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Reading Holy Qur'an to Improve Verbal Fluency in Elderly

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Abstract: The high prevalence of dementia that impairs verbal fluency has been a global source of concern. As a result, strategies for preserving or improving verbal fluency in the elderly are required. A neuroplasticity-based reading program has been shown to improve verbal fluency. This study aims to ascertain whether reading the Holy Qur'an has an effect on an older adult's ability to communicate fluently. It is an experimental study with a quasi-experimental design with pretest-posttest control groups. This study sampled 22 elderly individuals with the following criteria: age greater than 60 years, ability to speak and read the Holy Qur'an, a Mini-Mental State Examination (MMSE) score greater than 24, absence of psychiatric disorders, absence of head trauma, and absence of neurological disease. The intervention group read the Quran for two weeks, while the control group did not. Both groups were measured for Verbal fluency at the beginning and after the intervention. There were significant differences in post-test phonemic scores between the control group (CG) and the intervention group (IG) ($p=0.019$). Meanwhile, there was no significant difference in semantic score in all groups ($p>0.852$). Reading the Holy Qur'an activity intervention for two weeks affected verbal fluency in the elderly by increasing phonemic but not semantic scores.

Keywords: elderly; dementia; holy Quran; neuroplasticity; reading; verbal fluency

INTRODUCTION

Dementia is a global health problem. According to 2019 WHO data, it was the seventh leading cause of death worldwide 2019. Dementia is a progressive disease that wreaks havoc on one's memory, reasoning, behavior, and ability to carry out daily tasks.[1] By 2020, the global population with dementia will exceed 50 million. Alzheimer's Disease International estimates that 82 million people will have dementia in 2030 and 152 million in 2050. Dementia cases are increasing in the majority of developing countries. 60% of dementia patients will live in low- and middle-income countries by 2020. Alzheimer's disease will affect 71% of developing countries by 2050.[2] In 2016, dementia was estimated to affect approximately 1.2 million people in Indonesia, which is expected to rise to 2 million in 2030 and 4 million in 2050.[3]

Preventive measures are necessary to minimize dementia in the elderly. According to the WHO, cognitive intervention is a preventive measure. Increased cognitive activity has been shown to stimulate (or increase) cognitive reserve and act as a buffer against rapid cognitive decline [4,5]. Cognitive training can be used as a potential intervention to prevent or delay the onset of age-related cognitive decline, mild cognitive impairment, and dementia.[5,6] According to neuroplasticity theory, cognitive training may be beneficial in stimulating the brain to create new neural pathways and maintain existing ones to build a brain reserve against future decline.[6]

Reading activities are one of the developments of the neuroplasticity theory. According to a study titled "Effect of reading intervention and task difficulty on orthographic and phonological reading systems in

the brain," children who struggle with reading have different brain functions than typically developing leaders. Additionally, this study discovered that when poor readers engaged in reading activities consistently, they exhibited an activation pattern consistent with verbal fluency in the inferior bilateral frontal, bilateral insula, right parietal, and left cerebellum.[7] One of the reading activities that can be undertaken is reciting the Holy Qur'an. Reading the holy book of the Qur'an is both a cognitive and religious activity.[8] Quran recitation resulted in significant relaxation as the Quran directly affects the human heart, resulting in certain hormones and chemicals responsible for relaxation.[9] Neuroplasticity associated with the reading activity is beneficial. However, research on reading is still limited to children's age groups and the read object (book).[7,10,11] This study aims to determine whether reading the holy Qur'an affects the elderly's ability to communicate fluently and is expected to be used as one of the simplest and least expensive methods of maintaining cognitive function or slowing cognitive decline in the elderly.

MATERIAL AND METHOD

This study is a quasi-experimental research with a pretest-posttest control group design. The study was conducted at Triyola Clinic, Surakarta, Central Java. The research sample consisted of 22 elderly who met the following criteria: age greater than 60 years, ability to speak and read the Holy Qur'an, Mini-Mental State Examination (MMSE) score> 24, absence of psychiatric disorders, absence of head trauma, and absence of neurological disease. The research sample was divided into two groups. The first group was the control group (CG), consisting of ten individuals; the second group was the reading Holy Qur'an (IG), consisting of twelve individuals.

