

INNOVATION OF ELDERLY CARE STICKS IN MAINTAINING ELDERLY WALKING BALANCE AND SPEED

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INFO ARTIKEL	ABSTRACT
Diterima 04 November 2022 Direvisi 12 December 2022 Disetujui 25 December 2022	<i>The study of balance in the elderly is a serious concern. Even the main goal of rehabilitation for elderly people who have fallen is to improve balance. The need for a simple, fast, and accurate balance-checking tool is expected to help the elderly rehabilitation program. The purpose of this research is to produce Assistive Technology in fulfilling ADL to reach the SMART elderly. Research Methods This type of research is a cross-sectional study with observational (survey). Observation of balance in the elderly with two measuring devices, namely balance and walking speed. This research was conducted at the Tresna Werda Nursing Home Jakarta in August 2022. The number of residents of the Tresna Werda Jakarta Nursing Home who participated in the inclusion and exclusion criteria selection was 30 people consisting of 10 (35%) men and 30 (65%) females. The elderly who have fulfilled the inclusion and exclusion criteria become research subjects. In this study of the elderly using the I Care Stick, the results were better than the ordinary stick with a significance of 0.001. The average speed of respondents walking using the I Care Stick was 28.47 seconds and the normal walking stick was 31.87 seconds. In this study, it was found that the balance of the elderly who used the I Care Stick was more stable than the elderly who walked using a regular cane with a significance of 0.001, with the average slope that occurred on the I Care Stick at 21.13 seconds and the regular cane at 10.53. The elderly who used the I Care Cane significantly (p-value: 0.001) seemed to walk better than the regular cane with an average speed of 34.70 seconds, while the average speed of the cane was 42.80 seconds. The balance of the elderly who uses the I Care Cane is very significant compared to the elderly who walks using a regular cane</i>
Keywords: <i>Sticks for the Elderly, Balance, Walking speed.</i>	

Introduction

Elderly in the future the number will increase. The results of the 1990 population census number of elderly are 6.3% (11.3

million people), in 2015 the number of elderly people is estimated to reach 24.5 million and will exceed the number of children under five

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which at that time was estimated at 18.8 million people. In 2020, the number of elderly people in Indonesia is expected to rank 6th in the world and will exceed the number of elderly people in Brazil, Mexico, and European countries.

The Elderly is not a disease, but an advanced stage of a life process that is marked by a decrease in the body's ability to adapt to environmental stress (Hindriyastuti & Zuliana, 2018). In general, signs of the aging process begin to appear from the age of 45 and problems will arise around the age of 60 (Setiorini, 2021).

The aging process is often followed by a decrease in quality of life so the elderly can experience health problems. One of the problems among the elderly is falling (Sari & Azizah, 2022).

Falls are one of the geriatric giants and a major problem among the elderly. More than one-third to one-half of seniors aged 65 and over fall each year and falls often result in serious injury. Falls in the elderly occur due to many factors, including cognitive impairment, muscle weakness, poor posture, visual disturbances, balance disorders, and abnormal walking patterns (Alviah & Imania, 2017). Of these factors, balance disorders are the main factor in the occurrence of falls. Another study found that 51% of people with balance disorders aged 65-74 years reported falling.

Balance is the ability to maintain the body in a state of balance (stable). The state of equilibrium is when the center of gravity of the body is in the plane of support. A state of balance is necessary at rest and movement. If the elderly are unable to maintain a balanced body posture, they will fall (Yani et al., 2020).

The study of balance in the elderly is a serious concern. Even the main goal of rehabilitation for elderly people who have fallen is to improve balance. The need for a simple, fast, and accurate balance-checking tool is expected to help the elderly rehabilitation program (Erobathriek, 2017).

The Elderly is someone who has reached the age of 60 years and over, the aging process

in the elderly occurs as the elderly get older which will cause problems related to health, economic, and social aspects (Tristanto, 2020). Overcoming this problem requires development based on evidence-based assistive technology in fulfilling the concept of ADL (Activity Daily Living) is an activity of daily life that is routinely carried out by individuals in their lives. Seniors SMART (Healthy, Independent, Active and Productive) to help the elderly who have limited ADL fulfillment.

The Walking Stick is specially designed to be comfortable for everyday use. This stick can help you gain maximum stability in supporting mobility. Made with a practical design, we can adjust the height of the stick as needed. Made of high-quality material, which is sturdy, lightweight, and not easy to rust. This stick is also suitable for the elderly or for those who are going about their daily activities.

The geriatric syndrome is a series of clinical conditions in elderly people (elderly) which can have an impact on reducing the quality of life, disability, and even the risk of death (van der Putten et al., 2014). Some of the four risk factors that are common in geriatric syndrome include old age, impaired cognitive function, and impaired carrying out daily activities. day, impaired mobility (Brown et al., 2012). An elderly group is a group that is prone to balance disorders and falls (postural instability).

