Effectiveness of Bacopa Herb for Solving Dementia in the Elderly

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ABSTRACT

Background: Dementia in the elderly has become a problem in health, medicinal plants, have been used to cure several human diseases.

Methods: The study used pretest-posttest control group design research from September 2020 to March 2021 based on phases of before and after herbal treatment. Samples were 361 elderly, randomly selected using cluster random sampling. Data were collected based on an Abbreviated Mental Test (AMT) and the Barthel index of Activities of Daily Living (ADL) which were then analyzed using Pearson's product-moment correlation coefficient, multiple regression, and a paired t-test.

Results: The results revealed that most samples had dementia at an abnormal level (40.50%), 91.50% had no record of a relative with dementia, and had an ADL score of 'help themselves and help others. In addition, age and stress were related to dementia in the elderly, with statistical significance at α =0.01 (r=0.224 and r=0.636, respectively). Moreover, these factors can be used to predict dementia with 51.1% (R^2=0.511; p<0.0001) of the total variance of dementia in the elderly. The effectiveness of the bacopa herb was confirmed by a reduction in the dementia level from 40.50% to only 24.68% (p<0.0001) and the ADL was increased to 89.24% (p<0.0001).

Conclusion: Age and stress had a major effect on dementia. Therefore, a daily capsule that contains the herbs Bacopa monnieri and Centella asiatica and germinating rice and turmeric could benefit brain activity, which were supported by increases in AMT and ADL.

Keywords: Elderly, Dementia, Quality of life, Bacopa herb, AMT, ADL

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INTRODUCTION

The number of elderly people is increasing so that changes in both physical and mental health are inevitable and may cause several health disorders (Kowal P and Dowd JE, 2001). Dementia is considered to be a neurodegenerative disorder that is characterized by increased oxidative stress. Medicinal plants, with their antioxidant properties, have been used to cure several human diseases. Dementia in the elderly has become a common occurrence. There are several traits for dementia, including memory loss (both short and long term), declining ability to learn new things, and changes in daily behavior. These traits can be gradually observed. Recently, several studies have suggested that factors that promote the risk of dementia include sex, age, education, body mass index, disease, accidents, genetics, lack of exercise, excess alcohol, and stress (Alzheimer's Association, 2012; Baumgart M, et al., 2015; Larson EB, et al., 2013; Håkansson K, et al., 2009). Stress in the elderly is caused by both internal and external factors which normally affect happiness and cause discomfort at different levels for different people. This stress is directly related to dementia in the elderly (Ryan J, et al., 2008; Sakuldach M, et al., 2020; Phakdeekul W and KedThongma W, 2019; Sardsaengjun C, 2013).

Treatment includes medicine, rehabilitation, and the use of herbs. Bacopa monnieri (L.) Wettst. and Centella asiatica (L.) have been used in treatments due to the ingredients triterpenoid saponin and bacoside that aid in memory in the elderly. Studies in 2013 and 2016 showed that when the elderly (aged 55 and above) consumed 300-450 g daily there was a significant decrease in memory loss without further side effects (Dhanasekaran M, et al., 2007; Pongpom M, et al., 2013; Nuss P, et al., 2009; Hamon A, et al., 2003; Heysieattalab S, et al., 2016; Korpi ER and Sinkkonen ST, 2006).

