Relationship between Degree of Independence in Daily Activities and Denture Wearing Status of Residents of Special Nursing Homes for Elderly Persons

Mitsumasa SAIJO, Akira TAKEHITA, Masaru MATSUMOTO, Tomoko FUKAI, Koichiro IRIE, Kunihiro KITA, Yumi ONO, Yuuji MARUYAMA and Toshikazu YASUI

Abstract: The purpose of this research was to survey the relationship between the degree of independence in daily activities and denture wearing status of residents of special nursing homes for elderly persons. The study participants were 80 residents of special nursing homes for elderly persons who needed to wear dentures. Their daily activities and oral conditions were examined, and the relationship between denture usage and each item was examined using the χ² test and Fisher’s exact test.

The residents’ denture wearing status was significantly correlated with the degree of nursing care, diet type, ability to wear dentures, ability to rinse the mouth, ability to brush (p<0.01), and Eichner’s classification (p<0.05).

The subjects who used dentures were independent regarding items of the oral status and daily activities.

Key words: Special nursing homes for elderly persons, Elderly people, Degree of independent living, State of denture wearing, Oral frailty

Introduction

Japan is currently a super-aging society, and elderly persons aged 65 years and over accounted for 28.7% of the population in 2020*. The number of elderly people requiring nursing care is increasing annually with the aging of society, and the total number of certified elderly people requiring nursing care, including support required, continues to increase1). Preventive benefits, community support projects, and community-based integrated care systems have been launched as measures to counteract the increasing number of elderly people requiring nursing care, and such support for elderly persons is urgently needed in Japan.

With the revision of the Long-term Care Insurance Act in 2009, oral function maintenance and management were established, and in recent years, the demand for home dentistry and gerodontology has increased, and the number of dental clinics involved in home-visit dental care is increasing2,3). In particular, frailty syndrome and sarcopenia are attracting attention from the viewpoint of extending healthy life expectancy and minimizing the need for nursing care when engaging in home-visit dental care at facilities for elderly persons. Although the pathological definition of frailty is being developed, many elderly people deteriorate from a healthy state to a state requiring nursing care through this stage of frailty, and this is a precursor stage of being bedridden4). In the field of gerodontology, it has been reported that deterioration of the oral and swallowing functions causes frailty, and, in particular, undernutrition in the frailty cycle is due to tooth loss due to periodontal disease and caries. It is considered that deterioration of the oral function has a marked effect5,6).
The Japanese Society of Gerodontology has proposed a decrease in the degree of self-interest in oral management (hereinafter referred to as oral literacy) as a cause of tooth loss in elderly persons. In addition, it is a problem that motivation for life decreases due to the limitation of the living range of elderly persons and the decrease in the level of activity, and their interest in their own oral cavity health decreases*2. On the other hand, it has been shown that frailty can be reversed to a healthy state by intervention. It has also been shown that the detection of elderly people early in the frailty cycle and appropriate intervention may prevent them from becoming bedridden*7.

Few studies have examined in detail whether it is possible to avoid the frailty cycle if oral dysfunction is rectified with dentures. We consider it important to investigate the actual conditions of denture use in elderly persons living in facilities and the factors related to their use. Therefore, we need to examine whether the degree of independence can be improved by avoiding the frailty cycle when oral function decline due to a decrease in the number of functional teeth is compensated for by dentures in elderly persons living in facilities. The purpose of this study was to obtain basic data on people living in special nursing homes for elderly persons and to understand the relationships among the degree of care required, degree of independence in daily life, and stable occlusal condition of the molars.

**Methods**

1. **Study population**

The study was explained to the elderly persons themselves (or their families) living in one special nursing home for elderly persons in Saitama Prefecture, and 99 people who provided consent were enrolled.

1) **Survey items**

When conducting the survey, people who needed dentures were selected first, and then the general status and oral status of the subjects were investigated.

2) **Selection of subjects who needed dentures**

Subjects who needed dentures were selected according to Minakuchi’s method*8: (1) those who were currently using dentures; and (2) those who were not currently using dentures, but had three or more consecutive defects (including remaining root teeth) and did not have occlusal support on both sides. Oral examinations were performed by one dentist.

