Article

Continence status and presence of pressure skin injury among special elderly nursing home residents in Japan: a nationwide cross-sectional survey

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Abstract: Urinary and fecal incontinence as well as skin pressure injury are common healthcare problems in nursing home; however, these prevalence and related risk factors were not well understood in the Japanese special elderly nursing home settings. We surveyed the prevalence of urinary, fecal and double incontinence, and skin pressure injury among the elderly living in special elderly nursing home in Japan. A nationwide cross-sectional epidemiological survey was conducted with a total of 4,881 residents. The prevalence of urinary, fecal and double incontinence was 82.9%, 68.9% and 64.9%, respectively. Skin pressure injury was found in 283 residents (283/4,881, 5.8%). Age, Care-Needs level, loss of voiding desire, and fecal incontinence were significant risk factors for urinary incontinence. Residential period, Care-Needs level, loss of voiding and defecation desires, and urinary incontinence were significant risk factors for fecal incontinence. Only male sex was a significant risk factor for skin pressure injury. Our study revealed continence status and the prevalence of pressure skin injury among older adult residents who receive an end-of-life care in special nursing homes in Japan. Further studies should be conducted to examine whether recovery of urinary and fecal sensations improves continence status.

Keywords: urinary incontinence; fecal incontinence; double incontinence; pressure skin injury; special elderly nursing home

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1. Introduction

Mean life expectancies of Japanese male and female are 81.41-years and 87.45-years in 2019 [1]. In 2019, proportion of the elderly aged ≥65 years became 28.1% in Japan and the Japanese situation has been in super-aged society (the proportion of the elderly ≥65-year-old, >21%) since 2007 [2]. Nowadays, number of the elderly people who need long-term care is approximately 6.7 million (almost equal to 5% of the Japanese population) in Japan and it has also kept increasing [3].

The long-term care insurance system, the public social service for elderly care in Japan, has launched since 2000. There are two types of public long-term care facility in Japan; geriatric health services facility and special elderly nursing home. The former is a facility which provides medical care, nursing care, daily life support and rehabilitation to help the elderly to go back home. The latter is a facility that provides an end-of-life care to support the peaceful and heart warm lives of the elderly. Recently, we conducted a na-

tionwide survey of continence status among the elderly living in geriatric health services facilities in Japan, and reported that the prevalence rates of urinary, fecal and double incontinence were 66.9%, 42.8% and 41.1%, respectively. Motor and cognitive subscales of the Functional Independence Measure score, an indicator of daily activity of living, was significantly worse among the elderly with incontinence than those without [4]. As far as we know, a nationwide survey regarding continence status among elderly living in Japanese special elderly nursing home has not been conducted to date. Correlation between loss of voiding and defecation desires and continence status has been scarcely investigated, either. Pressure skin injury is also a common health problem particularly among the physically limited or bedridden elderly [5]. In nursing home settings, the national average prevalence of pressure skin ulcer in the US is reported to be 7.3% [6]. Japanese hospital-based study reported the prevalence of pressure skin injury was 4.3% [7]; however, the prevalence among the elderly living in Japanese special elderly nursing home has been still unknown.

The aim of this study was to measure the prevalence rates of urinary, fecal and double incontinence, as well as pressure skin injury among the elderly living in Japanese special elderly nursing home. We also investigated voiding and defecation desires of the participants and identified the significant risk factors of continence status and pressure skin injury by including these sensations as confounding factors.

