

CORRELATION BETWEEN SOCIAL ENGAGEMENT AND COGNITIVE FUNCTION IN ELDERLY

(Running head: social engagement, cognitive function, and elderly)

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ABSTRACT--Background: A normal aging process affects all physiologic process since in old age there is a natural neurodegenerative process which happens to everybody during the aging process. The Global burden of disease study (GBD) estimates that in 2020, dementia and other neurodegenerative diseases will be the eighth biggest source for burden of disease in developing countries. Cognitive function degradation is common in elderly and considered as a dreaded burden and social problem.

Objective: To find out the correlation between social engagement and cognitive function in elderly.

Material and Methods: The study was a cross-sectional and used sampling consecutive admission designs with 64 elderly in an elderly community in Gubeng Airlangga and Hargodelali Nursing Home Surabaya. Cognitive function in elderly was assessed using MoCA Ina Test.

Result: The study consisted of 64 respondents, the average age of the research subjects was 72.56 ± 7.436 and the percentage of the subject's gender was 21.9% for 14 male and 78.1 % for 50 female, 48.44% of them had poor social engagement and abnormal cognitive function, and 31.25% had a good social engagement and abnormal cognitive function, with value $p = 0.009$ and odds ratio of 8.525%.

Conclusion: There is a significant relation between social engagement and cognitive function in elderly. Eko

Keywords--- social engagement, cognitive function, elderly, index social engagement

I. INTRODUCTION

A normal aging process affects all physiologic process since in old age there is a natural neurodegenerative process which happens to everybody during aging process (1). The neurodegenerative process will cause cognitive function degradation in elderly. It is the most dreaded aspect of aging as well as the costliest in terms of finance, personal and social burden (2). According to World Health Organization (WHO), there will be approximately 29 million people with dementia by the end of 2020 (3). The Global burden of disease study (GBD) estimates that in 2020, dementia and other neurodegenerative diseases will be the eighth biggest source for burden of disease in developing countries (4). The increase of elderly population in Indonesia is predicted to be higher than that in Asia and global regions after 2050. The population in the age of ≥ 65 is expected to increase from 12% in 2003 to 20% in 2030 or in other words, there is an addition of around 72 million (5).

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Along with the increase of elderly population, the risk of cognitive function becomes a threat to the elderly's independence and quality of life as well as a challenge for health system (6). The increase of elderly population will burden a country in the aspect of economy, increase the needs for treatment and support, affect the budget, and affect tax rates (7). The lack of effective preventive and treatment will cause a huge loss in health system to be inevitable (8). It is highly important for elderly to improve or to maintain their cognitive function capability since cognitive function degradation in elderly potentially puts individuals at risk of losing the ability to live independently (9).

Some experts suggest that the proper action to prevent and to slow down the progressivity of dementia is behavior intervention. Based on the observational study, it is known that cognitive leisure activities have a protective effect on the development of Alzheimer's disease and other kinds of dementia and shows a significant relation toward rapid memory degradation onset delay on those who experience dementia (10). In some latest researches, the emphasis of social engagement role in cognitive function is found. Social activities that stimulate cognition is hypothesized as beneficial for cognitive function by inhibiting mental diseases such as dementia and decreasing the cognitive degradation rapidity (11).

Indonesian society's characteristic as social creatures is cooperation which involves various sectors in the process. Due to the fact, we aim to observe social engagement among the elderly group in their social life because the elderly tend to experience degradation of physical and cognitive functions. Cognitive function impairment in elderly is a problem that causes a majority of obstacles for them in daily life. Therefore, the study aimed to give a picture of the contribution of the factor of social interaction toward cognitive function in elderly.

II. METHODS

The study was a cross-sectional and used sampling consecutive admission designs with 64 elderly in an elderly community in Gubeng Airlangga and Hargodolali Nursing Home Surabaya, who met inclusion criteria are male/female, age of ≥ 60 , capable of reading and writing and exclusion criteria are having history of several diseases: stroke, intracranial infection, multiple sclerosis, cerebral neoplasm, head trauma, depression.

Cognitive function was assessed using index social engagement while MoCA Ina test was used to assess social engagement. Before participating in the study, the respondents who are willing to join were required to fill informed consent. The results of the assessment were analyzed using SPSS 22.

III. RESULT

After the 64 research subjects were examined, the average age of the research subjects was 72.56 ± 7.436 . The percentage of the subjects' gender was 21.9% for 14 male and 78.1% for 50 females. The percentage of the subjects' education level was 75.0% for ≤ 12 years (48 people) and 25% for > 12 years (16 people) (Table 1). The results from MoCA Ina test showed the median value of 21.50 (the lowest was 10 and the highest was 29), with the percentage for abnormal MoCA Ina test result 79.7% (51 people) and 20.3% (13 people) for the normal MoCA Ina test result. Median of index social disengagement value was 2 (the lowest was 2, the highest was 4), median value for diabetes mellitus was 121.50 (the lowest was 67, the highest was 300) (Table 2). Statistic test with Chi-Square showed the result of $p = 0$, $p = 0.009$ with odds ratio of 8.525 (Table 3).

