

# A cross-sectional study of elderly individuals with oedema and skin injuries in long-term care facilities

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## Abstract

**[Purpose]** When nurses provide care for individuals with oedema, the objective is to protect the skin and avoid applying external force to the skin, but the efficacy of gentle care is currently not well understood. This study was performed to clarify the relationships between oedema and skin injury caused by external force in elderly individuals with oedema.

**[Methods]** This cross-sectional study was performed in patients  $\geq 65$  years old at a long-term care hospital with 500 beds and a nursing home with 100 beds in Japan. These facilities fulfilled the selection criteria for prevention of pressure ulcers and external force preventive care, standardized for elderly patients with a history of skin tears on the limbs. Patients with severe conditions or for whom consent to participate was not obtained directly or from their family members were excluded. Data collected included age, sex, duration of hospitalization, main disease, body mass index (BMI), immobility, paralysis, articular contracture, Braden Scale, and risk factors for development of pressure ulcers. To identify edema and skin injury, the whole body of each participant was divided into 55 anatomical sites. Degree of oedema was evaluated using the modified Fukazawa method, from 0 to 4. Degree of oedema  $\geq 2$  was defined as "with oedema." Skin injury was defined as "pressure ulcers, skin tears, and other external force-related skin injuries."

**[Results]** Of the 579 patients recruited, 269 were excluded from the analysis based on the exclusion criteria. Of the 310 participants remaining in this study, 205 participants showed  $\geq 1$  anatomical location with degree of oedema  $\geq 2$ . The characteristics of these 205 participants were: mean ( $\pm$  standard deviation) age,  $87.2 \pm 7.3$  years; female, 75.1%; median duration of hospitalization, 2 years (interquartile range (IQR), 0.72 – 3.56 years); median BMI, 18.2 kg/m<sup>2</sup> (IQR, 15.8 – 20.4 kg/m<sup>2</sup>); cerebrovascular disease present, 62.0%. Braden Scale total score = 12 (IQR, 11 – 15), and 73.2% of participants were bedridden, 23.9% were chair-bound, 58.0% had paralysis, 60.5% had contracture of the upper limbs, and 67.8% had contracture of the lower limbs. Skin injuries were identified in 41 regions, and 58.5% of total skin injuries were on the lower limbs. Five sites (12.2%) showed both oedema and skin injuries, all of which were on the lower limbs. The odds ratio for oedema by cross-tabulation of oedema and skin injury was 0.87 (95% confidence interval, 0.467 – 1.616).

**[Conclusion]** We examined the relationship between oedema and skin damage in elderly patients at facilities providing standardized preventive care for pressure ulcers and skin tears. No significant relationship was identified between oedema and skin injury, and the odds ratio of oedema was 0.87. Only the lower limbs showed skin injury coexisting with oedema. These results suggest that nurses can reduce skin damage in elderly patients with oedema using external force adjustment preventive care.

## KEY WORDS

oedema, skin injury, elderly

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## Introduction

When nurses provide care for individuals with oedema, the objective is to protect and avoid applying external force to the skin, because the skin in people with oedema is thin and more susceptible to injury<sup>1)</sup>. Among the elderly, the characteristic pattern of rete ridges flattens out and the surface area of the dermal-epidermal junction is reduced<sup>2,5)</sup> when external force is applied, weakening the bond between the epidermis and dermis. The skin of elderly individuals with oedema is thus relatively fragile, and is considered more susceptible to skin injury. Nurses attending oedema patients provide gentle care. However, whether skin injury occurs at particular oedema sites when gentle care is carried out remains unclear. The efficacy of gentle care is thus currently not very well understood.