2. **General status**

There were four items: the degree of nursing care in the long-term care insurance system (hereinafter, the degree of nursing care), independence in the degree of daily living for disabled elderly persons, independence in the degree of daily living for demented elderly persons, and diet type.

The degree of nursing care, degree of independence in daily life of elderly persons with disabilities, and degree of independence in daily life of elderly persons with dementia were divided into two groups: a group showing independence in daily life and a group requiring assistance. The degree of nursing care was divided into rank 1/2/3 and rank 4/5 in consideration of the current situation that the standard for moving into special nursing homes for elderly persons in Japan is rank 3 or higher in principle. The degree of independence in daily life of elderly persons with disabilities was divided into normal/rank J/A (a group that can go out and be independent indoors) and rank B/C (a group requiring assistance indoors). The degree of independence in daily life of elderly persons with dementia was divided into normal/ rank 1/2 (a group capable of living independently) and rank 3/4/M (a group that interferes with daily life and requires long-term care). The diet types were classified into 4 categories: Level 4, regular diet group; Level 3, chopped/extremely chopped diet group; Level 2, mixer diet group; and Level 1, parenteral intake group. Ages were tabulated in 5 categories in increments of 5 years.

3. **Oral status**

Oral examinations were performed by one dentist from 1 hour after subjects’ breakfast to before the start of lunch. The number of functional teeth was calculated from the current number of teeth and number of

---

remaining root teeth, and Eichner’s classification was recorded as the occlusal state. In addition, a questionnaire was administered to the facility staff to investigate the usage status of dentures and oral care independence (brushing, denture wearing, and mouth rinsing; hereinafter, BDR index).

Each item of the BDR index was divided into 3 or 4 groups according to the degree of independence. That is, brushing was classified into: independence/requires partial assistance/requires full assistance. Denture wearing was classified into: can be attached and detached/can be attached or detached/cannot be attached or detached/no dentures. However, if they had dentures even if they did not normally use them, the dentist in charge of the survey instructed the subject to put in and take out the dentures and confirmed the degree of independence. Mouth rinsing was classified into possible/possible to take water into the mouth/impossible to take water into the mouth. The number of functional teeth was classified into 4 categories: 20 or more teeth, 10 to 19 teeth, 1 to 9 teeth, and 0 teeth. Eichner’s classification was divided into three groups: group A (A1, 2, 3), group B (B1, 2, 3, 4), and group C (C1, 2, 3).

4. Data analysis

In order to investigate the correlation between the denture usage status and each item of denture needs, the data were analyzed by cross tabulating the denture usage status and each item, and performing the \( \chi^2 \) test. However, Fisher’s exact test was used for items of dietary form, age, and the number of functional teeth.

For the analysis, the \( \chi^2 \) test was performed with software IBM SPSS Statistics ver.27 (IBM Corp., Armonk, NY, USA.), Fisher’s exact test was performed with EZR\(^a\), which is for R. More precisely, it is a modified version of R commander designed to add statistical functions frequently used in biostatistics.

Ethics

The data were anonymized. This study was approved by the Ethics Committee of the Faculty of Dentistry, Meikai University (approval number: A1801).

Results

1. Denture needs, average number of functional teeth, denture usage, and Eichner’s classification

Eighty subjects were considered to need dentures (average age: 86.3±7.8 years; 21 men, average age: 84.5±8.5 years; 59 women, average age: 87.0±7.5 years). The average number of functional teeth was 6.9. The number of denture users was 36 (45.0%; average age: 87.8±6.4 years) and the number of denture non-users was 44 (55.0%; average age: 85.2±8.7 years). The distribution of Eichner’s classifications for subjects needing dentures was as follows: Eichner’s classification group A (A1, 2, 3) had 0 subjects, group B (B1, 2, 3, 4) had 24 subjects (average age 81.2±8.7 years), and group C (C1, 2, 3) had 56 subjects (average age 88.5±6.3 years). The overall finding was that 70.0% had no occlusal contact.

2. Relationship between general status and denture usage

Table 1 shows the relationship between the general status and denture usage. The use of dentures showed a significant correlation with the degree of nursing care and diet type (\( p<0.01 \)).