Recent studies showed the consumption of Centella asiatica reduced memory loss and promoted brain activity in children similar to gingko and has already been commercialized in capsule form (Dhanasekaran M, et al., 2015; Anekonda TS and Reddy PH, 2005). GABA or Gamma-Amino Butyric Acid is an amino acid that acts as neurotransmitter to inhibit and balance the neurotransmitter system. When consumed, it promotes calmness and reduces stress as well as reducing jitteriness. In addition, it was reported to prevent Alzheimer's disease, Parkinson's disease, act as an anticancer ingredient, to reduce stress disorder, insomnia, epilepsy, headaches, and blood pressure and to increase brain metabolism, by ameliorating thick artery walls and abnormal blood circulation which may cause a rupture of a blood vessel. The recommended amount is 750-1,950 mg per day. Turmeric (Curcuma longa L.) is a potent antioxidant ingredient due to its major component of tyrosine, which can be used for detoxifying and to reduce inflammation. The World Health Organization has registered turmeric as an ingredient for treating Alzheimer's and Parkinson's diseases and to address symptoms of vein thrombosis. Tyrosine also promotes the production of serotonin which improves sleep soundness and reduces depression by converting to melatonin (Lieberman HR, et al., 2015; McTavish SF, et al., 2001; McLean A, et al., 2004; Fernstrom JD and Fernstrom MH, 2007). Psychiatric symptoms and mental health may be caused by genetic factors, a dysfunction in brain activity, social pressures, and mental instability (Thomsen PH, 1996; Lazarus RS and Folkman S, 1984; Phakdeekul W, et al., 2011). To treat such disorders, it is important to reduce the effects of these factors (Yiengprugsawan V, et al., 2012; Foundation for Thai Gerontology Research and Development, 2009). Global estimations of the burden of disease show that mental illness plays a prominent role. Elderly club is one of the several ways to promote social interaction, gain self-esteem, slow progression of physical and mental disabilities in old age people. Furthermore, in Sakon Nakhon province, Thailand there is an increasing trend per capita of dementia in the elderly. In 2017, approximately half the elderly (12.9% of the population)

showed sign of dementia. In 2018, 0.9% from 13.5% and 1.40% from 14.6% in 2019 were reported (Apidechkul T, 2011; Kosulwit L, 2012; Turner III DW, 2010). Therefore, in the present study, we aimed to evaluate the factors predicted dementia in the elderly, and the effectiveness of herbs in the treatment of dementia in the elderly in Sakon Nakhon province, Thailand.

MATERIALS AND METHODS

This study investigated the effectiveness as a treatment for dementia in the elderly of a combination of herbs that had been classified as safe for human consumption and had already been proven in clinical testing. The study used pretest-posttest control group design research during September 2020 to March 2021 based on phases of before and after herbal treatment.

Phase I

Cross-sectional survey research: The target population was 1,897 elderly people older than 60 years with reported dementia in Sakon Nakhon province. The number of samples was calculated based on the following equation using cluster random sampling; the design effect was multiplied by n to produce a sample size of 316 individuals (Turner III DW, 2010; Hsieh FY, *et al.*, 1998). Samples were enrolled through cluster random sampling from two sets of data (large and small districts) in Sakon Nakhon province, with Mueang districts representing the large, and Kusuman small districts, respectively. The names of the elderly were placed in a container and drawn at random according to the required sample size *(Table 1)*.

Table 1: Probability proportional to size of elderly with dementia

District	N	n
Mueang	426	271
Kusuman	69	45

Inclusion criteria: It consisted of

• Elderly with dementia older than 60 years within the two subdistricts of the study

• Able to read and write to complete the survey, and

• Willing to answer the study questions.

Exclusion criteria: It consisted of:

• Any unexpected situation that meant the interview could not continue and

• Participant's desire to leave the program.

Phase II

Experimental Research: Pretest-posttest Control Group Design Research: In this phase, 316 individuals were given the herbal treatment consisting of a capsule of a combination of herbs at 750 mg or BRAH-MIX. This product was formed and packed in a facility accredited with GMP by the Food and Drug Administration. Each subject had to be willing to take the capsule daily and was monitored by public health personnel for side effects during the 6 months of study. After the herbal treatment, each subject was evaluated again using the AMT and ADL tests.

