

Research Article



## The Effect Of Brain Gym For Kognitif Function In Elderly Kendari City Healtyh Center

Armayani<sup>1</sup>, Faridah Mohd Said<sup>2</sup>, Nisha Nambiar<sup>3</sup>, Ratna Umi Nurlila<sup>4</sup>

<sup>1,4</sup> Nursing Program, University of Mandala Waluya, Kendari, Indonesia

<sup>2,3</sup> Lincoln University College Malaysia

Corresponding Author :

Armayani

[arma.umw@gmail.com](mailto:arma.umw@gmail.com)

085395830303

ORCID id 0000-0001-5210-8724

### ABSTRACT

**Background:** World Health Organization Stated that dementia is experienced by the elderly aged 60-74 years by 15-20%, 75-85 years by 5-15%. The older the age, the greater the prevalence and the heavier the type of dementia experienced by the elderly. This study aims to determine the effect of brain exercise on the cognitive function of the elderly at the Public Health Center of Kendari City.

**Methods:** : The design of this research is quasi experiment with pre and post test without control with quota sampling technique. The population in this study amounted to 125 people and the sample in this study was the elderly who experienced cognitive function disorders at the Perumnas Public Health Center as many as 15 people. Data analysis used the statistical paired sample t-test. The data collection tool used is the Mini Mental Status Examination questionnaire.

**Results:** The results of this study indicate t count (12,646) > t table (6.714) and p value 0.000 < 0.05 so Ho is rejected, meaning that there is an effect of brain exercise on the cognitive function of the elderly.

**Conclusions:** It is hoped that the Public Health Center will pay more attention to the condition of the elderly who are in the working area of the Perumnas Health Center in order to minimize the risk of cognitive function disorders and carry out brain exercises for the elderly when the Posyandu for the elderly is carried out.

**Keywords :** Brain Gym, Kognitif Function, Elderly

## INTRODUCTION

The progression of aging is an ongoing phenomenon, commencing not at a specific point in time but from the very inception of life itself. In accordance with the regulations outlined in Law Number 13 of 1998 regarding the Elderly, the threshold for old age is established at 60 years (Kemenkes-RI, 2016). The natural progression of aging and entering the elderly phase is a universal occurrence affecting every individual<sup>1</sup>.

In 2017, the World Health Organization reported that individuals aged 60 to 58 years old exhibited a dementia prevalence ranging from 15-20% of the overall population. Analyzing the statistical findings revealed a significant variance in the average MMSE score between elderly individuals aged 60-75 and those above 76 years old. The research indicated that as age advanced, there was an escalation in both the prevalence and severity of dementia among the elderly, aligning with the fact that age constitutes a key risk factor for dementia<sup>2</sup>. Moreover, in the Asia Pacific region, the elderly population is projected to surge from 410 million in 2007 to 733 million in 2025, with an estimated increase to 1.3 billion by 2050<sup>3</sup>.

In 2006, the life expectancy of the Indonesian population was recorded at 66.2 years, resulting in a rise in the elderly demographic by approximately 19 million individuals (8.9%). By 2010, the elderly population had increased to 23.9 million (9.77%), accompanied by a life expectancy of 67.4 years. Looking ahead to 2020, it is anticipated that life expectancy will further ascend to 71.1 years, with an estimated elderly population of 28.8 million (11.34%).

The surge in the number of elderly individuals positions Indonesia among the four nations with the highest elderly populations, alongside China, India, and Japan<sup>4</sup>.

In 2015, within Southeast Sulawesi, the count of elderly individuals availing services amounted to 83,556 people. Notably, Kendari City emerged as the second-largest city, hosting a substantial proportion of elderly individuals receiving services, reaching 8,895 people (86.27%). These services encompassed care for cognitive decline, degenerative disorders, and various other treatments. This circumstance underscores the imperative for concerted efforts from the government, healthcare sector, and families to recognize and address the significance of providing treatment for the disorders affecting the elderly population<sup>5</sup>.