In previous studies of "oedema and skin injury", the prevalence of oedema in people with pressure ulcers was reported as 36.4% by Ohura<sup>6)</sup> and 32% by Moriguchi<sup>7)</sup>. Extensive oedema is widely recognized as a risk factor for the development of pressure ulcers<sup>3)</sup>. The odds ratio of oedema for pressure ulcers was reported as 4.7 by Ohura<sup>8)</sup>, 6.3 by Ohura<sup>9)</sup> and 2.35 by Casimiro et al<sup>10)</sup>. However, those studies did not determine whether pressure ulcers were present at the actual oedema sites. Skin tears are wounds caused by shearing, friction, and/or blunt forces that result in the separation of skin layers<sup>11)</sup>. The prevalence of oedema in skin tear regions has been reported as 38.8% by Lepez et al<sup>12)</sup> and as ranging from 12.4% to 17.7% by Konya et al<sup>13)</sup>. White et al<sup>14)</sup> reported that skin tears tend to occur in frail elderly individuals who can ambulate independently. Many of them showed oedema of the lower extremities with areas of purpura and ecchymosis. They also reported that skin tears usually occur when these patients are transferred from wheelchairs or tub chairs<sup>14)</sup>. Koyano et al<sup>15)</sup> examined the presence of oedema using high-frequency skin ultrasonography. Increased numbers of low-echogenic pixels, which are considered indicative of oedema at the papillary dermis, were noted at the sites with skin tears. However, whether impressions were present at the sites showing such oedematous images is unclear. Gill et al<sup>16)</sup> identified six risk factors of developing skin tears in the elderly. The odds ratio of oedema for skin tears was reported as 3.011 (95% confidence interval (CI), 1.617-5.605%). It is evident that oedema is a risk factor for skin

injuries. While various studies have examined skin tears at oedema sites, the occurrence of other lesions at oedema sites remains unclear.

Examination of each site is necessary because nurses want to clarify whether skin injury and oedema are present at the sites. First, it is necessary to determine whether the skin injury is caused by external force at the site with oedema. This step is to examine preventive care to avoid skin injuries caused by external force in elderly individuals with oedema. The purpose of the present study was to clarify the relationship between oedema and skin injury caused by external force in elderly individuals with oedema.

## Methods

### 1. Study design and settings

This cross-sectional study was conducted at a long-term care hospital with 500 beds and a nursing home with 100 beds in Ishikawa, Japan, between December 9, 2013 and October 15, 2014. These facilities had met the selection criteria for prevention of pressure ulcers and external force preventive care, standardized to elderly patients with a history of skin tears on the limbs.

### 2. Participants

All residents of the participating facilities were considered eligible for inclusion in this study. The exclusion criteria were: age <65 years; lack of consent from the patient or their family members; or the presence of severe medical conditions identified by a physician or nurse. Data collected from participants included age, sex, duration of hospitalization, main disease, body mass index (BMI), immobility, paralysis, articular contracture, Braden Scale<sup>17)</sup> and risk factors for the development of pressure ulcers. These data were obtained from medical and nursing records.

### 3. Evaluation of oedema and skin injuries

To observe the whole body of the participant for oedema and skin injury, each participant was considered to be divided into 55 anatomical sites (Figure 1). While a researcher observed the participant, another assistant researcher took care of the safety of the participant.

The degree of oedema was evaluated using the modified Fukazawa method (Table 1). The original Fukazawa method<sup>18)</sup> used a scale from grade 0 to grade 3. Our study added non-pitting oedema (NPE) to the original Fukazawa table as a gradable condition. After this addition, the new