Research tools

Tools for analysis consisted of 4 parts. First was basic personal information (sex, age, education, financial status, personal health, and record of health program). Second was the stress level record from Suanprung hospital (Suanprung Stress Test-20, SPST-20). The test consists of 20 questions with a maximum possible score of 100. The test was used to evaluate the recent stress level from daily activities during the past 6 months prior to the test date. Scores were classified into 4 categories: 0-23 was categorized as low stress; 24-41 was categorized as moderate stress; 42-61 was categorized as high stress; and above 62 was categor-

ized as severe. The third part was the brain condition test determined using the Abbreviated Mental Test (AMT) from the Institute of Geriatrics, Department of Medical Services, Ministry of Public Health, Thailand. This test consists of 10 questions with a score less than or equal to 7 considered as abnormal and above 8 points considered as normal. For part four, the Barthel Index of ADL was used to identify an individual's ability to perform daily activities (Ministry of Public Health, 2019). Scores were categorized into three separate groups: 0-4, indicated the target was unable to carry out normal daily activities and required assistance; 5-11, indicated moderate assistance was required but could perform most basic activities; and 12 and higher, categorized as normal. The Department of Medical Services uses the stress level questionnaire SPST-20 to determine AMT and ADL with Cronbach's Alpha coefficients of 0.86, 0.82, and 0.87. However, due to preliminary experiment, these coefficients were adjusted to 0.79, 074, and 0.89, respectively.

Data collection

Public health officers from both the district and subdistrict assisted in collecting data from the 316 elderly participants before and after herbal treatment.

• Data were collected during interviews to evaluate stress level and brain condition using the Abbreviated Mental Test (AMT). Activities of Daily Living (ADL) were assessed using the Barthel index. Each participant was asked to answer a control question within 30 minutes.

• Follow up and monitoring was done once a month by checking the food record book when distributing the dietary supplement products

• After 6 months of treatment, the stress level and brain condition tests were repeated.

• Data were checked and recollected if necessary.

• Data were coded and filed.

• Data were evaluated statistically and analyzed.

Data analysis

The intention to treat analysis method (descriptive statistics) was used which considered the frequency, percentage, average, and standard deviation in the analysis. Inferential statistics were used to identify factor correlation by interval and ratio based on bi-variable analysis and the Pearson's product moment correlation coefficient. Multiple regression was used to evaluate the factors influencing dementia in the elderly and ADL. All data were then compared using a paired t-test.

Ethics

This research was approved by authorities from the Provincial Health Office, Sakon Nakhon (SKN REC 2020-001), and registration at Thai Clinical Trials Registry (TCTR) since 2020-08-25 22:05:57. TCTR identification number is TCTR20200903007.

RESULTS

The majority of elderly participants in this study was female and aged 60-72 years old (69.60%), with the average age being 70.1 years (66.82%) of the total studied population. Most (92.79%) of the sample had a highest education level at primary school, 90.82% faced a financial problem, and 86.40% had a personal health problem other than dementia. Of the sample, 40.50% had signs of dementia, 90.89% were in the elderly care program, and 91.50% did not have any relative with a record of dementia. Age and stress level each had a significant influence on dementia in the elderly (α =0.01, r=0.224:p<0.0001 and r=0.636:p<0.0001, respectively) as shown in *Table 2*. These factors can be used to predict the potential of dementia with R2=0.511 (p<0.0001) as shown in *Table 3*.

Table 2: Correlation coefficient of elderly dementia

Factor	Related to elderly dementia	
	Correlation coefficient (r)	p-Value
Age	0.224**	<0.0001
Stress	0.636**	<0.0001
Note: **significance at 0.01 level		

Table 3: Stepwise multiple regression analysis of predictive variables of elderly dementia (n=136)

Predictive variable	Non standard regression coefficient		Standard regression coefficient	t	p-Value
	B	Std. Error	Beta		
Age	0.038	0.005	0.33	8.246	<0.0001**
Stress	0.272	0.016	0.687	17.18	<0.0001**
Constant	-0.363	0.365		-6.465	0.003*
R=0.715, R²=0.511, Adjusted R²=0.508, SE=0.6017					
Note: *significance at 0.05 level, **significance at 0.01 level					

The dementia level before treatment (40.50%) was reduced to 24.68% after herbal treatment, as shown in *Table 4*. The AMT showed an increase in brain condition *(Table 5)*. In addition, a slight increase was observed in activities of daily lives after herbal treatment from 84.81% to 89.21%, as shown in *Table 6*. After herbal treatment, the elderly could conduct their daily routine without needing support, as shown in *Table 7*.