Complications of posture instability most often cause falls and fractures in the elderly. Handling the elderly who fall is not limited to injuries, but identifying and preventing the causes of falls in the elderly is very important to avoid recurring falls (Huang et al., 2012). In addition to falling, the elderly are very vulnerable to several diseases caused by decreased immunity. The aging process increases the tendency to suffer from severe infections which are the main cause of high mortality and morbidity in old age (Susanti, 2014).

The Elderly is someone who has reached the age of 60 years and over, the aging process

in the elderly occurs as the elderly get older which will cause problems related to health, economic, and social aspects (Prince et al., 2015). Based on the 2020 population census, there has been an increase in the proportion of the elderly or elderly population (60 years and over) to 9.78 percent in 2020 from 7.59 percent in 2010.

Assistive Technology is a term that refers to all tools or systems that enable a person with disabilities (could be due to disease or aging/degenerative effects) to carry out their daily activities to increase convenience and safety in these activities (Pradana, 2018).

Furthermore, technology has a very large role for the elderly in improving their quality of life, this is to the results of research conducted by (Pradana, 2018) which stated that the use of companion technology has been scientifically proven to have a large role in improving the quality of life of individuals with dementia based on studies. literature with a simple approach to 11 articles about the application of companion technology for the elderly, the results obtained are an increase in client satisfaction and independence in carrying out daily activities with the help of assistive technology.

ADL (Activity daily living) is the activity of doing routine daily work and is the main activity for self-care. ADL is a measuring tool for assessing a person's functional capacity by asking about activities of daily life, to find out the elderly who need help from others in carrying out activities of daily life or can do it independently. Based on the problems mentioned above, a research innovation is needed to solve problems based on Evidence-Based Assistive Technology in fulfilling ADL to reach SMART (Healthy, Independent, Active, and Productive), senior citizens, in the form of developing a walking stick that has sensors for elderly people with visual impairments and limitations in physical activity. walk.

Producing Assistive Technology in fulfilling ADL to reach the SMART Elderly

using the balance function data collection technique in this study.

Method

This type of research is a cross-sectional study with observational (survey). Observation of balance in the elderly with two measuring devices, namely balance and walking speed (Smith-Ray et al., 2014). The research method in the first year was to develop a prototype of the elderly stick to become the I Care Stick and to test its function of the I Care Stick.

The instruments and measuring instruments used are a checklist that includes:

- 1) Time the speed of the elderly walking. The measuring instrument used is a timer,
- 2) The time when the balance disturbance or tilt begins. The measuring instrument used is a timer,

The population in this study were all elderly living in the Tresna Werda Social Institution and meeting the inclusion and exclusion criteria. Subject inclusion criteria were at least 56 years old (elderly), living in the Tresna Werda Social Institution, Jakarta, able to walk 10 meters, and able to follow simple instructions or orders. Examination with a mini mental test, able to see and distinguish between two objects at a distance of 6 meters, does not suffer from neurological diseases such as Parkinson's, or stroke.

A. Implementation Stage

1. The walking speed test is carried out using the "10-meter walk test":

The research team measured the walking speed of the elderly by:

- a. Measuring the speed of the respondent walking without assistance using an assistive device as far as 10 meters, with the time being measured is the medium distance that is as far as 6 meters
- b. Take the initial measurement starting when your toes cross the 2-meter mark
- c. Taking the measurement ends/stops when the toes cross the 2-meter mark

- d. Take measurements on three trials and calculate the average of the three trials for the use of a regular cane
- e. Perform three trials of measurements and calculate the average of three trials for the use of the I Care Stick

A representation of the 10-meter walk test line is described in the figure below:

Set-up (derived from the reference articles):

- measure and mark a 10-meter walkway
- add a mark at 2-meters
- add a mark at 8-meters

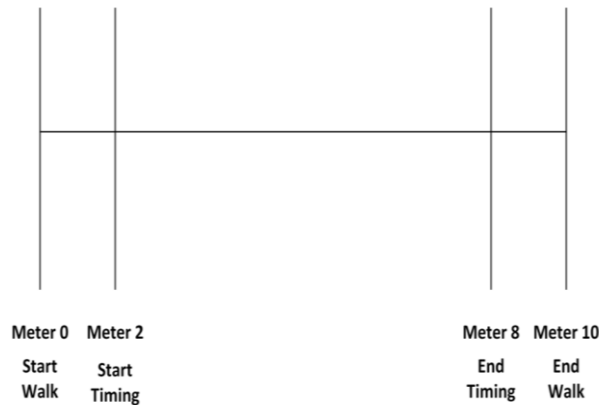


Figure 10.
Representative line of a 10-meter walk test

2. The balance test is carried out by using the “10-meter walk test”:

When measuring the walking speed test, a balance test is also carried out by measuring at what second the balance disturbance starts to occur which is indicated by the tilt of the elderly's body $> 15^\circ$. Measurements were taken when the respondent used a regular cane and when he used the I Care Stick.

Result and Discussion

This research was conducted at the Tresna Werda Social Institution, Jakarta in August 2022. The number of residents of the Tresna Werda Social Institution, Jakarta who participated in the inclusion and exclusion criteria selection was 30 people consisting of 10 (35%) men and 20 (65%) women. The elderly

who have met the inclusion and exclusion criteria become research subjects.

