

Dementia Risk Profile Among Older Adults at GKI Gunung Sahari: The Role of Lifestyle and Health Factors

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Abstract

Background: Dementia is a major health problem in older adults because it impacts cognitive function and overall quality of life. Exploring the dementia risk profile in dense, heterogeneous urban environments provides crucial insights for early prevention. **Objective:** This study aims to identify the dementia risk profile and examine the associations between demographic characteristics, lifestyle factors, medical history, random blood glucose (RBG) levels, total cholesterol levels, and suspected dementia among a heterogeneous community of older adults in the GKI Gunung Sahari congregation, Jakarta. **Methods:** A cross-sectional method with total sampling was used. Eighty participants were assessed using the Mini-Cog instrument, as well as random blood glucose and total cholesterol measurements. Data were analyzed using the Chi-square test and Spearman correlation. **Results:** Most respondents (78.8%) had a low probability of developing dementia. No significant associations were found between age, gender, education, occupation, lifestyle, or medical history with dementia risk ($p > 0.05$). However, total cholesterol levels showed a significant negative correlation with dementia risk ($r = -0.244$; $p = 0.029$). **Conclusion:** These findings indicate a distinct biological mechanism in urban older adults, where lower cholesterol levels are associated with a higher risk of dementia. The Mini-Cog has proven effective as a rapid screening tool in the community. Further longitudinal studies are needed to explore this cholesterol-dementia relationship in metropolitan populations.

Keywords: Cognitive, Dementia, Elderly, Lifestyle, Risk Factors

Introduction

Older adulthood represents the final stage of the human lifespan and is characterized by age-related changes in health and functional capacity. As people age, changes occur across all organ systems, making them susceptible to various diseases. Common conditions in later life include atherosclerosis, hypertension, diabetes mellitus, osteoporosis, hypothyroidism, and also dementia (1). The global population of older adults is projected to increase substantially in the coming decades. Badan Pusat Statistik in 2021 estimated that there were 727 million people aged 65 years or older in 2020, a number that will double to 1.5 billion by 2050 (2). According to the March 2023 National Socioeconomic Survey, older adults comprised 11.75% of the population, and population projections indicated an old-age dependency ratio of 17.08 (3). This means that every 100 people of productive age

(aged 15-59 years) support approximately 17 older adults (3). The increasing older adult population will also contribute to a higher dependency burden on the working-age population. Naturally, the aging process entails physical, mental, spiritual, economic, and social changes (4).

One of the health problems among older adults is dementia. Dementia is a syndrome that arises from multiple underlying conditions, including Alzheimer's disease, vascular disease, Parkinson's disease, and other etiologies (5). Dementia is a condition of continuous mental decline that worsens over time, including decreased memory for recent events, language decline, intellectual decline, changes in behaviour, and other changes in brain function that interfere with daily activities (6,7). People with dementia are found to have a series of symptoms, such as memory loss, difficulty thinking, problem-solving, and language (5,7). Dementia cases among older adults are increasing globally; it is estimated that someone develops dementia every three seconds worldwide (8). Dementia cases in Indonesia are estimated to be around 1.2 million people in 2016, and will increase to 2 million in 2030, and 4 million people in 2050 (9).

Risk factors for dementia in among older adults include age, gender, education, history of non-communicable diseases, family history of dementia, and physical activity (10). This is supported by research showing relationships among age, education, medical history, and physical activity and the incidence of dementia (11). Older adults with dementia experience a decline in their quality of life. By gender, data from the 2023 National Socioeconomic Survey show that the proportion of older adult women is higher than that of men (52.82% vs. 47.18%)(3).

People with dementia experience significant changes in their lives, which affect their families and those around them. As cognitive function declines, seniors become less able to meet their needs and increasingly dependent. Research has found a significant relationship between dementia and quality of life among older adults, as age-related cognitive decline can disrupt the brain's potential, resulting in a semi-independent quality of life for seniors with severe dementia (12).