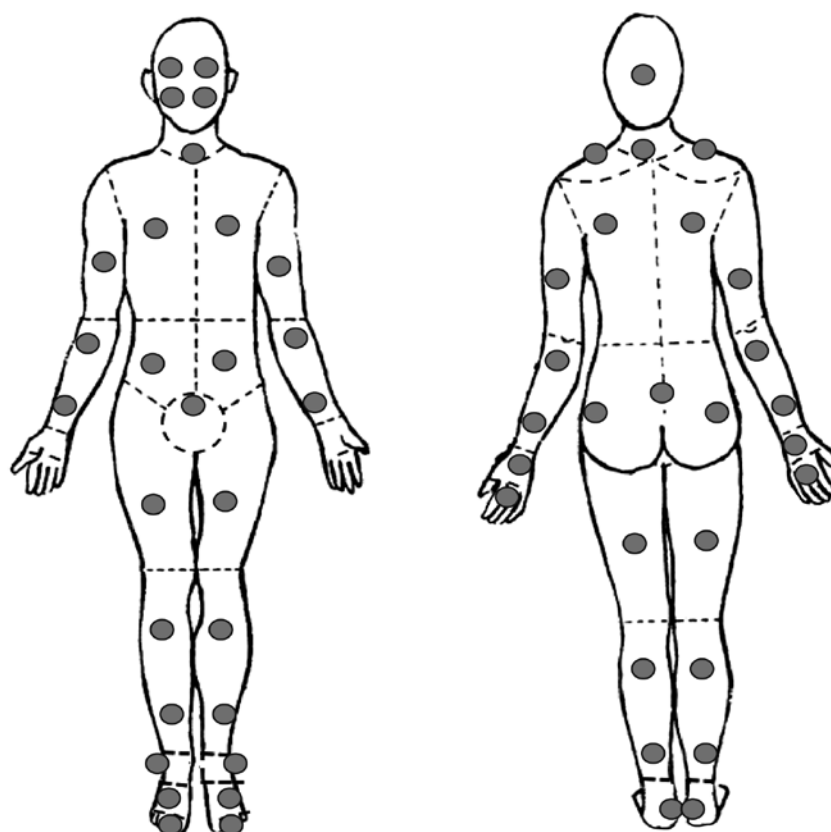


Figure 1. The evaluation sites of oedema and skin injuries

Note. Each participant was divided into 55 anatomical sites. The degree of oedema was evaluated by the modified Fukazawa method (Table 1) .

Table 1. Modified Fukazawa Method

grade	criteria
0	There is no impression, and there is no swelling.
1	The impression which the outline of the dimple is slightly differentiated by release of pressing, and seems to be sometimes missed.
2	The impression does not become clear at the beginning of the pressure, but it is found with pressure, and impression is left after release.
3	The deep impression already remains after pressure release with oedema is clear on ocular inspection and palpation at pressure initiation.
<b>NPE</b>	There is no impression, but is enlarged. (non-pitting oedema)

Note. The original Fukazawa method<sup>18)</sup> is from grade 0 to grade 3. Our study, added “non-pitting oedema (NPE)” to the original Fukazawa table as a gradable condition. The researcher pressed one thumb onto the evaluation site of participant for 10 s.

table with the NPE grading was called the "modified Fukazawa method". The researcher pressed one thumb onto the evaluation site of the participant for 10 s. Degree of oedema  $\geq$  grade 2 was defined as "with oedema". The rater was a researcher who checked the accuracy of the pressure in the pitting test. This rater was certified in wound, ostomy and continence nursing (WOC nurse). Calibration was performed before the real test began. First, the rater pressed on a pressure evaluator (Parm Q<sup>®</sup>; Cape, Yokosuka, Japan). Next, the rater checked the reading on the pressure evaluator and ensured that the range was 40-60 mmHg (intraclass correlation coefficient (ICC), (1,1) = 0.977). Stable pressure was important for pressing and evaluation purposes and patient safety. This was because patients with oedema and elderly individuals have vulnerable skin. The duration of pressure on the participant was measured with a stopwatch in every experiment.

Skin injury was defined as "pressure ulcers, including medical device-related pressure ulcers, skin tears and other external force-related skin injuries". After the researcher took pictures of the skin injuries, evaluation was performed. A dermatologist and another WOC nurse who did not belong to the research group then determined the type of skin injury from the photos. Next, the researcher analysed the wounds. Analyses from the dermatologist and the WOC nurse were found to indicate the same types of skin injury.

#### 4. Data analysis

Characteristics of the participants, sites of oedema grade  $\geq 2$ , and types and sites of skin injury for participants with oedema were tabulated. We calculated the odds ratio of oedema by cross-tabulation of oedema and skin injury. We performed cross-tabulation of oedematous regions showing both oedema and skin injury. Statistical analysis was performed using Statistical Package for Social Science (SPSS) version 22.0 software (IBM, Chicago, IL).

#### 5. Ethical consideration

Verbal explanations of the study were given to the patients and/or their family members, and written consent was obtained. Explanations included emphasis of the fact that consent for participation could be withdrawn at any time for any reason, without negative consequences. After the examination, two researchers confirmed that no skin abnormalities had developed at the examination sites. Two researchers performed the examinations in

order to ensure participant safety. All examinations were performed in a private room and unnecessary exposures of participants were avoided to protect the privacy of the participants.

This study was approved by the Medical Ethics Committee of Kanazawa University (approval No.481) and the two participating facilities.

