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Factors Associated with Caregivers' Concern in Maintaining the Oral Function of Elderly Living in Long-Term Care Facilities

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Abstract

This study investigated the attentiveness of elderly caregivers in long-term care facilities in maintaining oral function. A cross-sectional approach was used to achieve the study's purpose. The sample size formula accounted for 213 caregivers randomly selected from 18 long-term care facilities in 4 provinces. A self-reported questionnaire of sociodemographic characteristics and an adapted Leopold's oral care checklist was distributed. The average age of study participants was 35.24 (±11.2 SD; aged 18–70 years), dominated by females (62.9%), and only 39% had experienced long-term care training. Multiple linear regression analysis indicated that younger caregivers likely pay more attention in the swallowing periods (β = -.182), females pay more attention in meal preparation (β = .146), and environmental observation (β = -. 238). Caregivers working in public long-term care facilities and having longer working experience paid more attention in environmental observation (β = .172) and (β = -.161), while training experience showed a significant association with feeding and swallowing periods (β = .291) and (β = .211). This study highlights the importance of training programs for care capacity, particularly oral care.

Keywords: aspiration pneumonia, caregiver, elderly, oral care

Introduction

Most countries have experienced aging population,[1] including Indonesia. Statistics Indonesia reported that the proportion of the older population in 2023 had reached 11.75%.[2] Aging population has substantial implications for various aspects of life, as well as for health policy and healthcare service needs.[3] The elderly naturally experience degeneration and functional decline throughout their entire organ system,[4-5] resulting in the emergence of chronic diseases and problems in the oral cavity. Chronic diseases share common risk factors with most oral diseases; for example, the aging process is associated with diminished function of salivary glands, which results in mouth dryness and dental caries caused by reduced salivary flow.[4]

Aging is also strongly associated with decayed, missing, or filled teeth (DMF-T). According to the 2023 Indonesian Health Survey, the prevalence of DMF-T in the elderly aged 65 or above is 13%.[6] Dental and oral health problems are among the top ten health issues suffered by the elderly, along with hypertension, stroke, diabetes, pneumonia, joint diseases, and upper respiratory tract infections.[6] Furthermore, poor oral health is significantly associated with the risk of aspiration pneumonia,[7] coronary heart disease, metabolic syndrome, and reduced quality of life for the elderly.[8]

Aging causes a decline in the function of the digestive system,[9] including oral and swallowing function. This situation causes frequent visits to health care providers. Simultaneously, changes in the oral cavity in older adults may limit their ability to eat and enjoy a normal diet, impacting their nutritional intake and contributing to malnutrition.[10] These aging-related conditions negatively affect older adults' quality of life, dignity, and general health.[11] Degeneration of the oral cavity and masticatory function causes decreased swallowing ability.

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This condition makes the elderly susceptible to aspiration of foreign material (such as food debris, saliva, and fluid) that descends into the bronchial tree and the lung alveoli. With age and functional decline, coughing reflexes, ciliary transport, and intact immune systems that act as defense mechanisms become impaired. This condition renders fragile elders more vulnerable to developing aspiration pneumonia.[12] Addressing both oral health and swallowing function can significantly reduce the risk of aspiration pneumonia, especially in vulnerable populations.

The elderly living with various physical deterioration often need long-term care and require various levels of assistance in performing their activities of daily living, including self-care.[13] Appropriate support for oral care and swallowing function necessitated by aging-related decline is also essential to maintain and improve not only oral health but also the overall health and well-being of older adults.[14-15] As various diseases and disorders cause functional disabilities in older adults, they require caregivers to support their daily activities. Caregivers are particularly essential in assisting older persons suffering from physical and/or mental limitations.[16] Residents of long-term care institutions are at a greater risk for oral health problems due to their declining physical condition.[17-18] Moreover, long-term care institutions often have difficulty providing good oral health care to their residents due to the lack of human resources.[19]

While long-term care services in Indonesia emphasize family-based care in the community, there are various reasons why many older adults reside in long-term care facilities.[20] In 2019, 445 long-term care facilities were managed by the government and private companies in Indonesia. Government-managed long-term care services mainly provide social protection for older persons, assisting them in restoring and developing social functions managed by the Indonesian Ministry of Social Affairs' insurance system.[21] Privately owned long-term care facilities are retirement homes or care institutions prioritizing housing and services tailored to each individual's needs. These can include living facilities, meals, recreational activities, and some form of health or hospital care.[22]

