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Correlation Study of Frailty Status to Cognitive-Neuro-Behavior Changes in Elderly in Nursing Homes and Health Centers

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ABSTRACT

Background : A large amount of literature demonstrated several multisystem pathophysiological processes that are important in the pathogenesis of *frailty syndrome*, including chronic inflammation and immune activation, as well as processes in the musculoskeletal and endocrine systems. **Aims :** This research aims to determine the analysis of the *Frailty* Correlation Study on *Cognitive-Neuro-Behavior Changes* in the Elderly in Nursing Homes and Community Health Centers. **Methods :** This research is a descriptive *cross-sectional study* with 165 elderly respondents from several health centers in Makassar City and one nursing home in Gowa Regency. This research used several instruments: *the Barthel Index*, *Lawton Scale*, *Abbreviated Mental Test Score* (AMTS), and *The Geriatric Depression Scale* (GDS) *Short Form.* **Results :** This study showed that most respondents (51.5%) had *a frail scale* that was not at risk, and most respondents (79.4%) who took *the Abbreviated Mental Test* did not experience dementia/were normal. More than half of the respondents (95.2%) had good functional status, with the majority also having good psychological status. *The frail scale* is also related to psychological status in older people with *a p-value* <0.05 (0.000). **Conclusion:** This research found a correlation between *the frail scale* and the psychological status of older people. Therefore, efforts are needed to maintain the quality of life of older people, especially psychological factors, to prevent *frailty* in the elderly in nursing homes and community health centers.

KEYWORDS : Frailty, Cognitive-Neuro-Behavior, Elderly

INTRODUCTION

The elderly population worldwide, which continues to increase every year, reflects science's success, especially in the health sector. The world's elderly population is expected to grow by 223% or 694 million people between 1970–2025. This figure is estimated to reach 2 billion people by 2050, and 80% of the population is in developing countries. According to BPS data, in Indonesia, in almost five decades (1971–2019), there has been an increase of around two-fold, bringing the percentage of elderly to 9.6% or around 25.64 million people. Meanwhile, the threshold for a country is referred to as a country with the structure of the aging population if it is more than 10%. This

condition shows an increase in the Indonesian people's life expectancy (UHH) (Hakim, 2020).

Research has found that older adults experience various problems, including self-concept problems (Hentika, 2019). WHO revealed that the causes of problems in older people are physical, psychosocial, spiritual, mental, stress, economic issues, and a decline in cognitive and psychomotor function, which will affect self-concept. Older people's physical and functional conditions can influence cognitive, neurological, and behavioral changes. Good *fitness can protect against cognitive decline, while frailty* (physical weakness) can increase the risk of health problems. *Frailty* can be seen as a clinical syndrome (phenotype) or accumulation of comorbidities (deficits) that occur in the elderly with a pathological aging process. *The Cardiovascular Health Study (CHS)* scoring system is used to determine the condition of elderly individuals as fit/muscular, pre-frail, or frail. This is the most commonly used scoring system in *frailty syndrome studies*, particularly in the community, and has good predictive ability. The main risk factors that influence *frailty* are genetics, age, poor health, lifestyle/environment, and disease (including subclinical or due to specific trauma). Based on research by Rensa, et al. it has been observed a direct relationship between frailty and increased levels of inflammation, characterized by increases in interleukin-6 (IL-6), C-reactive protein (CRP), fibrinogen, and factor VIII, independent of common chronic disease conditions (Rensa, et al., 2019).

Cognitive-neuro-behavior changes often occur with age and can cause various disorders such as decreased cognitive function, depression, anxiety, and neurological disorders such as dementia. This problem is related to several sustainable development goals (SDGs). If action is not taken, a decline in the cognitive function of older people will result in a decline in memory in the elderly. This is to the theory of decline, which states that with increasing age, memory will decrease (Setyowati, Purnomo & Hartina, 2021). Older adults who live in nursing homes and those who live with family may experience different experiences and conditions. Older adults in nursing homes may tend to be more exposed to socialization and routine physical activity. At the same time, older adults living with family in the Puskesmas work area may have different levels of dependency and access to medical care. Comparing these two groups will help understand the impact of the residential environment on cognitive, neurological, and

behavioral changes in older adults. Older adults who live with their families have emotional support from those closest to them, such as family members, close friends, neighbors, and relatives (Yanti, 2022).

