

# Ablution place Ergonomic Design and Effect on Elderly Comfort (Case Study of Mosques in Indonesia)

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## 2 Ablution place Ergonomic Design and Effect on Elderly Comfort (Case Study of Mosques in Indonesia)

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### ABSTRACT

When taking ablution water, the bowing position is associated with discomfort, back pain, and potential risk of falling in the elderly. Meanwhile, an ergonomic design provides compatibility between limitations and the equipment design, thereby ensuring comfort and safety from injury. This study aims to obtain an ergonomically designed ablution place for the elderly. This was a qualitative study conducted to obtain an ergonomically designed ablution place using a mosque in Indonesia as case study. The data were obtained via interviews and observation. 1 Observations on the ablution place include the floor, water taps height, while data validity was carried out by triangulating the interviews and observations results. The results showed that 1 the bent posture causes discomfort, meanwhile, there was no wall grip as well as seat and footrest at the ablution place. In addition, the water tap height was 72 cm while the bent posture was 90°. Based on the results, ablution facilities are not ergonomically and specifically designed. Meanwhile, 1 the ease of worship facilities for the elderly contributes to the prevention of injury, illness and improvement of life quality. The findings from study is 1 become a guideline for preparing ablution place in mosques, thereby increasing comfort and convenience.

Keywords: *ablution place, elderly, comfort, ergonomic design.*

## INTRODUCTION

The elderly population in Indonesia increase by 2.14% from 2010 to 2019, with a total of 25.9 million people due to an increase in life expectancy (Kemenkes 2019). According to the Ministry of Health, they are classified as individuals aged 60 years and above (Kholifah 2016). Meanwhile, with increasing age there is a decrease in physical abilities and movement coordination due to physiological degeneration processes that affect the independence. This is determined based on dependence on the environment and other people. Although, ablution constitute one of bathroom activities, the elderly are not entirely independent in performing this task. The difficulty of reaching extremely high water tub is 97% as found at the Tresna Wredha Denpasar, a social institution (Ananta and Griadhi 2017), therefore, bathroom comfort needs to be prioritized through suitability of equipment and design that fulfills safety aspects. The ablution place constitute one of the worship facilities for Muslims used at least 5 times a day, this makes the floor to be wet and slippery, resulting in a potential risk of falling. Meanwhile, the ablution process involves movements to clean the body parts such as the face, hands, and feet. With an ergonomic design, the ablution movement becomes more comfortable while sitting (Suparwoko 2016).

Non-ergonomic ablution places, especially for the elderly, are found in most mosques at Indonesia. Observations at the research location found that there was no hand restraints while bowing posture for a long time causes discomfort and low back pain. This study was conducted using an ergonomic perspective to prevent injury and achieve a balance between abilities and limitations in the elderly. Ergonomics is a multi-disciplinary approach to design equipment, therefore, harmony is obtained between humans and equipment to improve healthy, safe, comfortable and efficient work (Hutabarat 2017)(Yumadhika and Sholihah 2019). This study aims to develop an ergonomic ablution design for the elderly.

## METHOD

### 1. Research location and design

This study was conducted in a mosque at Deli Serdang Regency, located on the causeway connecting the sub-district city and the Kuala Namu international airport which has become a stopover for Muslims to pray. The qualitative research design was used because it examines one problem, namely the ablution place condition in the elderly (single). Moreover, the problem was observed in-depth and explored ablution place comfort, hence, an ergonomic design was found.

### 2. Research informant

The research informants consisted of 2 elderly key informants, and 1 supporting informant (the mosque *nazir*) which have been asked for approval and willingness to become research informants, as well as 2 community support informants that came to the mosque. Informants were determined using accidental techniques, during the research.

### 3. Data collection

Data were collected through interview and observation. Interviews were conducted to obtain information, opinions and the need for an ergonomically designed ablution place by asking open questions, recorded using Sony tape recorder. Meanwhile, observations at the ablution place include height of the water tap and floor, bathroom wall, as well as the distance between the bathroom and mosque. Anthropometric data were measured in 4 elderly informants, namely body height, leg to waist length, and reach length using GEA brand stature meter from the laboratory of the Public Health Faculty, State Islamic University of North Sumatra, Medan, meanwhile, tap height and distance were measured using a Stakley brand meter.

### 4. Data analysis

The data analysis begins with data collection, reduction, presentation and formulation of

conclusions. Reduction involve data sorting, and removal of certain themes and categories (Rijali 2018). Furthermore, unnecessary information were also eliminated. The interview results were validated by triangulating the sources and comparing it with the data from observations.

## RESULTS

Anthropometric measurements are needed to design a seat for ablution. The sizes required for the design are shown in table 1 below.