In 2016, the Public Health Center of Kendari City held the seventh position in terms of the highest elderly population among the 15 Puskesmas in Kendari City, totaling 538 individuals, all of whom availed health services. The following year, the number of elderly residents increased to 1,212, and again, all of them received health services. This underscores the necessity for increased attention from the Kendari City health team. Apart from receiving care at the Puskesmas, the elderly were actively engaged in Posyandu activities tailored for their age group, where they were instructed in performing prolans gymnastics<sup>5</sup>.

The rising number of elderly individuals has the potential to give rise to health issues among this demographic. According to the Ministry of Health of the

Republic of Indonesia (2016), 7.2% of the population aged over 60 years is reported to be afflicted with dementia. Specifically, 5% of individuals aged 65-70 years within the elderly population are currently experiencing dementia, and this rate is projected to double every five years, reaching 45% among those over the age of 85 years<sup>6</sup>.

Enhancing cognitive abilities in the elderly can be achieved through group activity therapy incorporating Reminiscence therapy. This approach yields advantages in preserving individual identity and has the potential to enhance cognitive function. This is because elderly individuals often draw upon their past experiences to defend their opinions when faced with criticism<sup>7</sup>. Another method to enhance cognitive function involves engaging in brain gym or cognitive exercises/sports. This type of mental exercise not only facilitates increased blood and oxygen flow to the brain but also stimulates both hemispheres of the brain<sup>8</sup>.

The analysis findings indicate that advancing age constitutes a significant factor associated with the risk of dementia. The likelihood of dementia increases with the age of the respondent, aligning with earlier research outcomes that highlight a higher incidence of dementia among individuals aged 60-75 years, reaching 75%<sup>9</sup>. Additionally, Watson's (2003) study reveals a doubling in the prevalence of dementia in individuals aged 60 years and above for every 5-year increment in age among the elderly<sup>10</sup>.

Engaging in mental exercises, often referred to as brain gymnastics, functions as a straightforward and efficient self-help technique. These brain exercises consist of uncomplicated activities specifically crafted to harmonize brain function through coordinated movement skills<sup>11</sup>. In the elderly

population, the diminishing capacities of both the brain and the body render individuals more susceptible to illness, cognitive decline, and emotional distress. Nonetheless, this decline can be mitigated by actively participating in brain exercises<sup>12</sup>.

Different sources highlighting the advantages of brain gym (cognitive exercise) for cognitive function have guided the identification of specific movements in this research. After assessing the average capabilities of the elderly population, the study ultimately identified eight brain gym movements. These movements include relaxed hooks, cross movements, owls, gravity glides, positive points, ear plugs, hand hooks, and earth buttons<sup>12</sup>.

Based on the findings of an initial survey conducted by researchers among the programmers at the International Posyandu in Kendari City Health Center, it was observed that a majority of the elderly participants exhibited diminished cognitive functions, specifically senile dementia and dementia, totaling 125 individuals. Apart from seeking treatment at the Posyandu for the elderly, they typically visit the Perumnas Health Center with the support of their families. According to Posyandu programmers, common complaints voiced by the elderly include frequent forgetfulness when organizing belongings, easy lapses in recalling the names of family members or neighbors, and occasional confusion when questioned by others. Moreover, they often experience disorientation after traveling and tend to ask for directions from anyone they encounter on the road. This observation aligns with medical diagnoses from doctors, confirming that a considerable number of the elderly population is affected by dementia.

In consideration of the preceding context, the author proposes a research

project titled "Impact of Brain Gym Therapy on Cognitive Functions among the Elderly in the Service Area of Kendari City Public Health Center."

## METHOD

This study adopts a quantitative approach employing a quasi-experimental design involving pre- and post-tests without a control group. A quasi-experiment is a research method that assesses an intervention's impact on a group of subjects, either with or without a comparison group, and lacks randomization in assigning subjects to treatment or control groups (Notoadmojo, 2017). The research was carried out at the Kendari City Health Center.

