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Cognitive Function of the Elderly in Banjar Busana, Desa Sibanggede, Badung Regency: A Descriptive Study

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Abstract

Countries around the world are currently entering an aging population era, where the number of elderly individuals is increasing. In the elderly, there is a decline in intrinsic capacities such as physical, mental, and cognitive capacities, which hampers their functional abilities. Cognitive function impairment is an early stage of cognitive decline and is a risk factor for dementia, which significantly disrupts daily activities. Banjar Busana, Desa Sibanggede, is one of the banjars with a relatively large elderly population, totalling 117 individuals. However, data on the cognitive function profile in Banjar Busana, Desa Sibanggede, is not yet definitively available. This study aims to determine the cognitive function profile of the elderly in Banjar Busana, Desa Sibanggede, Badung Regency. The population of this study comprises all elderly individuals in Banjar Busana in 2023, totalling 117 people. The sample size was calculated using the formula by Dean et al., 2013, with a 95% confidence level, resulting in a sample size of 90 individuals. The sample was then selected using simple random sampling. Cognitive function was measured using the MoCA-INA questionnaire. The data were analyzed descriptively and quantitatively. The results showed that the majority of respondents were aged 60-69 years (59%), with more male respondents (51%) than female respondents (49%). Respondents experiencing cognitive function impairment amounted to 47%, while those without cognitive function impairment were 53%. It is recommended to provide more education to the community regarding the dangers of cognitive function impairment and preventive efforts.

Keywords: elderly, cognitive function, MoCA-INA

INTRODUCTION

The global population of the elderly is steadily increasing, partly due to improved healthcare services. The number and percentage of people aged 60 years and above in the population are rising. (1) According to World Health Organization (WHO) data, in 2020, the number of people aged 60 years and above was approximately 1 billion. (2) This number is projected to increase to 1.4 billion by 2030 and 2.1 billion by 2050. This increase is occurring at an unprecedented rate and is expected to accelerate in the coming decades, particularly in developing countries. Data from the Central Statistics Agency (BPS) in 2019 predicts that the total number of elderly people will increase by 15.77%, or to 48.2 million people, by 2035.

The growing elderly population each year will impact various aspects of life, especially in the healthcare sector. This is because the physiological functions of the body begin to decline due to the degenerative processes. Degeneration indicates a faster process of neuron, myelin, and tissue damage as age increases. (3) The 2018 Riskesdas report mentioned that various conditions and diseases in the elderly can cause complex health problems. The most common diseases found in the elderly are non-communicable diseases such as hypertension, joint diseases, oral problems, and many other degenerative diseases, including cognitive function impairment.

Cognitive function is the ability to think, learn, and remember, forming the basis for an individual's capacity for perception, reasoning, action, creativity, problem-solving, and intuition. Cognitive

health, particularly during aging, is crucial for maintaining independence and staying active. Cognitive function is divided into five major domains: attention, memory, visuospatial ability, language, and executive function, all of which are interconnected and cannot stand alone. (4)

Cognitive function impairment significantly disrupts cognitive function in individuals (generally the elderly) due to damage to the brain's structure and function caused by aging, leading to a state where it cannot return to normal function without treatment. Cognitive decline and impairment can occur due to several factors, including brain structure and function damage caused by aging and risk factors throughout life. These risk factors include hypertension, diabetes, dyslipidemia, nutritional disorders, cerebrovascular diseases, such as heart disease, kidney disease, and autoimmune diseases. (5) Cognitive function impairment is a critical diagnosis as it is the early stage of dementia. (6) Approximately 46% of the elderly with cognitive function impairment are at high risk of developing dementia within three years compared to the normal population. (7) According to BPS data in 2022 on elderly population statistics, eight provinces fall into the aging population category: West Sumatra, Lampung, Central Java, DI Yogyakarta, East Java, Bali, North Sulawesi, and South Sulawesi. Bali ranks fourth with 13%. The number of elderly people is also increasing annually, while data on the prevalence of elderly individuals experiencing cognitive function impairment is not yet available. Therefore, this study aims to determine the cognitive function profile, including orientation, visuospatial ability, naming, memory, attention, abstraction, and delayed recall, in the elderly in Banjar Busana, Desa Sibanggede, Badung Regency.