This study utilized the MMSE (Mini-Mental State Examination) instrument and the Verbal Fluency Test. The MMSE is a screening test for cognitive impairment that includes verbal and nonverbal tasks assessing temporal and spatial orientation, memory, calculation, attention, language, and visuoconstructive abilities. The test performance analysis in this study was conducted using totaled task scores. The results were then stratified by formal education level. Individuals with nine years or more of formal education are expected to achieve a minimum score of 28 on the MMSE.[12] A verbal fluency test was used to assess speaking fluency. The verbal fluency test followed the previous study.[13] In these tasks, the individual must elicit as many words as possible within a specified time limit (one minute), such as in the semantic VF (SVF) or phonemic VF (PVF). In this study, The K-A-M test was used to assess phonemic fluency adapted from the F-A-S test, adapted into Indonesian. The sample was asked to say as many words as possible in one minute with K-A-M prefixed letters. Words from various categories were permitted except for personal names, and repetitions were not counted. Semantic fluency was determined using an animal test in which the sample stated as many animal names as possible in one minute without counting repetitions.

Variable data collection was carried out using data collection instruments (pre-and post-verbal fluency test). The examination was carried out directly in the clinic before treatment and two weeks after treatment in the control and treatment groups.An Independent sample T-Test was used to differentiate between the control group (CG) and the intervention group (IG). A paired sample T-test was used to determine the difference between one group's mean pre- and post-intervention values. IBM SPSS Statistics 25 for Windows was utilized to analyze the data. P will be significant if p is less than 0.05. This research has received ethical approval from the health research ethics committee from the Faculty of Medicine, Universitas Sebelas Maret, with the number 116/UN2.06.6.1/KEPK/EC/2020. Before the treatment, the research subjects gave informed consent to carry out the research.

RESULT

The study of verbal fluency in the elderly who read the Holy Quran involved 22 respondents. Respondents were divided into two groups; 10 in the control group and 12 in the intervention group. The baseline characteristics of participants are shown in Table 1, with an age range between 60 - 77 years, and there are more women than men. Mini-Mental State Examination (MMSE) scores vary from 24-29. These scores mean that the respondents involved in this study have a normal cognitive function. The pre-test and post-test scores after the reading activity intervention was carried out for two weeks on 22 study subjects can be seen in Figure 1. Phonemic pre-test scores showed no big difference between the CG and IG groups. Both groups had a value of about 27. Meanwhile, the post-test score of the IG group was higher than the CG group. It is different with semantic scores; both pre-test and post-test in the two groups did not differ much in value.

Table 1. Subject Characteristics

Characteristic	Groups	
	Control Group	Intervention Group
Total Participant	10	12
Gender		
Male	7	2
Female	3	10
MMSE Score		
24	1	1
25	1	1
26	2	-
27	3	5
28	1	1
29	2	4

The parametric test, Paired Sample T-Test, and Independent Sample T-Test were utilized in this study as statistical tests. IBM SPSS Statistics 25 for Windows was used to conduct the statistical tests. As a parametric test assumption, the normality test was performed first. As the sample data was less than 50, a Shapiro-Wilk normality test was used. The results for each group's normality test findings were significant ($p>0.05$), indicating that the data was normally distributed. Furthermore, the homogeneity test on all data scores at each step yielded significant results ($p>0.05$), indicating homogeneous data variance.

The paired T-test is the first parametric test used to determine the difference in verbal fluency test scores between pre-and post-intervention groups. The results of the paired T-test are shown in Figure 1. According to the Paired Sample T-Test results with a significance level of $p<0.05$, significant results were obtained for the IG group's pre-and post-phonemic scores ($p=0.006$). Meanwhile, no significant results were obtained for the IG group's semantic score.

The Independent Sample T-Test is the second parametric test. The purpose of the statistical test was to identify if there was a difference in scores between the groups. The Independent Sample T-Test results are shown in Figure 2. The independent sample t-test results between the pretest scores of the CG and IG groups were not significantly different, likewise, with the post-test score (Figure 2). Significant differences were found in the independent t-test between the pretest and posttest delta scores of the phonemic score between the GC and IG groups ($p=0.019$), while the semantic score did not differ significantly (Figure 3).