2. Materials and Methods

This is a cross-sectional, nationwide point prevalence measurement study designed to investigate continence status and pressure skin injury among elderly individuals in special elderly nursing home settings in Japan. From 15th October 2015 to 16th November 2015, we recruited elderly residents aged ≥65 years from the member special elderly nursing homes of the Japanese Council of Senior Citizens Welfare Service and collected data. Each member facility randomly selected one-tenth number of the residents. Caregivers of each facility collected data by using a structured investigation sheet including sex, age, residential period, continence status, voiding and defecation desires, existence of pressure skin injury, and stool form. The point in time of the outcome variables for urinary incontinence, fecal incontinence, double incontinence and pressure skin injury was on the day of data collection. Stool form was assessed by the Bristol stool scale that classifies a stool form into seven categories: type 1, separate hard lumps; type 2, lumpy and sausage like; type 3, a sausage shape with cracks in the surface; type 4, like a smooth, soft sausage or snake; type 5, soft blobs with clear-cut edges; type 6, mushy consistency with ragged edges; and type 7, liquid consistency with no solid pieces [8]. Urinary incontinence as well as fecal incontinence was defined as any leakage of urine/feces. We assessed the frequency of urinary incontinence and fecal incontinence according to five levels, which are as follows: none, less than once a week, twice or more per week, almost every day, and every day. Voiding and defecation desires were appraised by following three levels: normal, ambiguous, and impaired. We also investigated the implementation of toileting assistance for urination. In addition, we simply assessed pressure skin injury as normal, intact skin with non-blanchable redness, and skin ulcer.

The Long-Term Care Insurance System is the public social service for elderly care in Japan. The classification process starts with an initial assessment by a trained local government assessor, who evaluates his/her care-needs by a questionnaire on current physical and psychological status (73 items) and use of medical procedures (12 items). The results are transformed into the applicant's standardized scores for the seven dimensions of physical and psychological status. In addition, required time for the nine categories of care (grooming, bathing, eating, toileting, transferring, assistance with instrumental activities of daily living, behavioral problems, rehabilitation, and medical services) is estimated. The Care-Needs level is finally determined by the Nursing Care Needs Certification Board, considering the results of assessment and the statement by the applicant's primary care physician. The Care-Needs level of this insurance system is

a five-point ordinal scale that ranges from level-1 (estimated total care minutes per day, 32 to 50 minutes) to level-5 (estimated total care minutes per day, ≥110 minutes) [9].

This study was approved by the ethics committee of Tokyo Teishin Hospital (approval No. 975). A written informed consent was obtained from all participants or their family members.

Statistical analysis was performed using the JMP PRO software, version 15.0.0 (SAS, Cary, NC). Odds ratios and 95% confidence intervals were assessed to identify significant risk factors of urinary incontinence, fecal incontinence, and pressure skin injury via a logistic regression analysis. In multivariate analyses, we included following parameters in the parenthesis to detect significant risk factors of urinary incontinence (age, sex, residential period, Care-Needs level, voiding desire, defecation desire, fecal incontinence, and pressure skin injury), fecal incontinence (age, sex, residential period, Care-Needs level, voiding desire, defecation desire, urinary incontinence, and pressure skin injury), double incontinence (age, sex, residential period, Care-Needs level, voiding desire, defecation desire, and pressure skin injury), and pressure skin injury (age, sex, residential period, Care-Needs level, voiding desire, defecation desire, urinary incontinence, and fecal incontinence). A P value of < 0.05 was considered statistically significant.

3. Results

3.1. Characteristics of the elderly participants

We asked 2,341-member special elderly nursing homes registered in the Japanese Council of Senior Citizens Welfare Service to be involved in the present study, and 969 (41.4%) facilities responded. In total, 5,673 elderly residents from 969 facilities participated in the study. However, 792 residents were excluded from the analysis based on the following exclusion criteria: aged 64 years or younger (n = 54); missing information of age (n = 23), sex (n = 8), residential period (n = 53), Care-Needs level (n = 94), urinary incontinence (n = 145), fecal incontinence (n = 119), pressure skin injury (n = 175), voiding desire (n = 55), and defecation desire (n = 66). The characteristics of the study participants are shown in Table 1.

Table 1. Baseline characteristics of the elderly participants.

