

# **Risk Factors for Sarcopenia among Elderly People with Type 2 Diabetes in Japan**

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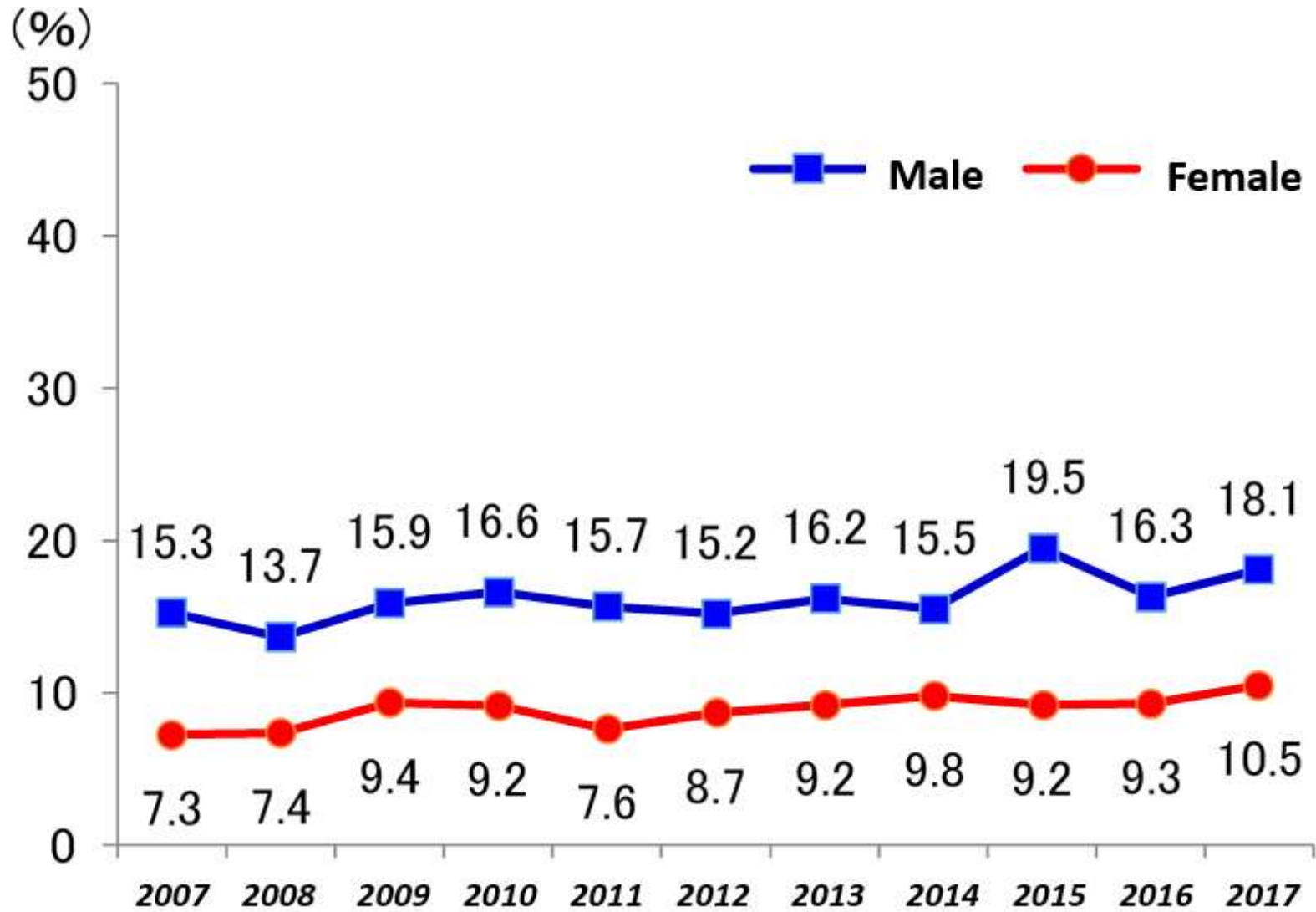
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**Disclosure of Conflict of Interest**