IV. DISCUSSION

It is currently found that there was a significant relation between social engagement and cognitive function in elderly in which good social engagement enables the possibility of elderly having normal cognitive function to be 8.525 times bigger. Based on the research result, it can be implied that executive function is a key component of mental activities in social short episode. Being engaged in a short conversation 10 minutes, where participants are instructed to get to know the others resulting in increased ability to do a set of common cognitive tasks (12). In addition, the lack of social interaction, as an instance of isolation impact due to retirement, leads to problems in cognitive functions. Cognitive degradation as a result from the lack of socialization following retirement is more common in male. Another research found that among German citizens, sparing time to have conversation with friends increases health and life expectancy in elderly. There is also another research using the data from U.S.'s longitudinal research from 1982 to 1994 in which they found that those who do not conduct any social contact suffer more severe cognitive degradation compared to the overall population (13).

There are several mechanisms where social engagement can reduce the risk of dementia: in a study on animals, environmental complexity and richness inhibits cognitive degradation and increases neurogenesis; in human, hypothesis on cognitive reserve states that social and physical activities can improve the ability to tolerate brain pathology through the increase of synaptic activities as well as more efficient brain healing and repair; social experience affects various biological systems and reduces the risk of dementia by reducing stress or heart disease risk which is also associated with brain disease. Hormones such as glucocorticoids and corticosteroids are associated with stress response and brain function, particularly in hippocampus. The level of hormones can be modified through stress reduction which is related to social engagement (14).

The processes of social engagement affect cognitive function, one of them is through the approach of examining Alzheimer which involves the use of animal models to imitate neuropathology and disease symptoms. Transgenic mice model from Alzheimer's targets a gene coding Amyloid precursor protein (APP), and Presenilin 1 (PS 1), the protein related to familial Alzheimer with earlier onset. In the recent study, the researchers used the APP/PS1 mice to examine neural mechanisms underlying the benefits of social interaction in reducing cognitive degradation which is associated with Alzheimer's. The researchers focus on forming hippocampus, the part of the cerebral cortex, particularly on dentate gyrus – an area that plays roles in memory and one of brain regions that have a high level of neurogenesis (15).

In mice, it can be seen that APP/PS1 multiple transgenic mice demonstrate repair in memory with an increased protein and messenger Ribonucleic acid (mRNA) levels of Brain-derived neurotrophic factor (BDNF) in hippocampus as well as an increased dentate gyrus BDNF. In addition, the researchers figure that cohousing results in a significant increase of dentate gyrus which serves as the marker of neurogenesis. The study showed that the increase of BDNF expression and neurogenesis in hippocampus and dentate gyrus after grouping underlies memory deficit repair in APP/PS1 mice (16,17).

BDNF plays a prominent role in regulating life sustainability and differentiation of certain neurons, synaptic plasticity as well as learning and memory process (18). Despite the majority of studies focusing on the effect of physical activities on BDNF expression increase, the neurotrophin expression increase has been documented in environmentally enriched animals. To what extent that social, intellectual, and physical stimulations affect the

expression increase is still unclear, but it is stated that BDNF expression and other neurotrophin can be improved through social as well as intellectual stimulation (19). Thus, the study's hypothesis that there is a relation between social engagement and cognitive function in elderly is proven.

A similar study has been conducted in Jakarta with similar result which shows a relation between poor social engagement and lower cognitive function. What differentiates the study from the previous one is that the study measures cognitive function using MoCA Ina test that is considered more sensitive in detecting cognitive function impairment, while the previous study uses Mini mental state examination (MMSE) (20).

V. CONCLUSION

The study found a significant relation between social engagement and cognitive function in elderly

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TABLES

Table 1: Basic Data of Research Subjects

Variable	Standar Deviation
Age (in year)	72.56 (7.436)
Variable	Percentage
Male	21.9
Female	78.1
Level education ≤ 12 years	75
Level education > 12 years	25

Table 2: Clinical Data of Research Subjects

Variable	Median (min-max)
MoCA-Ina	21.50 (10-29)
Index social disengagement	2 (1-4)
Diabetes Mellitus	121.50 (67-300)
Variable	Mean (Satndart Deviation)
Hyperthension	133.27 (18.697)
Hypercolestherolemia	198.50 (45.609)

Variable	Percentage
Smoker	4.7
Non-smoker	95.7
Alcoholic	0
Non-alcoholic	100

Table 3: Correlation between Social Engagement and Cognitive Function

Social	Cognitive		Total	P	RO (IK 5%)
	Abnormal	Normal			
Bad	31 (93.9%)	2 (6.1%)	33 (100%)	0.003	8.525 (1.707-42.256)
Well	20 (64.5%)	11 (35.5%)	31 (100%)		
Total	51	13	64		