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# COGNITIVE FUNCTION OF THE ELDERLY IN PALEMBANG CITY NURSING HOMES: AN EPIDEMIOLOGICAL STUDY

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**ABSTRAK**

Tujuan penelitian ini adalah untuk memperoleh gambaran fungsi kognitif lansia di seluruh Panti Wreda Kota Palembang. Penelitian ini merupakan studi cross-sectional dengan sampel penelitian seluruh lansia di Panti Wreda Kota Palembang sesuai kriteria inklusi-eksklusi. Fungsi kognitif diperiksa menggunakan Montreal Cognitive Assessment versi Indonesia (MoCA-Ina). Pada studi ini, sebanyak 69 lansia (87,34%) telah mengalami penurunan fungsi kognitif. Kemudian, karakteristik yang dominan pada kelompok yang mengalami penurunan fungsi kognitif adalah berusia >90 tahun (100%), perempuan (91,38%), pendidikan terakhir perguruan tinggi (100%), tidak bekerja (100%), memiliki riwayat penyakit stroke (92,86%), tidak ingat atau tidak mengetahui riwayat keluarga dengan gangguan fungsi kognitif (93,33%). Delayed recall merupakan aspek kognitif yang paling banyak mengalami gangguan (96,2%). Dari studi ini, diketahui bahwa kejadian gangguan kognitif di Panti Wreda Kota Palembang sangat tinggi sehingga perlu diadakan skrining berkala untuk mendeteksi dini gangguan fungsi kognitif pada lansia agar dapat diberikan tatalaksana segera.

**ABSTRACT**

**Cognitive Function Of The Elderly In Palembang City Nursing Homes: An Epidemiological Study**. This study aims to determine the profile of cognitive function in the elderly at Palembang Nursing Homes. This study is cross-sectional involving all elderly individuals in Palembang City Nursing Homes who meet the inclusion-exclusion criteria. Cognitive function was assessed using the Indonesian version of the Montreal Cognitive Assessment (MoCA-Ina). In this study, as many as 69 elderly (87.34%) had experienced a decline in cognitive function. Then, the dominant characteristics in the group that experienced a decrease in cognitive function were >90 years old (100%), women (91.38%), college graduates (100%), never worked (100%), had a history of stroke (92.86%), did not remember or did not know about cognitive impairment history in the family (93.33%). Delayed recall was the aspect that experienced the most disruption (96.2%). From this study, it is known that the incidence of cognitive impairment in Palembang Nursing Homes is very high, it is necessary to conduct periodic screening to detect early cognitive impairment in the elderly to give immediate treatment.

## INTRODUCTION

Cognition is a person's ability to recognize and interpret the environment based on aspects of attention, language, memory, and decision-making functions.[1] As we age, cognitive function will experience a decline due to a degenerative process in which large numbers of nerve cells die, as well as the accumulation of various other chronic diseases such as hypertension and diabetes mellitus.[2,3] Cognitive impairment is one of the health problems that is quite common (38.4%) experienced by elderly people in Indonesia according to *the Center of Aging Studies,* University of Indonesia (CAS UI). The Directorate General of Medical Services of the Ministry of Health also stated that there are 32.4% of elderly people in Indonesia experience impaired cognitive function and are most vulnerable at the age of 65 years (5%) which will then increase at the age of 85 years and over (20%).[4]

Cognitive disorders will cause elderly people to forget more easily, have difficulty focusing, become disoriented in time and place, and have trouble communicating. [5] A decline in these aspects will disrupt daily activities and reduce the independence and quality of life of the elderly. Cognitive disorders also make older people less confident about their condition and tend to withdraw from social activities, giving rise to further complications in the form of anxiety and depression.[5,6]

Various tests, including *the Montreal Cognitive Assessment* (MoCA), have been developed to detect cognitive impairment. This test has a sensitivity of 90–96% and a specificity of 87–95% so it is considered valid tool for cognitive dysfunction screening.[7] However, there are still many people in the general public who do not want to undergo assessment or bring their families to have their cognitive function checked because of the belief that dementia in the elderly is a normal phenomenon and does not need to be treated. Apart from that, families tend to pay less attention to the condition of the elderly because they are busy at work or taking care of their immediate family.[7,8] In addition, there are no prominent symptoms in the initial period of decline in cognitive function so many elderly people are not aware of this disorder and think it is normal for their age. [9] Therefore, cognitive disorders in the elderly are often diagnosed and treated too late. This study aims to determine the incidence of cognitive disorders in the elderly in Palembang City Nursing Homes and to obtain an overview of the sociodemographic and clinical characteristics of these cognitive disorders.

