

# AKUDEMEN App: a digital health education intervention to enhance dementia awareness and elderly care at Griya Lansia Banguntapan

Pinasti Utami<sup>1\*</sup>, Ingenida Hadning<sup>2</sup>, Hendy Ristono<sup>3</sup>, Amallia Puspitasari<sup>4</sup>, Zelmi Dwi Novita<sup>1</sup>, Eliana Fairuz Afifah<sup>1</sup>, Fita Rahmawati<sup>5</sup>, Astuti<sup>6</sup>, and Zullies Ikawati<sup>5</sup>

<sup>1</sup>Pharmacology and Clinical Pharmacy Department, School of Pharmacy, Faculty of Medical and Health Science, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

<sup>2</sup>Managemen Pharmacy Department, School of Pharmacy, Faculty of Medical and Health Science, Universitas Muhammadiyah Yogyakarta, Yogyakarta, Indonesia

<sup>3</sup>Pharmacy Faculty, Universitas Ahmad Dahlan, Yogyakarta, Indonesia

<sup>4</sup>Industrial Engineering Department, Institut Teknologi Yogyakarta, Yogyakarta, Indonesia

<sup>5</sup>Department of Pharmacology and Clinical Pharmacy Faculty of Pharmacy, Universitas Gadjah Mada, Yogyakarta, Indonesia

<sup>6</sup>Department of Neurology, Faculty of Medicine, Universitas Gadjah Mada, Yogyakarta, Indonesia

**Abstract.** Dementia, often referred to as senility, remains underrecognized and poses significant challenges in elderly care. Limited public literacy regarding early symptoms, risk factors, and the use of digital health resources hinders timely detection and management. This study employed a community-based, non-experimental cross-sectional design conducted in February 2025 to evaluate the effectiveness of a digital health education intervention using the AKUDEMEN App, a mobile platform developed to enhance dementia awareness among older adults, families, and caregivers. A total of 33 participants, including administrators of Griya Lansia Salimna and representatives of PCA Banguntapan, completed pre- and post-intervention assessments using the Dementia Knowledge Assessment Scale (DKAS) and the System Usability Scale (SUS). The findings revealed a 9.21% increase in dementia knowledge, with statistical analysis indicating a significant improvement ( $p = 0.001$ ) between pre- and post-test scores. The AKUDEMEN App also achieved a mean SUS score of 68.33, demonstrating acceptable usability. The intervention demonstrated the potential of digital health education to improve dementia literacy and provide sustainable digital support in elderly care settings.

## 1 Introduction

Dementia is a decline in cognitive function that is generally accompanied, and sometimes preceded, by changes in mood, emotional control, behavior, or motivation [1]. In Indonesia, the prevalence of dementia is expected to continue to increase as the elderly population grows. Yogyakarta has the highest proportion of elderly residents in Indonesia, and this

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\*Corresponding author: [pinasti.utami@umy.ac.id](mailto:pinasti.utami@umy.ac.id)

demographic trend is expected to remain unmatched nationwide for the next 15 years [2]. The prevalence of dementia in Yogyakarta reaches 20.1%, significantly higher than the international average imposing a considerable burden on families, communities, and the local health system [3]. The high prevalence is closely associated with advanced age, female predominance, low education levels, stroke history, and unemployment.

Studies show that additional risk factors, such as low education levels and a history of stroke, significantly increase the risk of dementia [4]. Post-stroke, approximately 25–50% of patients experience cognitive impairment that can progress to dementia. In Yogyakarta, high prevalence is associated with older age, female gender dominance, low education, history of stroke, and unemployment [5]. The main risk factors for dementia include advanced age (65 years and above), hypertension, diabetes, obesity, smoking, excessive alcohol consumption, low physical activity, social isolation, and depression. Research confirms that dementia can be prevented by modifying these risk factors, including increasing physical activity, mental stimulation, and social interaction [6]. Decreased functional ability is also an indicator of dementia risk [7]. A study at Posbindu Caringin showed that low education levels are associated with dementia. Physical, mental, social, and spiritual activities can help prevent the decline in brain function. The risk of cognitive deficits also increases after a stroke, with 25–50% of stroke patients developing dementia [8]. Lack of family attention leads to isolation and anxiety, which can trigger dementia.

Family support has been shown to improve the quality of life for older people [9]. Griya Lansia Salimna, established in 2023 under the auspices of the North Banguntapan Aisyiyah Branch, is a community for the elderly, predominantly women. Women are more involved in informal care due to their social and emotional roles [10]. Caregivers play a crucial role in personal care, addressing behavioral issues and reducing the risk of death from dementia [11]. They also assist in fulfilling the physical, mental, social, and spiritual needs of older adults, support daily activities, reduce dependency, prevent complications, and help maintain the quality of life until the end of life [12]. However, activities at Griya Salimna are still limited to general health check-ups. Varying health conditions, age over 60, and diverse educational backgrounds are risk factors for dementia. Increasing knowledge has been shown to impact prevention. Initial surveys indicate that caretakers do not understand the early signs of dementia, such as memory loss and emotional changes [13], mainly due to a lack of prior information and counseling. However, social support can slow the progression of dementia by reducing isolation.