Characteristics		**Total number of elderly participants N=4,881**
Age, years (mean ± SD)		87.0 ± 7.5
Sex, n (%)	Male/female	934 (19.1%) / 3,947 (80.9%)
Residential period, years (median [IQR])		2.6 [1.2 to 4.8]
Care-Needs level, n (%)	Level-1	112 (2.3%)
	Level-2	323 (6.6%)
	Level-3	1,106 (22.7%)
	Level-4	1,711 (35.1%)
	Level-5	1,629 (33.4%)
Voiding desire, n (%)	Normal	1,356 (27.8%)
	Ambiguous	1,478 (30.3%)
	No complaint of voiding	2,047 (41.9%)
Defecation desire, n (%)	Normal	1,559 (31.9%)
	Ambiguous	1,409 (28.9%)
	No complaint of voiding	1,913 (39.2%)
Urinary incontinence, n (%)	None	836 (17.1%)

	Once a week	409 (8.4%)
	Twice or more per week	566 (11.6%)
	Almost every day	878 (18.0%)
	Every day	2,192 (44.9%)
Fecal incontinence, n (%)	None	1,517 (31.1%)
	Once a week	1,048 (21.5%)
	Twice or more per week	1,174 (24.1%)
	Almost every day	300 (6.1%)
	Every day	842 (17.3%)
Pressure skin injury, n (%)	No	4,598 (94.2%)
	Yes	283 (5.8%)
	Redness	143 (2.9%)
	Skin ulcer	128 (2.6%)
	Both	14 (0.3%)
	Unclassified	26 (0.5%)
Bristol stool scale, n (%)	Type 1	68 (1.4%)
	Type 2	130 (2.7%)
	Type 3	293 (6.1%)
	Type 4	1,591 (33.1%)
	Type 5	1,927 (40.1%)
	Type 6	626 (13.0%)
	Type 7	123 (2.6%)
	unclassified	42 (0.9%)

Abbreviations: SD, standard deviation.

Number of the elderly individual with normal voiding desire and defecation desire was limited to 1,217 (24.9%). In other words, three quarters of participants had impaired voiding and/or defecation desire. The prevalence rates of urinary, fecal and double incontinence were 82.9% (4,045/4,881 participants), 68.9% (3,364/4,881 participants), and 64.9% (3,169/4,881 participants), respectively. Only 641 (13.1%) participants had continence, while 4,240 (86.9%) suffered from urinary and/or fecal incontinence. After excluding 30 participants with missing data of toileting assistance from 4,881 participants (n = 4,851), toileting assistance was conducted in 2,144 (44.2%) and not conducted in 2,707 (55.8%) elderly individuals. Of 2,144 participants with toileting assistance, types of toileting assistance conducted was timed voiding in 1,271 (59.3%), prompted voiding in 571 (26.6%), and unknown in 302 (14.1%), respectively. Of 2,707 participants without toileting assistance, 660 (24.4%) could go to the toilet independently, 1,222 (45.1%) usually urinate in diapers or pads, 60 (2.2%) refused toilet assistance, but the reasons for 765 (28.3%) subjects were unknown.

Overall prevalence rate of pressure skin injury was 5.8% (283/4,881 participants). The number of participants with intact skin with non-blanchable redness and skin ulcer by body sites were as follow: 4 and 0 in head, 1 and 1 in shoulder, 5 and 2 in elbow, 10 and 5 in back, 123 and 99 in hip/sacrum, and 1 and 1 in lower limb, respectively. Hip/sacrum was the most frequent site of pressure skin injury (5.8%, 283/4,881 participants) with intact skin with non-blanchable redness (2.5%, 123/4,881 participants) and skin ulcer (2.0%, 99/4,881 participants). As for the shape of the stool, proportion of the elderly with normal shape of the stool (Bristol stool scale types 3 and 4) was 38.6% (1,884/4,881 participants).

3.2. Risk factors of urinary incontinence, fecal incontinence, double incontinence and pressure skin injury

In a multivariate analysis, age, Care-Needs level, loss of voiding desire, and fecal incontinence were significantly associated with urinary incontinence (Table 2). Meanwhile, residential period, loss of voiding desire, loss of defecation desire, and urinary incontinence were significant risk factors for fecal incontinence (Table 3). Moreover, age, residential period, loss of voiding desire, and loss of defecation desire were significant risk factors for double incontinence (Table 4). Concerning with pressure skin injury, only male sex was a significant risk factor (Table 5).