Early detection of dementia is essential for planning appropriate care and treatment. The Mini-Cog Screening is a brief and straightforward assessment designed to identify dementia in its early stages, thereby facilitating timely diagnosis and intervention. Early identification through such screening can improve both current and future health outcomes

and quality of life. Research indicates that the Mini-Cog is effective at identifying individuals at high risk for cognitive impairment and assessing the cognitive abilities of older adults in approximately 3 minutes (13).

The selection of GKI Gunung Sahari as a research location was based on several unique demographic characteristic's representative of urban populations. First, this church has a high level of congregation heterogeneity, with members coming from various ethnic and cultural backgrounds in Indonesia. Second, GKI Gunung Sahari has a substantial older adult population that is actively engaged in community activities, making it a relevant setting for aging-related research. Finally, its central location in the capital city of Jakarta provides a realistic portrait of older adults' urban residents exposed to the dynamics, lifestyles, and stressors of the metropolitan environment. These characteristics are important because urban psychosocial and cultural factors have the potential to influence clinical manifestations and the identification of risk factors for dementia among older adults. Early detection of dementia in older adults can be achieved by identifying associated risk factors. The earlier dementia is detected, the better the treatment outcomes. Based on the phenomena observed, the researchers were interested in investigating factors that may influence the suspicion of dementia among older adults. This study aims to analyse the factors that can trigger suspicion of dementia among older adults.

Methods

Design

This study used a cross-sectional design to analyse individual characteristics, lifestyle, and random blood glucose and cholesterol levels, and their relationships with dementia risk among older adults. All data were collected simultaneously over a single time period. This design was chosen for its time efficiency and its suitability for simultaneously observing prevalence and relationships between variables.

Population

The population in this study consisted of all older adults at GKI Gunung Sahari Jakarta. Sampling was conducted using a total sampling technique. Of the 104 individuals in the total population, all met the eligibility criteria and initially agreed to participate. However, 24 participants withdrew (*dropped out*) during the data collection process due to time constraints and sudden personal agendas. Consequently, a final sample of 80 older adults successfully completed and participated in the study. Inclusion criteria were respondents

aged > 45 years (middle age and elderly categories), with full consciousness and the ability to communicate and hear well. Exclusion criteria were participants who were seriously ill or unable to participate in the examination.

Instruments used

The Mini-Cog questionnaire was employed to assess the risk of cognitive impairment or dementia. The Mini-Cog is a sensitive and efficient tool that requires approximately 3 to 5 minutes to administer. It comprises a three-word recall test and a clock drawing test. Risk assessment for cognitive impairment is based on the cumulative Mini-Cog score: a total score of 0–2 suggests a high likelihood of cognitive impairment, while a score of 3–5 suggests a low likelihood (13). According to the literature, the Mini-Cog demonstrates a sensitivity of 76% and a specificity of 83%, supporting its recommendation for cognitive function screening in older adults' populations (14,15). The materials utilized in this study included a random blood glucose and cholesterol-measuring device, a calibrated examination stick, disposable gloves, alcohol swabs, pens, and a wall clock to serve as a visual reference during the clock-drawing component of the Mini-Cog questionnaire.

Research Procedure

The research procedure is divided into several stages:

- 1. Preparation Stage:** The study commenced with initial observations regarding independence and memory decline among older adults' participants during church activities. Following approval from the management of GKI Gunung Sahari Jakarta, potential participants who met the inclusion criteria were approached. The study's purpose and objectives were explained, and informed consent was obtained from the respondents or their guardians. Confidentiality of all participants data was strictly maintained.
- 2. Implementation Stage (Three-post System):** At Post 1 (Initial Screening), participants completed demographic information, including age, gender, highest level of education, occupation, medical history, and lifestyle patterns (duration: approximately 2 minutes). At Post 2 (Physical Examination), participants had random blood glucose and cholesterol levels measured using standardized equipment (duration: approximately 3 minutes). At Post 3 (Cognitive Evaluation), participants were interviewed and completed the Mini-Cog questionnaire (approximately 3 minutes).