MATERIALS AND METHODS

Design used is quantitative research with a descriptive *cross-sectional study approach*. A descriptive *cross-sectional study* assessed the functional status, vulnerability, cognitive function, psychosocial status, and sociodemographic variables in older people. This research was carried out for two months, from April 2024 to May 2024, at the Tresna Werdha Gau Mabaji Social Home, Gowa Regency, and five health centers, namely Puskesmas Tamalanrea, Makassar City; Puskesmas Tamalanrea Jaya, Makassar City; Puskesmas Kassi-Kassi, Makassar City; Puskesmas Jongaya, Makassar City; and Puskesmas Minasa Upa, Makassar City. The population of this study is the elderly group, with the affordable population being older adults in nursing homes. Respondents were recruited using a *simple random sampling method* with 165 respondents. The research sample calculation used *a sample size calculator* affiliated with the University of California San Francisco. The selected responses were older adults who lived in nursing homes, aged 60 years or more, and expressed willingness to become research respondents.

Data collection in this study used a questionnaire submitted to older people using a *paper-based questionnaire in the form* of *a Self-Reported Questionnaire*, where respondents in the research sample completed the filling independently or with the help of an enumerator. This research used several instruments: *the Barthel Index*, *Lawton Scale*, *Abbreviated Mental Test Score* (AMTS), and *The Geriatric Depression Scale* (GDS) *Short Form.* The univariate analysis examined sociodemographic characteristics such as age, gender, ethnicity, domicile, occupation, and marital status. *Frailty* conditions and cognitive-neuro-behavioral change status by assessing frequency, percentage, normality, mean, minimum-maximum value, standard deviation. The Chi-Square test used a bivariate analysis to analyze *frailty condition data* with cognitive, functional, and behavioral/psychological changes. Data analysis was carried out computerized using the SPSS (*Statistical Product and Service Solution*) computer tool version 21.0. This research has passed the ethical test of the Ethics Committee of the Faculty of Public Health, Hasanuddin University, Makassar, with Number 871/UN4.14.1/TP.01.02/2024.

Data analysis was carried out to assess the instruments' validity, reliability, and internal consistency.

RESULTS

Based on table 1 shows that the average age of respondents is 68 years; the majority of respondents are women (83.0), and less than half of whom are high school graduates, 27.3%. More than half of the respondents were retirees, 68.5%, and more than half had no income (68.5%). More than half of the respondents were married (59.4%), while the majority of respondents came from the Jongaya health center (21.8%).

Table 1 : Distribution Characteristic Respondent

Characteristic	Mean±SD	Mode	n	%	N
Age	68.02 ± 7.597	62			
Gender					
Male			28	17.0	165
Female			137	83.0	
Last Education					
Elementary school			63	38.2	165
Junior High School			19	11.5	
Senior High School			45	27.3	
Bachelor			38	23.0	
Income					
No Income			112	67.9	165
< Rp. 500,000			5	3.0	
Rp. 500,000 - Rp. 1,000,000			12	7.3	
> Rp. 1,000,000			36	21.8	
Work					
Retired/IRT			113	68.5	165
Doesn't work			35	21.2	
Other			17	10.3	
Marital status					
Not married yet			3	1.8	165
Marry			98	59.4	
Divorced			9	5.5	
Death Divorced			55	33,3	
Family Culture					
PSTW Gau Mabaji Gowa Nursing Home			17	10.3	165
Puskesmas Tamalanrea			22	13.3	
Puskesmas Tamalanrea Jaya			30	18.2	
Puskesmas Kassi-Kassi			26	15.8	

Puskesmas Jongaya	36	21.8
Puskesmas Minasa Upa	34	20.6

Based on table 2 shows that more than half of the respondents on *the frail scale* were not at risk, namely 51.5%, and the majority of respondents who took *the Abbreviated Mental Test* were not dementia/normal, 79.4%. Most respondents had good functional status (95.2%), with the majority having good psychological status 93.3%.

