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RESEARCH ARTICLE

Assessment of the impact of MoCA-Ina (Montreal Cognitive Assessment Indonesia version) scores on depression, burden, and knowledge in dementia caregivers

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Abstract

Background: Dementia patients necessitate intensive care, often imposing a substantial burden on caregivers. With the rising global prevalence of dementia, it becomes crucial to elucidate the determinants that influence caregiver stress and overall well-being. **Objective:** This research mainly aimed to examine the impact of the Montreal Cognitive Assessment Ver. Indonesia (MoCA-Ina) score on the stress scale, life burden, and knowledge level among caregivers of dementia patients. **Method:** Observational research was conducted at Dr Sardjito Hospital Yogyakarta's Memory Clinic between March and May 2023. The study involved dementia patients who met specific criteria. Caregivers completed questionnaires, including the Hamilton Depression Rating Scale (HDRS), Zarit Burden Interview (ZBI), and Dementia Knowledge Assessment Scale (DKAS). The data was analysed using the Spearman correlation test. **Result:** The research findings from 47 participants showed that the majority of caregivers were male (55.3%), university-educated (38.3%), family members (42.5%), spent over six hours per day with the patient (63.8%), and cared for the patient for varying durations. Caregiver stress scale scores indicated mild depression, mild-moderate burden, good knowledge level, and severe cognitive impairment. The Spearman test found no significant correlation between the cognitive impairment score and caregiver stress, burden, or knowledge level. **Conclusion:** MoCA-INA score in patients with dementia did not affect the caregiver's stress scale, caregiver burden, or knowledge levels.

Introduction

Dementia is a multi-factorial syndrome characterised by multiple cognitive deficits. The decline in intellectual function can affect activities of daily living, and sometimes, behaviour changes occur but are not caused by delirium or major psychiatric disorders (Perdossi, 2015). According to WHO (2021), around 55 million people suffer from dementia in the world, with more than 60% living in low- and middle-income countries. Asia has around 2-13% of dementia cases, with age, female gender, and low education being the main risk factors (Chen *et al.,* 2016). According to Alzheimer's Disease International (ADI), a report in 2016, every three seconds, there is one person in the world experiencing dementia. Indonesia is among the top ten dementia countries in the world and Southeast Asia with 1.2 million people (Suriastini *et al.,* 2016). The data is expected to increase to two million in 2030 and four million people in 2050. The prevalence of dementia in the Special Region of Yogyakarta reached

20.1% in the elderly age group of 60 years old and above, which means that one in five elderly people has dementia (Suriastini *et al.,* 2016). This data shows that the prevalence of dementia in Yogyakarta is much higher than the prevalence at the global level. The prevalence of dementia in Yogyakarta is high due to risk factors, namely a high population of elderly people, more female residents, low education, history of stroke, and unemployment (Suriastini *et al.,* 2020). According to the Central Bureau of Statistics, the elderly are people aged 60 years and above. Currently, in Indonesia, there are five provinces with the highest number of elderly people, where the Special Region of Yogyakarta is ranked first, with the percentage of elderly people reaching 14.71% of the province's total population (Central Bureau of Statistics, 2021).

Dementia impacts not only health but also social and economic aspects. In 2016, USD 818 billion was spent on the care of dementia patients and is predicted to increase by 2018 to around USD 1 trillion and by 2030 to exceed USD 2 trillion. In addition, the number of people living with dementia patients will also increase the cost of treatment (Alzheimer's Disease International, 2018). The high economic impact and significant burden on patients, caregivers and healthcare providers prompt the need to evaluate alternative approaches to healthcare delivery for dementia. This requires support from all health system levels, social, financial, and care methods for patients with dementia (Galvin *et al.,* 2014).