3. Relationship between the oral status and denture usage

Table 2 shows the relationship between the oral status and denture usage. The use of dentures showed a significant correlation at the 1% level with the items of brushing, denture wearing, and mouth rinsing. In addition, a correlation at the 5% significance level was found with Eichner’s classification.

Discussion

Of the subjects who needed dentures while living in the facility, 70.0% were in Eichner’s classification group C, and no contact with the opposing teeth was observed. Of those who were considered to need dentures, 45% used them, which was almost the same as in the report by Minakuchi et al.\(^a\). In many elderly people, the state of frailty progresses gradually, and it is considered that they eventually deteriorate to a point necessitating long-term care. The state in which frailty progresses gradually is called the cycle of frailty. The condition begins with a decrease in dietary intake, resulting in a decrease in muscle mass, called sarcopenia. Further-
more, it is considered to be linked to decreases in the basal metabolic rate, energy consumption, appetite, and a further decrease in food intake. Therefore, appropriate nutritional intake for the elderly has a marked effect on the prevention of frailty syndrome, and the role of dentures that complement masticatory function is important for the nutritional intake of elderly people with many missing teeth. In the present study, a large proportion of denture users had lost all molar occlusion. Therefore, it is considered that increasing the denture wearing rate enhances the masticatory ability of residents and promotes improvement of the diet, thereby preventing elderly people from becoming malnourished.

Regarding the correlation between the denture usage status and each item, the items of denture wearing and brushing were found to have higher correlations than dental prosthetic items, such as the number of functional teeth and Eichner’s classification. In elderly people in need of care, significant impacts on den-

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Relationship between general status and denture usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Classification</td>
</tr>
<tr>
<td>Degree of nursing care</td>
<td>Rank 1, 2, 3</td>
</tr>
<tr>
<td></td>
<td>Rank 4, 5</td>
</tr>
<tr>
<td>Degree of independence in daily living for disabled elderly persons</td>
<td>Normal, J. A</td>
</tr>
<tr>
<td></td>
<td>B, C</td>
</tr>
<tr>
<td>Degree of independence in daily living for demented elderly persons</td>
<td>Normal, 1, 2</td>
</tr>
<tr>
<td></td>
<td>3, 4, M</td>
</tr>
<tr>
<td>Diet type</td>
<td>Level 4</td>
</tr>
<tr>
<td></td>
<td>Level 3</td>
</tr>
<tr>
<td></td>
<td>Level 2</td>
</tr>
<tr>
<td></td>
<td>Level 1</td>
</tr>
<tr>
<td>Age, y</td>
<td>≤74</td>
</tr>
<tr>
<td></td>
<td>75–79</td>
</tr>
<tr>
<td></td>
<td>80–84</td>
</tr>
<tr>
<td></td>
<td>85–89</td>
</tr>
<tr>
<td></td>
<td>≥90</td>
</tr>
</tbody>
</table>

(n=80)
(**: p<0.01, *: p<0.05, n.s.: not significant)

<table>
<thead>
<tr>
<th>Table 2</th>
<th>Relationship between oral status and denture usage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item</td>
<td>Classification</td>
</tr>
<tr>
<td>Brushing</td>
<td>Independence</td>
</tr>
<tr>
<td></td>
<td>Requires partial assistance</td>
</tr>
<tr>
<td></td>
<td>Requires full assistance</td>
</tr>
<tr>
<td>Denture wearing*</td>
<td>Can be attached and detached</td>
</tr>
<tr>
<td></td>
<td>Can be attached or detached</td>
</tr>
<tr>
<td></td>
<td>Cannot be attached or detached</td>
</tr>
<tr>
<td>Mouth rinsing</td>
<td>Possible</td>
</tr>
<tr>
<td></td>
<td>Possible to take water into the mouth</td>
</tr>
<tr>
<td></td>
<td>Impossible to take water into the mouth</td>
</tr>
<tr>
<td>Number of functional teeth</td>
<td>20–2</td>
</tr>
<tr>
<td></td>
<td>10–19</td>
</tr>
<tr>
<td></td>
<td>1–9</td>
</tr>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Eichner’s classification</td>
<td>B 1, 2, 3, 4</td>
</tr>
<tr>
<td></td>
<td>C 1, 2, 3</td>
</tr>
</tbody>
</table>