Common problems include a lack of understanding about dementia, limited access to information and support, and minimal use of digital technology by the elderly and caregivers. However, health technology, such as mHealth, has been shown to help people access medical services flexibly. A dual intervention is proposed to address these challenges: health education and implementing the digital application “AKUDEMEN”. This application is designed to detect early symptoms of dementia and provide practical guidance for caregivers. AKUDEMEN includes ADL and IADL measurements and several dementia detection questionnaires for patients and caregivers. This innovation aims to enhance dementia care by combining early detection features with educational and monitoring tools for both patients and caregivers. By combining education and technology, this program aims to improve early detection and comprehensive dementia care at Griya Lansia Salimna.

## **2 Methods**

### **2.1 Study design and participants**

This study employed a cross-sectional, non-experimental analytical design aimed at evaluating the effectiveness of a digital health education intervention in improving dementia

awareness and elderly care knowledge among participants at Griya Lansia Banguntapan. A total of 33 participants were included in the study using a purposive sampling method. All participants provided informed consent before participating in the intervention.

## 2.2 Intervention

The intervention consisted of counseling sessions and hands-on training using the AKUDEMEN application, a digital tool designed to enhance dementia literacy and caregiving skills. The intervention sequence included a pre-test, dementia health education session, AKUDEMEN app training, and a post-test. The counseling component covered essential topics such as dementia definition, early symptoms, risk factors, and early detection strategies. Meanwhile, the training component guided participants through the process of app installation, navigation, and utilization of its features under facilitator supervision. To ensure consistency, all facilitators received standardized instructions and followed identical procedures for all participants.

## 2.3 Instrument

Two validated instruments were used in this study: the Dementia Knowledge Assessment Scale (DKAS) and the System Usability Scale (SUS). The DKAS, consisting of 20 multiple-choice questions (maximum score 100), was used to measure participants' dementia knowledge before and after the intervention, with scores above 50% categorized as good. The SUS assessed the usability of the AKUDEMEN App, with scores interpreted based on an adjective rating scale from "Best Imaginable" to "Marginal" as shown in **Table 1**.

**Table 1.** Score system usability scale

Grade	SUS	Percentils Range	Adjective	Acceptable	NPS
A+	84,1 -100	96 – 100	Best Imaginable	Acceptable	Promoter
A+	80,8 - 84,1	90 – 95	Excellent	Acceptable	Promoter
A-	78,9 - 80,7	85 – 89	Good	Acceptable	Promoter
B+	77,2 - 77,8	80 – 84		Acceptable	Passive
B	74,1 - 77,1	70 – 79		Acceptable	Passive
B-	72,6 - 74,0	65 – 69		Acceptable	Passive
C+	71,1 - 72,5	60 – 64		Acceptable	Passive
C	65,0 - 71,0	41 – 59	OK	Marginal	Passive
C-	62,7 - 64,9	35 – 40		Marginal	Passive
D	kurang dari 51,7	15 – 34		Marginal	Detractor

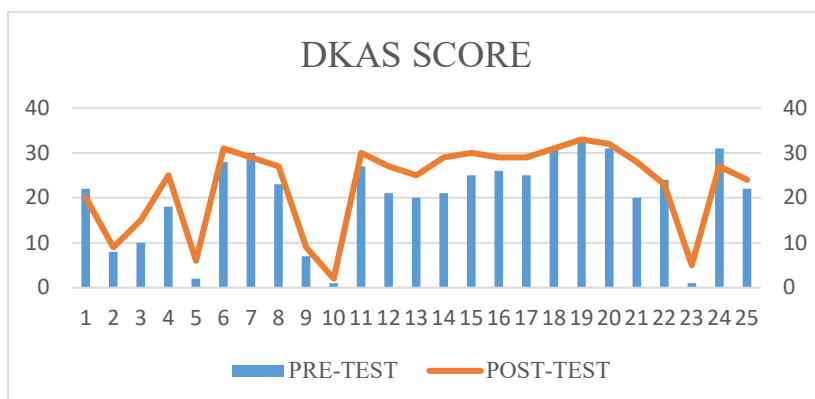
## 2.4 Data collection and analysis

Data were obtained from pre-test and post-test questionnaires administered to all participants. The paired t-test was used to compare the pre-test and post-test DKAS scores, as the data were normally distributed. A *p*-value of less than 0.05 was considered statistically significant. For usability evaluation, SUS scores were analyzed descriptively and interpreted based on the adjective rating scale shown in Table 1. Higher SUS scores reflected greater user satisfaction and better system usability of the AKUDEMEN App.

### 3 Results and discussion

#### 3.1 Knowledge Level

The Dementia Knowledge Assessment Scale (DKAS) was used to evaluate participants’ knowledge of dementia before and after the intervention. The DKAS consists of 25 items encompassing four domains: causes and characteristics, communication and behavior, care considerations, and risks and health promotion. Total scores range from 0 to 50, with higher scores indicating greater dementia knowledge. The DKAS has been validated as a reliable and comprehensive tool for assessing dementia knowledge among clinicians, educators, caregivers, and students, addressing key limitations found in earlier measurement instruments.