## METHOD

This research is a descriptive observational study with a cross-sectional approach. According to the Lemeshow formula, this study's minimum sample size is 84 elderly people. Entire elderly people in all Palembang City Nursing Homes who are ≥60 years old and expressed their willingness to participate were included as research samples. Elderly people who cannot read and write, are illiterate, uncooperative, or have communication barriers were excluded from this study because elderly people with these conditions will find it difficult to undergo a MoCA examination. Sociodemographic data was obtained through interviews using a checklist and cognitive function was assessed using the Indonesian version of the MoCA questionnaire (MoCA-Ina). Both interview and MoCA-Ina assessment were carried out by 8 General Medicine Undergraduate Study Program of Universitas Sriwijaya students in their final semester. These students had passed the cognitive screening *lab skills* and received retraining from a Neurology specialist before collecting data.

## RESULTS

There were 121 elderly people in four nursing homes in Palembang City, however, 42 were uncooperative or could not communicate well so they were not included in this research. Of the total 79 samples, 10 elderly people (12.7%) still had normal cognitive function while the other 69 elderly people (87.3%) had impaired cognitive function. Data regarding the distribution of cognitive function of the elderly in Palembang City Nursing Homes based on sociodemographic characteristics can be seen in **Table 1**. The elderly who most often experience impaired cognitive function are in the age group >90 years (100%). The frequency of elderly women experiencing decreased cognitive function is greater than males, namely 53 elderly (91.38%). All college graduates included in this study experienced impaired cognitive function. The majority of elderly people who have experienced a decline in cognitive function are someone who has never worked (100%), followed by elderly people with a history of daily work as housekeepers (96.88%) and honorary or contract workers (92.86%). All (100%) elderly in Nursing Homes A and D had impaired cognitive function.

**Table 1. Frequency Distribution of Cognitive Functions of Elderly Nursing Homes in Palembang City Based on Sociodemographic Characteristics**

| Sociodemographic Characteristics | | Cognitive Decline | | Normal Cognitive | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| Age | 60–74 years | 39 | 84.78% | 7 | 15.22% |
| | 75–90 years | 28 | 90.32% | 3 | 9.68% |
| | > 90 years | 2 | 100% | 0 | 0% |
| Gender | Man | 16 | 76.19% | 5 | 23.81% |
| | Woman | 53 | 91.38% | 5 | 8.62% |
| Level of education | No school | 15 | 93.75% | 1 | 6.25% |
| | Finished elementary school | 23 | 95.83% | 1 | 4.17% |
| | Finished middle school | 11 | 84.62% | 2 | 15.38% |
| | Finished high school | 14 | 70% | 6 | 30% |
| | College | 6 | 100% | 0 | 0% |
| Employment history | Civil servants | 2 | 66.67% | 1 | 33.33% |
| | Businessman | 13 | 86.67% | 2 | 13.33% |
| | Workers/Farmers/ Fishermen | 5 | 83.33% | 1 | 16.67% |
| | Private/BUMN employees | 4 | 50% | 4 | 50% |
| | Temporary Staff | 13 | 92.86% | 1 | 7.14% |
| | Housewives | 31 | 96.88% | 1 | 3.12% |
| | Unemployed | 1 | 100% | 0 | 0% |
| Elderly residence | Nursing Home A | 15 | 100% | 0 | 0% |
| | Nursing Home B | 19 | 76% | 6 | 24% |
| | Nursing Home C | 25 | 86.21% | 4 | 13.79% |
| | Nursing Home D | 10 | 100% | 0 | 0% |