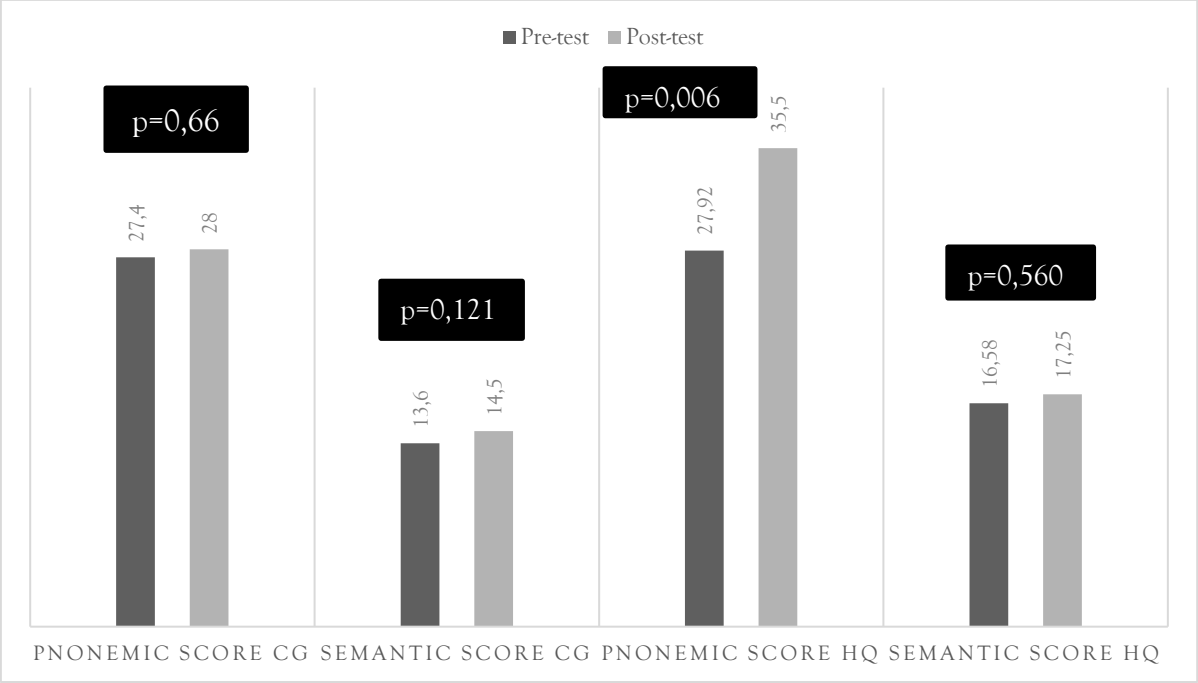

Figure 1. Mean phonemic, semantic scores, and p-value of paired sample t-test

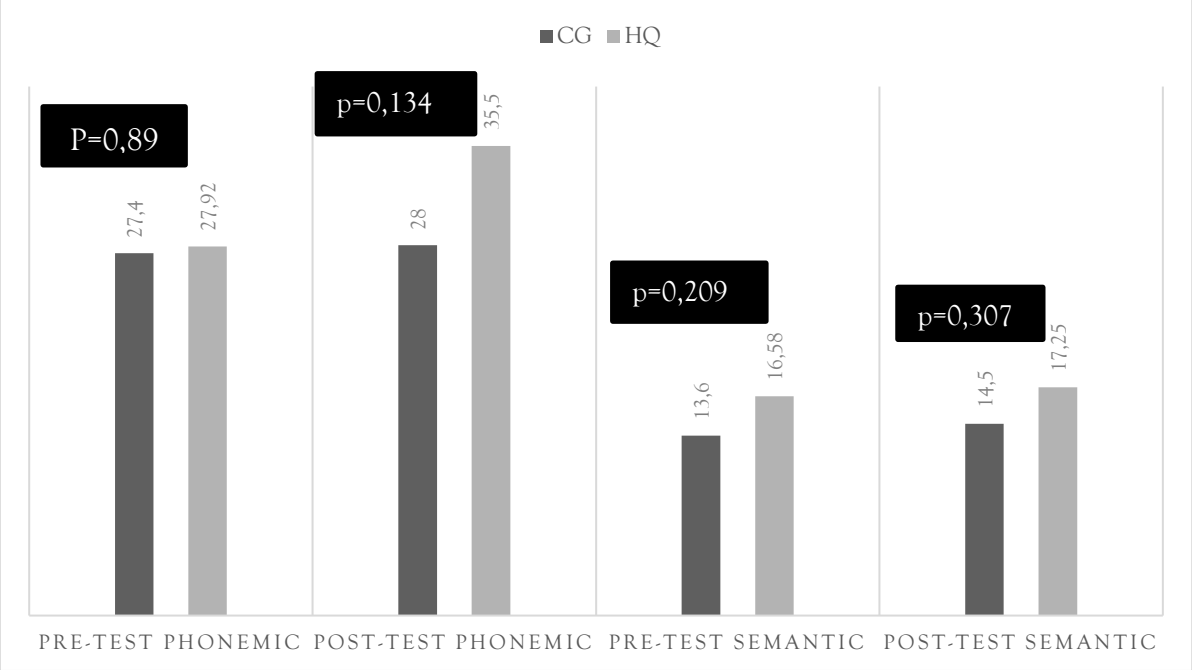