The study targeted a population comprising individuals aged 60-75 years who sought services at the Public Health Center of Kendari City, totaling 125 people. The selected sample for this research consisted of 30 individuals. Quota sampling was employed as the sampling technique, wherein the sample was not chosen based on strata, randomization, or geographical location but rather on a predetermined number determined by the researcher, aligning with the population's characteristics. This method was chosen due to practical considerations such as time constraints and the available number of respondents during the study period<sup>13</sup>. The inclusion criteria for the participants are as follows: [continue with the inclusion criteria].

## RESULTS

### Characteristics of Respondents

#### Gender

**Table 1.** Distribution Of Respondents By Gender

Gender	n	Percentage (%)
Man	12	40.0
Woman	18	60.0
<b>Total</b>	<b>30</b>	<b>100</b>

Based on table 1, it can be concluded that the respondents with female sex were 18 respondents (60.0%) more when compared to 12 male respondents (40.0%).

#### **Table 2.** Distribution Of Respondents By Age

Age	n	Percentage (%)
60 - 67	10	33.3
68 - 75	20	66.7
Total	30	100

Based on table 2, it can be concluded that, most respondents aged 68-75 as many as 20 respondents (66.7%) more when compared to the age of 60-67 as many as 10 respondents (33.3%). Analysis

#### Univariat

#### Cognitive function before being given brain exercise

#### **Table 3.** Distribution of MMSE cognitive function before brain exercise

Classification	n	Percentage %
Mild Cognitive	12	40
Medium Cognitive	18	60
<b>Total</b>	<b>30</b>	<b>100</b>

Based on table 3, it can be concluded that the moderate cognitive classification was 18 (60%) more when compared to the mild cognitive classification as many as 12 (40%), before brain exercise was performed.

#### Cognitive Function After Being Given Brain Exercise

#### **Table 4.** Distribution of MMSE cognitive function after brain exercise

Classification	n	Persentase %
Mild Cognitive	22	73.3
Medium Cognitive	8	26.7
<b>Total</b>	<b>30</b>	<b>100</b>

Based on table 4, it can be concluded that there are 11 (73.3%) mild cognitive classifications compared to 4 (26.7%).

### Analisis Bivariat

Bivariate analysis was used to perform a comparative test of existing research data<sup>14</sup>. Prior to bivariate analysis, a normality test was conducted to determine whether the data were normally distributed or not. The normality test in this study used the Shapirowilk test because the sample data was less than 50<sup>15</sup>. The results of the Shapiro-wilk normality test can be seen in Table 5 below.

**Table 5. Normality test : Shapirowilk**

Variable	Uji p value
Pre test	0,484
Post test	0,637

Based on table 5 the Shapiro Wilk test, the p value before the intervention was 0.484 and the p value after the intervention was 0.637, so that the p value obtained > 0.05 was normally distributed and the statistical test used was parametric statistics with the Paired Sample t-test.

**Table 6. Paired Sample t-test**

Variable	Mean	t hitung	t tabel	p value
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Pre test	0.60	12.646	6,714	.000
Post test	0.27			

Based on Table 6, the mean pre test result is 0.60 and the mean post test is 0.27, so it can be seen that there is an increase in cognitive function before and after treatment 0.33. The t-count result is 12.646 > t table 6.714 with a p value of 0.000 so that Ho is rejected, meaning that there is an influence before and after brain exercise on the cognitive function of the elderly at the Public Health Center of Kendari City.

### DISCUSSION

Upon conducting measurements using the Mini Mental Status Examination (MMSE) Questionnaire, it was observed that the cognitive values of the respondents prior to engaging in brain exercises predominantly fell within the moderate cognitive range, comprising 9 respondents (60%). This outcome aligns with findings from prior research, which similarly indicated that the cognitive values before undergoing brain exercises tended to be within the moderate cognitive category (60%)<sup>16</sup>.

Korten (2016) suggests that the decline in cognitive function among the elderly is attributed to morphological and biochemical changes occurring in the central nervous system. The reduction in brain weight in the elderly is linked to diminished protein and fat content, leading to a decrease in overall brain capacity. Noteworthy alterations occur in axons, dendrites, and nerve cell bodies, with dendrites—essential communication tools between nerve cells—becoming thinner and losing connectivity between nerve cells. Consequently, nerve conduction decreases, resulting in sluggish movement<sup>17</sup>.