Table 2. Risk factors of urinary incontinence.

Variables	Univariate OR (95% CI)	Multivariate OR (95% CI)
Age	1.030 (1.020 – 1.040)	1.023 (1.011 – 1.036)
Sex		
Female	Reference	Reference
Male	0.760 (0.635 – 0.910)	0.842 (0.672 – 1.053)
Residential period, years	1.039 (1.014 – 1.064)	1.000 (0.975 – 1.027)
Care-Needs level (continuous)	4.183 (3.505 – 4.993)	1.149 (1.041 – 1.267)
Voiding desire		
Normal	Reference	Reference
Ambiguous	13.929 (10.840 – 17.898)	7.256 (5.286 – 9.987)
No complaint of voiding	9.277 (7.643 – 11.260)	2.481 (1.643 – 3.748)
Defecation desire		
Normal	Reference	Reference
Ambiguous	7.301 (5.856 – 9.104)	0.916 (0.664 – 1.264)
No complaint of defecation	8.063 (6.584 – 9.874)	1.159 (0.745 – 1.804)
Fecal incontinence		
No	Reference	Reference
Yes	11.892 (9.964 – 14.193)	6.381 (5.158 – 7.894)
Pressure skin injury		
No	Reference	Reference
Yes	2.114 (1.402 – 3.186)	1.054 (0.665 – 1.673)

Abbreviations: OR, odds ratio; CI, confidence interval.

Table 3. Risk factors of fecal incontinence.

Variables	Univariate OR (95% CI)	Multivariate OR (95% CI)
Age	1.016 (1.007 – 1.024)	1.000 (0.990 – 1.011)
Sex		

	Female	Reference	Reference
	Male	0.881 (0.757 – 1.026)	1.095 (0.894 – 1.342)
Residential period, years		1.072 (1.051 – 1.092)	1.033 (1.009 – 1.057)
Care-Needs level (continuous)		2.243 (2.097 – 2.400)	1.143 (1.044 – 1.252)
Voiding desire			
	Normal	Reference	Reference
	Ambiguous	7.304 (6.184 – 8.627)	1.408 (1.119 – 1.772)
	No complaint of voiding	18.770 (15.662 – 22.496)	2.224 (1.589 – 3.113)
Defecation desire			
	Normal	Reference	Reference
	Ambiguous	10.480 (8.804 – 12.476)	5.339 (4.246 – 6.713)
	No complaint of defecation	19.740 (16.435 – 23.708)	6.254 (4.480 – 8.731)
Urinary incontinence			
	No	Reference	Reference
	Yes	11.892 (9.964 – 14.193)	6.386 (5.169 – 7.890)
Pressure skin injury			
	No	Reference	Reference
	Yes	2.633 (1.892 – 3.665)	1.368 (0.927 – 2.020)

Abbreviations: OR, odds ratio; CI, confidence interval.

Table 4. Risk factors of double incontinence.

Variables	Univariate OR (95% CI)	Multivariate OR (95% CI)
Age	1.020 (1.012 – 1.028)	1.011 (1.001 – 1.022)
Sex		
Female	Reference	Reference
Male	0.821 (0.709 – 0.952)	0.961 (0.798 – 1.158)
Residential period, years	1.070 (1.051 – 1.090)	1.035 (1.013 – 1.057)
Care-Needs level (continuous)	2.188 (2.048 – 2.337)	1.188 (1.090 – 1.294)
Voiding desire		
Normal	Reference	Reference
Ambiguous	8.827 (7.449 – 10.461)	2.960 (2.384 – 3.675)
No complaint of voiding	16.376 (13.794 – 19.441)	2.420 (1.786 – 3.279)
Defecation desire		
Normal	Reference	Reference
Ambiguous	10.325 (8.710 – 12.241)	4.712 (3.805 – 5.835)
No complaint of defecation	17.447 (14.690 – 20.721)	7.184 (5.299 – 9.739)
Pressure skin injury		
No	Reference	Reference
Yes	2.230 (1.657 – 3.000)	1.191 (0.851 – 1.667)

Abbreviations: OR, odds ratio; CI, confidence interval.