Problems that occur in the therapeutic management of dementia patients require caregivers in daily activities. Physical, psychological, social and economic impacts occur for patients and caregivers (Perrar *et al.,* 2015; Triyono *et al.,* 2018). The impact on the caregiver will be a burden if adequate knowledge does not support it. This happens considering that living together with a dementia patient will get physical pressure and emotional and financial expenses, causing anxiety and stress for the caregiver. Several previous studies have shown a correlation between the level of knowledge of caregivers and health workers and the outcomes of therapy for patients with dementia. Some factors among health workers and caregivers have been identified as influencing dementia-related knowledge, including age, employment status, and caring experience (Aisy Sunaryo *et al.,* 2020). The level of dementia knowledge can be measured with the Dementia Knowledge Assessment Scale (DKAS). This instrument has proven its validity across multiple domains relevant to clinicians, educators, caregivers, and students. These students include medical and nursing students, as well as non-healthcare students (Annear *et al.,* 2015)

Clinical outcome measurement of dementia patients uses a standardised instrument, the Montreal Cognitive Assessment Indonesian version (MoCa-Ina), which measures cognitive impairment. Husein et al. (2010) developed MoCa-Ina, validated in Indonesia. MoCA-Ina is more sensitive than the Mini Mental State Examination (MMSE) (Godefroy *et al*., 2011). The final MoCa-Ina score is divided into three categories: severe (0-9), moderate (10-20), and mild (score 21-26). The lower the MoCa-Ina score, the more severe the patient's cognitive impairment (Husein *et al.,* 2010). Based on the literature, patients who have a low MoCA score (score 0-9) will have the condition and dependency on caregivers, which is important to be aware of with the assessment of caregiver burden by using the Zarit Caregiver Burden Interview (ZBI) and depression assessment using the Hamilton Depression Rating Scale (HDRS).

Previous studies have shown that gender, education level, marital status, and relationship with the patient are factors that can affect depression and caregiver burden (Putri & Riasmini, 2013; Lou *et al.,* 2015; Lucijanić et al., 2020; Zhang *et al.,* 2021; Putri *et al.,* 2022). Lucijanić (2020) showed that the duration of caregiving and the number of hours of caregiving are related to caregiver burden. In addition, health status and social support are also factors that can affect the level of depression and burden of a caregiver (Liu *et al.,* 2017; Zhang *et al.,* 2021; Razi *et al.,* 2023). The results of multivariate analysis show a significant relationship between caregiver burden and quality of life (Deskianditya *et al.,* 2021). With the rising global prevalence of dementia, it becomes crucial to elucidate the determinants that influence caregiver stress and overall well-being. This research mainly aimed to examine the impact of the Montreal Cognitive Assessment Ver. Indonesia (MoCA-Ina) score on the depression scale, burden, and knowledge level among caregivers of dementia patients.

Methods

Research design and sampling

This observational study used a cross-sectional descriptive approach and prospective data. This research has passed the ethical feasibility test from the Medical and Health Research Ethics Committee for Human Research, Faculty of Medicine, Public Health and Nursing, Gadjah Mada University and declared ethical feasibility through letter no KE/FK/0164/EC/2023. The research place was the Memory Clinic of Dr Sardjito Hospital, and the time required was three months, from March to May 2023.

Study participants included all dementia patients of the Dr. Sardjito Hospital Yogyakarta's Memory Clinic who met the inclusion and exclusion criteria between March and May 2023. The caregivers were administered the Hamilton Depression Rating Scale (HDRS), Zarit Burden Interview (ZBI), and Dementia Knowledge Assessment Scale (DKAS) questionnaires.

For dementia patients, the inclusion criteria are patients diagnosed with dementia and treated at the memory clinic of Dr. Sardjito Hospital, dementia patients who have a caregiver who can use a mobile device, and dementia patients who have Alzheimer's and vascular types. The exclusion criteria were incomplete medical record data, communication disorders, and patients who did not have routine control in the last three months.

For caregivers of patients with dementia, the inclusion criteria are caregivers who care for patients with dementia full time, are willing to sign the Informed Consent sheet, and can use mobile devices. In contrast, the exclusion criteria are caregivers who have communication disorders. According to the World Health Organization (2021), a full-time caregiver is a caregiver who lives with the patient.

Research instrument

Instruments for patient data characteristics used data collection forms. Data were collected through medical records of patients with dementia and interviews with the researcher. The data collection form used contained patient-related data, including the number of dementia patients, age, weight, education, duration of dementia, degree of cognitive impairment based on MoCa-Ina and patient companion-related data including age, address, education, gender, burden, depression, scale, time spent with the patient, relationship with the patient, length of care.