(n=80)
(**: p<0.01, *: p<0.05, n.s.: not significant)
* Twenty-four subjects with no dentures were excluded from the analysis.
ture use of dementia and ADL conditions have been reported\textsuperscript{15-18}. In the study of Minakuchi et al.\textsuperscript{8}, items such as whether or not gargling was possible among oral functions were closely associated with the denture usage status of elderly people living in facilities, and they were effective items for determining the ability to use dentures. The same result was obtained in the present study. The decrease in the degree of independence in denture wearing and tooth brushing is considered to be due to disorders such as paralysis of the upper limbs, increased dementia, and background factors such as daily life habits. Therefore, it is important for dentists to educate elderly persons and their long-term care staff about maintaining a healthy oral condition in order to prevent frailty syndrome and a bedridden status.

On the other hand, facilities for elderly persons are chronically short of human resources, and so each facility staff member must perform various tasks at the same time\textsuperscript{19}; thus, it is not easy to provide all residents with sufficient dental intervention. Ohtake et al.\textsuperscript{20} reported that those with worsening dementia showed more favorable cleaning of dentures and teeth than those with moderate dementia. The reported reason is that elderly requiring long-term care who require full assistance have a high rate of dental intervention such as cleaning of dentures by caregivers. This means that elderly people who perform oral care on their own, but do not perform sufficient cleaning, may not received sufficient dental intervention from their caregivers. Therefore, in order to improve the oral hygiene status of all elderly residents, it is necessary to increase the frequency of caregivers providing oral care for elderly people who cannot brush their teeth sufficiently. In addition, it is necessary to take an approach to prevent the elderly from losing their interest in oral cavity health by continuing effective oral care even for elderly who can brush their teeth sufficiently with the help of a dentist or dental hygienist. Considering the current situation of long-term care sites, it is necessary to cooperate with dentists and dental hygienists and establish a simple oral hygiene management system that does not burden caregivers.

As a future research subject, we will compare the actual oral cleaning status and nutritional status of the four groups: "Residents with dentures and high degree of independence", "Residents with dentures and low degree of independence", "Residents without dentures and high degree of independence", and "Residents without dentures and low degree of independence", from the viewpoint of denture usage and independence. Then, we aim to develop an appropriate oral hygiene management system for each group.

Acknowledgements

The authors would like to express their gratitude to all the people involved in the special nursing homes for elderly persons for their cooperation in this research.

References

口腔衛生会誌  J Dent Hlth 71(3), 2021


Reprint requests to M. SAIJO, Division of Oral Health and Preventive Dentistry, Department of Community Health Sciences, Meikai University School of Dentistry, 1-1, Keyakidai, Sakado, Saitama, 350-0283, JAPAN
TEL: 049-279-2786/FAX: 049-286-2343
E-mail: saijo@dent.meikai.ac.jp

特別養護老人ホーム入居高齢者の日常生活自立度と義歯装着の関連について

西條 光雅  竹下 玲  松本 勝
深井 智子  入江浩一郎  北 邦宏
小野 裕美  丸山 裕士  安井 利一
明海大学歯学部社会健康科学講座

概要：施設入居高齢者において，要介護度や日常生活自立度と義歯の装着状況の関連性の実態を把握するために，これらを基礎的データを得ることを目的とした。特別養護老人ホームに入居する高齢者のうち義歯を必要とする80名を対象として，全身状態に関する項目および口腔の状態に関する項目について調査を行い，義歯使用状況との関連をχ2検定およびFisher直接確率法を用いて検討した。

入居者の義歯使用状況は，要介護度，食事形態，義歯着脱の自立度，うがいの可否，歯みがきの自立度（p<0.01），Eichner分類（p<0.05）との相関が見いだされた。

義歯必要者のうち，義歯使用者は口腔に関する自立度が高いため，生活面での自立度が高いことが示された。

口腔衛生会誌 71:147–152, 2021

索引用語：特別養護老人ホーム，高齢者，日常生活自立度，義歯装着，オーラルフレイル

著者への連絡先：西條 光雅 〒350-0283 埼玉県坂戸市けやき台1-1 明海大学歯学部社会健康科学講座
TEL : 049-279-2786 FAX: 049-286-2343
E-mail : saijo@dent.meikai.ac.jp