Furthermore, **Table 2** shows the distribution of cognitive function of elderly people in Palembang City Nursing Homes based on clinical characteristics. The majority of elderly people who experience cognitive decline have a history of stroke (92.86%), followed by elderly people who have

a history of other diseases (92%) and a history of hypertension (88.46%). The proportion of elderly people who experience cognitive impairment with a family history of the same disease is quite large, namely 91.67%. The domain of cognitive function that is most frequently impaired is *delayed recall* (96.2%) followed by language (88.61%), visuospatial or executive (84.81%) and abstraction (82.28%), attention (79.75%). %), orientation (74.68%), and naming (63.3%).

**Table 2. Frequency Distribution of Cognitive Functions of Elderly Nursing Homes in Palembang City Based on Clinical Characteristics**

| Clinical Characteristics | | Cognitive Decline | | Normal Cognitive | |
|---|---|---|---|---|---|
| | | n | % | n | % |
| Comorbid | No comorbid | 31 | 86.11% | 5 | 13.89% |
| | Hypertension | 23 | 88.46% | 3 | 11.54% |
| | Diabetes mellitus | 11 | 84.62% | 2 | 15.38% |
| | Strokes | 13 | 92.86% | 1 | 7.14% |
| | Heart disease | 4 | 66.67% | 2 | 33.33% |
| | Etc | 23 | 92% | 2 | 8% |
| Family History | There is | 22 | 91.67% | 2 | 8.33% |
| | There isn't any | 33 | 82.5% | 7 | 17.5% |
| | Don't remember/don't know | 14 | 93.33% | 1 | 6.67% |
| Domains on MoCA-Ina | Visuospatial or Executive | 67 | 84.81% | 12 | 15.19% |
| | Naming | 50 | 63.3% | 29 | 36.7% |
| | Attention | 63 | 79.75% | 16 | 20.25% |
| | Language | 70 | 88.61% | 39 | 11.39% |
| | Abstraction | 65 | 82.28% | 14 | 17.72% |
| | *Delayed Recall* | 76 | 96.2% | 73 | 3.8% |
| | Orientation | 59 | 74.68% | 20 | 25.32% |

## DISCUSSION

Age is one of the factors that influences an individual's cognitive function. This can occur due to anatomical changes such as brain shrinkage and changes in *neurotransmitters* in the central nervous system which are directly proportional to increasing age.[10,11] Naturally, aging will reduce the elasticity of blood vessels, reducing the brain's ability to regenerate dead cells. Apart from that, there is a decrease in the brain's speed in processing information through the central nervous system.[12] These declines will be more severe in elderly people over 90 years old.

In this study, elderly people were divided into three age groups, where the highest percentage of elderly people who had experienced a decline in cognitive function was in the age group >90 years (100%). These results are in line with previous research which stated that the age group most likely to experience impaired cognitive function was 75–89 years (50%).[11] Other research also shows that all elderly in the age group >90 years (100%) have experienced a decline in cognitive function, while there are only 2 elderly (22.22%) in the age group 75–90 years and only 5 elderly (23 .81%) in the age group 60–74 years who had cognitive impairment.[13]

Then, based on the examination that was carried out, the elderly who experienced a decline in cognitive function were predominantly women (91.38%). This is similar to previous research which stated that as many as 46 of the 80 respondents examined were women and as many as 42 of the 46 elderly women examined experienced cognitive impairment (52.5%).[11] Meanwhile, in another study, of 107 elderly people who had experienced a decline in cognitive function, 74 were women (69.2%).[10]

Women are more likely to experience cognitive decline due to a decrease in endogenous sex hormones which play a role in regulating learning and memory functions.[11,12] *Menopause* will cause a decrease in the production of estrogen and progesterone, where estrogen is responsible for regulating the *brain-derived neurotrophic factor* (BDNF) gene in *the hippocampus* and cerebral cortex which has an important role in inducing neurogenesis.[14] Anatomically, women also have a lower *gray matter volume so they experience a* more rapid decline in *gray matter volume, causing neurodegenerative diseases.*[15] Therefore, most elderly people who have experienced a decline in cognitive function are women. Referring to other research, men have less cognitive *reserve*, therefore men tend to suffer from a mild decline in cognitive function, MCI, or *Parkinson's Disease.*[15,17] Apart from that, men also have lifestyle risk factors such as smoking, which can increase the risk of heart disease which is a risk factor for decreased cognitive function.[2]