Table 5. Risk factors of pressure skin injury.

Variables	Univariate OR (95% CI)	Multivariate OR (95% CI)
Age	1.011 (0.995 – 1.027)	1.012 (0.995 – 1.029)
Sex		

	Female	Reference	Reference
	Male	1.335 (1.005 – 1.773)	1.550 (1.148 – 2.092)
Residential period, years		1.030 (1.001 – 1.061)	1.010 (0.979 – 1.042)
Care-Needs level (continuous)		1.570 (1.363 – 1.809)	1.180 (0.994 – 1.401)
Voiding desire			
	Normal	Reference	Reference
	Ambiguous	2.678 (1.729 – 4.148)	1.397 (0.776 – 2.516)
	No complaint of voiding	4.461 (2.976 – 6.689)	1.707 (0.880 – 3.312)
Defecation desire			
	Normal	Reference	Reference
	Ambiguous	2.808 (1.871 – 4.213)	1.652 (0.952 – 2.867)
	No complaint of defecation	4.262 (2.928 – 6.203)	1.876 (0.996 – 3.533)
Urinary incontinence			
	No	Reference	Reference
	Yes	2.114 (1.402 – 3.186)	1.056 (0.666 – 1.673)
Fecal incontinence			
	No	Reference	Reference
	Yes	2.633 (1.892 – 3.665)	1.372 (0.927 – 2.031)

Abbreviations: OR, odds ratio; CI, confidence interval.

4. Discussion

This is the first nationwide epidemiological survey of continence status and pressure skin injury as well as loss of voiding/defecation desire among the elderly living in special elderly nursing homes in Japan. We also investigated types of continence care provided by caregivers. The prevalence rate of urinary, fecal and double incontinence was 82.9%, 68.9% and 64.9%, respectively. In our previous study conducted in geriatric health services facilities in Japan, the prevalence of urinary, fecal and double incontinence was 66.9%, 42.8% and 41.1%, respectively [4]. Continence status of the present study was worse than the previous study. It might be because older age (mean age; 87.0 versus 85.2 years) and higher dependency of care (mean Care-Needs level (continuous); 3.9 versus 2.9) of the present study. Offermans et al reviewed 10 epidemiological studies that addressed the prevalence of urinary incontinence in nursing home residents. They reported the prevalence rate of urinary incontinence was ranged to 47 to 77% and identified age, female sex and limited cognitive function were associated risk factors for urinary incontinence [10]. In the present study, age, female sex, the Care-Needs level, loss of voiding desire and fecal incontinence were significantly associated with urinary incontinence. Saga et al reported the prevalence of not only urinary incontinence but also fecal incontinence and double incontinence among the elderly living in Norwegian nursing homes. The prevalence rate of urinary, fecal and double incontinence was 72.0%, 42.8% and 40.2%, respectively. Continent residents were characterized by being in short-term care, shorter stay in nursing home, less cognitive and physical impairment, less Parkinson's disease, stroke, constipation and diarrhea, and more independence in activities of daily living [11]. In our cohort, continent residents were characterized by being younger age, lower care dependency, intact voiding and defecation desires (data not shown). Higami et al reported the prevalence of urinary, fecal and double incontinence among the elderly cognitively impaired older residents in long-term care facilities in East Asia. The prevalence rate of urinary, fecal and double incontinence was ranged to 10.1 to 71.0%, 4.0 to 57.0% and 4.0 to 57.0%, respectively [12]. Gorina et al reported a percentage of difficulty controlling urinary bladder and/or bowels among hospice patients aged 65 years and over was 82.4% [13]. Similarly, 86.9% (4,240/4,881 participants) of our cohort suffered from urinary and/or fecal incontinence. Both urinary and fecal incontinence are highly

prevalent conditions among the elderly in the stage of end-of-life. The prevalence rate of urinary, fecal and double incontinence in our cohort marked the highest rate compared to the previous reports. Worsened Care-Needs level and loss of voiding desire were significant common risk factors for urinary, fecal and double incontinence of our cohort.