Table 2. Frail Scale, Abbreviated Mental Test. Functional Status. and Psychological Status in the Elderly

Meassurement	f	%
Frail Scale		
Frailty Risk	80	48.5
No Risk	85	51.5
Abbreviated Mental Test		
Risk of Dementia	34	20.6
Normal	131	79.4
Functional Status		
Poor Functional Status	2	1,2
Insufficient Functional Status	6	3.6
Good Functional Status	157	95.2
Psychological Status		
Psychological Distress	11	6,7
Good Psychology	154	93.3
Total	165	100%

Table 3 shows that the results of the Chi-square statistical test conclude that there are two characteristics, namely occupation and research location, which influence *the frail scale* in older people. It is proven by *the p-value <0.05,* the p-value from work is 0.006, and the p-value from the research location is 0.003, so it can be concluded that there is a relationship between these two characteristics and *the frail scale* in older people.

Table 3. Correlation Between Characteristics of Frail Scale Respondents

Characteristic	Frail Scale				*p-value*
	Frail Risk		No Risk		
	f	%	f	%	
Gender					
Male	15	53.6%	13	46.4%	0.554
Female	65	47.4%	72	52.6%	
Last Education					

Elementary school	36	57.1%	27	42.9%	0.268
Junior High School	10	52.6%	9	47.4%	
Senior High School	18	40.0%	27	60.0%	
Bachelor	16	42.1%	22	57.9%	
Income					
No Income	52	46.4%	60	53.6%	0.812
< Rp. 500,000	3	60.0%	2	40.0%	
Rp. 500,000 - Rp. 1,000,000	7	58.3%	5	41.7%	
> Rp. 1,000,000	18	50.0%	18	50.0%	
Work					
Retired/IRT	46	40.7%	67	59.3%	
Doesn't work	25	71.4%	10	28.6%	0.006
Other	9	52.9%	8	47.1%	
Marital status					
Not married yet	1	33.3%	2	66.7%	
Marry	46	46.9%	52	53.1%	
Divorced	7	77.8%	2	22.2%	
Death Divorced	26	47.3%	29	52.7%	
Family Culture	26	47.3%	29	52.7%	
PSTW Gau Mabaji Gowa Nursing Home	9	52.9%	8	47.1%	
Puskesmas Tamalanrea	16	72.7%	6	27.3%	0.003
Puskesmas Tamalanrea Jaya	16	53.3%	14	46.7%	
Puskesmas Kassi-Kassi	4	15.4%	22	84.6%	
Puskesmas Jongaya	20	55.6%	16	44.4%	
Puskesmas Minasa Upa	15	44.1%	19	55.9%	

Table 4 shows that the results of the Chi-square statistical test conclude that there is psychological status on the influence of *the frail scale* in older people. It is proven by *the p-value <0.05* with the value of 0.000, so it can be concluded that there is a relationship between psychological status and *the frail scale* in older people.

Table 4. Correlation between Abbreviated Mental Test, Functional Status, and Psychological Status with the Frail Scale

Characteristic	Frail Scale				*p-value*
	Frail Risk		No Risk		
	f	%	f	%	
Abbreviated Mental Test					
Risk of Dementia	19	55.9%	15	44.1%	0,333
Normal	61	46.6%	70	53.4%	
Functional Status					
Poor Functional Status	1	50.0%	1	50.0%	0.219
Insufficient Functional Status	5	83.3%	1	16.7%	
Good Functional Status	74	47.1%	83	52.9%	
Psychological Status					