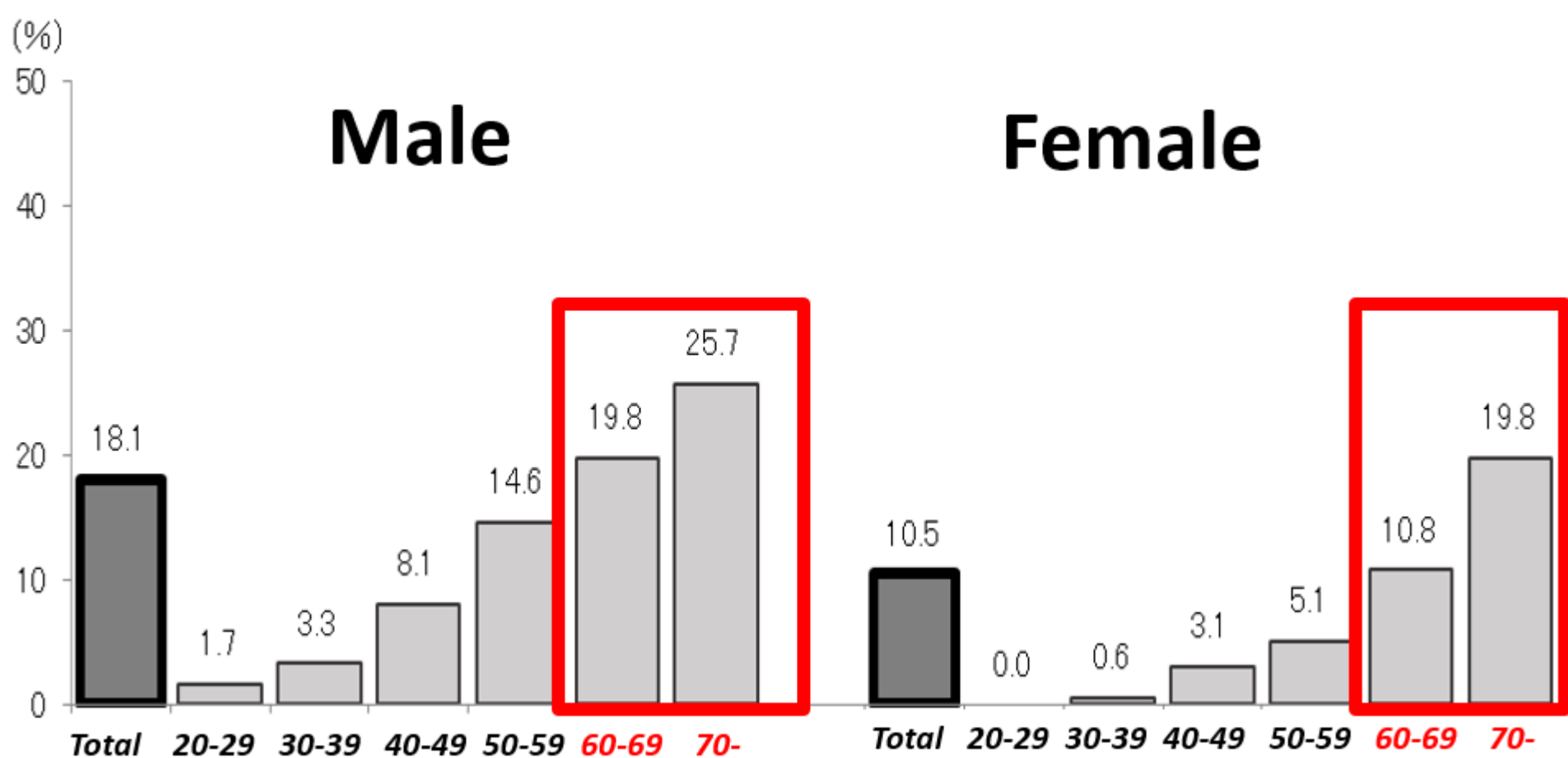
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I have no COI  
with regard to our presentation.