Implementing a comprehensive oral care program in a stroke unit reduced aspiration pneumonia rates from 4% to 1.4%.[23] Another study concluded that improving oral hygiene could prevent 1 in 10 deaths from pneumonia in elderly nursing home residents.[24] To the authors' knowledge, there have not been many studies on oral care that involve the importance of maintaining swallowing function in the elderly, who are a vulnerable group to experience aspiration pneumonia. This study used oral care and swallowing function instruments, adapted from Leopold's five-stage ingestion checklist, aimed at identifying the extent of elderly caregivers' attention in performing oral care and maintaining swallowing function, and identifying the associated factors. This study's findings could become evidence to strengthen the capability of elderly caregivers in long-term care facilities in Indonesia as frontliners for aspiration pneumonia prevention in long-term care facilities. Maintaining the swallowing function is critical for preventing life-threatening complications, supporting healthy aging, and reducing healthcare burdens globally.[25] The growing emphasis on innovative assessment methods and targeted interventions reflects both the urgency and evolving strategies in addressing dysphagia as well as reducing the risk of aspiration pneumonia.

Method

A cross-sectional observational study was used to clarify the attentiveness of caregivers in providing meal assistance to the elderly in long-term care facilities and determine the potential associated factors. Long-term care facilities refer to the institutions that provide long-term care for the elderly, both medical and personal support services, to individuals who are unable to live independently due to chronic illnesses, disabilities, or age-related conditions.[13] In Indonesia, there are several types of long-term care facilities, including nursing homes, respite care, assisted living, and Griya Lansia, as well as centers for seniors or any type of elderly home.

The procedure for implementing research permits begins with coordination with the Indonesian Ministry of Social Affairs, as the guardian of elderly homes in Indonesia. A total of 30 letters of request for research permits were sent to the list of accessible long-term care facilities from November 2018 to March 2019. There were 18 responses from 4 provinces that were finally followed up with research procedures comprising 11 privately owned institutions managed by profit and non-profit foundations. The four provinces, including Special Region of Yogyakarta, Banten, Special Capital Region of Jakarta, and West Java, employed 400 caregivers. A Lameshow sample size calculator accounted for 197 study participants with 10 inflation, 216 participants with 3 incomplete responses, and 213 study participants (Table 1). A random proportional selection method was used to enroll caregivers working in long-term care facilities. Furthermore, a research explanation was delivered, followed by obtaining signed informed consent.

Table 1. The Distribution of Long-Term Care Facilities

Province	Long-Term Care Facilities	Ownership	Number of Caregivers	Percentage (%)
Special Region of Yogyakarta	Long-Term Care Facility A	Government	18	8.37
	Long-Term Care Facility B	Government	13	6.05
	Long-Term Care Facility C	Government	8	3.72
	Long-Term Care Facility D	Private	10	4.65
West Java	Long-Term Care Facility E	Government	13	6.05
	Long-Term Care Facility F	Private	4	1.80
	Long-Term Care Facility G	Private	4	1.80
	Long-Term Care Facility H	Private	18	8.37
	Long-Term Care Facility I	Government	17	7.91
	Long-Term Care Facility J	Private	20	9.30
Special Capital Region of Jakarta	Long-Term Care Facility K	Government	17	7.91
	Long-Term Care Facility L	Government	20	9.30
	Long-Term Care Facility M	Private	20	9.30
	Long-Term Care Facility N	Private	5	2.33
	Long-Term Care Facility O	Private	4	1.80
Tangerang Banten	Long-Term Care Facility P	Private	6	2.79
	Long-Term Care Facility Q	Private	6	2.79
	Long-Term Care Facility R	Private	10	4.65
Total			**213**	100.00

Data were collected using a background questionnaire regarding participants' sociodemographic details (age (<35 and ≥35), sex, educational background (elementary school, junior school, high school, and higher education), years of working experience, training received in the last five years after assigned at the nursing home staff, and the type of care facility that consist of private care facility (managed by private sector) and public care facility (managed by the government). To assess the outcome variable, a 42-item validated checklist was adapted from previous studies.[26-27] The original instrument is relevant to Japanese and Indonesian culture. It incorporates Leopold's five-stage process of ingestion, which emphasizes the sequential and coordinated nature of ingestion, from anticipation to digestion, which involves both motor and sensory systems in the ingestion process.[28]