Regarding educational history, according to the assessment that has been carried out, the majority of elderly people who experience impaired cognitive function are college graduates (100%). The results of this assessment are not in line with previous research where the majority of elderly people who experienced a decline in cognitive function were elderly people with elementary school education or equivalent (61.5%).[18] Other research also obtained similar results, namely that the majority of elderly people who experienced impaired cognitive function were elderly people who had only attended elementary school or equivalent (33.3%).[11]

Educational history is one of the factors that can influence cognitive function in the elderly. This is because the brain works actively when it is frequently exposed to new information and carries out complex thinking activities which can stimulate cognitive function and reduce the risk of neurodegeneration in an individual. Elderly people who have a high level of education tend to have better cognitive function, especially in the aspects of executive function, memory, language fluency, and visuospatial.[16,18] Meanwhile, in this study, all elderly people with a tertiary education experienced a decline in cognitive function. These inconsistent findings could be caused by the presence of other risk factors in college graduate respondents such as age, family history, and history of illness. Apart from that, researchers did not ask about the intensity and quality of education respondents received at university. These things are stimulations that could become a protective factor in cognitive function.[16,18]

Furthermore, it was found that the largest percentage of elderly people who experienced a decline in cognitive function were housewives (96.88%). These results are in line with previous research which showed that of 98 elderly people who experienced impaired cognitive function, the majority of these elderly people had a work history as housewives (90.9%).[19] Work history is related to cognitive function because elderly people who do not work and spend time without doing any activities are less likely to get sufficient cognitive stimulation so there will be a decline in their cognitive abilities and they will only be able to do things they are used to do.[16,20] In this study, most elderly people with a history of working as housewives experienced a decline in cognitive function, possibly due to the daily activities of housewives who tended to carry out less cognitive activities.

Apart from that, elderly women also tend to have experienced *menopause*, resulting in a decrease in estrogen production which functions as a protective factor.[14]

In this study, the results also showed that the largest percentage of elderly people who had experienced a decline in cognitive function were elderly people who had a history of stroke (92.86%), followed by a history of other diseases, such as cataracts, *Parkinson's Disease*, and head trauma (92% ). Occlusion of the cerebral artery lumen and rupture of blood vessels during a stroke will cause a decrease in the amount of blood flowing to certain parts of the brain, causing a decrease in nutrition received by the brain and neurological deficits in certain brain lobes, one of which is the brain lobe that regulates cognitive function.[21] Furthermore, high blood pressure can increase vascularization disorders in the brain and affect the working system of the brain as the cognitive center.[18] Apart from that, the aging process also causes changes in brain structure and cerebrovascular dysfunction, which will cause the blood vessels that supply blood and nutrients to the brain to become damaged and cause brain hypoperfusion, resulting in a decline in cognitive function.[22] Other research states that hypertension will cause brain tissue death due to atherosclerosis or blockage of large blood vessels. The tissue is then unable to carry out the regeneration process due to aging, resulting in a decline in cognitive function in the elderly.[16] In addition, plaque formation occurs due to increased blood vessel permeability resulting in extravasation of aggregated amyloid proteins. This plaque causes the death of cholinergic neurons that produce acetylcholine. Deficit of the neurotransmitter acetylcholine results in cognitive mechanisms disruption in brain tissue which then causes a decline in cognitive function in the elderly.[23]

Based on the history of cognitive decline in the family, according to the examination that was carried out, the results showed that the majority of the elderly did not remember or did not know the history of decreased cognitive function in their family (93.33%). Family history can influence genetic factors, namely the Apolipoprotein E (APOE) ε4 allele, one of the genes consistently shown to increase the risk of dementia. Individuals with a family history of dementia carry this allele more often than individuals without a family history of dementia.[24] However, other risk factors that can cause a decline in cognitive function in the elderly also need to be considered, in addition to a family history of dementia.

