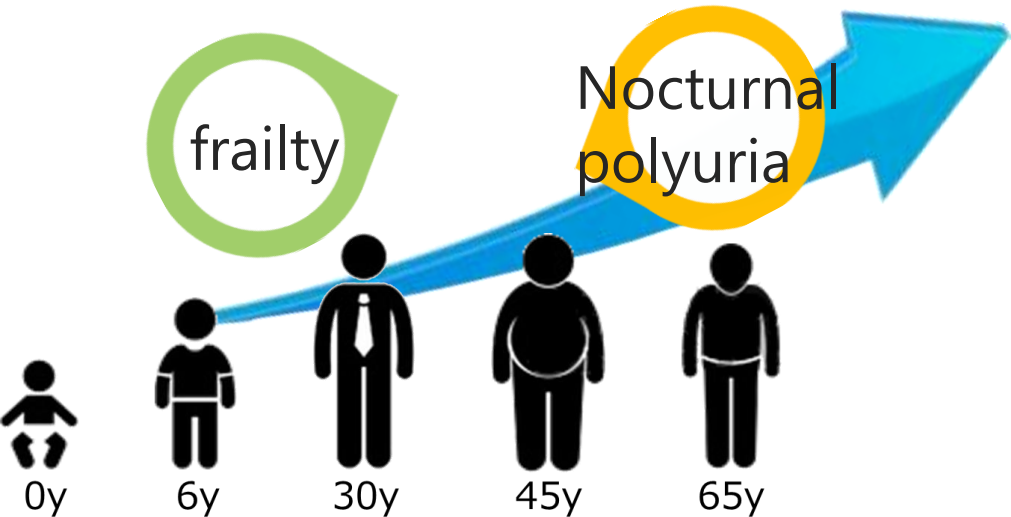


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Hypothesis/ Aims of study

Both frailty and nocturnal polyuria are common in the elderly and reduce their quality of life. However, there are few reports examining which factors of frailty are associated with nocturnal polyuria. The cause of nocturnal polyuria is not clear, and prevention of nocturnal polyuria is difficult. On the other hand, some of causes of frailty are clear and can be prevented. Identification of factors associated with frailty and nocturnal polyuria may lead to prevention of nocturnal polyuria. The aim of study was to investigated which factors of frailty are associated with nocturnal polyuria.



Study design, materials and methods

Patients who visited our hospital's internal medicine department between November 2022 and December 2023 and were suspected of having pre-frailty or frailty were targeted. Gender, height, weight, BMI, grip strength, walking speed, lower limb muscle strength, and complications were evaluated. To evaluate frailty, the Kihon checklist (KCL) (Fig. 1) were used. To evaluate nocturnal polyuria, nocturnal polyuria index (NPi) from frequency volume chart was used. Cases with declining physical function and requiring nursing care were excluded.

1	Do you go out by bus or train by yourself?	0. Yes	1. No
2	Do you go shopping to buy daily necessities by yourself?	0. Yes	1. No
3	Do you manage your own deposits and savings at the bank?	0. Yes	1. No
4	Do you sometimes visit your friends?	0. Yes	1. No
5	Do you turn to your family or friends for advice?	0. Yes	1. No
6	Do you normally climb stairs without using handrails or wall for support?	0. Yes	1. No
7	Do you normally stand up from a chair without any aids?	0. Yes	1. No
8	Do you normally walk continuously for 15 minutes?	0. Yes	1. No
9	Have you experienced a fall in the past year?	1. Yes	0. No
10	Do you have a fear of falling while walking?	1. Yes	0. No
11	Have you lost 2kg or more in the past 6 months?	1. Yes	0. No
12	Height: cm, weight: kg, BMI: kg/m ² If BMI is less than 18.5, this item is scored	1. Yes	0. No
13	Do you have any difficulties eating tough foods compared to 6 months ago?	1. Yes	0. No
14	Have you choked on your tea or soup recently?	1. Yes	0. No
15	Do you often experience having a dry month?	1. Yes	0. No
16	Do you go out at least once a week?	0. Yes	1. No
17	Do you go out less frequently compared to last year?	1. Yes	0. No
18	Do your family or your friends point out your memory loss? E.g. "You always ask the same question over and over again"?	1. Yes	0. No
19	Do you make a call by looking up phone numbers?	0. Yes	1. No
20	Do you find yourself not knowing today's date?	1. Yes	0. No
21	In the last two weeks have you felt lack of fulfilment in your daily life?	1. Yes	0. No
22	In the last two weeks have you felt a lack of joy when doing the things you used to enjoy?	1. Yes	0. No
23	In the last two weeks have you felt difficulty in doing what you could do easily before?	1. Yes	0. No
24	In the last two weeks have you felt helpless?	1. Yes	0. No
25	In the last two weeks have you felt tired without a reason?	1. Yes	0. No