## Results

### 1. Participants

A total of 579 patients hospitalized in the two facilities were eligible to participate. Of those, 269 patients were excluded from the analysis based on the exclusion criteria. As a result, 310 participants were evaluated in this study. No skin abnormalities were present at the examination sites. A total of 269 individuals were excluded from the study: 2 patients were <65 years old, 153 patients declined to participate, and 114 patients were critically ill (Figure 2). We categorized participants showing oedema grade  $\geq 2$  at any of the 55 observed sites to the "oedema group". All other patients were categorized as the "without oedema group". A total of 205 patients had  $\geq 1$  anatomical location showing grade  $\geq 2$  oedema. The prevalence of oedema was thus 66.1% (95%CI, 60.7 – 71.1%). The remaining 105 participants were without oedema. Characteristics of participants in the oedema group were: mean ( $\pm$  standard deviation) age,  $87.2 \pm 7.3$  years; female, 75.1%; median duration of hospitalization, 2 years (interquartile range (IQR), 0.72 – 3.56 years); median BMI, 18.2 kg/m<sup>2</sup> (IQR, 15.8-20.4 kg/m<sup>2</sup>); and presence of cerebrovascular disease, 62.0%. Median total Braden scale score was 12 (IQR, 11 – 15), 73.2% of participants were bedridden, 23.9% were chair-bound, 58.0% showed paralysis, 60.5% had contracture of the upper limbs, and 67.8% had contracture of the lower limbs (Table 2).

### 2. Oedema and skin injury

In the oedema group, 10,968 sites were evaluated, with 828 sites (7.5%) showing oedema grade  $\geq 2$ . Of these, 88.2% were on the lower limbs (Table 3). Skin injuries were present in 41 sites, and 58.5% of total skin injuries were on the lower limbs. Pressure ulcers were seen at 26 sites, and the trunk and lower limbs each showed 12 pressure ulcer sites. Skin tears were present at 5 sites, with 3 on the lower limbs. Other wounds included 10 cases of subungual hematoma or hematoma under callus. Nine of these 10 hematomas were on the lower limbs (Table 4). Five of

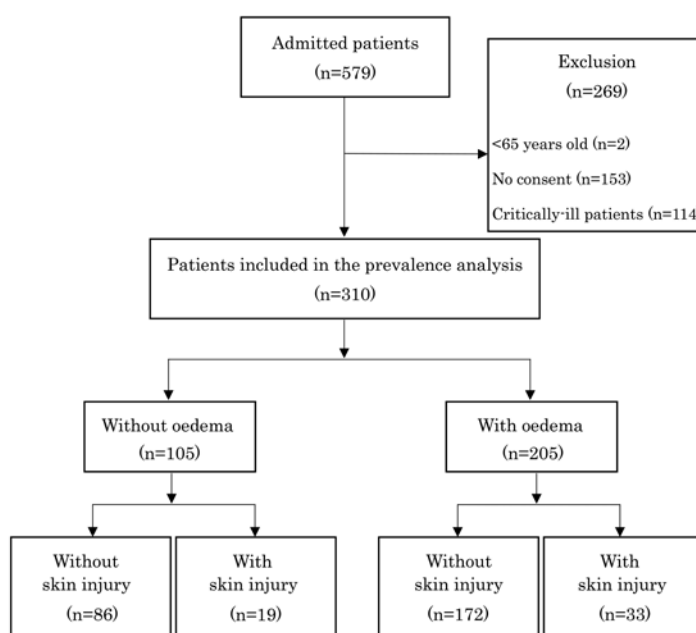


Figure 2. Flow diagram of participants

the 41 sites with skin injury (12.2%) also showed oedema. Skin injuries included 2 pressure ulcers, 1 skin tear and 2 other wounds. All 5 skin injuries were on the lower limbs (Table 5, Table 6).

The prevalence of skin injury with oedema was 10.6% (95%CI, 7.7 - 14.6%), and the odds ratio of oedema by cross-tabulation of oedema and skin injury was 0.87 (95%CI, 0.467-1.616%; Table 7).

### Discussion

This study revealed three findings for oedema and skin injury in the elderly. The odds ratio of oedema for skin injury was 0.87, sites with both skin injury and oedema comprised 12.2% of skin injury sites, and sites showing both skin injury and oedema were uniformly restricted to the lower limbs. The accuracy of these findings was considered to be high because a single WOC nurse (as a nurse specializing in wound care) performed the monitoring of oedema and skin injury, evaluations of skin injury were performed by a dermatologist and another WOC nurse, and pressure for testing pitting was calibrated and showed a high ICC.