The questionnaire outcomes revealed that a considerable number of elderly



individuals exhibited a moderate level of cognitive function based on the Mini Mental Status Examination questionnaire. Specifically, 18 respondents scored at an average level when addressing 3 out of the 11 questions. In terms of time orientation, they were capable of answering 3 out of 5 questions; for calculation-related queries, they managed to respond to 3 out of 5 points; and regarding language, they were successful in answering 2 out of 3 questions. These findings indicate that a majority of the elderly participants demonstrated a moderate decline in cognitive function.

According to Aggarwal's investigation in 2014, approximately 5% of individuals aged 65-70 experience cognitive impairment, and this rate doubles every five years, reaching 45% among those over 85 years old<sup>18</sup>. Vascular dementia accounts for approximately 15-20% of cases, while the remaining 15-35% is attributed to other forms of dementia<sup>10</sup>. Notes that the prevalence of dementia and its specific types vary based on the region, country, and ethnicity. In developed countries such as America, the prevalence of impaired cognitive function and dementia among the elderly is estimated at 10-15%, affecting around 3-4 million individuals, while in Europe, it ranges from 50-70%<sup>16</sup>.

After implementing brain exercises in elderly individuals with compromised cognitive function, the study revealed that 22 participants (73.3%) achieved a mild cognitive score. The brain exercise theory presented in Paul and Gail E. Dennison's book on brain gym asserts that these exercises have the capacity to activate all segments of the brain, thereby enhancing cognitive abilities. Furthermore, the movements involved in brain exercises serve to heighten alertness, concentration, and

memory. An illustrative example is the "8 sleep" (lazy 8) movement, specifically designed to enhance concentration and memory.

The findings from interviews conducted with 30 participants revealed that they could appropriately and accurately respond when asked to name objects, perform number subtraction, and state the names of the months. Addressing dementia can be approached through both pharmacological and non-pharmacological means. This study specifically focuses on non-pharmacological therapy, wherein brain exercises are employed. The brain exercise regimen involves a daily 15-minute session for a duration of 2 weeks. This approach aligns with the theory proposed by an American expert who introduced brain exercise movements, asserting that regular implementation of a 15-minute daily brain exercise over 2 weeks can mitigate the occurrence of cognitive decline<sup>11</sup>.

Based on the findings from the conducted research, it was observed that subtle changes in the cognitive function of the elderly began to manifest on the fourth day of the treatment. However, these changes were minimal, and not all elderly participants exhibited them. Subsequent days, specifically from day 5 onwards and continuing through day 10, demonstrated more noticeable changes following the implementation of brain exercises.

The study results indicate a discernible impact of brain exercises on the cognitive function of elderly individuals with dementia. As evidenced by Azizah's research in 2017, brain exercises demonstrated a noteworthy improvement in cognitive function, evident in a significant value before treatment at 9.15 and after treatment at 15.85, reflecting a difference of 6.7. This

outcome aligns with earlier research affirming that brain exercises contribute to a significant enhancement in the memory of elderly individuals, as indicated by a p-value of 0.005 ( $p < 0.05$ )<sup>12</sup>.

Engaging in brain exercises also offers advantages such as reduced emotional stress, enhanced clarity of thoughts, fostering a happier and more relaxed environment for individuals, and improved memory and language proficiency. Additionally, participating in brain gym activities promotes heightened creativity, efficiency, and enthusiasm, attributable to the alleviation of stress<sup>11</sup>.

Brain exercises serve the purpose of activating three distinct dimensions of the brain, namely the focusing dimension (front-back brain), concentration dimension (up-down brain), and lateral dimension (left-right brain). Each dimension holds specific tasks, allowing for diverse exercise movements, as highlighted by Suhari, Astuti, and Rahmawati in 2020. Stimulation of the brain occurs through uncomplicated hand and foot movements, generating stimuli that enhance cognitive abilities such as alertness, concentration, speed, perception, learning, memory, problem-solving, and creativity. Moreover, it is emphasized that activities associated with spirituality should be intensified to provide a sense of peace for the elderly, as recommended by the Ministry of Health of the Republic of Indonesia in 2021<sup>19</sup>.