Furthermore, nursing homes are believed to be related to the decline in cognitive function in the elderly because each has a different environment, activity patterns, social interactions, and activities. Literature states that elderly people who never read books are 1.5 times more likely to experience impaired cognitive function compared with those who do it more than once a week. Reading activities play a role in stimulating executive function, *working memory*, and *episodic memory*.[10] Meanwhile, not all nursing homes have adequate facilities to support cognitive activities in the elderly, so differences in treatment in providing cognitive activities at each place where the elderly are cared for are one of the risk factors for decreased cognitive function in the elderly.[25] Each nursing home also has differences in social interactions between the elderly. Several social activities that can improve cognitive function include elderly exercise, community service, and participating in group worship or reciting the Koran.[20,26] However, unfortunately, some elderly people who live in nursing homes tend to interact less with other elderly people because of the perception that they are new members and still feel strange, causing minimal interaction and limited communication between the elderly.[20] Referring to previous research, elderly people who are no longer actively participating in social activities have twice the chance of experiencing impaired cognitive function compared to elderly people who are still active in participating in social activities.[20,26] Lastly, each

nursing home also has differences in serving food that meets the nutritional needs of the elderly. Adequate nutrition will help the brain maintain its performance. Meanwhile, if the elderly are given food that does not meet their needs, the brain will lack nutrition, affecting brain performance and becoming a risk factor for impaired cognitive function in the elderly. Thus, where an elderly person lives can be an influencing factor due to differences in environmental aspects, cognitive activities, social interactions, and nutrition.[10]

According to the assessment that was carried out, it was found that the highest percentage of cognitive domains that experienced a decline was the *delayed recall aspect* (96.2%). The results of this study are different from previous research where the majority of cognitive domains that experienced a decline were in registration (48.3%) followed by language (50%). Other research shows that the aspect that experiences the most interference is visuospatial/executive (100%) and the least is *delayed recall* (47.83%).[23] The elderly tend to experience a decline in the visuospatial domain because as they get older, it becomes more difficult for them to comprehend visual information in comparison to verbal information. The elderly also tend to have difficulty copying complex drawings, so they can only draw things as they are.[16,23] Furthermore, a decline in the information processing function also makes it difficult for elderly people to capture and retain the given information, resulting in a decline in the *delayed recall function*. In addition, the elderly have limited energy in directing focus on information, so they have difficulty ignoring other irrelevant information and ultimately experience a decline in attention. The elderly also experience cognitive decline due to changes in cortical synapses in the lateral dorsal prefrontal cortex, an important area that regulates working memory and executive function.[16,23] Some differences in cognitive aspects that are impaired in other studies may be caused by differences in subjects, underlying diseases, risk factors, and instruments used.

There were several limitations of this study. Several elderly people had severe cognitive impairment, causing bias in the data collected. Several subjects also refused to carry out assessment. Loss of important files (certificates and ID cards) made it difficult for researchers to determine the last level of education and age of respondents. Besides, there are no official documents available that can show data regarding impaired cognitive function in the respondent's family so data is only obtained through direct interviews with respondents and causes the possibility of data bias.

## CONCLUSION

The incidence of impaired cognitive function in the elderly in Palembang City nursing homes is quite high (87.3%). This figure is obtained using a screening method so that a more comprehensive follow-up cognitive examination is certainly needed to confirm the diagnosis. However, the results of this study emphasize the importance of regular cognitive screening in the elderly to detect and treat any impairment early.

Future studies may need to analyze the risk factors for cognitive impairment in the elderly in Palembang City Nursing Homes. Apart from that, it is necessary to hold a *caregiver* training program to stimulate cognitive function in the elderly in nursing homes. It is also important to standardize activity programs in Palembang City Nursing Homes which focus on cognitive function activities to prevent ongoing cognitive decline in the elderly.

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