3. Post Examination Post: After completing these three posts, participants met with a doctor provided by the research team for a medical consultation, medication, and education on dementia prevention (duration: ± 5 minutes).

Results

Researchers used the SPSS version 24.0 application for data analysis, with statistical significance set at $p < 0.05$. All data were available for this study. Relevant demographic and study factors were summarized using descriptive statistics, and categorical data were analysed using the Chi-square test, while numeric data were analysed using the non-parametric Spearman test.

Results

Table 1. Characteristic of Study Participants (N= 80)

Variable			Participants	
			n	%
Age (years)	Middle Age (45 – 59)		3	3.8
	Elderly (60 – 74)		51	63.8
	Old (> 74)		26	32.5
Sex	Male		12	15
	Female		68	85
Education	Elementary		15	18.8
	Junior high school		22	27.5
	Senior high school		26	32.5
	Diploma		4	5
	Bachelor		11	13.8
	Master		2	2.5
Occupation	House wife		52	65
	Self-employed		8	10
	Retirees		20	25
Mini-Cog	Lower risk of dementia		63	78.8
	Higher risk of dementia		17	21.3
Medical history	Diabetes Mellitus	Yes	14	17.5
		No	66	82.5
	Stroke	Yes	0	0
		No	80	100
	Hiperlipidemia	Yes	2	2.5
		No	78	97.5
	Gastritis	Yes	11	13.8
		No	69	86.2
	Gout	Yes	1	1.2
		No	79	98.8
	Heart disease	Yes	5	6.2
		No	75	93.8
	Hypertensi	Yes	37	46.2
		No	43	53.8

Variable			Participants	
			n	%
Life style	Smoking habit	Yes	2	2.5
		No	78	97.5
	Stress	Yes	22	27.5
		No	58	72.5
	Sleep Problem	Yes	29	36.2
		No	51	63.8

Study participants' characteristics were dominated by aged 60 to 74 years (63.8%), female (85%), senior high school education (32.5%), and housewives (65%). Mini-Cog assessments showed a low risk of dementia (78.8%). Medical history was dominated by no history of diabetes mellitus (82.5%), stroke (100%), hyperlipidaemia (97.5%), gastritis (86.2%), gout (98.8%), and hypertension (53.8%). Study Participants' lifestyles were dominated by not having a smoking habit (97.5%), not experiencing stress (72.5%), and not experiencing insomnia (63.8%) (Table 1).

Table 2. Descriptive Statistic of Study Variable (N=80)

Variable	Minimum	Maximum	Mean	Standard Deviation
Age	47	84	70.96	7.243
Random blood glucose level	72	201	108.21	25.501
Cholesterol level	92	350	220.71	48.348
Mini-Cog test score	0	5	3.38	1.140

Table 2 presents the characteristics of participants, showing the maximum value, mean, and standard deviation. It is known that the oldest participant was 84 years old, and the average age was 70.96 years. The highest random blood glucose value was 201 mg/dL, and the average random blood sugar across all participants was within the normal range at 108.21 mg/dL. The highest cholesterol value among participants in the study was 350 mg/dL, and the average cholesterol value across all participants was high at 220.71 mg/dL. The highest risk assessment of participants for dementia was 5, and the average mini-cog value of participants was 3.38, meaning a low risk of dementia.

Table 3. Relationship Between Older Adults' Characteristics and Dementia (N=80)

Variable	Group	Risk of Dementia		Not at Risk of Dementia		p-value
		n	%	n	%	
Age (years)	Middle Age (45 – 59)	0	0	3	100	0.271
	Elderly (60 – 74)	9	17.6	42	82.4	
	Old (> 74)	8	30.8	18	69.2	
Sex	Female	14	20.6	54	79.4	0.711
	Male	3	25	9	75	
Education	Elementary	5	33.3	10	66.7	0.21
	Junior high school	7	31.8	15	68.3	
	Senior high school	3	11.5	23	88.5	
	Diploma	0	0	4	100	
	Bachelor	1	9.1	10	90.9	
	Master	1	50	1	50	
Occupation	House wife	10	19.2	42	80.8	0.834
	Self-employed	2	25	6	75	
	Retirees	5	25	15	75	