In Smith's investigation from 2015, it is asserted that engaging in brain exercises is beneficial for unlocking previously closed or obstructed sections of the brain. This, in turn, facilitates learning or work activities utilizing the entire brain (whole brain). The outcomes include a reduction in emotional stress, clearer thinking, heightened

enthusiasm, increased concentration, enhanced creativity and efficiency, improved language and memory skills, and the fostering of improved human relationships within a more relaxed and joyful learning or working environment, as highlighted in Smith-Ray et al.'s research in 2019.

### **Cognitive Function Scores After Brain Exercise Is Performed.**

The outcomes of the normality test, conducted using the Shapiro-Wilk test, yielded a p-value of 0.484 before the intervention and 0.637 after the intervention. As the obtained p-values are greater than 0.05, it signifies that the data follows a normal distribution, allowing the use of parametric statistics, specifically the Paired Sample t-test. The Paired Sample t-test results revealed a mean pre-test score of 0.60 and a mean post-test score of 0.27. This indicates an improvement in cognitive function by 0.33 units before and after the treatment. The calculated t-value of 12.646 exceeds the t-table value of 6.714, with a p-value of 0.000. Consequently, the null hypothesis ( $H_0$ ) is rejected, indicating a significant influence before and after brain exercises on the cognitive function of the elderly at the Public Health Center of Kendari City. These findings underscore the substantial benefits of brain exercises in enhancing the cognitive function of the elderly, as evidenced by the significant improvement in cognitive function scores post-exercise.

According to the observations of elderly researchers with impaired cognitive function at the Perumnas Public Health Center, improvements in cognitive abilities are evident when they are questioned about the day, hour, and the names of fellow elderly

individuals, and they can respond accurately.<sup>21</sup> While the outcomes may not be highly significant, the elderly participants demonstrated enhanced orientation regarding names, times, and places compared to their previous abilities. Additionally, they appeared more enthusiastic and communicative when engaged in conversations with each other. This suggests the effectiveness of brain exercises in enhancing the cognitive function of the elderly.<sup>22</sup> The study results indicate that the optimal age range for effective brain exercises is between 60 and 70 years. Consequently, the researchers concluded that incorporating brain exercises is crucial for training the cognitive functions of the elderly.

## CONCLUSION

Based on the results of the research that has been described in the previous chapter, it can be concluded that there is an effect of brain exercise on the cognitive function of the elderly at the Public Health Center of Kendari City.

## REFERENCES

1. Lisnawati. Pengaruh Supportive Group Therapy Terhadap Stres Lansia Dengan Hipertensi di Puskesmas Pudukpayung [thesis]. Semarang: Universitas Diponegoro; 2018.
2. Kemenkes-RI. Situasi lanjut usia (lansia) di Indonesia. Jakarta: Kementerian Kesehatan Republik Indonesia; 2020.
3. Setiyorini E, Wulandari NA, Sari YK. Perawatan Lansia dalam Persektif Budaya [Internet]. Available from: <http://repository.phb.ac.id/427/2/Layout> Perawatan Lansia.pdf.
4. Suurnäkki T, Nygård CH, Ilmarinen J. Stress And Strain Of Elderly Employees In Municipal Occupations. *Scand J Work Environ Health*. 2016.
5. Dinas Kesehatan Kota Kendari (2020) Profil Kesehatan Dinas Kesehatan Kota Kendari Tahun 2020. Kendari: Dinas Kesehatan Kota Kendari.
6. Lionakis N. Hypertension in the elderly. *World J Cardiol*. 2012;4(5):135. doi: 10.4330/wjc.v4.i5.135.
7. Yamagami T, Oosawa M, Ito S, Yamaguchi H. Effect of activity reminiscence therapy as brain-activating rehabilitation for elderly people with and without dementia. *Psychogeriatrics*. 2007;7(2):69-75. doi: 10.1111/j.1479-8301.2007.00192.x.
8. Cabral JCC, Veleda GWA. Stress and Cognitive Reserve as independent factors of neuropsychological performance in healthy elderly *Estresse e Reserva Cognitiva como determinantes independentes para o desempenho neuropsicológico de idosos saudáveis*. *Ciência Saúde Coletiva*. 2019;21(11):3499-3508. doi: 10.1590/1413-812320152111.17452015.
9. Landeiro F, Barrows P, Nuttall Musson E, et al. Reducing social isolation and loneliness in older people: A systematic review protocol. *BMJ Open*. 2017;7(5):e013778. doi: 10.1136/bmjopen-2016-013778.
10. Afrina Y, Lestari H, Jumakil. Hubungan Antara Pengetahuan, Kebutuhan, Motivasi, Emosi, Dan Budaya Dengan Persepsi Keluarga Skizofrenia (Gangguan Jiwa Berat) Di Rsj. *Jurnal Ilmiah Mahasiswa Kesehatan Masyarakat*. 2021;4(1):1-10.