The level of knowledge of health workers and patient companions was measured from interviews with respondents using the Dementia Knowledge Assessment Scale (DKAS) questionnaire. Measurement of the burden and depression scale of patient companions using the Zarit Caregiver Burden Interview (ZBI) and Hamilton Depression Rating Scale (HDRS). Previous researchers have tested these instruments for validity and reliability.

Using the Brislin method for instrument translation, the Indonesian version of DKAS was adapted (Beaton *et al.,* 2000). Fifteen years later, it was developed by Annear et al. (2015), who translated it into Indonesian and validated it with Cronbach's alpha value of 0.674. The DKAS questionnaire used to measure the level of knowledge consists of 25 question items. There are four domains in the DKAS questionnaire: the causes and characteristics domain, the communication and behaviour domain, the consideration care domain, and the risk and health promotion domain. The DKAS score range is 0 - 50; each question is worth two. Health workers and caregivers are said to have a good level of knowledge if they score > 50% and are said to be poor if they score < 50% of the total domain.

The Zarit Burden Interview (ZBI) was used to measure caregivers' burden of living. The ZBI instrument has met the reliability for the Indonesian version (Afriyeni & Sartana, 2016). The instrument reflects how a person feels when caring for others, and there are no right or wrong answers in this questionnaire. This instrument consists of 22 question items, with the last question point, question 22, asking about the overall burden statement. Questions 1 - 21 had five answer options using a Likert scale of "*never*" rated 0, "*rarely*" rated 1, "*sometimes*" rated 2, "*frequently*" rated 3 and "*nearly always*" rated 4. In comparison, for question 22 there were five options with ratings: "*Not at all*" was scored 0, "*a little*" was scored 1, "*moderate*" was scored 2, "*severe*" was scored 3, and "*very severe*" was scored 4. In determining the interpretation of the burden category, the total score is categorised as follows: score 0 - 20 means no to mild burden; score 21 - 40 means mild-moderate burden, score 41 - 60 means medium-severe burden and score 61 - 88 means severe burden.

Depression scale measurement using the Hamilton Depression Rating Scale (HDRS). Psychiatrist Max Hamilton invented the HDRS at the University of Leeds in the late 1950s. The 21-item HDRS is widely used in clinical and epidemiological research studies. This instrument has 21 question items with a total score ranging from zero to 66 points. Eight questions consist of five possible responses (from 0 to 4), four questions consist of four possible responses (from 0 to 3) and nine questions with three responses (from 0 to 2). The interpretation of the score is 10 - 13 in the mild depression category, 14 - 17 in the moderate depression category and more than 17 in the severe depression category (Zimmerman *et al.,* 2013).

Data analysis

Data analysis on SPSS was initiated by checking the distribution of data. The analysis showed that the HDRS and MoCA-Ina scores were not normally distributed ($p < 0.05$), while the DKAS and ZBI scores were normally distributed ($p > 0.05$). Therefore, different central tendency data sets followed the data distribution of each score. The central tendencies of HDRS and MoCA-Ina scores are presented as median, minimum, and maximum scores, while DKAS and ZBI scores are

presented as mean and standard deviation. The Spearman correlation test was employed to determine the relationship between MoCA-Ina and caregiver stress levels, burden, and knowledge. The results of the statistical significance test ($p < 0.05$) mean that there is a significant relationship between the MoCA-Ina score and the level of caregiver stress, burden, and knowledge.

Results

One hundred thirty-eight respondents who came to the clinic from March to May 2023 met the inclusion criteria. A total of 46 respondents were duplicated because they visited the clinic more than once during the study period, and 17 were unwilling to be respondents. Of the seventy-five patients and caregivers of patients with dementia, 28 respondents were excluded because five respondents had communication disorders, and 23 had incomplete data, so the total sample in this study was 47.

The findings of this study revealed that of the 47 participants in Table I, most caregivers (55.3%) were male, had a university degree (38.3%), were family members (42.5%), spent more than six hours per day with the patient (63.8%), and were caring for the patient for less than six months to more than 36 months (32%).