*Chi-Square

Table 3 presents the results of the Chi-square test examining the association between older adults' characteristics and suspected dementia among congregants at GKI Gunung Sahari. The findings show that 30.8% of participants are at risk of developing dementia. However, there is no association between age and the risk of dementia based on the mini-cog questionnaire results (p-value = 0.271). It is known that female participants (20.6%) have a high risk of dementia, but there is no relationship between gender and the risk of dementia based on the results of the examination using the mini-cog questionnaire (p-value 0.711). It is known that participants with a master's degree (50%) experience dementia, but there is no relationship between education and the risk of dementia based on the results of the examination using the mini-cog questionnaire (p-value 0.21). It is known that participants who are self-employed (25%) and retired (25%) are at risk of developing dementia. However, there is no association between occupation and the risk of dementia based on the mini-Cog questionnaire results (p-value 0.834).

Table 4. Relationship Between Lifestyle Factors and Dementia in Older Adults (N=80)

Variable	Group	Lower Risk of Dementia		Higher Risk of Dementia		r	p-value
		n	%	n	%		
Smoking habit	Yes	0	0	2	100	0.457	1.000
	No	17	21.8	61	78.2		
Stress	Yes	5	22.7	17	77.3	0.842	1.000
	No	12	20.7	46	79.3		
Sleeping problem	Yes	8	27.6	21	72.4	0.299	0.395
	No	9	17.6	42	82.4		

* Chi-Square

Table 4 presents the results of the Chi-square test examining the association between older adults' lifestyle and suspected dementia among congregants at GKI Gunung Sahari.

Participants with non-smoking habits are at risk of developing dementia by 17.8%. However, there is no relationship between smoking habits and the risk of dementia based on the results of the mini-Cog questionnaire examination (p-value 1.000). Participants (22.7%) have a high risk of dementia, but there is no relationship between stress and the risk of dementia based on the results of the examination using the mini-cog questionnaire (p-value 1.000). Participants with difficulty sleeping (27.6%) are at risk of developing dementia, but there is no relationship between difficulty sleeping and the risk of dementia based on the results of the examination using the mini-cog questionnaire (p-value 0.21).

Table 5. Relationship Between Older Adults' Cholesterol and Blood Glucose Levels and Dementia (N=80)

Variable	Group	r	p-value
Blood tests	Random Glucose Level	0.134	0.237
	Cholesterol Level	-0.244	0.029*

*Spearman test

Table 5, using the Spearman test, examines the relationship between cholesterol and blood sugar levels in the older adults with suspected dementia. A correlation was found between blood cholesterol levels and the risk of dementia, as assessed by the Mini-Cog questionnaire (p-value 0.029). However, the test results showed a negative correlation of -0.244, meaning that the lower the cholesterol level in the older adults, the higher the risk of dementia. Meanwhile, random blood glucose tests showed no correlation with the risk of dementia using the Mini-Cog questionnaire.

Table 6. Relationship Between Medical History and Dementia in Older Adults (N=80)

Variable	Group	Lower Risk of Dementia		Higher Risk of Dementia		<i>p-value</i>	
		n	%	n	%		
Medical History	Diabetes Mellitus	Yes	2	14.3	12	85.7	0.722
		No	15	22.7	51	77.3	
	Stroke	Yes	0	0	0	0	.
		No	17	21.3	63	78.8	
	Hyperlipidaemia	Yes	0	0	2	100	1.000
		No	17	21.8	61	78.2	
	Gastritis	Yes	4	36.4	7	63.6	0.234
		No	13	18.8	56	81.2	
	Gout	Yes	0	0	1	100	1.000
		No	17	21.5	62	78.5	
	Heart disease	Yes	1	20	4	80	1.000
		No	16	21.3	59	78.7	
Hypertension	Yes	7	18.9	30	81.1	0.785	
	No	10	23.3	33	76.7		

