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Original article

Cognitive impairment and associated factors in the elderly at Pracha Niwet Village in Thailand

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Background: Thailand has already become an aging society. Previous studies showed that cognitive impairment is one of the most common problems in the elderly. The prevalence of major neurocognitive disorder globally is between 5 - 7%. Currently, there are still limited data of cognitive impairment in Thailand.
Objectives: To determine the prevalence of cognitive impairment and to explore factors associated with it.
Methods: A descriptive study was conducted in the elderly aged above 60 years at Pracha Niwet Village from September to October 2017. The research instruments consisted of four questionnaires: 1) the demographic data form, 2) the mini – mental state examination: Thai version (MMSE – Thai 2002), 3) the Thai geriatric depression scale (TGDS), and 4) the Thai version of the Pittsburgh sleep quality index (T-PSQI). The prevalence of cognitive impairment was presented by frequency and percentage. The associated factors of cognitive impairment were analyzed by chi-square test, Fisher's exact test, and Pearson's correlation coefficient. The predictors of cognitive impairment were analyzed by logistic regression analysis.
Results: Among 254 participants with the mean age of 77.1 ± 7.3 years old; 66.5% of them were female. The prevalence of cognitive impairment was 7.5% and the mean MMSE – Thai 2002 score was 25.8 ± 3.6. The associated factors of cognitive impairment were hyperlipidemia ($P < 0.01$) and cardiovascular diseases ($P < 0.05$). Age, income, sleep duration, and TGDS scores were correlated with MMSE – Thai 2002 scores (r = -0.435, 0.271, -0.682, and -0.213, respectively). The predictors for cognitive impairment were hyperlipidemia and cardiovascular diseases ($P < 0.05$).
Conclusion: The prevalence of cognitive impairment was 7.5%. The associated factors and predictors of cognitive impairment were hyperlipidemia and cardiovascular diseases.

Keywords: Cognitive impairment, risk factors, elderly, Thailand.

Thailand has already become aging society. According to a survey by the National Statistical Office of the Ministry of Information and Communication Technology in 2014, 14.9% of the entire population were elderly. [1] Elderly is generally defined as chronological age of 65 years or above. [2] Many physical and mental problems can occur in this period of life. Cognitive impairment is one of the most common problems that not only affects the patients but also their families and societies. [3] The number of patients with neurocognitive disorder were expected to reach 115.4 million people by 2050 [4], and the worldwide cost of care and treatments were estimated by the United States (US) at $818 billion in 2015, an increase of 35% since 2010. [5]

Cognitive impairment ranges from mild (normal aging process) to major neurocognitive disorder or dementia, which is an acquired cognitive decline in one or more cognitive domains. [6, 7] The prevalence of major neurocognitive disorder globally is between 5 - 7%, and Alzheimer's disease is the most common irreversible cause of neurocognitive disorder. [1, 8, 9] Although a specific treatment for neurocognitive disorder is not effective at present, there are a large number of potentially modifiable risk factors.[10] Several studies found that risk factors for cognitive impairment were genetic, hypertension, obesity,

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diabetes, smoking, hearing loss, physical inactivity, social isolation, and depression. [10 - 13]

Early detection and intervention to cognitive impairment and its risk factors in the elderly may prevent further deterioration of disease and complications. There are still limited data of cognitive impairment in Thailand. The objectives of this study were to determine the prevalence of cognitive impairment and to find its associated factors. The benefit of this study may help to raise awareness of cognitive impairment in society. We selected the samples from Pracha Niwet Village because it is a medium size community, which can be the representative of a suburban area especially in Nontaburi.

Methods

This is a cross-sectional descriptive study. The samples consisted of 254 elderly people, aged above 60 years, recruited from Pracha Niwet Village between September and October 2017. The participants must be able to understand and communicate in Thai, and were excluded if they could not orientate to time, place and person, or had a severe visual impairment.

This study was approved by the Ethical Committees, the Institutional Review Board (IRB) of Faculty of Medicine, Chulalongkorn University (COA No. 664/2017). All participants were informed of the objectives and method of the present study.

All subjects completed four questionnaires: 1) Demographic data form, 2) Mini – Mental State Examination: Thai version (MMSE – Thai 2002), 3) Thai version of the Pittsburgh sleep quality index (T-PSQI), and 4) Thai Geriatric Depression Scale (TGDS).

