Analysis of dysphagia risk using the modified dysphagia risk assessment for the community-dwelling elderly

Haewon Byeon, DrSc

1) Department of Speech Language Pathology, Nambu University: 23 Cheomdan Jungangro, Gwangsan-gu, Gwangju 506-706, Republic of Korea

Abstract. [Purpose] The elderly are susceptible to dysphagia, and complications can be minimized if high-risk groups are screened in early stages and properly rehabilitated. This study provides basic material for the early detection and prevention of dysphagia by investigating the risks of dysphagia and related factors in community-dwelling elders. [Subjects and Methods] Participants included 325 community-dwelling elderly people aged 65 or older. The modified dysphagia risk assessment for the community-dwelling elderly was used to assess dysphagia risk. [Results] Approximately 52.6% (n=171) of participants belonged to the high-risk group for dysphagia. After adjusting for confounding variables, people aged 75+, who used dentures, and who needed partial help in daily living had a significantly higher risk of dysphagia. [Conclusion] It is necessary to develop guidelines for dysphagia for early detection and rehabilitation.

Key words: Dysphagia risk assessment scale, Prevalence, Community-dwelling elders

INTRODUCTION

Although the development of medical technologies is prolonging the average human life span, longevity does not necessarily mean prolonged healthy life. In 2014, the average life expectancy for Koreans was 81 years, but the average healthy life was only 71 years, indicating that most people are likely to suffer from disease in their last decade. Geriatric diseases refer to chronic diseases that occur in old age, such as degenerative diseases like dementia and cardiovascular diseases like stroke. Dysphagia, which results in eating problems, is caused by stroke, dementia, Parkinson’s disease, malignant tumors, and gastroesophageal reflux disease, and it is one of the most common diseases for which patients visit rehabilitation clinics.

Sustained dysphagia not only causes serious health problems, such as malnutrition and weight loss, but can also lead to complications, such as aspiration pneumonia, and even death. In addition, dysphagia in old age causes anxiety about eating, negatively affecting not just psychological health, but quality of life as well.

The lifetime dysphagia prevalence among the Korean elderly in local communities is 17.1%, meaning that as much as one-fifth of the elderly Korean population experiences dysphagia, higher than elderly people in the U.K. (11.4%), Australia (16%), and Japan (13.8%). Nevertheless, unlike hospitalized patients, community-dwelling elderly people do not always recognize dysphagia and tend to consider it one of the symptoms of aging, and so only a very small proportion actually seek or receive treatment.

If the risk factors of dysphagia are investigated and well managed, complications (e.g., aspiration pneumonia) can be minimized. Complications and medical costs can be reduced by screening high-risk groups in early stages and providing proper rehabilitation. Nonetheless, previous studies on dysphagia have only investigated dysphagia patients’ physiological
changes, and few studies have examined the risk of dysphagia among community-dwelling elders. This study provides basic material for the early detection and prevention of dysphagia by investigating the risks of dysphagia in community-dwelling elders and related factors.

**SUBJECTS AND METHODS**

The subjects were selected by convenience sampling from elderly adults at five senior citizen centers in the Seoul and Incheon metropolitan areas from February to May 2015. Ultimately, 325 elderly (108 males and 217 females) were analyzed, after excluding 15 people with incomplete survey responses and 21 who had withdrawn. The required minimum sample size was 74 people at a significance level of (α)=0.05, effect size of 0.15, and power of test (1-β)=0.95, determined using G-power version 3.1.7; therefore, our experimental sample size was appropriate. All participants provided voluntary informed consent to participate in the study. This protocol was approved by the Institutional Review Board of Nambu University, and was conducted in accordance with the ethical standards of the Declaration of Helsinki. The questionnaire survey was conducted using a one-on-one interview method by pre-trained researchers with structured questionnaires. Subjects without neurological diseases such as stroke, dementia, and Parkinson’s disease, and who were literate were selected for participation.

A modified dysphagia risk assessment for the community-dwelling elderly (DRACE)\textsuperscript{12} was used for assessing dysphagia risk. DRACE has a total of 23 items, and is composed of four phases: pharyngeal dysphagia, swallowing the “wrong way”, oral cavity dysphagia, and esophageal dysphagia. Fewer than 6 points out of a possible 69 indicates normal swallowing, while six or more points indicates risk of dysphagia. The Cronbach’s alpha for this tool was 0.93.

The short form of the Korean version of the Geriatric Depression Scale\textsuperscript{13} was used to assess depression, and the Korean Activities of Daily Living\textsuperscript{14} was used to assess physical functioning.