METHODS

This study was conducted in Banjar Busana, Desa Sibanggede, Kecamatan Abiansemal, Badung Regency. The research was carried out from March to November 2023, with data collection taking place in July and August 2023. The research design was descriptive cross-sectional. Data on cognitive function profiles were obtained using the MoCA-INA questionnaire. The Montreal Cognitive Assessment (MoCA), or its Indonesian version commonly abbreviated as MoCA-INA, is a screening instrument for cognitive function disorders, based on the original version from Canada. The Indonesian version has been adapted to fit the cultural background and characteristics of Indonesia. The MoCA test was initially developed as an alternative to the MMSE, and it has proven to be more effective than the MMSE for detecting/ screening Mild Cognitive Impairment (MCI) in patients over the age of 60.

The population of this study comprised all elderly individuals in Banjar Busana, Desa Sibanggede, Badung Regency, totaling 117 people according to data from January 2023. The sample size was calculated using the open-source application Epidemiologic Statistics for Public Health version 3.01, resulting in a required sample size of 90 individuals. To select the 90 individuals who would serve as the sample, a random sampling technique was used. The collected data were tabulated and processed using Microsoft Excel Office 2019, and then presented descriptively. This study received ethical clearance from the Research Ethics Committee of the Faculty of Medicine, Universitas Pendidikan Ganesha, with the number: 044/ UN48.24.11/LT/2023, dated July 11, 2023.

RESULTS

The study found that the largest age group was 60-69 years, with 53 individuals (59%), followed by the 70-79 years age group with 28 individuals (31%), and the ≥80 years age group with 9 individuals (10%). (8)

These results are similar to those found by Irawani and Nuryawati in 2019 in their study titled "Gambaran Fungsi Kognitif pada Lanjut Usia di UPTD Puskesmas Majalengka Wetan Kabupaten Majalengka," which reported that the majority of elderly respondents were in the 60-65 years age group, with 22 respondents (73.3%). (9) Additionally, a study conducted by Am-

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bohamsah et al. in 2020, titled "Gambaran Fungsi Kognitif pada Lanjut Usia di Desa Buku Kecamatan Mapilli Kabupaten Polewali Mandar," found similar results, with the majority of elderly individuals in the 60 -74 years age group, totaling 43 respondents (56.25%).

Respondent Characteristics by Gender

The study found that the majority of respondents were male, totalling 46 individuals (51%), while female respondents totalled 44 individuals (49%). (10) This finding aligns with the study conducted by Dalilah in 2019, which also showed a higher number of male respondents, accounting for 63.3%. (11) In a study conducted by Rinaningsih et al. in 2022, examining factors related to cognitive function impairment among the elderly in Kelurahan Susukan, Kecamatan Ciracas, East Jakarta, it was reported that 44.7% of respondents were male and 55.3% were female. Although the percentage of male elderly respondents was higher in this study, the difference in percentage is not significant. According to BPS data from 2022 on elderly population statistics, elderly females contribute more to the total elderly population, with approximately 51.81% being female and 48.19% being male. However, the percentage difference is not substantial and is nearly balanced.

Table 1. Distribution of Respondents' Cognitive Function

No	Result	Category	Frequency	Percentage
1	Content 1	Mild cognitive impairment	22	25%
2	Content 2	Moderate cognitive impairment	11	12%
3	Content 3	Severe cognitive impairment	9	10%
4	Content 4	No cognitive impairment	48	53%
	Total		90	100%

Based on the data from this study, as shown in Table 1, 42 respondents (47%) experienced cognitive function impairment, with 22% categorized as having mild cognitive impairment, 12% as having moderate cognitive impairment, and 10% as having severe cognitive impairment. Meanwhile, 48 respondents (53%) did not experience cognitive function impairment. These results are consistent with the findings of Made Juniarta and Aryana in 2018, who studied the relationship between depression, cognitive function impairment, and quality of life among the elderly in Desa Pedawa, Singaraja Regency, using the Abbreviated Mental Test (AMT) questionnaire. They found that 64 individuals (54.7%) had cognitive function impairment, while 53 individuals (45.3%) did not. (12) Another study conducted by Hutasusut et al. (2021) found that 46 respondents (43.0%) had impaired cognitive function, while 61 respondents (57.0%) had normal cognitive function.