The Mini – Mental State Examination: Thai version (MMSE – Thai 2002) was developed from its original version in English, a widely used instrument for screening cognitive impairment in Thailand. It has six domains including orientation, recall, attention, calculation, language manipulation, and constructional praxis. There is a specific cut-off point for cognitive impairment dependent on level of education. At the cut-off value of a total score less than 15 for uneducated, 18 for primary education, and 23 for higher primary education indicates cognitive impairment. [14]

The Thai version of the Pittsburgh sleep quality index (T-PSQI) consists of 19 self-rated items. At the cut-off value of a global score of more than 5 indicates poor sleep quality. [15]

Thai geriatric depression scale (TGDS) developed by Train the Brain Forum Thailand consists of 30 self-rated items. The cut-off value of a total score of more than 12 indicates depression. [16]

The data were analyzed using SPSS for Windows, version 22.0. The prevalence of cognitive impairment was presented by frequency and percentage. The associated factors of cognitive impairment were analyzed by chi-square test, Fisher's exact test, and Pearson's correlation coefficient. Significant factors from theoretical review and univariate analysis were entered into multiple logistic regression models (Odds ratio: OR and 95% CI) in order to identify the potential predictors of cognitive impairment. A p-value of less than 0.05 was considered statistically significant.

Results

There were 254 elderly participants with a mean age of at 77.1 ± 7.3 years. Most of them were female (66.5%), married (57.9%), with at least primary school education (96.1%), and had adequate income (74.4%). The median of personal income was 9,000 baht/month; 82.3% of participants had at least one medical illness; the six most common medical illness were: hypertension, hyperlipidemia, musculoskeletal disorders, diabetes, cardiovascular diseases, and cerebrovascular diseases, respectively; 4.3% of the subjects had a history of mental illness, whereas 11% of them had a history of substance use; 52% had a poor sleep quality. One-third of them had regular exercise (Table 1).

The prevalence of cognitive impairment according to MMSE – Thai 2002 was 7.5% and the mean of total score was 25.8 ± 3.6. The associated factors of cognitive impairment were a history of hyperlipidemia ($P < 0.01$) and a history of cardiovascular diseases ($P < 0.05$) (Table 2).

Age, sleep duration, and TGDS scores were negatively correlated with MMSE – Thai 2002 scores. (r = -0.435, -0.682, and -0.213, respectively). Income was positively correlated with MMSE – Thai 2002 score (r = 0.274) (Table 3).

Logistic regression analysis found 2 factors that were statistically significant predictors for cognitive impairment, namely: a history of hyperlipidemia ($P < 0.05$) and a history of cardiovascular diseases ($P < 0.05$). (Table 4)

Table 1. Participants' characteristics.

Characteristics	N (%) or Mean ± SD	Characteristics	N (%) or Mean ± SD
Gender		History of medical illness	209 (82.3)
Female	169 (66.5)	Common medical illness	
Male	85 (33.5)	- Hypertension	133 (52.4)
Age (years)	77.1 ± 7.3	- Hyperlipidemia	113 (44.5)
min = 60, max = 93		- Musculoskeletal disorders	68 (26.8)
Marital status		- Diabetes	53 (20.9)
Single	31 (12.2)	- Cardiovascular diseases	33 (13.0)
Married	147 (57.9)	- Cerebrovascular diseases	8 (3.1)
Widow	51 (20.1)	History of mental illness	
Divorce or Separation	25 (9.8)	- Yes	11 (4.3)
Education		- No	243 (95.7)
Lower than primary school	10 (3.9)	Depression (N=252)	
Primary school	45 (17.7)	- Yes	21 (8.3)
Middle school	16 (6.3)	- No	231 (91.7)
High school	49 (19.3)	History of substance use	
Diploma	29 (11.4)	- Alcohol	17 (6.7)
Bachelor or equivalent	86 (33.9)	- Nicotine	11 (4.3)
Higher than bachelor	19 (7.5)	- No	226 (89.0)
Personal income (baht/month)		Sleep quality	
≤ 5,000	116 (45.7)	- Good	122 (48.0)
5,001-10,000	31 (12.2)	- Poor	132 (52.0)
10,001-15,000	15 (5.9)	Regular exercise	
> 15,000	92 (36.2)	- Yes	89 (35.0)
Median (IQR) = 9,000 (600 - 22,500)		- No	175 (65.0)
Adequate income	189 (74.4)		

Discussion

This study found that 7.5% of the subjects had cognitive impairment. The associated factors and predictors of cognitive impairment were a history of hyperlipidemia and a history of cardiovascular diseases.

The prevalence of cognitive impairment in this study was similar to previous studies not only globally [8, 9] but also domestically [17] as the prevalence increases exponentially with increasing age, and doubles every five years of age after the age of 65.[8, 9] However, in this study we used only MMSE – Thai 2002 to screen cognitive impairment, we did not evaluate the subjects in other dimensions to confirm the diagnosis of neurocognitive disorder.