Psychological Distress	11	100.0%	0	0.0%	0,000
Good Psychology	69	44.8%	85	55.2%	

DISCUSSION

Description of Respondent Characteristics

The research results show that the average age of respondents is 68 years. It is in line with other research that as older people age, their cognitive function will decrease (Mbaloto, et al., 2023). Furthermore, in this study, the % of older adults were female, namely 83.0%. In line with other research conducted on the Caucasian race, it shows that women suffer from more *frailty* than men (Buckinx, et al., 2015). This gender difference in frailty may be due to reduced immune responses and regulation in frail individuals, making them more vulnerable to harmful environmental stressors (Fitriana, 2022). Furthermore, this research found that most older adults had at least an elementary school education; on average, they had no income and worked as retirees/domestic workers. In line with research conducted by Maryam & Tien (2016), it is stated that a lower level of education is at a higher risk of *frailty and dementia.* Also, older adults who do not do enough daily activities will experience a high risk of *frailty* (Leton, Putri and Devi, 2022). The research results showed that there were more older adults with married status than those who were unmarried or divorced. It is in line with research conducted by Riani (2013), which found that married respondents had lower levels of frailty than unmarried or widowed individuals. It is supported by other research that reports a significant relationship between marital status and decreased cognitive function (Yolanda, 2020). However, research conducted by Wahid & Sudarma (2018) did not find a significant relationship between marital status and cognitive function, indicating that other factors may also play a role. Marital status can influence happiness, with married individuals tending to be happier (Darmayanti, et al., 2020).\

Frail Scale, Abbreviated Mental Test, Functional Status, and Psychological Status in the Elderly

The research results showed that respondents on *the frail scale* were not at risk. Namely, 51.5% of respondents who took *the Abbreviated Mental Test* were not dementia/normal, 79.4%. Most respondents have good functional status (95.2%), with the majority having good psychological status 93.3%. It is because the majority of older adults live with their families. It is consistent with research showing that the physical

fitness and health of older adults who live with their families are higher than those who live in nursing homes (Mauliana, Maidar, and Hermansyah, 2020). It is due to the better quality of life, including physical, psychological, social, and environmental aspects, experienced by older adults who live with their families (Luthfa, 2018). According to research conducted by Putri, Fitriana, and Ningrum (2018), older adults who live with their families tend to have a better level of physical fitness because they receive more intensive support and care.

Relationship between Respondent Characteristics and the Frail Scale

Based on the research results, it was found that there is a relationship between *the frail scale* and work in older people. In line with other research which states that the physical demands of work, especially in busy jobs, can cause pain and muscle weakness in older people (Nurseptiani, Setyawan and Izzati, 2022), other research also states that age and work have a significant impact on the independence and depression of older people (Hidayati and Baequny, 2021). Apart from that, the same research was also conducted by Punanto and Khosiah (2018), who found a negative correlation between work and independence for older people, and specific jobs could cause decreased independence in older people. Other research has shown that cognitive decline is related to the type of work (Maghfirah, 2022). In line with this, elderly workers experience physical decline, causing fatigue and pain (Jannah and Mujahid, 2024). Apart from that, there is a risk of "ending-endong" labor work in Yogyakarta, especially an increased risk of musculoskeletal problems and accidents due to heavy loads under them (Tutstsintaiyn, 2022). It proves that heavy work will affect the level of weakness in older people.

Correlation of the Frail Scale with Abbreviated Mental Test, Functional Status, and Psychological Status

Based on the research results, it was found that there was a relationship between *the frail scale* and the psychological status of older people. In line with this, other research suggests that there is a significant correlation between *frailty* and depression, which can indirectly affect the psychological status of older people (Makmur and Saelan, 2023). Other research also suggests that weakness is a condition characterized by decreased physical and psychosocial function, closely related to various psychosocial factors (Freitag & Schmidt, 2016). The psychological conditions of the elderly indirectly influence their food choices and nutritional status (Wirahana, Mangalik and Ranimpi, 2021).

Weakness in the elderly can be prevented by maintaining psychological well-being by accepting their age and developing their potential (Sukadari, Dea, and Mabruri, 2020). The presence of peers can also emphasize psychological well-being in the elderly. In addition, other research suggests that trait awareness in the elderly can improve psychological well-being. Thus, psychological factors are critical in *the frail scale* of the elderly (Wirahana, Mangalik and Ranimpi, 2021). So, it can be concluded *that the frail scale* plays a role in influencing the psychological status of the elderly through correlation with depression. Physical and psychosocial weakness in the elderly is influenced by psychological factors, which can also influence food choices and nutritional status. The role of the family is vital in maintaining the psychological and physical well-being of the elderly so that they are not susceptible to weakness and other disorders.