#### 1. Odds ratio of oedema for skin injury

We thought that skin injury would be more likely to occur at sites with oedema, but the odds ratio of oedema for skin injury in our study was 0.87, considerably lower

than in other research<sup>8,10, 16</sup>. The reasons for this were unclear. From a pathological perspective, oedema is a condition involving an abnormally large fluid volume in the circulatory system or in tissues in the interstitial space<sup>19</sup>. The four causes of oedema are a rise in hydrostatic pressure, decreased colloid oncotic pressure, lymphatic obstruction and capillary permeability sthenia<sup>19</sup>. Oedema can occur in all internal organs and tissues, but is particularly common in the subcutaneous tissue, lungs and brain<sup>19</sup>.

Capillaries are distributed within the layers of the dermis, and we thus think that oedema fluid accumulates in the dermis. We therefore predict that binding between the epidermis, dermis, and hypodermis would be weakened. Furthermore, we think that oedematous skin would be easily injured by external force due to the flattening of the epidermis-dermis boundary with age<sup>2</sup>. However, the present results showed that the odds ratio for oedema was lower than reported elsewhere.

The fiscal year (FY) 2001 revision to Medical Fees in Japan influenced preventive care for pressure ulcers in each facility. The odds ratio of oedema for pressure ulcer has been reported as 4.7 in 2002<sup>8</sup> and 6.3 in 2003 by Ohura<sup>9</sup> and 2.35 by Cesar et al<sup>10</sup>. Furthermore, Ohura<sup>9</sup> reported that when support surface were not used, the odds ratio of oedema rose markedly to 23.5. Based on

the findings of Ohura<sup>8,9)</sup>, we considered that preventive care for pressure ulcer was insufficient in facilities that underwent revision of medical fees during FY 2002<sup>8)</sup> and 2003<sup>9)</sup>. In addition, the studies by Ohura<sup>8,9)</sup> investigated acute care hospitals and homecare settings, not long-term care facilities, which would have influenced the odds ratios. We conducted our research in facilities already providing preventive care for pressure ulcers, and skin injuries may have been prevented by the provision of such care even in patients with oedema, thus reducing the odds ratio.

## 2. Sites with both oedema and skin injuries

Three previous studies have examined the presence of oedema at sites of skin injury, but those only focused on skin tears<sup>12, 13, 16)</sup>. Skin tears are wounds caused by shearing, friction, and/or blunt forces that result in the separation of skin layers<sup>11)</sup>. Such lesions are common in the elderly. Skin tears readily develop in the elderly because, with age, the characteristic pattern of rete ridges flattens out<sup>2)</sup> when external force is applied, weakening the bond between the epidermis and dermis. Skin tears

Table 2. The characteristics of participants with oedema (n=205)

Variables	n (%) or Mean $\pm$ SD / Median(IQR)
Age (years )	87.2 $\pm$ 7.3
Gender	
Male	51 (24.9)
Female	154 (75.1)
Length of hospitalization(years )	2 (0.72-3.56)
BMI (kg/m <sup>2</sup> )	18.2 (15.8-20.4)
Main disease	
Cerebrovascular disease	127 (62.0)
Dementia	80 (39.0)
Cardiac disease	80 (39.0)
Endocrine, nutritional and metabolic diseases	49 (23.9)
Diseases of the musculoskeletal system and connective tissue	35 (17.0)
Neurologic disease	33 (16.1)
Diseases of the respiratory system	30 (14.6)
Diseases of the genitourinary system	17 ( 8.3)
Diseases of the digestive system	11 ( 5.4)
Malignant neoplasms	8 ( 3.9)
Others	2 ( 1.0)
Braden Scale	
Total score (6-23)	12 (11-15)
Sensory Perception (1-4)	3 (2-3)
Moisture (1-4)	2 (2-3)
Activity (1-4)	1 (1-2)
Mobility (1-4)	2 (2-2)
Nutrition (1-4)	3 (3-3)
Friction and shear (1-3)	1 (1-2)
Daily life independence level	
Bedridden	150 (73.2)
Chair bound	49 (23.9)
Ambulatory	6 ( 2.9)
Paralysis	119 (58.0)
Contracture	
Upper limbs	124 (60.5)
Lower Limbs	139 (67.8)

could thus be studied under different research settings. The prevalence of skin tears with oedema was reported as 17.7%<sup>12)</sup>. The research settings for that study were an acute-care ward for the elderly and rehabilitation wards in a hospital. Konya et al<sup>13)</sup> investigated participants including both <65 years old and ≥65 years old in 11 facilities, including some university and general hospitals, the prevalence of skin tears with oedema was reported as 38.8%. Other study demonstrated that the odds ratio of oedema for skin tears was reported as 3.011 (95%CI, 1.617 – 5.605%)<sup>16)</sup>.