This study found that a history of hyperlipidemia and a history of cardiovascular diseases were not only risk factors for vascular cognitive impairment, but also for Alzheimer's disease. Cardiovascular diseases can cause or worsen cerebral hypoperfusion, leading to process that result in the production of toxic proteins. Although the role of hyperlipidemia is still unclear for cognitive impairment, several studies found that alterations in brain cholesterol homeostasis have been linked to the main pathological features of Alzheimer's disease, in particular Aβ, and could be related to neurocognitive disorder risk through being a component of metabolic syndrome. [11, 18, 19]

Age, depression, and sleep quality were not associated factors in this study. However, the results showed that age, TGDS scores, and sleep duration were negatively correlated with MMSE – Thai 2002 scores. Several studies suggested that depression has a bi-directional relationship with neurocognitive disorder.[11] Recurrent major depression in earlier adulthood appears to increase the risk of neurocognitive disorder in later life [20], while late-life depression is believed to be an early sign of the vascular or degenerative neurocognitive disorder. [21] Sleep disruption such as obstructive sleep apnea may cause intermittent hypoxia, inflammatory state, and increase Aβ deposition. [22, 23] These processes may be an etiology of Alzheimer's disease.

Table 2. Factors associated with cognitive impairment.

Variables	Cognitive impairment				χ^2	*P* - value
	No (N = 235)		Yes (N = 19)			
	N	%	N	%		
Gender						
Male	79	92.9	6	7.1	0.033	0.856
Female	156	92.3	13	7.7		
Age (years)						
<65	45	97.8	1	2.2		0.213[a]
≥ 65	190	91.3	18	8.7		
Education						
Lower than bachelor	140	94.0	9	6.0	1.080	0.299
Bachelor or higher	95	90.5	10	9.5		
Adequacy of income						
Adequate	176	93.1	13	6.9		0.586[a]
Inadequate	59	90.8	6	9.2		
History of medical illness						
No	44	97.8	1	2.2		0.212[a]
Yes	191	91.4	18	8.6		
Hyperlipidemia						
No	136	96.5	5	3.5	7.088	0.008**
Yes	99	87.6	14	12.4		
Hypertension						
No	115	95.0	6	5.9	2.123	0.145
Yes	120	90.2	13	9.8		
Diabetes						
No	187	93.0	14	7.0		0.543[a]
Yes	48	90.6	5	9.4		
Cardiovascular diseases						
No	208	94.1	13	5.9		
Yes	27	81.8	6	18.2		0.024[a]*
Cerebrovascular diseases						
No	228	92.7	18	7.3		
Yes	7	87.5	1	12.5		0.301[a]
History of mental illness						
No	224	92.2	19	7.8		
Yes	11	100.0	0	0.0		1.000[a]
History of substance use						
No	208	92	18	8.0		
Yes	27	96.4	1	3.6		0.704[a]
Depression						
No	215	50.6	16	49.4		
Yes	19	14.3	2	85.7		0.652[a]
Regular exercise						
No	83	93.3	6	6.7	0.108	0.742
Yes	152	92.1	13	7.9		
Sleep quality						
Poor	120	90.9	12	9.1	1.030	0.310
Good	115	94.3	7	5.7		

*$P < 0.05$, **$P < 0.01$, [a] Fisher's exact.

Table 3. Correlations with MMSE-Thai 2002 score.

Variables	r	*P* - value
Age (years)	-0.435	< 0.001**
Income (Baht)	0.274	< 0.001**
Sleep duration (hours)	-0.682	< 0.001**
PSQI score	-0.095	0.134
TGDS score	-0.213	0.001**

***P* < 0.01. PSQI: Pittsburgh Sleep Quality Index; TGDS: Thai Geriatric Depression Scale.

Table 4. Stepwise multiple logistic regression.

Variables	Adjusted OR	95% CI of Adjusted OR		*P* - value
		Lower	Upper	
Dyslipidemia	3.024	1.022	8.952	0.046*
Cardiovascular diseases	3.039	1.025	9.008	0.045*

**P* < 0.05, Backward logistic regression.

The study, however, had a few limitations. First, due to descriptive design, we can indicate only associated factors but not causal relationships. Second, we collected the samples only from Pracha Niwet Village, so they might not be representative of all of the elderly. Third, although MMSE-Thai 2002 is a widely used instrument, it has low sensitivity in subjects with low education levels. [24] Finally, we used only MMSE – Thai 2002 to define cognitive impairment, so future studies should evaluate in other comprehensive dimensions to confirm the diagnosis.

According to the present study, cognitive impairment in the elderly is a common problem, screening for cognitive impairment in the elderly especially those with risk factors may be useful. Early intervention and modification of its risk factors are also helpful in order to improve quality of life and reduce further complications.

Conclusion

The prevalence of cognitive impairment was 7.5%. The associated factors and predictors of cognitive impairment were hyperlipidemia and cardiovascular diseases.

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Conflict of interest

None of the authors has any potential conflict of interest to disclose.

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