Table 4: Average AMT of participants before and after project (n=316)

Before project			After project		
Frequency (percentage)	x	SD.	Frequency (percentage)	x	SD.
188 (59.50)	8.54	2.04	238 (75.32)	9.01	2.61
128 (40.50)	6.32	1.61	78(24.68)	7.64	1.09
316(100.0)	8.34	1.953	316(100.0)	9.24	1.73

Table 5: Comparison of AMT before and after project (n=136)

Variable	n	x	SD.	95%CI		t	(p-Value)
				Lower	Upper		
Before project	316	8.34	1.953	-1.732	1.0471	4.308	0.0001
After project	316	9.24	1.73				
Note: **significance at 0.01 level							

Table 6: Average ADL before and after project (n=316)

ADL score	Before project			After project		
	Frequency (percentage)	x	SD.	Frequency (percentage)	x	SD.
12 or more	268 / -84.81	17.46	2.61	282 / -89.24	19.46	2.74
5-11	32 / -10.13	7.49	2.05	24 / -7.59	12.05	2.18
Less than 5	16 / -5.06	3.24	0.52	10 / -3.16	6.81	1.02
Total Score	316 / -100	17.29	3.043	316 / -100	19.1	2.14

Table 7: Comparison of AMT before and after project (n=136)

Variable	n	x	SD.	95%CI		t	(p-Value)
				Lower	**Upper**		
Before project	316	17.29	3.043	-2.791	1.51	-10.108	0.0001
After project	316	19.1	2.14				
Note: **significance at 0.01 level							

DISCUSSION

Preliminary investigation revealed that stress level and age were the two major factors influencing dementia in the elderly and could be used to predict potential dementia with 51.1% accuracy, but in the pass time little was known about adherence to antidepressant treatment during acute and continuation phase of depression among older adults with dementia and newly diagnosed major depressive disorders (Ministry of Public Health, 2019; Bhattacharjee S, *et al.*, 2020). Which was similar to other studies found that more than one-third of Parkinson's Disease (PD) and Psychiatric patients used inappropriate antipsychotics among those who were treated with atypical antipsychotic medications. Various socio-demographics and clinical factors were associated with inappropriate antipsychotic use in older patients with PD. Concerted efforts are needed to reduce inappropriate atypical antipsychotic use (Chekani F, *et al.*, 2020; Wang J, *et al.*, 2019; Piyabhan P and Wetchateng T, 2013). However, the several study reported the stress level of the elderly and mental health were not correlated. For example, dementia is not included in the government-subsidized Community Health Service (CHS) package, and currently, there is few public health care program specifically for dementia in China. For dementia family, extra resources are still belonging to paid services (Wang J, *et al.*, 2019; Piyabhan P and Wetchateng T, 2013; Piyabhan P and Wetchateng T, 2015; Uabundit N, *et al.*, 2010). Then, the current is study found a correlation between dementia and the age/stress level of the elderly with accuracy of 51.1% yielding an AMT score of 8.34 ± 1.953 with 40.50%

having dementia that affected their daily life with a score of 17.29 ± 3.04 and elderly participants with disability accounting for 15.19% with an ADL score below 11. After participating in the herbal treatment program, the AMT increased to 9.24 ± 1.73 and the ADL increased to 19.1 ± 2.14, as shown in *Figure 1*.