Distribution of Characteristics of Respondents with Severe Cognitive Impairment (MoCA-INA Score < 10)

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Table 2. Characteristics of Respondents with Severe Cognitive Impairment

No	Respondents Characteristics	Frequency	Percentage (%)
1	Gender		
	Male	3	33
	Female	6	67
2	Education Level		
	Did not complete primary school/equivalent.	4	45
	Completed primary school/equivalent.	4	45
	Completed junior high school/equivalent.	1	10
3	Chronic disease		
	Diabetes Mellitus	0	0
	Hypertension	8	90
	None	1	10
4	Exercise Habits	6	67
	< 3 times per week	3	33
	≥ 3 times per week		
	Total	9	100

Table 2 shows that 9 respondents experienced severe cognitive impairment. Among these 9 respondents, 6 (67%) were female, 3 (33%) were male, 4 (45%) did not complete primary school, 4 (45%) completed primary school, and 1 (10%) completed junior high school. Among the respondents, 8 (90%) suffered from chronic hypertension, and 67% exercised less than three times per week.

DISCUSSION

Cognitive function involves memory aspects, both short-term and long-term, planning functions, reasoning, and strategic thinking. (13) As the elderly population increases, particularly in Indonesia, the incidence of diseases due to degenerative processes also rises. (14) Impairment of these functions can manifest as disturbances in orientation, attention, concentration, memory, and language. Cognitive function is crucial for maintaining adequate roles and interactions in social environments. Decline in cognitive function affects the elderly's interaction patterns with their living environment, family members, and social activities, thereby increasing the burden on families, communities, and society. Cognitive decline can be influenced by various factors, both individual and environmental. Individual factors include age, gender, education level, genetic factors, and disease history. (15) Environmental factors include social relationships/involvement and activities, both physical and cognitive.

Cognitive Function of Respondents Based on MoCA-INA Components

Based on the data from the distribution of each cognitive component in the MoCA-INA questionnaire, the components most frequently impaired, indicated by the highest percentage of a score of 0, were: visuospatial 14%, memory and delayed recall 12%, abstraction 12%, language 10%, attention 4%, naming 1%, and orientation 1%. Cognitive impairment can affect one or more of these domains, causing difficulties in various aspects of thinking and mental processes. (16)

Impairments in executive and visuospatial domains are associated with disturbances in the prefrontal cortex of the

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brain. According to a study by Morley et al. in 2015, the prefrontal cortex, located in the frontal lobe, continues to develop until the age of 20. This area plays a critical role in cognitive functions, particularly in executive and visuospatial functions such as sequencing, problem-solving, working memory, cognitive flexibility, and abstract thinking. Damage to the prefrontal cortex can lead to executive function deficits, affecting the ability to organize, plan, initiate tasks, and multitask.

Functional brain capacity progressively declines with aging, manifesting as reductions in memory, attention, decision-making speed, sensory perception, and motor coordination. (17) Cognitive decline in aging is caused by bioenergetic disturbances, impaired neuroplasticity and adaptive resilience, aberrant neural network activity, dysregulation of neuronal Ca2+ homeostasis, accumulation of oxidatively modified molecules and organelles, and inflammation.

In this study, 9 respondents were found to have severe cognitive impairment (MoCA-INA score < 10), with 67% being female, 90% having six years or less of education (45% did not complete primary school, 45% completed primary school), 85% suffering from chronic hypertension, and 67% exercising less than three times per week. (18) Several factors identified as being related to severe cognitive impairment include: 1) Age: increasing age is a major risk factor for cognitive impairment; 2) Education level: lower education levels are associated with higher incidence of cognitive impairment; 3) Gender: some studies have found significant differences in cognitive impairment incidence between genders, with females being more at risk; 4) Vascular risk factors: hypertension, high cholesterol, and diabetes have been identified as risk factors for cognitive impairment; 5) Lifestyle factors: smoking, obesity, depression, and lack of physical exercise are also associated with increased cognitive impairment risk; 6) Health history: history of brain injury, exposure to pesticides or toxins, and certain medical conditions such as Parkinson's disease, heart disease, and stroke have been linked to cognitive impairment; 7) Genetic factors: family history of cognitive impairment or dementia can also increase risk. It is important to note that cognitive impairment is a complex condition with various potential causes, and each case may involve a combination of these factors.

In this study, four variables were found to coexist in respondents with severe cognitive impairment: female gender, low education level (six years or less), chronic hypertension, and low physical activity (<3 times per week). Early recognition of cognitive impairment is crucial as it allows individuals to take preventive measures to avoid severe cognitive impairment.

CONCLUSIONS

In this study, the majority of respondents were aged 60-69 years, male, with primary school or equivalent education, had a history of chronic disease, exercised less than three times a week, and did not have a smoking habit. Additionally, 53% of respondents did not experience cognitive function impairment, while 47% did. Four dominant variables were found in respondents with severe cognitive impairment: female gender, low education level (six years or less), chronic hypertension, and low physical activity (<3 times per week).

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