Confounding factors included age (65–74, ≥75), gender, marital status (married, divorced/separated/widowed), level of education (middle school and lower, high school or higher), average monthly household income (<2 million won, ≥2 million won), smoking (yes, no), drinking (yes, no), dentures (yes, no), depression (yes, no), and physical function (independence, partial dependence).

Data was analyzed using SPSS version 23.0 (SPSS Inc., Chicago, IL, USA). An independent t-test was used for differences in characteristics based on dysphagia risk, and multiple logistic regression analysis was used for the risk factors of dysphagia.

**RESULTS**

The general characteristics of subjects are shown in Table 1. According to DRACE, 52.6% (n=171) of participants belong to the high-risk group for dysphagia. Those over the age of 75, those who use dentures, and those who need partial help in the daily living had a higher proportion of high-risk for dysphagia (independent t-test, p<0.05). Even after adjusting for confounding variables, those aged 75+ (Exp(B)=3.25), those who use dentures (Exp(B)=1.56), and those who need partial help in daily living (Exp(B)=4.29) had significantly higher risk of dysphagia (Table 2).

**Table 1.** General characteristics of subjects (n=325)

| Variables              | Category                        | n (%) |
|------------------------|---------------------------------|-------|
| Age                    | Mean ± SD                        | 73.1 ± 8.3 |
| Gender                 | Male (108) 33.2                  |       |
|                        | Female (217) 66.8                |       |
| Education              | Middle school (28) 70.3          |       |
|                        | High school (97) 29.7            |       |
| Marital status         | Married (277) 85.1               |       |
|                        | Separated/divorced/widowed (48) 14.9 |       |
| Average monthly        | ≤2 million won (273) 83.9        |       |
| household income       | ≥2 million won (52) 16.1         |       |
| Smoking                | Yes (69) 21.3                    |       |
| Drinking               | Yes (138) 42.5                   |       |
| Physical function      | Independence (229) 70.5          |       |
| Depression             | Yes (105) 32.3                   |       |
| Dentures               | Yes (266) 81.7                   |       |

**Table 2.** Multiple logistic regression analysis for dysphagia risk factors

| Variables              | Category                  | Exp (B) | 95.0% CI       |
|------------------------|---------------------------|---------|----------------|
| Age                    | 75–84                     | 3.25*   | 1.18–5.83      |
| Physical function      | partial dependence        | 4.29*   | 1.85–8.61      |
| Dentures               | Yes                       | 1.56    | 1.05–3.05      |

CI: confidence interval. *p<0.05
DISCUSSION

Our results show that 52.6% of participants belonged to the high-risk group for dysphagia. This is consistent with Whang’s study\(^{12}\), that reported that one out of every two Korean elderly individuals were at high risk for dysphagia. The risk of dysphagia in community-dwelling elderly people in Korea was higher than in the U.S. (33%) and Japan (47%)\(^{6,15}\). Since the elderly not only lack knowledge of dysphagia but also tend to consider it a natural process of aging\(^{10}\), education on dysphagia and constant monitoring are required for those at high risk.

Older age, use of dentures, and poor physical functioning were factors linked to an increased risk of dysphagia. Previous studies have reported that dysphagia risk increases with age, associated with age-related declining muscle strength and degeneration of nerve conduction velocity\(^4,8,12\). In particular, we found that the elderly needing partial assistance in their daily living experienced as much as a 4.3-fold higher risk for dysphagia, implying that the maintenance of physical functioning is important for effective swallowing. In addition, those with dentures had a 1.6-fold higher risk for dysphagia than those who did not, presumably because dentures decrease the secretion of saliva, causing formation of food bolus obstructions\(^{12}\).

Although the elderly with dentures and the elderly who need partial help in daily living are at a high risk of dysphagia, educational programs on dysphagia are conducted mainly for hospitalized patients in medical institutions, and there are very few programs for the community-dwelling elderly\(^8\). As the decline of physiological functioning during old age is affected not simply by aging but also by decreased activity, it is necessary to develop programs aimed at preserving the swallowing function of those at a high risk for dysphagia.

Regarding the limitations of this study, the subjects of the study were community-dwelling elderly adults in certain regions, and so the results are difficult to generalize. Moreover, as this study had a cross-sectional design, its results cannot be interpreted as indicating a causal relationship.

In conclusion, one out of two community-dwelling elderly individuals belonged to the high-risk group for dysphagia. It is necessary to develop guidelines for early detection of dysphagia and rehabilitation.

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