


ORIGINAL ARTICLE

Increased anxiety about falls and walking ability among community-dwelling Japanese older adults during the COVID-19 pandemic

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) pandemic, which began in 2019, has significantly changed people's lives and behaviours. In January 2020, the first infected person was confirmed in Japan. After that, the number of infected people increased, and an emergency declaration was issued on April 7, 2020. Although restrictions on going out were not as strong as those in the EU lockdown, recommended infection

Abstract

Background: Understanding the physical and mental changes in community-dwelling elderly people is very important during the coronavirus disease 2019 (COVID-19) pandemic when considering preventive measures. The purpose of this study was to clarify the changes of physical function and anxiety for activities of daily living in community-dwelling older adults, focusing on locomotor function during the COVID-19 pandemic.

Methods: The study participants were 127 older people who participated in successive surveys, in the summers of 2019 and again in 2020, after the state of emergency. The Locomo 25 questionnaire, Geriatric Depression Scale-15 (GDS-15) questionnaire, medical history, and number of people living together were self-reported. The Locomo 25 covers six aspects of physical pain, movement-related difficulty, usual care, daily activity, social activities, and anxiety.

Results: The paired samples *t*-test revealed that Locomo 25 total scores in 2020 were significantly higher than those in 2019. The GDS-15 score showed no significant difference. The comparison of scores for each item of the Locomo 25 revealed significantly higher scores in 2020 on Q21 ('difficult to perform sports activity', $P = 0.0021$), Q22 ('restricted from meeting own friends', $P < 0.001$), Q23 ('restricted from joining social activities', $P < 0.001$), Q24 ('anxious about falling in own house', $P = 0.0023$), and Q25 ('anxious about being unable to walk in the future', $P = 0.0016$).

Conclusions: About 2 months after declaration of the first state of emergency due to the COVID-19 pandemic in Japan, social activity was severely restricted. Older adults showed almost no changes in body pain and locomotive disabilities, but increases in their anxieties about walking ability and falling were remarkable.

control measures in Japan included cancelling some events, refraining from going out unnecessarily, school closures, recommendations for telework, keeping physical distance as much as possible, wearing a mask, washing hands, gargling, etc. After that, people were recommended to continue the above new lifestyle even after the state of emergency was lifted on May 25, 2020. A second state of emergency was subsequently issued in January 2021, and

a third state of emergency was issued in April 2021, with the above restrictions reinstated.

Mortality from coronavirus infection in healthy adults has been reported to be about 2–3%, and is about three times higher in the elderly.¹ Scientists have speculated that older people are at increased risk of being more seriously affected by COVID-19 infection because viral infection can exacerbate symptoms from existing diseases. Furthermore, pandemic stress can also increase mental illness in older people with a weakened immune system.²

Under these circumstances, the total physical activity time in the elderly living in the community in Japan decreased significantly in April 2020 compared to January 2020.³ Numerous studies abroad have also shown that people's physical activity during the COVID-19 pandemic is decreasing, and sitting time is increasing.^{4,5} Physical activity is one of the key behavioural factors that has a positive impact on health outcomes, including reduced risk of chronic illness, increased cognitive function, and improved mental health.^{6,7} In addition, restrictions on going out have weakened social connections, which are deeply linked to the nervous system, endocrine system, and immune system. The feeling of loneliness caused by social isolation causes mood and cognitive decline, alters the regulation of inflammatory responses in the body, damages the immune system, and impairs concentration and sleep habits.⁸

Understanding the physical and mental changes in the elderly living in the community is very important in such a situation when considering preventive measures. However, most reports have described abstract anxiety feelings in young people, and few reports have described self-evaluated motor function in elderly people.

We have been conducting health classes and physical fitness tests for older adults living in Kaizuka City in Osaka Prefecture. In general, older adults who attend the event are healthy and are very active in promoting their own health. However, this pandemic has forced many, including these people, to refrain from social activities. Therefore, the purpose of this study was to clarify the changes in physical function and anxiety for activities of daily living in community-dwelling older adults, focusing on locomotor function during restrictions on going out during the COVID-19 pandemic.

METHODS

Study design and participants

The study was conducted in Kaizuka City, Osaka Prefecture, Japan, between 2019 and 2020 for community-dwelling Japanese aged 60 and older. Kaizuka City is located about 30 km south of the centre of Osaka City, close to Kansai International Airport, and is a rural area with an ageing rate of 24.9%. All participants took part in the annual health check co-sponsored by Osaka Kawasaki Rehabilitation University and the Kaizuka City Elderly Care Division. Surveys in the summer of 2019 assessed the elderly in the community who participated in a health check, which is an event to measure athletic ability and body composition, and to answer a questionnaire about their locomotive function. The survey in the summer of 2020 (after the first state of emergency was lifted) assessed the older adults in the community who were sent a questionnaire about their locomotive function in July and responded by mid-August. The 2019 survey included 272 participants. In the 2020 survey, 504 people who had participated in the previous health check were mailed questionnaires, and 283 of these people returned their answers. We analysed 127 of the 195 people who participated in both 2019 and 2020, excluding 68 people (14 who were under the age of 60 years, and 54 who did not answer the questionnaire completely; Fig. 1).