Data analysis included univariate analysis with descriptive statistics to determine the characteristics of the research subjects which included age, sex, and history of falls. Univariate analysis was also used to determine the distribution of data and the normality of data distribution for the data ratio scale.

A. Test the Function of the I Care Wand

The function test of the I care stick was carried out on 30 elderly people with the following results:

- 1) A comparison of the results of the walking speed test between the I Care Stick & the Ordinary Cane was carried out using the T-Test, with the following results:

Table 1
Distribution of the average walking speed of the elderly by type of cane

Variable	Mean	SD	SE	P value	n
Road Speed					
I Care stick	28.47	8.468	1.546	0.000	30
Common Stick	31.87	8.097	1.478		

In this study, it was found that the elderly who used the I Care Stick walked faster than ordinary canes with a significance of 0.001. The average walking speed of respondents using the I Care Stick was 28.47 seconds, while the

average walking speed was longer, 31.87 seconds.

2) A comparison of the results of the walking balance test between the I Care Stick & the Ordinary Cane was carried out using the T-Test, with the following results:

Table 2.
The average distribution of walking balance in the elderly by type of cane

Variable	Mean	SD	SE	P value	n
Balance					
I Care stick	21.13	10.248	1.871	0.000	30
Common Stick	10.53	5.643	1.030		

In this study, it was found that the I Care Stick in the balance test proved to be better, as evidenced by that the elderly who used the I Care Stick were more stable/more balanced than the elderly who walked using a regular cane with a significance of 0.001, with an average slope of the I Care Stick being at 21.13 seconds while the stick usually occurs at 10.53 seconds.

Research and development of Elderly Balance & Walking Speed. The study of the I Care Stick as a measure of balance for the elderly is expected to reinforce the assumption that the I Care Stick is a valid, reliable, and efficient walking aid for the elderly (van Het Reve et al., 2014).

The results of the walking speed and balance test were: The elderly who used the I Care Stick significantly (p-value: 0.001) walked faster than ordinary canes with a significance of 0.001. The average speed of respondents walking using the I Care Stick was 28.47 seconds, while the average walking speed was longer, 31.87 seconds.

The balance of the elderly who used the I Care Stick was significantly more stable/more

balanced than the elderly who walked using a regular cane with a significance of 0.001, with the average slope occurring on the I Care Stick at 21.13 seconds while the normal walking stick occurred at 10.53 seconds. Balance is needed to maintain position and stability when moving from one position to another (Lee & Scudds, 2003). The balance of the elderly who improves by using the I Care stick shows that their cognitive function improves, according to (Pramadita et al., 2019) which shows that there is a significant relationship between cognitive function and impaired postural balance in the elderly.

The elderly show a decline due to age in the sensory system and reduced ability to adapt to changes in their environment to maintain balance. Using the I Care stick increases walking speed and improves balance, this is in line with (Pieruccini-Faria et al., 2020) study which stated that there are different changes in spatiotemporal gait parameters associated with aging, such as slower gait and increased gait variability, which is reinforced by exposure to visual disturbances. Increased gait variability, particularly with mediolateral distraction, poses

a particular challenge for elderly adults and is associated with an increased risk of falls. Virtual reality training has shown promising effects on balance and gait.

The I care stick used by the elderly gives patients confidence to walk faster because the care stick provides stability to the elderly. Elderly who walk without a cane will feel unbalanced when walking at a faster speed, this is by (Kongsuk et al., 2019) showing some elderly people with lower balance feel unbalanced at a faster walking speed, even though the external threat to balance is low.

The activity of patients in this study using the I care stick increased, in line with (Ivanali¹ et al., 2021) which stated that there was a significant relationship between low physical activity and changes in the balance of the elderly with a negative correlation direction which means that the lower the physical activity, the worse the balance of the elderly.

The walking speed of the elderly in this study increased from 31.87 seconds per 10 meters to 28.47 seconds per 10 meters distance traveled, this shows that to travel the same distance, I Care stick users need less time, and walking speed increases. This is in line with (Wijayani et al., 2022) which shows that there is a non-unidirectional relationship, that is, the higher the dynamic balance value, the less time it takes to carry out the 4-meter walking test (the faster the walking speed).

Tingkat I Care is a companion technology in line with (Pradana, 2018) which shows an increase in client satisfaction and independence in carrying out daily activities with the help of assistive technology.

Conclusion

Research has shown that the elderly who use the I Care Stick walk faster than ordinary canes with a significance of 0.001. The average speed of the respondents walking using the I Care Stick was 28.47 seconds while the normal walking stick was longer at 31.87 seconds. The balance of the elderly who used the I Care Stick was significantly more stable than the elderly

who walked using a regular cane.

Research has shown that the elderly using the I Care Stick in a balance test proved to be better and more stable/more balanced than the elderly who walked using an ordinary cane with a significance of 0.001, with the average slope occurring on the I Care Stick at 21.13 seconds while the normal walking stick at 10.53 seconds.

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