Figure 2. Mean Pre-test, post-test score, and p-value of independent sample t-test

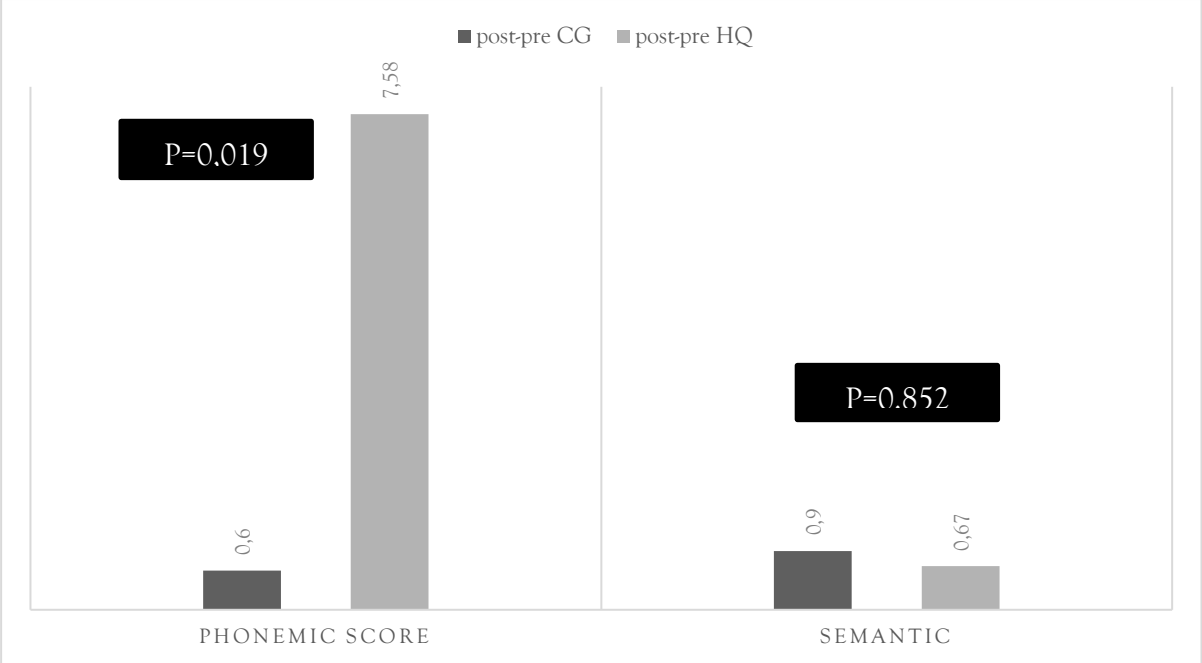

Figure 3. Delta score pre-test and post-test of CG and IG and p-value of independent sample