**Fig.1.** Comparison of participants’ dkas scores in pre-test and post-test phases (source: primary data, 2025)

As shown in Figure 1, most participants demonstrated increased scores across the 25 items. The greatest improvements were observed in items 4, 14, and 21, which assessed understanding of common dementia types, early signs and symptoms, and the role of lifestyle factors in dementia management. Overall, participants’ average DKAS scores increased by 9.21%, from 60.73% pre-test to 69.94% post-test, indicating a measurable improvement in dementia knowledge following the intervention.

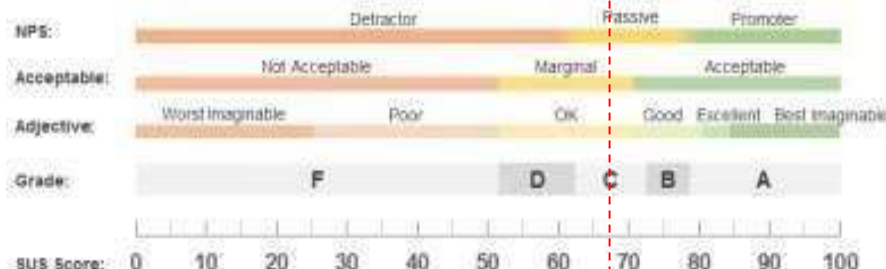
**Table 2.** Paired t-test results of knowledge improvement after AKUDEMEN app intervention

Measurement	N	Mean	SD	Sig. (2-tailed)
Pre-test	33	69.33	8.16	0.001
Post-test	33	75.87	7.18	

Table 2 presents the paired t-test results of knowledge improvement following the AKUDEMEN App intervention. The mean score increased from 69.33 (SD = 8.16) in the pre-test to 75.87 (SD = 7.18) in the post-test. The statistical analysis revealed a significant difference between the two measurements ( $p = 0.001$ ), indicating that the AKUDEMEN App effectively enhanced participants’ knowledge after the intervention. This finding aligns with previous studies showing that mobile health (m-Health) based interventions can improve dementia management by enhancing knowledge and caregiver support, increasing cost efficiency, and maintaining quality of life.

### 3.2 System usability scale application evaluation

The development of the AKUDEMEN application followed a multi-phase process, including user needs analysis, black-box testing, and limited-scale trials prior to broader implementation. The System Usability Scale (SUS) was employed to evaluate the application’s usability and overall user experience. The final usability assessment yielded a mean SUS score of 68.33, which falls within the “acceptable” range but indicates only moderate user satisfaction and a limited likelihood of recommendation.



**Fig.2.** AKUDEMEN usability level measured by system usability scale (sus) (source: primary data, 2025)

As shown in **Figure 2**, the AKUDEMEN App received a Grade Scale of C, classified as *Marginally Acceptable*, with a Percentile Rank between 41–59 and a Passive Net Promoter Score (NPS). These findings suggest that, while the application’s functionality and interface are generally satisfactory, further refinement is required to enhance user engagement and ease of use. The difference may be attributed to the distinct objectives of each application, AKUDEMEN focuses on health education and caregiver training, whereas Digimenz emphasizes interactive engagement and entertainment. Accordingly, future development of AKUDEMEN should prioritize improvements in interface design, interactivity, and personalized content delivery to strengthen user experience and satisfaction.

Health apps can positively influence clinical outcomes, user engagement, and self-management behaviors, though implementation challenges remain [14]. In line with this evidence, the implementation of m-Health applications such as AKUDEMEN demonstrates the potential to broaden access to health education and services for older adults. Such interventions can enhance health literacy, promote self-management, and ultimately improve quality of life and independence among aging populations. As an evolving approach to managing chronic disorders, mobile health technology continues to offer innovative solutions for patient care [15].

### 3.3 Strength and limitation

This study demonstrates several strengths. The AKUDEMEN App represents an innovative m-Health intervention designed to improve dementia knowledge and awareness among caregivers and the general public. The use of a pre–post experimental design with a validated questionnaire provides empirical evidence of knowledge improvement following the intervention. Furthermore, the digital delivery format enhances accessibility, making dementia education more scalable and feasible across various community settings.

Nevertheless, this study has several limitations. Participant characteristics, such as varying levels of digital literacy and prior exposure to health technologies may have influenced usability perceptions. Future studies should employ longitudinal designs to evaluate sustained effects, and incorporate advanced digital features (e.g., personalized feedback, progress tracking, or gamification) to improve user engagement and assess the long-term impact of AKUDEMEN on dementia awareness, prevention, and care practices.

## 4 Conclusion

The AKUDEMEN application can improve knowledge and usability, categorized as acceptable but with moderate enthusiasm for recommending it to others. Further improvements are suggested, including refining the app's interface, adding interactive features, and continuing caregiver support and education programs to enhance user engagement and outcomes.

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