*Chi-Square

Table 6, using the Chi-square test, examines the relationship between the medical history and Mini-Cog categories of study participants. The results show that participants without DM (22.7%) are at risk of developing dementia, but there is no relationship between DM and the risk of dementia based on the mini-cog questionnaire examination (p-value = 0.722). The results also show that participants without hyperlipidaemia (21.8%) have a high risk of dementia, but there is no relationship between hyperlipidaemia and the risk of dementia based on the mini-cog questionnaire examination (p-value = 1.000). Study participants with gastritis (36.4%) have a high risk of dementia, but there is no relationship between gastritis and the risk of dementia based on the mini-cog questionnaire examination (p-value = 0.234). Study participants without heart disease (21.3%) have a high risk of dementia, but there is no relationship between heart disease and the risk of dementia based on the mini-cog questionnaire examination (p-value = 1.000). The participants without hypertension (23.3%) have a high risk of dementia, but there is no relationship between hypertension and the risk of dementia based on the mini-cog questionnaire examination (p-value = 0.785).

Discussion

Dementia, a chronic, progressive syndrome characterized by a decline in cognitive function, is a major concern in the health of older adults (16). The condition impairs not only memory but also mood, emotional regulation, behaviour, and motivation (17). The global annual cost of dementia currently exceeds US\$ 1.3 trillion and is projected to rise to US\$ 2.8 trillion by 2030 (8). Dementia is the seventh leading cause of death worldwide and is a major contributor to disability and dependency among older adults (7). The risk of developing dementia increases substantially with age, particularly during the seventh and eighth decades of life (18).

The growing global older adults population, as estimated by the Central Bureau of Statistics in 2021, reached 727 million people aged 65 years or older in 2020 and is projected to increase to 1.5 billion by 2050, further emphasizing the urgency of dementia management. Lack of activities involving cognitive functions, such as thinking, seeking information, and social interaction, is one of the factors contributing to the risk of dementia in older adults (19). Various risk factors for dementia have been identified in the literature, including hypertension, smoking and tobacco chewing habits, obesity, diabetes, stroke,

family history of dementia, depression, low education level, head injury, sleep disturbances, advanced age (over 66 years), female gender, and lack of social activity are significant risk factors (20). In addition to lifestyle and biomedical factors, contemporary epidemiological evidence suggests that environmental exposures, such as air pollution from residences located too close to major highways, are significantly associated with increased dementia incidence, as they can mediate changes in brain structure (21). Therefore, the integration of modifiable risk factors such as physical activity, diet, and reduced exposure to pollution is crucial (Liu, 2026).

This study used the Mini-Cog as a screening tool to detect suspected dementia. The Mini-Cog is a quick and simple test, proven effective in identifying the risk of cognitive impairment in older adults within 3 to 5 minutes (13,23). Its sensitivity reached 76% and specificity of 83%, making it a recommended instrument for dementia screening in the community (23). The characteristics of study participants in this study showed a predominance of older adults aged 60-74 years (63.8%), women (85%), those with a high school education (32.5%), and those working as housewives (65%). The Mini-Cog results showed that most participants (78.8%) had a low risk of dementia. The average age of participants was 70.96 years, with a mean random blood glucose of 108.21 mg/dL (normal), but the average cholesterol level was high at 220.71 mg/dL. The mean Mini-Cog score of 3.38 indicates a low risk of dementia in this population.

Interestingly, analysis of the relationship between older adults' characteristics and Mini-Cog categories showed no significant correlation with age ($p=0.271$), gender ($p=0.711$), education ($p=0.21$), or occupation ($p=0.834$). The main takeaway is that suspected dementia was not significantly associated with these characteristics, although the proportion of high-risk individuals with dementia was higher in certain groups: older adults (30.8%), men (20.6%), those with a master's degree (50%), and those who are self-employed (25%). These findings differ somewhat from a study by Azwar & Setiati (2021), which found a significant association between age (above 66 years), female gender, and low education level with dementia. However, other studies have shown that gender does not correlate with cognitive impairment and dementia risk, using either the Mini-Cog or the MMSE (13). Azwar & Setiati (2021) study revealed that nearly half of dementia patients in urban populations have completed higher education.