# Diabetes trends in Japan



# Prevalence of diabetes by age



# Health issue for elderly people with diabetes

- Many cases of diabetes in elderly people are accompanied by geriatric conditions.
- People with diabetes had a three-fold higher risk of sarcopenia than subjects without diabetes after adjusting for several confounding factors.
- Sarcopenia and diabetes are intertwined.

**It is important to control diabetes and prevent sarcopenia related to diabetes in elderly people.**

# Aim

To clarify the prevalence of sarcopenia and the risk factors associated with sarcopenia among Japanese elderly people with diabetes

# Methods

- Research design: **A cross-sectional study**
- Subjects: **116 out patients with type 2 diabetes aged 65 years and over in Western Japan**
- Data collection: **From June to September 2017**
- Ethical consideration: **Approved by the IRB of Kobe University Graduate School of Health Sciences (Approval No.543)**

# Methods

- Measurements:

## **Self-administered questionnaire**

Age, sex, diabetes condition, health management, community support, tobacco use, alcohol consumption, physical activities

## **Physical checkup**

Hand grip strength, Skeletal Muscle Index (SMI), 10m gait speed, Body Mass (BMI), Body Fat Percentage (BFP)

## **Blood sample data related to glycolipid and nutrition status**

HbA1c (HbA1c), triglyceride (TG), high-density lipoprotein cholesterol (HDL), low-density lipoprotein cholesterol (LDL), total protein (TP), and serum albumin (Alb)

- Data analyses:

**SPSS version 25.0 for Windows, A P-value of <0.05**



# Algorithm of Sarcopenia

Grip strength (<26kg in men, <18kg in women) and  
Usual gait speed (<0.8m/sec) measurement

No low grip strength and  
No low usual gait speed

**No Sarcopenia**

Low grip strength and/or  
Low usual gait speed

Muscle mass measurement (SMI)  
DXA: <7.0kg/m<sup>2</sup> in men, <5.4kg/m<sup>2</sup> in women  
BIA: <7.0kg/m<sup>2</sup> in men, <5.7kg/m<sup>2</sup> in women

Normal

**No Sarcopenia**

Low muscle mass

**Sarcopenia**

# Characteristics

| Variables                | Sarcopenic group<br>(n=12) | Control group<br>(n=101) | Total<br>(N=113) | <i>P</i>                 |
|--------------------------|----------------------------|--------------------------|------------------|--------------------------|
| Age (Y)                  | 79.6±6.5                   | 72.9±6.5                 | 73.7±6.9         | <b>0.001<sup>a</sup></b> |
| Female                   | 7 (58.3%)                  | 36 (35.6%)               | 43 (38.1%)       | 0.21 <sup>c</sup>        |
| Duration of diabetes (Y) | 24.4±12.8                  | 16.8±10.4                | 17.6±10.9        | <b>0.02<sup>a</sup></b>  |
| Diabetes treatment       | 12 (100%)                  | 99 (98.0%)               | 111 (98.2%)      | 1.0 <sup>c</sup>         |
| Diabetes complications   | 3 (25.0%)                  | 28 (26.7%)               | 30 (26.5%)       | 1.0 <sup>c</sup>         |

<sup>a</sup> Unpaired Student's t-test, <sup>b</sup> Chi-squared test, <sup>c</sup> Fisher's exact test

# Health management

| Variables                      | Sarcopenic group<br>(n=12) | Control group<br>(n=101) | Total<br>(N=113) | <i>P</i>                 |
|--------------------------------|----------------------------|--------------------------|------------------|--------------------------|
| Smoking history                | 3 (25.0%)                  | 36 (36.0%)               | 39 (34.8%)       | 0.69 <sup>c</sup>        |
| Alcohol consumption            | 3 (25.0%)                  | 37 (36.0%)               | 40 (34.8%)       | 0.74 <sup>c</sup>        |
| Daily activities               | 9 (75.0%)                  | 67 (66.3%)               | 76 (67.3%)       | 0.75 <sup>c</sup>        |
| Awareness of health management | 7 (58.3%)                  | 92 (91.1%)               | 99 (87.6%)       | <b>0.007<sup>b</sup></b> |