Figure 1. Kihon Checklist. Working Group on Frailty in Japanese Geriatrics Society. BMI, body mass index.

Arai H, Satake S. Geriatr Gerontol Int.15, 2015.

Results

There were 59 patients, 28 males and 31 females. Median age was 75 years (65-93), height was 158.8 cm (142.5-178), weight was 61.8 kg (40.5-88.6), BMI was 23.8 kg/m2 (18.6-31.6) (Table 1). Grip strength was 24.3 kg (12.3-45.4), the 5-time standing test was 9.4 seconds (5.8-18.7), the average walking speed was 1.28 m/s (0.71-1.71) (Table 2). The KCL total score was 4 points (0-15) (Table 3). NPi was 35% (11-74) (Figure 3).

Results

Among these factors, only KCL16, which is the factor that expresses motivation and physical function (Are you going out at least once a week?) was significantly associated with NPi (p = 0.035). Furthermore, in the frail group (KCL total score 8 or higher), there was a significant relationship between KCL total score and NPi (p = 0.037).

Table 1. Characteristics pf patients

	Median (range)、 n
age (years)	75 (65-93)
sex males/females	Males 28/females 31
height (cm)	158.8 (142.5-178.0)
weight (kg)	61.8 (40.5-88.6)
BMI (kg/m2)	23.8 (18.6-31.6)
Systolic blood pressure (mmHg)	146 (116-187)
Diastolic blood pressure (mmHg)	77 (52-99)
Pulse (bpm)	72 (51-104)

Table 2. Physical function evaluation

	Median (range)
Grip strength (kg)	Males 34.4 (19.7-45.4) Females 20.6 (12.3-27.9)
5-time standing test(秒)	9.4 (5.8-18.7)
average walking speed (m/秒)	1.28 (0.71-1.71)

Table 3. KCL factors

0 point / point			point		
Percentage of 1 point (%)			KCL 13	51/7	12.1 (%)
KCL 1	52/7	11.9 (%)	KCL 14	40/19	32.2 (%)
KCL 2	57/2	3.4 (%)	KCL 15	41/18	30.5 (%)
KCL 3	53/6	10.2 (%)	KCL 16	55/4	6.8 (%)
KCL 4	36/23	39.0 (%)	KCL 17	32/26	44.8 (%)
KCL 5	54/5	8.5 (%)	KCL 18	49/10	16.9 (%)
KCL 6	44/15	25.4 (%)	KCL 19	56/3	5.1 (%)
KCL 7	51/8	13.6 (%)	KCL 20	46/13	22.0 (%)
KCL 8	54/5	8.5 (%)	KCL 21	49/10	16.9 (%)
KCL 9	48/11	18.6 (%)	KCL 22	55/4	6.8 (%)
KCL 10	37/22	37.3 (%)	KCL 23	44/15	25.4 (%)
KCL 11	46/13	22.0 (%)	KCL 24	50/9	15.3 (%)
KCL 12	59/0	0 (%)	KCL 25	43/16	27.1 (%)

Figure 3.The nocturnal polyuria index.