On the other hand, in this study, only one of the 5 sites with both skin injury and oedema showed skin tears (Table 6), representing a different prevalence due to different research settings than other studies. This study did not include acute-care settings, and when patients

showed skin tears on the limbs, skin injury preventive care was provided. This was considered the reason for the low prevalence of oedema with skin injury.

### 3. Anatomical location of oedema and skin injury

In this study, skin injury and oedema were only present on the lower limbs. Table 6 shows the characteristics of participants with skin injury at oedema sites. When participants with oedema on the trunk area use support surfaces, the external force applied to the skin is effectively reduced. Four of these 5 participants (80.0%) had used support surfaces in the preventive care of pressure ulcers. Approximately 60% of all participants with oedema had cerebrovascular disease, paralysis or contracture of the limbs. The level of independence in daily life for these participants was uniformly bedridden or chair-bound.

Based on the issues mentioned above, we could predict

Table 3. The sites with oedema (n=10,968)

Variables	n (%)
Number of grade 2 or more sites	828 ( 7.5)
Site of oedema	
Face, head and neck	0 ( 0.0)
Trunk	9 ( 1.1)
Upper Limbs	89 (10.4)
Lower Limbs	730 (88.2)

Table 4. The type and sites with skin injuries

site	n (%)	Type of skin injury		
		Pressure ulcers	Skin tears	Others
Trunk	13 (31.7)	12	1	0
Upper limbs	4 ( 9.8)	2	1	1
Lower limbs	24 (58.5)	12	3	9
Total	41 (100)	26 (63.4)	5 (12.2)	10 (24.4)

that these patients might be susceptible to developing skin injuries on the lower limbs. A study of skin disorders in the elderly showed that more than 40% of participants had oedema of the lower limbs<sup>20</sup>. Immobility contributes to vascular congestion, which in turn leads to both dependent oedema and deep oedema from fluid shifts<sup>3</sup>. In addition, paralysis had a negative influence on blood flow in the lower limbs, and contracture was considered as a cause of blood vessel denaturation.

Other wounds such as subungual hematomas are caused by bleeding in the underlying vasculature of the nail bed as a result of trauma<sup>21</sup>. However, no studies appear to have considered the relationship between oedema and subungual hematoma. In our study, two participants with

subungual haematomas and oedema were chair-bound. For these two participants, we speculated that the tip of the toe diagnosed with oedema would be susceptible to bleeding, because when external force was transferred and concentrated at the tip of the toe, pressure from the nail would result in vulnerability to bleeding.

**4. Contribution to nursing**

Although the odds ratio for oedema and skin injury was low in this study, not providing oedema patients with skin injury preventive care is very risky, because elderly individuals with oedema show vulnerable skin. The facilities we investigated provide skin injury preventive care to almost all patients who need such attention. The odds ratio of oedema has been reported to rise markedly

Table 5. The sites with oedema at sites with skin injuries

site	Skin injuries (n=41)	
	Site with oedema	Site without oedema
Trunk	0	13
Upper limbs	0	4
Lower limbs	5	19

Table 6. The characteristics of the cases with skin injury in the site with oedema

ID	Skin injury		Main disease	Daily life		Contracture		Support surface
	Type	Site		independence level	Paralysis	Upper limbs	Lower limbs	
1	Pressure ulcer	Ankle lateral	Cerebrovascular disease	Bedridden	+	+	+	Air mattress
2	Pressure ulcer	Ankle medial	Cerebrovascular disease	Chair bound	+	-	-	Urethane mattress
3	Skin tear	Ankle medial	Cardiac disease Cerebrovascular disease	Bedridden	+	+	+	Air mattress
4	Subungual hematoma	Toe	Cardiac disease	Chair bound	-	-	-	Urethane mattress
5	Subungual hematoma	Toe	Cerebrovascular disease Dementia	Chair bound	-	-	-	-



Table 7. The cross tabulation of oedema and skin injury

		Skin injury		total
		with	without	
Oedema	with	33	172	205
	without	19	86	105
total		52	258	310

Note. Odds ratio of oedema: 0.87 (95%CI, 0.467–1.616%)  
 Prevalence of oedema: 66.1% (95%CI, 60.7–71.1%)  
 Prevalence of skin injury with oedema: 10.6% (95%CI, 7.7–14.6%)

when support surfaces are not used<sup>9)</sup>. Therefore, when we observe oedema sites in patients, it is very important to provide external force preventive care as a prevention step against skin injury.

