hammarlund, C. (2014) 'Malnutrition and risk of falling among elderly without home-help service--a cross sectional study.', *The journal of nutrition, health & aging*, 18 (10), pp. 905–911. doi: 10.1007/s12603-014-0469-5.
 39. World Health Organization (WHO) (2018) 'Aging and Health', World Health Organization.
- How to cite this article: Muhammad Hazmi Sinulingga, Dina Aprillia Ariestine, Ariantho Sidasuha Purba. Relationship between nutrition status (MNA) and fall risk (FRQ) in elderly patients. *International Journal of Research and Review*. 2023; 10(7): 650-655.
DOI: <https://doi.org/10.52403/ijrr.20230776>