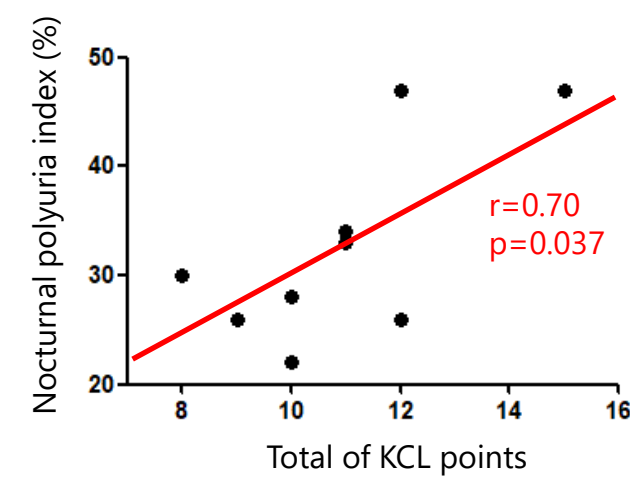
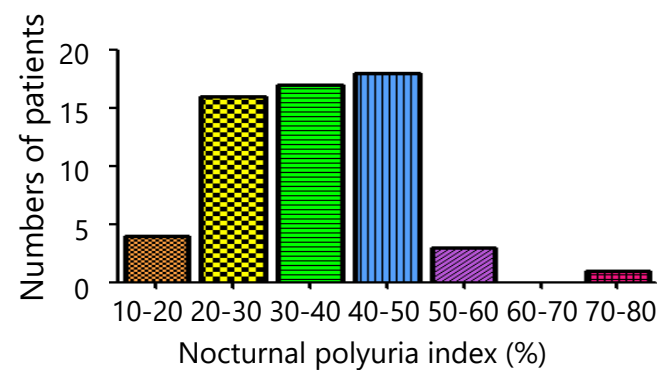


Table 4. Relationship between physical function and nocturnal polyuria index

	P value
Grip strength (kg)	Males 0.56 Females 0.85
5-time standing test(sec)	0.40
average walking speed (m/sec)	0.40

KCL	P value
KCL 1	0.13
KCL 2	0.55
KCL 3	0.61
KCL 4	0.25
:	:
KCL 16	0.031
:	:
KCL 23	0.65
KCL 24	0.41
KCL 25	0.28

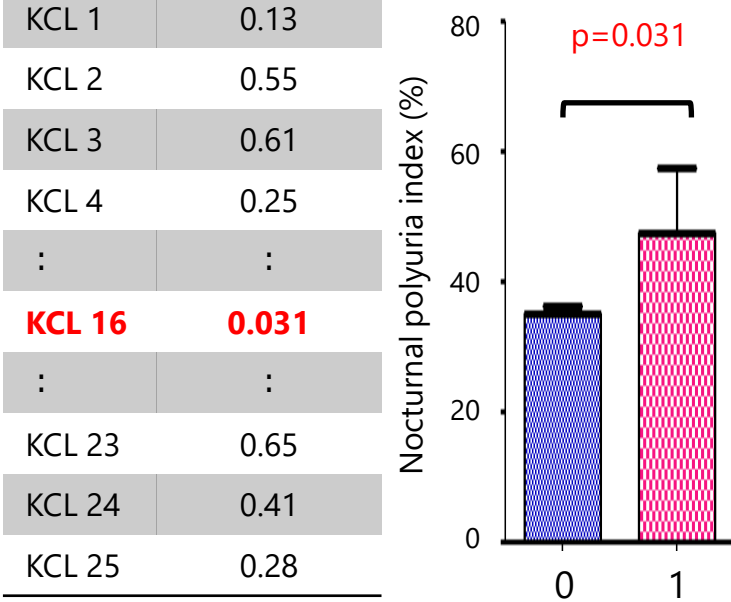


Figure 4.Association between KCL and nocturnal polyuria index

Figure 5. Correlation between KCL items and nocturnal polyuria index

Interpretation of results

Nocturnal polyuria was thought to be less common among patients who were willing to go out, and had sufficient physical function to go out. The results suggest that regular physical activity for maintenance of mobility and going outside regularly may be effective in preventing nocturnal polyuria.

Conclusions

The frailty factors of basic regular physical activity were significantly associated with NPi.