Table I: Characteristics of caregivers of dementia patients

Characteristic		Number of respondents (%) (n =4 7)
Gender	Male	26 (55.3%)
	Female	21 (44.7%)
Level of education	Senior high school	15 (31.9%)
	Diploma	6 (12.8%)
	Undergraduate	18 (38.3%)
	Master	7 (14.9%)
	Doctoral	1 (2.1%)
Relationship with patient	Spouse	18 (38.3%)
	Children	20 (42.5%)
	Relative	2 (4.3%)
	Other people	5 (10.6%)
	Parents	2 (4.3%)
Time with patient	Spending > 6 hours per day	30 (63.8%)
	Spending < 6 hours per day	17 (36.2%)
Duration of treatment	< 6 Months	15 (31.9%)
	7 - 12 Months	8 (17.0%)
	13 - 24 Months	7 (14.9%)
	25 - 36 Months	2 (4.3%)
	> 36 Months	15 (31.9%)

Table II shows regarding the typical caregivers' stress scale score, it was found mild depression with median HDRS score of 11 (min-max 1-36); burden of life was a mild-moderate burden with a mean of ZBI score 24.19 (SD ± 15.17); knowledge level was good with mean of DKAS score 15.11 (SD ± 2.32); and MOCA INA score was severe with median of ten (min-max 0-29).

Table II: Depression, life burden, and caregiver knowledge scales, along with MoCA-INA scores

Variable	Median (Min-Max)	Mean ± SD
Depression (HDRS)	11 (1-36)	-
Burden (ZBI)	-	24.19 ± 15.17
Knowledge (DKAS)	-	15.11 ± 2.32
Moca-INA	10 (0-29)	-

Table III shows that after analysing using the Spearman test, the data shows the relationship between the MOCA INA score and stress scale, burden level, or knowledge level of dementia caregivers obtained a *p*-value > 0.05, which means there is no significant relationship.

Table III: Bivariate analysis of the correlation of depression, life burden, and caregiver knowledge on the severity of cognitive impairment with MoCA-Ina

Variable	MoCA-Ina *p*-value
Depression (HDRS)	0.299
Burden (ZBI)	0.121
Knowledge (DKAS)	0.431

Discussion

Characteristics based on gender showed that caregivers of dementia patients were more likely to be male, 26 people (55.3%) compared to 21 women (44.7%). This result contradicts previous research, which shows that the majority of caregivers are women in accordance with the cultural views accepted by society, where women are considered more suitable as caregivers than men (Lou *et al.,* 2015; Deskianditya *et al*., 2021; O'Caoimh *et al.,* 2021). Previous research found higher levels of caregiver burden in female caregivers (Wang *et al.,* 2014). However, another study did not find similar results (Mould-Quevedo *et al.,* 2013). Female caregivers tend to report more health problems and depressive symptoms than male caregivers (Adana *et al.,* 2022). Male caregivers are more likely to use social services for external support than female caregivers. External support, such as support groups, provides caregivers with opportunities to share personal feelings and concerns to overcome feelings of social isolation and develop social networks (Covinsky *et al.,* 2003). Male caregivers also tend to only take part with patients when needed, whereas female caregivers are more likely to be responsible for all household tasks and personal care activities of family members. These care strategies can easily lead to feelings of burden and stress (De Vugt *et al.,* 2005).

Based on education level, 15 caregivers (31.9%) had a high school education level, and the other caregivers had a higher education level. The level of caregiver knowledge related to dementia measured using DKAS showed good results (15.11 ± 2.32) in line with the majority of caregivers having a high level of education. Lower education levels are associated with a higher caregiving burden. This is because low levels of education are associated with low health literacy, which can affect knowledge about dementia care (Bayati *et al.,* 2018; Putri *et al.,* 2022).

The majority of relationships between caregivers and patients with dementia in this research were between parents and children. As societal values still prevail, children are obliged to give love to their parents as they had received when they were young. This creates conflicting feelings for the caregiver between their responsibility to care for their parents and their responsibility to work to make a living for their family. These feelings of guilt will lead to depression in the caregiver (Putri & Riasmini, 2013). Previous research shows that the closeness of the caregiver's relationship with the patient is not associated with symptoms of caregiver anxiety and depression (Liang *et al.,* 2016). In contrast, another research showed that the closeness of the caregiver relationship was related to the burden of caring for the caregiver as measured by the ZBI (Putri & Riasmini, 2013; Lucijanić *et al.,* 2020).