The adapted version of the checklist comprises two domains. The first is environmental observation, which is observations of the care-setting environment relative to older residents' dietary needs; the domain includes nine items. The second is function and eating capabilities observations, which is divided into five periods: a) before-meal period (the patient's overall condition before meals; five items), b) meal preparation period (three items), c) feeding period (eight items), d) swallowing period (13 items), and e) after-meal period (four items).[22] Multidisciplinary experts (gerontologists, dentists, occupational therapists, nurses, and Japanese experts) were involved during the oral care checklist adaptation to confirm that the content and construct validity in Japanese and Indonesian cultures, including eating habits, were clarified. Cronbach's alpha, indicating Internal consistency reliability for each checklist category, ranged from 0.541 to 0.896.

This study used IBM SPSS Statistics for Windows (version 25.0 IBM Corp., Chicago, IL, USA) for data analysis, descriptive statistics to identify participants' sociodemographic characteristics, and Pearson's correlation coefficient to test the bivariate association between the variables and oral care in each domain. The enter method of multiple linear regression was conducted to explore the association of sociodemographic characteristics with each oral care implementation domain score. Statistical analysis was performed using a 95% degree of confidence, and oral care implementation scores were tabulated by summing the total scores of all items in each domain and period of the respective factors; higher scores indicated better implementation.

Results

Table 2 shows that the average age of the study participants was 35.24 years (±11.2 SD). Most participants were female (62.9%), graduated from high school (46.0%), had no long-term care training (60.6%), and had more than five years of working experience (62.4%). Private and public care institutions were equally represented, and oral care practice implementation was poor.

Table 2. Sociodemographic Characteristics and Oral Care Implementation of the Participants (N = 213)

Category	Frequency	Percentage (%)
Ages (mean: 35.24±11.2 SD (18–70))		
<35.24 years old	97	45.4
≥ 35.25 years old	116	54.5
Sex		
Male	79	37.1
Female	134	62.9
Educational Background		
Elementary school	13	6.1
Junior school	29	13.6
High school	98	46.0
Higher education	73	34.3
Working Experience (mean: 7.74±6.8 SD (1–37))		
>5 years	133	62.4
<5 years	80	37.6
Training Experience		
Yes	84	39.4
No	129	60.6
Type of Care Facility		
Public	106	49.8
Private	107	50.2
Oral Care Implementation by Each Domain		
Environmental observation	119	56.0
Function and eating capabilities observation		
Before-meal period	108	50.8
Meal preparation period	127	49.6
Feeding period	116	54.7
The swallowing period	119	54.6
After-meal period	88	41.4

Table 3. Bivariate Association Between Sociodemographic Characteristics and Oral Care Implementation

Sociodemographic Characteristics	Environmental Observation	Before-Meal Period	Meal Preparation Period	Feeding Period	Swallowing Period	After-Meal Period
Age	-0.009	-0.050	-0.094	-0.233*	-0.204*	-0.198*
Sex	-0.229*	0.034	0.160*	0.159*	0.162*	0.104
Educational background	-0.041	-0.051	-0.049	0.024	-0.027	0.155*
Type of care facility	0.111	0.058	0.079	-0.119	-0.104	0.074
Working experience	-0.130	-0.080	-0.103	-0.208*	-0.167*	-0.109
Training experience	0.042	0.141*	0.052	0.301*	0.231*	0.025

Notes: *correlation is significant at the 0.05 level (2-tailed) at 95% CI

Table 3 shows the bivariate correlation of sociodemographic characteristics and oral care implementation by domain. Age, sex, and working experience were most frequently and significantly correlated with various domains, although educational background was significantly correlated with one domain each. On the other hand, training experience showed a significant correlation to at least three periods in the function and eating capabilities observation domain. Table 4 presents details of the multiple linear regression analysis to determine the predictive model for caregivers' attentiveness in implementing oral care services in each domain. In the environmental observation domain, the care-setting environment was influenced by females, government-type long-term care facilities, and working experience. In the functions and eating capabilities observation domain, it was found that at least three periods in which sociodemographic factors could predict. The meal preparation period was associated with males, the feeding period was influenced by training experience, and the swallowing period was influenced by both young age and training experience.