### 5. Limitations

Our study investigated patients undergoing chronic care in long-term care facilities. Acute care was not examined in our study. Terminally ill cancer patients were not explicitly excluded from this study, but no such patients were present in the cohort.

Other studies have included patients in both acute and terminal phases. However, investigation of oedema with skin injury in elderly individuals did not yield similar results to our study.

This study included only Japanese patients. Numbers and sizes of melanosomes differ among races<sup>22)</sup>, and white people have few melanosomes and thin skin<sup>23)</sup>. Pale skin easily absorbs ultraviolet rays, and is thus more susceptible to damage by photoaging<sup>23, 24)</sup>. The present results thus may not be applicable to other races.

This research used a cross-sectional design and thus did not perform evaluations at the time injuries developed. A prospective study will be necessary in future because skin injury easily occurs at sites of oedema.

### Conclusion

We examined the relationship between oedema and skin damage in elderly patients at facilities providing standardized preventive care for pressure ulcers and skin tears. No significant relationship was identified between oedema and skin injury, with an odds ratio for oedema of 0.87. Only sites on the lower limbs showed both skin

injury and oedema. These results suggest that we can reduce skin damage in the elderly with oedema using external force adjustment preventive care.

### Acknowledgments

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### Disclosure

None.

## References

- 1) Sanada H, Okuwa M: Skin care according to the symptom. VII oedema. Guidance of the skin care (Wound care criteria study meeting, certified nurse committee), Japan Nursing Association Publishing Company 148-151, 2002 (in Japanese)
- 2) Flour M: The pathophysiology of vulnerable skin. World Wide Wounds: <http://www.worldwidewounds.com/2009/September/Flour/vulnerable-skin-1.html>
- 3) Edsberg LE, Langemo D, Baharestani MM, et al: Unavoidable pressure injury: state of the science and consensus outcomes. *Journal of Wound Ostomy & Continence Nursing* 41 (3) : 313-334, 2014
- 4) Jafferany M, Huynh T, Silverman MA, et al: Geriatric dermatoses: a clinical review of skin diseases in an aging population. *International Journal of Dermatology* 51 (5) : 509-522, 2012
- 5) Calleja-Agius J, Brincat M, Borg M: Skin connective tissue and ageing. *Best Practice & Research Clinical Obstetrics and Gynaecology* 27 (5) : 727-740, 2013
- 6) Ohura T: The present state of pressure ulcers and PU-treatment and some problems in the field of PUs in Japan. *Japanese Journal of Pressure Ulcer* 1 (2) : 201-214, 1999 (in Japanese with English abstract)
- 7) Moriguchi T: Investigation into the actual conditions for pressure ulcers patients in Okayama prefecture -Patients background and risk factor evaluation-. *Journal of Japan Society of Plastic and Reconstructive Surgery* 24: 1-8, 2004 (in Japanese with English abstract)
- 8) Ohura T: Risk factors for pressure ulcers of elderly people. *Japanese Journal of Pressure Ulcer* 4 (3) : 397-405, 2002 (in Japanese with English abstract)
- 9) Ohura T: Risk factors of pressure ulcers in bedridden elderly persons -Verification of the importance of pressure dispersing mattress-. *Japanese Journal of Pressure Ulcer* 5 (3) : 459-471, 2003 (in Japanese with English abstract)
- 10) Casimiro C, Garcia-de-Lorenzo A, Usan L: Prevalence of decubitus ulcer and associated risk factors in an institutionalized Spanish elderly population. *Nutrition* 18 (5) , 408-414, 2002
- 11) Payne RL, Martin ML: Defining and classifying skin tears: need for a common language. *Ostomy Wound Manage* 39 (5) : 16-20, 22-24, 26, 1993
- 12) Lepez V, Dunk AM, Cubit K, et al: Skin tear prevention and management among patients in the acute aged care and rehabilitation units in the Australian Capital Territory: a best practice implementation project. *International Journal of Evidence-Based Health Care* 9: 429-434, 2011
- 13) Konya C, Mizokami Y, Ryoichi K, et al: Investigation of skin tears at the 11 Japanese hospitals. *Journal of Japanese Society of Wound, Ostomy and Continence Management* 19 (1) : 50-60, 2015 (in Japanese)
- 14) White MW, Karam S, Cowell B: Skin tears in frail elders: a practical approach to prevention. *Geriatric Nursing* 15 (2) : 95-99, 1994
- 15) Koyano Y, Nakagami G, Iizaka S, et al: Exploring the prevalence of skin tears and skin properties related to skin tears in elderly patients at long-term medical facility in Japan. *International Wound Journal*: doi: 10.1111/iwj.12251, 2014
- 16) Gill F L, Nelly N, Janine JA, et al: Identification of risk factors associated with the development of skin tears in hospitalised older persons: a case-control study. *International Wound Journal*: doi: 10.1111/iwj.12490, 2015
- 17) Bergstrom N, Braden BJ, Laguzza A, et al: The Braden scale for predicting pressure sore risk, *Nursing Research* 36 (4) : 205-210, 1987
- 18) Fukazawa R, Koyama S, Hidekazu K, et al: Leg oedema detected on comprehensive geriatric assessment for elderly outpatients and its associated risk factors. *Journal of Japanese Geriatrics Society* 50 (3) : 384-391, 2013 (in Japanese with English abstract)
- 19) Kumar V, Cotran RS, Robbins SL, (2003/2004) , Mori W, Okeda R (trans): *Basic Pathology* (7th edition), Hirokawa Shoten, pp 95-99, 2004
- 20) Reszke R, Pełka D, Walasek A, et al: Skin disorders in elderly subjects. *International Journal of Dermatology* 54 (9) , e332-e338, 2015
- 21) Tully AS, Traves KP, Studdford JS: Evaluation of nail abnormalities. *American Family Physician* 85 (8) : 779-787, 2012
- 22) Shimizu H: *Textbook of Modern Dermatology* 2<sup>nd</sup> edition, Nakayama Shoten, pp 10, 2011 (in Japanese)
- 23) Berardesca E, Maibach H: Racial differences in skin pathophysiology. *Journal of American Academic Dermatology* 34 (4) : 667-672, 1996
- 24) Rawlings AV: Ethnic skin types: are there differences in skin structure and function?. *International Journal of Cosmetic Science* 28 (2) : 79-93, 2006