CONCLUSIONS

From the results of this study, it can be concluded that the majority of respondents on *the frail scale* are not at risk; that is, as many as the majority of respondents who took *the Abbreviated Mental Test* did not experience dementia/or were normal. More than half of the respondents had good functional status with the majority also having good psychological status. Occupation and research location influence *the frail scale* in the elderly, with a *p-value <0.05,* the p-value from work is 0.006, and the p-value from the research location is 0.003. Psychological status has a relationship with *the frail scale* in the elderly. It is proven by *the p-value <0.05* with p value 0.000. It is hoped that this research can be used as reading material to increase information and become reference material in developing efforts to maintain the quality of life of the elderly, especially psychological factors to prevent *frailty* in the elderly both in nursing homes and at community health centers.

REFERENCES

Buckinx F, Rolland Y, Reginster JY, Ricour C, Petermans J, and Bruyere O. (2015). Burden of frailty in the elderly population: perspectives for a public health challenge. Arch Public Health. 73(19):1-7.

Darmayanti, K.K., Insan, I., Winata, E.Y., Prasetyo, D.T., Sakti, P., & Rosandi, F.H. (2020). Perbandingaan Kebahagiaan Berdasarkan pada Perbedaan Gender dan Status Pernikahan. https://doi.org/10.31105/JPKS.V19I3.2125\

Fitriana, Ika .(2022). "Revaksinasi COVID-19 pada Kelompok Lansia dengan Frailty,"

Jurnal Penyakit Dalam Indonesia: Vol. 9: Iss. 2, Article 1. DOI: 10.7454/jpdi.v9i2.829 Available at: https://scholarhub.ui.ac.id/jpdi/vol9/iss2/1

Freitag, S., & Schmidt, S. (2016). Psychosocial Correlates of Frailty in Older Adults. *Geriatrics, 1*. https://doi.org/10.3390/geriatrics1040026

Hakim, L., N. (2020). Urgensi Revisi Undang-Undang tentang Kesejahteraan Lanjut Usia. Jurnal Masalah-Masalah Sosial [dikutip 17 Oktober 2023]; (11): 43-55.

Hentika, Y. (2019). Konsep Diri Lansia di Panti Jompo. SCHOULID: *Indonesian Journal of School Counseling* [dikutip 17 Oktober 2023]; 3(2), 46-54

Hidayati, S., & Baequny, A. (2021). Pengaruh Karakteristik Lansia Dan Dukungan Keluarga Terhadap Tingkat Depresi Pada Lansia. *Bhamada: Jurnal Ilmu Dan Teknologi Kesehatan (E-Journal)*. https://doi.org/10.36308/jik.v12i1.284

Jannah, M., & Mujahid, D.R. (2024). Penerimaan Diri Lansia yang Bekerja. *Psikobuletin:Buletin Ilmiah Psikologi*. https://doi.org/10.24014/pib.v5i1.15447

Leton E.M., Putri R.M., Devi H.M., (2022). Usia, Riwayat Pendidikan, Activity Daily Living (ADL) Berhubungan Dengan Kejadian Demensia Pada Lansia. Jurnal ilmu kesehatan. Vol 10, No 3, hal 486-500.

Luthfa, I. (2018). Perbedaan Kualitas Hidup Lansia Yang Tinggal Bersama Keluarga Dengan Lansia Yang Tinggal Di Rumah Pelayanan Sosial. *Jurnal Wacana Kesehatan*. https://doi.org/10.52822/jwk.v3i1.66

Maghfirah (2022). Analisis Pekerja Lansia Pada Masa Awal Pandemi COVID-19 di Indonesia. *Jurnal Ketenagakerjaan*. https://doi.org/10.47198/naker.v17i3.161

Makmur, S., & Saelan Tadjudin, N. (2023). Korelasi Antara Frailty Dengan Depresi Pada Lanjut Usia. *Al-Iqra Medical Journal : Jurnal Berkala Ilmiah Kedokteran*. https://doi.org/10.26618/aimj.v6i1.9096

Maryam R.S., Tien Hartini, Sumijatun. (2016). Hubungan tingkat Pendidikan dan activity daily living dengan demensia pada lanjut usia di panti werdha. Jurnal kesehatan reproduksi. https://doi.org/10.22435/kespro.v6i1.4757.45-56

Mauliana, M., Maidar, M., & Hermansyah, H. (2020). Perbedaan Kualitas Hidup Terkait Kesehatan Lansia yang Tinggal Bersama Keluarga dengan Lansia yang Tinggal di Panti Tresna Werdha Belai Kasih Kabupaten Bireuen. Jurnal Aceh Medika, Vol.4, No.2, Oktober 2020 : 137-149.