In addition, there were several studies that used Bacopa monnieri as medicine to treat Alzheimer's disease and to restore memory in patients with schizophrenia (Saini N, *et al.*, 2019; Saini N, *et al.*, 2012). Another finding from the current is study was that the quality of life of the elderly increased if they did not require support. These herbs (Bacopa monnieri wettst, Centella asiatica, Gaba and turmeric), improved memory and reduced panic and reduce depression. Similar findings were reported for a combination of these herbs (Deplanque D, *et al.*, 2018; Poisbeau P, *et al.*, 2018; Mattei C, *et al.*, 2019; Poonsawang T, *et al.*, 2020; Nueakhumung J, *et al.*, 2020; Van Patten R, *et al.*, 2020; Batko-Szwaczka A, *et al.*, 2020). Not only, herbal therapy was used for elderly care but also could be closely care by public health volunteers, and applied participation technology (Chekani F, *et al.*, 2020). Such as, aging populations across the globe are in need of creative, innovative treatments in order to support health and wellness in the later stages of life, a higher probability of Composite Endpoint (CE). It was associated with age ≥ 70 years (P=0.018), taking any medication or supplements (P=0.007). Therefore, concerted efforts are needed to reduce inappropriate atypical antipsychotic use among elderly patients.
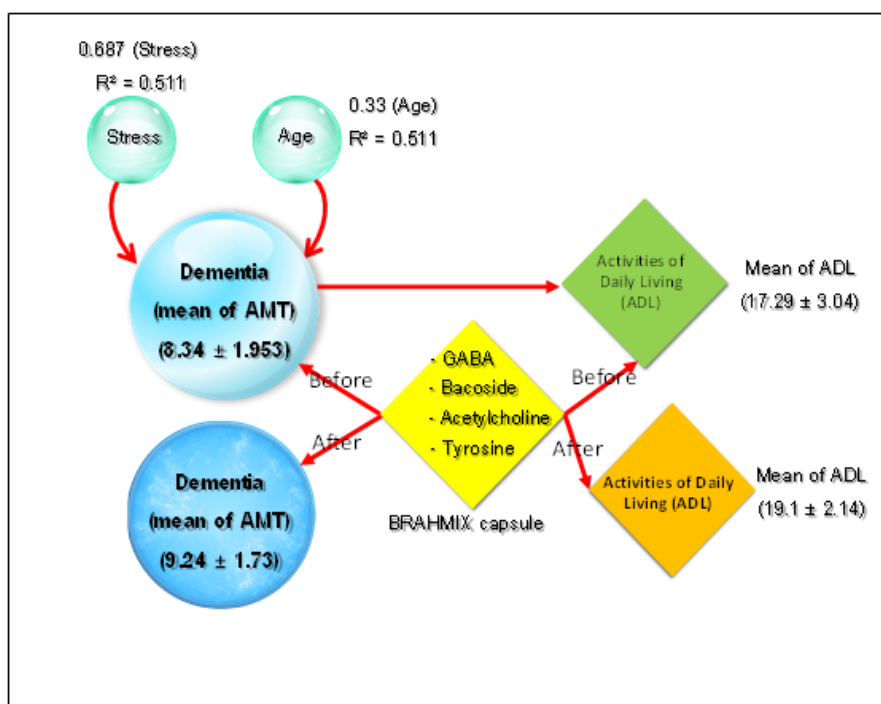

Figure 1: Association of factors affecting dementia and effectiveness of Bacopa Herb

CONCLUSION

Age had a major effect on dementia. Therefore, it is important to start monitor the elderly at an early stage by reducing stress and provide supplements to the diet that prevent dementia. A daily capsule that contains the herbs Bacopa monnieri and, Centella asiatica and germinating rice and turmeric could benefit brain activity as shown by an improvement in mood, aiding sleep, reducing depression, and improving memory, which were supported by increases in AMT and ADL. The authors plan to conduct further study at the cellular level to investigate brain activity.

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