DISCUSSION

The results of this study indicated that reading the Holy Qur'an improved phonemic scores. Meanwhile, following the intervention, the semantic score did not improve. This study did not expect to reveal any improvement in post-intervention semantic scores. However, it is consistent with the theory that semantic fluency declines more rapidly in old age due to its relationship to the processing speed factor, declining at age.[14] Another theory asserts that their ability to categorize words within a specific period diminishes.[15]

Additionally, additional variables, in the form of visualization, affect semantic fluency. This visualization activates the retrosplenial cortex involved in perception and memory.[14] Meanwhile, neuroplasticity associated with reading activity has a more significant effect on activating the left hemisphere, affecting phonemic verbal fluency.[16,17]

Additionally, this study discovered that the intervention improved the cognitive function of fluency. This study demonstrated that the research is consistent with the established theory. Reading activities promote maturation and strengthen interneuron connections through neuroplasticity, thereby increasing the cognitive function of fluency in speech.[10] This study is also supported by a theory that reading increases the volume of the frontal and parietal lobes of the brain, which affects the cognitive function of speech fluency.[18] The same study's findings of reading activities improving fluency function were replicated in an observational study titled "Reading Habits Among Older Adults concerning Level and 15-Year Changes in Verbal Fluency and Episodic Recall".[19] Additionally, the findings of an observational study titled "The Effect of Reading Activity on Verbal Fluency in Older Adults" corroborate the results of this study.[20]

According to studies, most cognitive functions of the brain decline with age, and one such area is verbal fluency.[21] Parallel to these declines in performance, there is a decline in cognitive function. That is, in the temporal and frontal systems, where the most noticeable decreases occur. White matter tracts with compromised integrity affect connectivity between brain regions, resulting in less efficient networks. This region's compromised integrity has a detrimental effect on verbal fluency.[22] Verbal fluency (VF) tasks are frequently used in neuropsychology.[13] A verbal fluency test can be used to determine verbal functioning. It is a brief assessment that typically includes two tasks: category fluency (occasionally referred to as semantic fluency) and letter fluency (sometimes called phonemic fluency). The standard versions of the tasks give participants one minute to generate as many unique words as possible within a given semantic category (category fluency) or beginning with a specified letter (letter fluency).[13,15,23,24]

Additionally, cognitive performance can be influenced by non-cognitive factors such as emotional state. Anxiety is a significant emotional factor that can impair demanding cognitive performance. Anxiety is characterized by a lack of control over worrying thoughts and attentional biases, increasing focus on negative stimuli. It has been demonstrated that anxiety impairs cognitive performance, including working memory (WM).[25,26] This relationship is reciprocal, as cognitive impairment in the elderly can increase anxiety.[26]

According to theory, reading the Holy Qur'an increases alpha waves in the brain.[27] This increase in alpha waves will alleviate anxiety, one of the risk factors for dementia.[9,27] According to the study, anxiety can impair a person's verbal fluency.[28] An anxious person performs worse on dependent time measures of phonemic verbal fluency. Further analysis revealed that individuals with anxiety disorders perform worse due to fewer switches than the emotional content of these words. Switching (a critical component of phonemic fluency) highly indicates executive functions associated with frontal lobe function.[29]

The findings of this study indicated that reading the Holy Qur'an, as an application of the neuroplasticity theory, affected increasing phonemic fluency, but not semantic fluency, and the cognitive function of speaking fluency in the elderly.

Our research is subject to several limitations. First, the small sample size precludes us from examining the effect of reading the Holy Qur'an on fluency in greater detail. However, we were able to monitor the research subjects closely due to the small sample size. Second, we did not classify subjects according to sociodemographic characteristics such as gender or educational history, influencing the study's findings. Third, we did not observe research subjects who met the inclusion criteria for anxiety disorders. Additional research is needed to compare the control group to research subjects who do not experience anxiety and those who experience anxiety to obtain more valid results.

CONCLUSION

This study established that a two-week intervention of reading the Holy Qur'an affected the speaking fluency by improving the phonemic score of the elderly at Triyola Clinic, Surakarta, Central Java.

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CONFLICT OF INTEREST

The authors reported no potential competing interest.

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