Mbaloto, F. R., Mua, E. L., Sekeon, R. A., Susanto, D., Yanriatuti, I. ., Tarigan, S., & Emilia, N. L. (2023). Peningkatan Fungsi Kognitif Lansia Melalui Terapi Aktivitas Kognitif. *Jurnal Altifani Penelitian Dan Pengabdian Kepada Masyarakat*, *3*(4), 494–499. https://doi.org/10.59395/altifani.v3i4.440

Nurseptiani, D., Setyawan, M.G., & Izzati, N. (2022). Gambaran Skala Nyeri Akibat Penurunan Kekuatan Otot Gastrocnemius pada Lansia Pekerja di Posyandu Lansia Pekajangan Gang 16. *Jurnal Fisioterapi dan Rehabilitasi*. https://doi.org/10.33660/jfrwhs.v6i2.172

Purnanto, N.T., & Khosiah, S. (2018). Hubungan Antara Usia, Jenis Kelamin, Pendidikan Dan Pekerjaan Dengan Activity Daily Living (Adl) Pada Lansia Di Puskesmas Gribig Kabupaten Kudus.

Putri, S.T., Fitriana, L.A., & Ningrum, A. (2015). Studi Komparatif : Kualitas Hidup Lansia Yang Tinggal Bersama Keluarga Dan Panti. https://doi.org/10.17509/JPKI.V1I1.1178

Rensa, Setiati, S., Laksmi, P. W., Rinaldi, I. (2019). Factors Associated with Physical Frailty in Elderly Women with Low Socioeconomic Status in Urban Communities: A Cross-Sectional Study. Acta Med Indones - Indones J Intern Med [dikutip 17 Oktober 2023]; (51), 221.

Riani, S. (2013). Studi Deskriptif Status Mental Lansia Berdasarkan Karakteristik Lansia Di Kelurahan Karangayu Semarang Barat. Medicine.

Setyowati, S., Purnomo, P. S. & Hartina, M. (2021). Dampak Kehilangan Gigi, Fungsi Kognitif dan Kualitas Hidup Lanjut Usia. *Health Sciences and Pharmacy Journal* [dikutip 17 Oktober 2023]; (5), 88-96.

Sukadari, Dea Komalasari, M., & Mabruri Wihaskoro, A. (2020). Studi Deskriptif Mengenai Psychological Well-Being Pada Lansia Di Taman Lansia An-Naba Tanggulangin Gunungkidul. *G-Couns: Jurnal Bimbingan dan Konseling*. https://doi.org/10.31316/G.COUNS.V4I1.465

Tutstsintaiyn, R. (2018). Perilaku beresiko pada lansia “endong-endong” di pasar induk sayur dan buah giwangan Yogyakarta. *Berita Kedokteran Masyarakat*. https://doi.org/10.22146/BKM.37697

Wahid, B.D., & Sudarma, V. (2018). Hubungan Status Gizi Dan Penurunan Fungsi Kognitif Pada Lansia. *Prosiding Seminar Nasional Pakar*.

https://doi.org/10.25105/pakar.v0i0.2655

Wirahana, G.Y., Mangalik, G., & Ranimpi, Y.Y. (2021). Kondisi Psikologis dan Perilaku Makan dalam Menentukan Status Gizi Lansia. https://doi.org/10.20527/ECOPSY.2021.02.002

Yanti, P. A. (2020). Studi Komparatif Kualitas Hidup Lansia Antara yang Tinggal di Keluarga Dengan Panti Jompo Tresna Werdha Natar [dikutip 17 Oktober 2023].

Yolanda, M.R. (2020). Hubungan Status Perkawinan Dan Status Nutrisi Dengan Fungsi Kognitif Lansia Di Wilayah Kerja Puskesmas Manukan Kulon Kota Surabaya. Medical Technology and Public Health Journal, Volume 4, No. 2. https://doi.org/10.33086/MTPHJ.V4I2.81