Table 4. The Prediction Model for Oral Care Implementation by Domain

Predictor Variables	Environmental Observation (R^2 = 10.2; F = 3.906; p-value = 0.01)		Before-meal Period (R^2 = 0.05; F = 1.722; p-value = 0.12)		Meal Preparation Period (R^2 = 0.06; F = 2.157; p-value = 0.04)		Feeding Period (R^2= 0.17; F = 7.224; p-value = 0.01)		Swallowing Period (R^2 = 0.13; F = 4.940; p-value = 0.01)		After-Meal Period (R^2= 0.05; F = 1.179; p-value = 0.11)	
	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value	β	p-value
Age	0.006	0.949	-0.037	0.693	-0.067	0.468	-0.161	0.065	-0.182	0.042	-0.142	0.127
Sex Female = 0 Male = 1	-0.238	0.001	0.019	0.784	0.146	0.037	0.109	0.097	0.118	0.081	0.066	0.348
Type of care facility Public = 1 Private = 0	0.172	0.020	0.142	0.061	0.132	0.080	-0.038	0.587	-0.030	0.677	0.034	0.654
Working experience	-0.161	0.047	-0.079	0.340	-0.082	0.323	-0.132	0.087	-0.089	0.264	-0.007	0.929
Educational background	-0.088	0.261	-0.099	0.219	-0.138	0.087	-0.025	0.743	-0.093	0.226	0.073	0.365
Training experience Yes = 1, No = 0	0.103	0.147	0.178	0.015	0.075	0.301	0.291	<0.001	0.211	0.003	0.002	0.979

Notes: β = standardized coefficient; R^2 = coefficient of determination.

Discussion

This study identified the association of sociodemographic factors with caregivers' attentiveness and implementation of oral care services in long-term care facilities in various domains. While its limitations derive from its descriptive nature, the results are significant given that similar studies have not been conducted in Indonesia. This study found that age was associated with the implementation of oral care only in the domain of the swallowing period, which is crucial due to the possibility of choking or potentially fatal aspiration.[29] This study's finding showed that younger caregivers (aged <35.24 years) tend to pay more attention to the elderly during the swallowing period than older caregivers (aged ≥35.24 years), suggesting more eager engagement, while older caregivers need encouragement to remain vigilant during the swallowing period.

Sex was significantly associated with environmental observation and meal preparation domains, which were related to care environment safety for the elderly's dietary needs, preparation of the eating environment, the presence of food variations, availability of tools for emergencies, and an adequate ratio of caregivers to residents.[27] Female caregivers tended to be more careful observers, paying more attention to the surrounding environmental conditions and the general condition of the elderly before feeding them. Meanwhile, males tend to be attentive to meal preparation. Previous studies also revealed modest distinctions between males and females, with females displaying higher levels of environmental concern and behavioral adjustments,[30] females are more likely to have a stronger connection to their environment.[31] This study also indicated female caregivers had a distinctive relationship with their care-setting environment. Interestingly, females are the predominant providers of care for chronic medical conditions.[32]

A significant association between males and meal preparation was also identified. This domain consists of observations about the ability to sit in a stable position and observing the older person's consciousness and tranquillity.[18] In this study, male caregivers tended to pay more attention to the meal preparation period, a crucial period that showed the severity of the older adult's condition. Improper observation during this period can have serious health implications. This finding supports a previous study showing that male caregivers respond more strongly to the severity of the caregiving situation.[33] Sex differences may also result from females and male dealing differently with the caregiving process; even if the older adults' conditions are similar, males generally focused on problem-solving strategies and anticipatory efforts,[33] this statement is supporting this study's findings that male caregiver are paying more attention during the meal preparation to avoid potential risks during the meal preparation period.

This study identified caregivers working in government-managed long-term care facilities as likely to have better implementation in the observation domain of the care-setting environment. Government-managed long-term care facilities often have a larger staff with various duties and responsibilities. As the government guarantees management costs of running the institution,[21] the government-managed long-term care facilities can have a better ratio of employees

to residents than private institutions. This gives staff more time to observe the eating environment compared to the private care facilities. The different types of long-term care facilities are also related to caregivers' quality, especially in terms of the opportunity to receive education and training to improve their ability to perform care.[34]

Working experience is inversely associated with the observation domain of the care-setting environment; caregivers with less work experience (those with shorter years of service) tend to make better eating environment observations, such as maintaining a calm environment. Caregivers with shorter work experience (<5 years) may be relatively more enthusiastic about their work environment and pay more attention.[35] Conversely, senior workers (>5 years working experience) tend to be more indifferent due to routine and monotonous nursing activities, which hinders their willingness to learn new ideas, such as oral care issues.