Prompted voiding is a toileting assistance that was recommended by the International Consultation on Incontinence as an effective intervention for the continence care of nursing home residents and home-care clients [14]. In prompted voiding care, caregivers regularly ask the elderly individual whether he/she feels voiding desire or not. If the response is yes, caregiver guides the elderly person to void and provide positive feedback for appropriate voiding. It results in increasing self-initiated toileting and decrease incontinent episodes in the short-term [15]. Meanwhile, timed voiding is a toileting assistance guiding the elderly to the toilet on a fixed time-interval regardless of voiding desire. Timed voiding was most frequently adopted toileting assistance in the present study followed by prompted voiding and approximately one-quarter of the participants were applied with absorbent products only. We wonder if we manage the elderly with incontinence solely by using absorbent products, they could not recover voiding desire or would lose urinary sensation. From our limited experience, old incontinent elderly individuals recovered urinary sensation after initiating prompted voiding care and then consumption of absorbent products turned to be decreased. As suggested by Borglin et al, many nurses understand the importance of continence care in the elderly receiving home-care, either in their own home or in an assisted living facility; however, provision of absorbent products prescription is being the first line of action but not evidence-based interventions, such as timed voiding or prompted voiding. We deeply agree with their following conclusion: "the provision of continence care that is based on key nursing standards, such as evidence-based and person-centered care, as well as individualized continence care that is based on evidenced-based guidelines, would ensure an improvement in the continence care that is presently on offer to older people" [16]. We hope such an approach will evoke and regain urinary or fecal sensation of the elderly. It is useful to try if recovery of urinary and fecal sensations improves continence status and quality of life of the elderly.

In the present study, pressure skin injury was observed in 283 residents (283/4,881, 5.8%) and only male sex was a significant risk factor for pressure skin injury. The prevalence was less frequent than the US situation (5.8% versus 7.3%) [6]. Jaul reported that aging, comorbidities, function (immobility, incontinence and impaired cognition), nutrition, and social, family and emotional factors were risk factors of pressure ulcer. These risk factors except for age and continence status were not included in our dataset, therefore, we could not clarify confounding factors developing pressure skin injury. However, urinary incontinence or fecal incontinence themselves were not a risk factor of pressure skin injury in our cohort.

The present study had several limitations which included lack of body mass index, comorbidities (presence of cerebrovascular disease, spinal disease, musculoskeletal disorders, and so on), medications, physical and cognitive functions evaluated by global indicators. As for skin trouble, we surveyed only pressure skin injury but not incontinence-associated dermatitis. Nevertheless, participation of nationwide large number of elderly persons with information of voiding and defecation desires was a strength of the present study. Further studies should be conducted to examine whether recovery of urinary and fecal sensations improves continence status.

5. Conclusions

In conclusion, the present study revealed continence status and the prevalence of pressure skin injury among older adult residents who receive an end-of-life care in special nursing homes in Japan.

Author Contributions: For research articles with several authors, a short paragraph specifying their individual contributions must be provided. The following statements should be used "Con-

ceptualization, M.S. and M.K.; methodology, M.S., M.K and K.S.; formal analysis, M.S., M.K and K.S.; investigation, M.S., M.K and K.S.; data curation, M.S., M.K and K.S.; writing—original draft preparation, M.S.; writing—review and editing, T.M., M.K., K.S. and H.K.; supervision, M.S.; project administration, M.S. and M.K.; funding acquisition, M.S. and M.K. All authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement: Informed consent was obtained from all subjects or their family members involved in the study.

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