## 療養施設入所中の高齢者における浮腫と皮膚損傷の横断研究

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### 要 旨

**【目的】** 浮腫があると愛護的なケアを提供するが、浮腫がある部位に皮膚損傷が発生しているか不明であるために、ケアの有効性がわからない。そのため、本研究の目的は、浮腫を有する高齢者の浮腫と外力による皮膚損傷との関係を見出すことである。

**【方法】** 研究デザインは横断観察研究である。対象は、石川県内の長期療養施設および特別養護老人ホーム入所中の65歳以上の高齢者である。対象施設では、褥瘡や外力による損傷の予防ケアが標準化されている。除外基準は、対象者またはその家族が研究参加に同意しない者、医師・看護師が調査不可能と判断した者とした。調査項目は、基本属性（年齢、性別、疾患、BMI、麻痺・関節拘縮、ブレイデンスケール）と、身体各部位（55部位）の浮腫および皮膚損傷とした。浮腫は深沢変法にて浮腫2度以上を浮腫ありとした。皮膚損傷とは、医療機器関連創傷を含む褥瘡、スキントア、その他外力による損傷とした。

**【結果】** 入所者579名から除外基準適合者269名を除外し、310名を調査対象とした。浮腫あり群は205名で、平均年齢87.2歳±7.3歳、女性75.1%、BMI18.2、脳血管障害62.0%、ブレイデンスケール合計点12、寝たきりが73.2%、麻痺・関節拘縮は約60%であった。205名の観察部位は10,968部で、浮腫2度以上は828部（7.5%）で下肢に88.2%認めた。皮膚損傷は41部で、下肢に58.5%認めた。浮腫保有部と皮膚損傷との一致は5部（12.2%）で、全て下肢であった。皮膚損傷に対する浮腫のオッズ比は0.87であった。

**【結論】** 褥瘡対策の体圧分散寝具選択基準を有し、スキントア予防ケアが標準化している施設において高齢者の浮腫と皮膚損傷の関係を検討した。浮腫と皮膚損傷には有意な関係はなかった。浮腫と皮膚損傷の部位一致は下肢のみであった。これらの結果が示唆することは、外力調整のケアにより浮腫を有する高齢者の皮膚損傷を低減できるということである。