Lifestyle analysis showed no significant association between smoking ($p=1.000$), stress ($p=1.000$), or insomnia ($p=0.395$) and the risk of dementia based on the Mini-Cog. Although study participants who did not smoke (17.8%), experienced stress (22.7%), and had insomnia (27.6%) had a risk of dementia in their group, this contrasts with Tarnoto & Okvia (2024) and Nurfianti & An (2020), which identified smoking and sleep disturbances as risk factors for dementia. Azwar & Setiati (2021) also found that patients who smoke and experience stress/depression are at risk of developing dementia. Although sleep disturbances were not significantly correlated in the statistical tests of this study, non-invasive interventions to improve sleep patterns and neural homeostasis, such as binocular Terahertz (THz) stimulation, are currently being developed because they have been preclinically proven to reduce sleep fragmentation, suppress inflammatory microglia activation in the hippocampus, and restore spatial memory abilities in a model of Amyloid- β -related dementia (24).

A statistically significant association was observed between blood cholesterol levels and dementia risk as measured by the Mini-Cog ($p=0.029$). Notably, the correlation was negative (-0.244), suggesting that lower cholesterol levels in older adults are associated with a higher risk of dementia. This finding warrants further investigation, as elevated cholesterol is typically linked to increased cardiovascular risk. In contrast, random blood glucose did not demonstrate a significant association with dementia risk, which diverges from the established association between diabetes and increased dementia risk. The average duration of diabetes mellitus (DM) was longer in patients with dementia (12 years) compared to those without dementia (9 years) (20). From a plasma lipidomic perspective, this unexpected negative correlation is consistent with evidence that certain lipid groups, including cholesterol esters (CHE) and phospholipids, are significantly reduced in individuals with Vascular Dementia (VAD) compared to healthy controls (Liu et al., 2020). A reduction in plasma cholesterol ester levels is closely linked to decreased performance in key cognitive domains, such as attention, information processing speed, and executive function, and may serve as an indicator of the underlying pathobiological processes in neurocognitive disorders (Liu et al., 2020).

On the other hand, random blood glucose did not show a significant association with dementia risk, in contrast to general findings linking diabetes to an increased risk of dementia, namely, a longer average duration of DM was seen in dementia patients (12

years) compared to older adults without dementia (9 years) (20). The absence of a significant association with random blood glucose in this study may be due to the participants' average random blood glucose value still being considered normal and controlled (108.21 mg/dL). Pathophysiologic ally, cognitive decline and neural tissue damage are generally triggered by chronic hyperglycaemia, which promotes oxidative stress, mitochondrial dysfunction, cerebral microvascular damage, and impaired insulin signalling in brain tissue, ultimately leading to synaptic loss and neuronal death (26).

Finally, a history of diseases such as Diabetes Mellitus ($p=0.722$), hyperlipidaemia ($p=1.000$), gastritis ($p=0.234$), heart disease ($p=1.000$), and hypertension ($p=0.785$) was not significantly associated with the risk of dementia. Although in this study population, a history of vascular disease did not show strong statistical significance, control of cardiovascular risk factors in the older adults remains a key preventive pillar due to its close relationship with the pathway of microscopic cerebral vascular pathology, which often goes undetected clinically in its early stages.

Conclusion

A study at GKI Gunung Sahari using the Mini-Cog device showed that the majority of elderly people have a low risk of developing dementia. Demographic factors, lifestyle, and history of chronic disease were not shown to have a significant association with this risk. However, a significant negative association was found between blood cholesterol levels and dementia risk (low cholesterol was associated with a higher risk). This study recommends routine Mini-Cog screening and cognitive health education programs for older adults, and further studies with larger samples are needed to validate these contradictory findings.

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