A total of 30 caregivers (63.8%) in this research spent time with patients > six hours/day. Research conducted by Lou et al. (2015) showed no correlation between hours/day caring for patients and caregiver burden, anxiety levels or depression. Previous research showed that depression levels increased by 1.89 times in caregivers who spent more than 40 hours/week with patients compared to those who spent < 40 hours/day caring for patients (Covinsky *et al.,* 2003).

Based on the duration of treatment, 30 caregivers (63.8%) took care of dementia patients for < 24 months. Previous research conducted in Indonesia showed that duration of care < 24 months and ≥ 24 months were not associated with caregiver burden (Putri *et al.,* 2022). In contrast, another research showed that the duration of care for dementia patients in Croatia (median two years) was related to the level of caregiver burden. That is because caregivers can feel bored and exhausted when providing care for long periods of time (Lucijanić *et al.,* 2020). The differences in results in previous studies indicate that these factors are uncertain in predicting caregiver burden because there are inconsistencies. Inconsistencies occur because the majority of respondents are children of patients, so there is a feeling of guilt if they do not take care of the patient, or after a long time of taking care of the patient, it becomes easier to understand the patient.

This is the first research to use the MoCA-INA score with HDRS, DKAS, and ZIB to measure depression, life burden, and knowledge level of caregivers of patients with dementia. Overall, the level of caregiver burden in this study was low to moderate. This is consistent with previous studies that reported similar findings of low to

moderate caregiver burden in Taiwan and in several other Asian countries (Ku *et al.,* 2019; Shim *et al.,* 2021).

Recent research reports that the average ZBI score for caregivers of dementia patients in various locations in Asia is 24.6 (low to moderate burden) (Shim *et al.,* 2021). For Europe and the United States, there is a difference in the average ZBI score, where Europe has an average of 30.6, with the highest burden in Estonia (39.7) and lowest in the Netherlands (26.5), while America has an average of 27.8 (Sutcliffe *et al.,* 2017; Besser & Galvin, 2019). Despite having different results, the level of caregiver burden on the three continents is still in the mild-moderate category. In Ohno et al. (2021) study comparing three countries taken from three continents, the results of the level of depression based on PHQ-9 and anxiety based on DAD7 showed that caregivers in the United States had significantly higher levels of depression and anxiety. This may be due to cultural variations and perspectives on caregiving responsibilities. Traditions in Asian countries are still strong with the value of filial piety and tend to view caregiving as a journey of life, while the United States view caregiving as a disruption (Mokuau & Tomioka, 2010).

The results of this study showed no relationship between MoCA-INA scores and stress scale, burden level, and knowledge level of dementia caregivers. In line with the results of research by Bednarek et al. (2016), which showed no correlation between the severity of depression and the severity of dementia as measured by the Centre for Epidemiologic Studies Depression Scale (CES-D) and the Global Deterioration Scale (GDS). There was also no significant correlation between Zarit Caregiver Burden Interview scores and dementia severity (Bednarek *et al.,* 2016). Another study also showed no correlation between MoCA scores and caregiver burden, anxiety levels or depression (Lou *et al.,* 2015).

In contrast to other studies that show caregiver burden measured using the Caregiver Burden Score (CBS) modified version of the ZBI, it significantly correlates with the MoCA score. Patients with severe dementia (median MoCA score 19) had higher CBS scores than patients with moderate (median MoCA score 16) and mild (median MoCA score 12) dementia (O'Caoimh *et al.,* 2021). The explanation for this difference is mainly due to the different questionnaires used to assess caregiver burden. In addition, differences in caregiver characteristics may also cause differences in results with previous studies. The influence of filial culture on parents in Asian countries could also be the reason for the differences in the results of this study.

This research has the strength of using the MoCA-INA, HDRS, and DKAS questionnaires. No previous research has analysed the relationship between dementia severity and caregivers' depression level and dementia knowledge using these questionnaires. The limitation of this research is that it has not analysed factors that may be related to the level of caregiver burden and depression. Further research could consider other factors such as caregiver marital status, economic problems, health status, and psychological status, which are also known to be associated with caregiver depression and burden (Putri & Riasmini, 2013; Liu *et al.,* 2017; Tsai *et al.,* 2021; Zhang *et al.,* 2021).

Conclusion

MoCA-Ina score in patients with dementia had no effect on the caregiver's stress scale, caregiver burden, or knowledge levels.

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