11. Cancela JM, Osório R, Pereira M, et al. Efficacy of brain gym training on the cognitive performance and fitness level of active older adults: A preliminary study. *J Aging Phys Act.* 2019;23(4):653-658. doi: 10.1123/japa.2014-0044.
12. Azizah LM, Martiana T, Soedirham O. The Improvement of Cognitive Function and Decrease the Level of Stress in the Elderly with Brain Gym. *Int J Nurs Midwifery Sci.* 2020;1(1):26. doi: 10.29082/ijnms.v1i1.33.
13. Notoadmojo S. *Metodologi Penelitian Kesehatan. Revisi.* Jakarta: Rineka Cipta; 2012.
14. Notoadmojo S. *Metodologi Penelitian Kesehatan. Revisi.* Jakarta: Rineka Cipta; 2012.
15. Shapiro SS, Wilk MB. An analysis of variance test for normality (complete samples). *Biometrika.* 1965;52(3-4):591-611. doi: 10.1093/biomet/52.3-4.591.
16. Suhari, Astuti A, Rahmawati PM. Brain Gym Improves Cognitive Function For Elderly With Dementia. *Int Conf Kerta Cendekia Nurs Acad.* 2019;1(31):57-62.
17. Korten NCM, Comijs HC, Penninx BWJH, et al. Perceived stress and cognitive function in older adults: which aspect of perceived stress is important? *J Geriatr Psychiatry.* 2022. doi: 10.1002/gps.4486.
18. Akbar MI, Effendi DS, Dewi N, Lestari H, Kohali RE. Interconnection study of stunting events in North Buton District. In *Proceedings of the 2nd Alauddin Health and Medical International Conference 2024 Mar 28.*
19. Aggarwal NT, Clark C, Beck TL, et al. Perceived Stress and Change in Cognitive Function Among Adults 65 Years and Older. *Psychosom Med.* 2019;76(1):80-85. doi: 10.1097/PSY.000000000000016.
20. KEMENKES-RI. *Buku Kesehatan Lanjut Usia.* Jakarta: Kementerian Kesehatan Republik Indonesia; 2021.
21. Desriatin, Tasnim,T., Risky, S., Depu, S.H. Analysis of the healthy living community movement program which was carried out without any policy in the industrial area in Konawe Regency. *Indonesian Journal of Health Sciences Research and Development.* 2023. 5(2).33-42. doi: <https://doi.org/10.36566/ijhsrd/Vol5.Iss2/169>.
22. Djabar, R., Tasnim, T., Munir, S. The relationship of elderly behaviour with visit compliance at the elderly posyandu review from the health belief theory in the Pomalaa Puskesmas Are. *Indonesian Journal of Health Sciences Research and Development (IJHSRD).* 2022. 3(2), 110-117. doi: <https://doi.org/10.36566/ijhsrd/Vol3.Iss3/99>