<sup>a</sup> Unpaired Student's t-test, <sup>b</sup> Chi-squared test, <sup>c</sup> Fisher's exact test

# Community support

| Variables                                       | Sarcopenic group<br>(n=12) | Control group<br>(n=101) | Total<br>(N=113) | <i>P</i>          |
|---|----------------------------|--------------------------|------------------|-------------------|
| Support for one another<br>within the community | 6 (50.0)                   | 71 (70.3)                | 77 (68.1)        | 0.19 <sup>c</sup> |
| Communication with<br>neighbors                 |                            |                          |                  |                   |
| Never   | 4 (33.3)                   | 9 (8.9)                  | 13 (11.5)        | 0.06 <sup>c</sup> |
| Seldom  | 6 (50.0)                   | 59 (58.4)                | 65 (57.5)        |                   |
| Close relationship                              | 2 (16.7)                   | 33 (32.7)                | 35 (31.0)        |                   |
| Feel lonely                                     | 3 (25.0)                   | 14 (13.9)                | 17 (15.0)        | 0.39 <sup>c</sup> |

<sup>a</sup> Unpaired Student's t-test, <sup>b</sup> Chi-squared test, <sup>c</sup> Fisher's exact test

# Binomial logistic regression with sarcopenia

| Variables                      | $\beta$    | Odds ratio (95% CI) | <i>P</i>    |
|--------------------------------|------------|---------------------|-------------|
| Duration of diabetes           | 0.04       | 1.05 (0.98-1.11)    | 0.15        |
| Awareness of health management | -1.7       | 0.18 (0.04-0.80)    | <b>0.02</b> |
| Neighbor communication         |            |                     |             |
| Never                          | References |                     |             |
| Seldom                         | -0.88      | 0.42 (0.07-2.45)    | 0.33        |
| Close relationship             | -1.23      | 0.29 (0.03-2.53)    | 0.27        |

Adjusted for age

# Physical status by sex

| Variables                | Males                  |                      |                  | Females                |                      |              |
|--------------------------|------------------------|----------------------|------------------|------------------------|----------------------|--------------|
|                          | Sarcopenic group (n=5) | Control group (n=65) | <i>P</i>         | Sarcopenic group (n=7) | Control group (n=36) | <i>P</i>     |
| Age (Y)                  | 79.0±6.0               | 73.1±6.8             | 0.06             | 80.0±7.2               | 72.4±6.0             | <b>0.005</b> |
| Duration of diabetes (Y) | 26.6±13.2              | 16.9±11.3            | 0.07             | 22.9±13.3              | 16.6±8.7             | 0.12         |
| BMI (kg/m <sup>2</sup> ) | 17.1±3.0               | 23.8±2.9             | <b>&lt;0.001</b> | 20.4±2.3               | 24.4±3.9             | <b>0.013</b> |
| BFP (%)                  | 14.5±8.2               | 23.1±6.5             | <b>0.006</b>     | 27.6±9.7               | 33.4±8.9             | 0.13         |
| HbA1c (%)                | 7.7±1.1                | 7.1±0.7              | 0.06             | 7.3±0.8                | 7.1±0.8              | 0.63         |
| TG (mg/dL)               | 115.6±49.3             | 142.4±99.2           | 0.55             | 130.6±79.7             | 135.0±79.9           | 0.9          |
| HDL (mg/dL)              | 81.4±55.9              | 53.4±14.8            | 0.33             | 57.8±16.9              | 57.8±17.8            | 1.0          |
| LDL (mg/dL)              | 93.4±33.6              | 100.3±23.4           | 0.55             | 107.2±12.0             | 92.6±22.4            | 0.13         |
| TP (g/dL)                | 6.6±0.4                | 7.1±0.4              | <b>0.03</b>      | 6.8±0.3                | 6.9±0.5              | 0.85         |
| Alb (g/dL)               | 3.9±0.4                | 4.1±0.4              | 0.14             | 4.1±0.2                | 4.1±0.3              | 0.94         |