Training experience was associated with observation during the feeding and swallowing periods. Although less than half (39%) of the participants had experience in long-term care-related training within the last five years, their learning process significantly influenced oral care implementation, especially in observing swallowing and feeding periods. However, the training programs offered to caregivers vary and are not specific to oral care. As mentioned, the elderly are prone to problems with swallowing or aspiration; training is therefore essential, particularly during the feeding and swallowing periods. A previous study identified that a lack of education and oral care knowledge in caregivers raises the risk of poor oral care among older adult patients residing in long-term care facilities.[36] Training and education for caregivers in long-term care facilities in Indonesia remain limited,[27] as indicated in prior interviews that the authors conducted with managers of six long-term care facilities (four private and two public) in West Java and the Special Capital Region of Jakarta Provinces. All six managers revealed that the facilities had no routine schedule for caregiver training, including for oral care. Hence, the authors developed an oral care checklist to promote its implementation because such institutions may not prioritize or implement oral care due to a lack of awareness.

No significant association was found between any indicators before and after meals in this study, possibly because Indonesian customs do not include environmental observation before eating or activities after eating, regardless of the caregivers' sociodemographic characteristics as seen in the long-term care guideline of the Indonesian Ministry of Health[37] that include the oral care procedures. Those caring activities are still limited; hence, oral hygiene, such as teeth brushing, is yet to be included as part of oral care. However, studies stated that maintaining good oral hygiene, including brushing teeth, decreases the risk of pneumonia,[38,39] making it beneficial to Indonesian older adults, among whom the prevalence of pneumonia was reportedly 5.4% in 2018.[40] Therefore, the Indonesian Government should encourage caregivers to improve oral care by stressing its importance, particularly after meals, and add it to the guidelines for long-term care services.[37] Specific training concerning oral care and maintaining swallowing function must be provided to promote the health and quality of life of older adults in long-term care.

The oral care checklist used in this study was found effective for guiding caregivers and improving oral health for older adults, even with its minimum requirements for preventing aspiration pneumonia. It is particularly useful for caregivers in Indonesia, as many are not aware of the importance of oral care, particularly in the before-meal and after-meal periods.[20] The checklist also helps caregivers with long working hours and excessive work demands, due to the high ratio of residents per caregiver,[36] efficiently implement essential oral care practices. The ultimate goal of this study was to provide appropriate oral care in accordance with the individual needs of the elderly, regardless of caregivers' characteristics. Therefore, further studies are needed to develop training and determine what kind of programs should be provided for caregivers with varying characteristics.

This study had some limitations, particularly in participants' recruitment, which was incidentally based on their availability to be interviewed. These data might not accurately represent the target population, or reliance on self-reported data, which can be prone to bias. However, these study findings were expected to lead to further research, such as determining whether this oral care checklist applies to family caregivers in home settings. Overall, this study's results showed a robust implicit association between sociodemographic characteristics and the implementation of oral care, which can be implemented to improve the quality of care in the elderly in long-term care facilities to prevent aspiration pneumonia.

Conclusion

This study identified associations between the sociodemographic characteristics of caregivers and the implementation of oral care in various domains. The oral care checklist used in this study can enhance caregivers' knowledge and skills in Indonesia, particularly when maintenance for patients in the after-meal period is emphasized.

Abbreviations

DMF-T: decayed, missing, or filled teeth.

Ethics Approval and Consent to Participate

The ethical approval for the study was obtained from the Universitas Respati Indonesia Institutional Ethics Review Board, and the study was carried out following its guidelines and regulations. This study was approved with approval number: 153/KE/UNR/IX/2018. Written informed consent was collected prior to data collection.

Competing Interest

The authors declare that they have no competing interests.

Availability of Data and Materials

The datasets generated and analyzed in this study are not publicly available because ethical guidelines prohibit researchers from providing research data to third-party individuals.

Authors' Contribution

Study concept and design: SN, YH, TBWR, MH; Acquisition of data: TBWR, SN, YH; Analysis and interpretation of data: SN, YH; Drafting of the manuscript: SN, YH; Critical revision of the manuscript for important intellectual content: TBWR, MH, YH. All authors have read and approved this final manuscript.

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