**Table 1. Anthropometric Measurement of the Elderly Aged 68 - 78 years old (n = 4 people)**

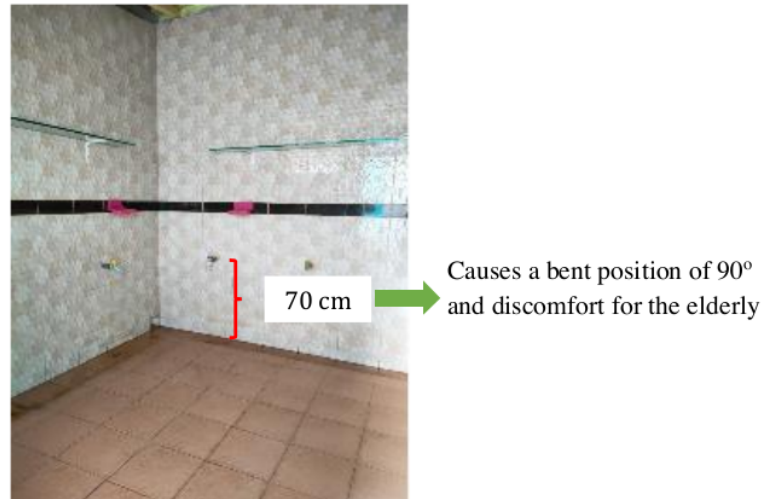
Measurement	Average (cm)	
	Male	Female
Body height	159.5	145
Length of leg to waist	91	87
Reach length	62	58
Waist height in sitting position	52	48
Foot length	24	20

*Source: primary data, February 2021*

Based on the measurements on 4 (male and female) subjects aged 68-78 years, there were differences in size, while the average height was 159.5 cm, and 145 cm for male and female respectively. Furthermore, the average leg to waist length was 91 cm for male and 87 cm for female while the reach length was 62 cm for male, and 58 cm for female. The sitting position for the male was 52 cm, and 48cm for the female while the foot length was 24 cm and 20 cm respectively.

The interview results with 2 informants showed that the bowing posture during ablution cause discomfort, meanwhile, the informant also reported that the standing position last longer than the bowing position. Moreover, the third informant (mosque *nazir*) stated that the seating design is very necessary to ensure safety during ablution. Based on the observation results, the average time required for ablution ranged from 7-12 minutes, with females taking longer than

males. The following figures shows the ablution place, the height of the tap, the floor and walls of the ablution place.



**Figure 1. The ablution place and the tap height**

The observation result showed that the water tap height was 72 cm, therefore, the elderly have to bend by 90°. Also, there was no handrails, seats and footrests, while the distance between the ablution and the prayer places was 5 meters.



**Figure 2. The tap splash shower system**

Other conditions obtained through field observations shows that open places were made for male (without doors) but closed for women to protect women's aurat during ablution. The water

tap was equipped with a splash shower to reduce water use as the water is evenly distributed on the body. In addition, the bathroom is cleaned 3 times a day, after dawn, midday and sunset.

## **DISCUSSION**

The ideal ablution place design is adapted to overcome elderly limitations based on anthropometry. Besides, the elderly last comfortably in a standing position compared to the bent position. The results also showed that the water tap height at 72 cm causes the elderly to bend 90° during ablution. This causes limitation and slowdown of movement in carrying out ablution. When the bent position is sustained for a long time, there is potential risk of back pain. Therefore, the ablution place design is carried out to avoid the bowing posture. Aman (2017) explained that the design needs to consider body parts such as the forearms, neck and legs. Moreover, posture improvement reduces difficulties in performing ablution in the elderly (Aman, Dawal, and Rahman 2017). It was also reported that anthropometric data such as height, and horizontal arm length, constitute the basis for designing ablution places (Anisah, Yuliarty, and Anggraini 2019) (Hasbi and Mamat 2020).

Dawal's (2016) in a study carried out at a mosque in Malaysia stated that most of the elderly (53%) chose to sit during ablution. They feel more comfortable, when ablution place in the mosque provides a place to sit, as these individuals do not have to stand and bend over. Furthermore, the need for seating is required by the elderly aged 60 years and above (Dawal et al. 2016). In contrast to Aman (2017), observations were made on body posture using the RULA method. The standing posture when cleaning hands cause no harm but still needs further evaluation. In addition, the standing posture when cleaning the feet as well as provision of footrest showed better results and were accepted, given that both variables prevents discomfort. Anthropometric measurements showed that the average height of the elderly male was 159.5 cm and 145cm for the female. Besides, increasing age causes the vertebral column bone mass

to decrease and become shorter, hence, it affects the elderly height (Azkiyah, Handayani, and Holipah 2016). Ablution is carried out in a standing or sitting posture, however, Suparwoko (2016) stated that standing posture causes the legs to receive pressure from the whole body. In contrast, the body weight when using the sitting posture is on the seat, therefore, ablution is more comfortable.

Observations on the ablution place shows that the floor is dry. This is supported by the interview results, which indicates that the the ablution place and bathroom is cleaned 3 times a day to keep the floor dry and not slippery. According to previous research, there is possible risk of injuries resulting from falls due to wet floors, therefore, efforts in form of drying the floor properly after use is required for safety (Kuboshima, McIntosh, and Thomas 2018)(Kuboshima, McIntosh, and Thomas 2018).

## **CONCLUSION**

Ablution facilities have not been ergonomically and specifically designed for the elderly, meanwhile, worship facilities need to consider the safety and comfort factors of its users, including the elderly. The physical limitations is solved by ergonomic design with chairs, footrests and handrails in the ablution place. Furthermore, the combination of standing and sitting ablution places give a sense of comfort to the elderly. The standing position is utilized when washing the face and hands, meanwhile, chairs are needed to wash the feet, and the handrails on the wall are used to rise after ablution. The findings from this research are expected to become a guide for preparing ablution places design in mosques, thereby increasing comfort and safety, as good design contributes to the prevention of injury as well as illness, and overall improvement of life quality.



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