# Health management by sex

| Variables                      | Males                     |                         |              | Females                   |                         |          |
|--------------------------------|---------------------------|-------------------------|--------------|---------------------------|-------------------------|----------|
|                                | Sarcopenic group<br>(n=5) | Control group<br>(n=65) | <i>P</i>     | Sarcopenic group<br>(n=7) | Control group<br>(n=36) | <i>P</i> |
| Smoking history                | 1 (20.0%)                 | 29 (44.6%)              | 1.0          | 2 (28.6)                  | 17 (47.2)               | 0.57     |
| Alcohol consumption            | 2 (40.0%)                 | 30 (45.3%)              | 0.50         | 1 (14.3%)                 | 7 (19.4%)               | 0.79     |
| Daily activities               | 4 (80.0%)                 | 45 (69.2%)              | 1.0          | 5 (71.4%)                 | 22 (61.1%)              | 0.70     |
| Awareness of health management | 2 (40.0%)                 | 59 (90.8%)              | <b>0.013</b> | 5 (71.4%)                 | 33 (91.7%)              | 0.18     |

Fisher's exact test

# Community support by sex

| Variables                                    | Males                  |                      |          | Females                |                      |          |
|--|------------------------|----------------------|----------|------------------------|----------------------|----------|
|  | Sarcopenic group (n=5) | Control group (n=65) | <i>P</i> | Sarcopenic group (n=7) | Control group (n=36) | <i>P</i> |
| Support for one another within the community | 3 (60.0%)              | 49 (75.4%)           | 0.6      | 3 (42.9%)              | 25 (58.1%)           | 0.43     |
| Communication with neighbors                 |                        |                      |          |                        |                      |          |
| Never  | 1 (20.0%)              | 8 (12.3%)            | 0.49     | 3 (42.9%)              | 1 (2.8%)             | 0.02     |
| Seldom                                       | 4 (80.0%)              | 41 (63.1%)           |          | 2 (28.6%)              | 18 (50.0%)           |          |
| Close relationship                           | 0                      | 16 (24.6%)           |          | 2 (28.6%)              | 17 (47.2%)           |          |
| Feel lonely                                  | 0                      | 12 (18.5%)           | -        | 3 (42.9%)              | 2 (5.6%)             | 0.03     |

Fisher's exact test



# Binomial logistic regression with sarcopenia by sex

| Variables                      | $\beta$   | Odds ratio (95% CI)  | <i>P</i>    |
|--------------------------------|-----------|----------------------|-------------|
| <b>Males</b>                   |           |                      |             |
| BFP                            | -0.35     | 0.70 (0.48-1.02)     | 0.07        |
| TP                             | -3        | 0.05 (0.01-3.19)     | 0.16        |
| Awareness of health management | -4.6      | 0.01 (0.00-2.84)     | 0.11        |
| <b>Females</b>                 |           |                      |             |
| Communication with neighbors   |           |                      |             |
| Never                          | Reference |                      |             |
| Seldom                         | -8.8      | 0.00 (0.00-0.94)     | <b>0.05</b> |
| Close relationship             | -8.8      | 0.00 (0.00-0.66)     | <b>0.04</b> |
| Feel lonely                    | 4.6       | 97.7 (0.85-11,283.6) | 0.06        |

Adjusted for age and BMI

# Discussion and Conclusion

- Aging and longstanding duration of diabetes may accelerate a high risk of sarcopenia.
- Sarcopenia was higher as BMI decreased in both sexes and as BFP and TP decreased in males.
- Awareness of health management and connections with neighbors are need to prevent sarcopenia, especially in females.
- The findings are expected to contribute to the development of effective strategies to prevent sarcopenia in Japanese elderly people with diabetes.

# Limitations

- This study could not infer the detailed mechanism responsible for the association between sarcopenia and its risk factors.
- The small sample size of the sarcopenic group limited the analysis.

Thank you so much!