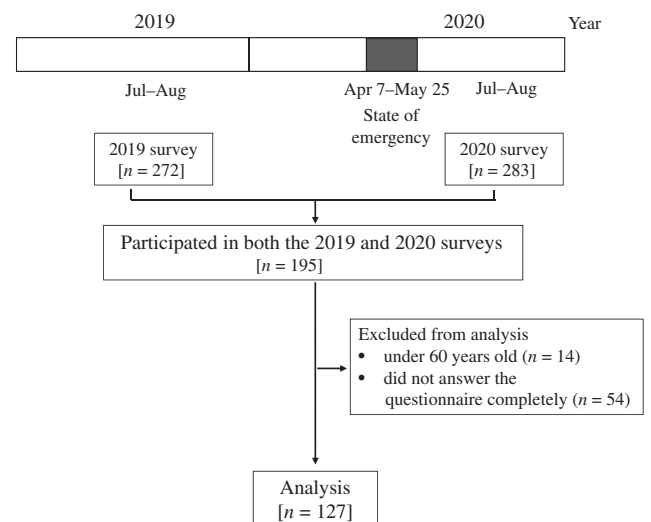


Figure 1 Flow chart showing the survey periods and the participants recruited in the study.

This study was approved by the Ethics Committee of Osaka Kawasaki Rehabilitation University (Reference No. OKRU20-A013) and performed in accordance with the Declaration of Helsinki. Written informed consent was obtained from all participants before the study began.

Questionnaires

The questionnaires included the Locomo 25 questionnaire, Geriatric Depression Scale-15 (GDS-15), and queries about medical history (Alzheimer's disease, cerebrovascular dementia, stroke, Parkinson's disease, hypertension, diabetes mellitus, hyperlipidaemia, respiratory disease, osteoporosis, osteoarthritis, fractures after age 60 years, depression) and the number of people living together at the time of the investigation. Locomo 25 is a self-administered questionnaire proposed by the Japanese Orthopaedic Association that subjectively screens for locomotive syndrome. The questionnaire contains 25 questions aimed at explaining the six aspects of physical pain (Q1–Q4), movement-related difficulty (Q5–Q7), usual care (Q8–Q11, Q14), daily activity (Q12, Q13, Q15–Q17, Q19, Q20), social activities (Q18, Q21–Q23), and anxiety (Q24, Q25), with 0 (no impairment) to 4 (severe impairment) points for each.^{9,10} Higher scores indicate worse locomotive function. The GDS-15, which is a commonly used instrument for depression screening in

the general geriatric population, was used to assess depression status.¹¹

Statistical analysis

The paired samples *t*-test was performed to compare variables between survey years. All statistical tests were two-tailed, and *P* values <0.05 were considered to indicate statistical significance. All statistical analyses were conducted using JMP11 Statistics software (SAS Institute, Cary, NC).

RESULTS

Characteristics of the study participants

Table 1 shows the characteristics of the study participants. The paired samples *t*-test revealed a significant difference in the Locomo 25 total scores between 2019 and 2020 (*P* < 0.001). The Locomo 25 total scores in 2020 were significantly higher than those in 2019. The GDS-15 score showed no significant difference (Table 1).

Comparison of scores for each item of the Locomo 25 between 2019 and 2020

Table 2 shows the comparison of scores for each item of the Locomo 25 between 2019 and 2020. The paired samples *t*-test revealed significantly higher scores in 2020 than 2019 on Q21 ('difficult to perform sports activity', *P* = 0.0021), Q22 ('restricted from meeting

Table 1 Characteristics of the study participants

Survey year	2019	2020	<i>P</i>
<i>N</i> (% men)		127 (26.8%)	
Age (years)	73.65 (6.01)	74.52 (6.00)	<0.0001
Locomo 25 score (points)	7.47 (8.19)	10.27 (1.00)	<0.0001
GDS-15 score (points)	3.22 (2.97)	2.99 (2.44)	0.2204
Living alone	28 (22.0%)		
Medical history			
Alzheimer's disease	0 (0%)		
Cerebrovascular dementia	1 (0.8%)		
Stroke	5 (3.9%)		
Parkinson's disease	0 (0%)		
Hypertension	51 (40.2%)		
Diabetes mellitus	14 (11.0%)		
Hyperlipidaemia	31 (24.4%)		
Respiratory disease	9 (7.1%)		
Osteoporosis	28 (22.0%)		
Osteoarthritis	19 (15.0%)		
Fractures after age 60 years	20 (15.7%)		
Depression	7 (5.5%)		

Data are presented as means (standard deviation) or as prevalence (percentage). The paired samples *t*-test was used to compare variables between survey years. GDS-15, Geriatric Depression Scale-15.

Table 2 Comparison of scores for each item in Locomo 25 between survey years

Survey year	2019	2020	<i>P</i>
Q1. Did you have any pain (including numbness) in your neck or upper limbs (shoulder, arm, or hand)?	0.72 (0.89)	0.72 (0.87)	0.9297
Q2. Did you have any pain in your lower back or buttocks?	0.71 (0.80)	0.75 (0.84)	0.5605
Q3. Did you have any pain (including numbness) in your lower limbs (hip, thigh, knee, calf, shin, ankle, or foot)?	0.65 (0.86)	0.76 (0.96)	0.1362
Q4. To what extent has it been painful to move your body in daily life?	0.43 (0.61)	0.51 (0.71)	0.1664
Q5. To what extent has it been difficult to get up from a bed or lie down?	0.12 (0.32)	0.15 (0.40)	0.3478
Q6. To what extent has it been difficult to stand up from a chair?	0.11 (0.31)	0.13 (0.36)	0.5337
Q7. To what extent has it been difficult to walk inside the house?	0.05 (0.21)	0.09 (0.28)	0.0585
Q8. To what extent has it been difficult to put on and take off a shirt?	0.02 (0.15)	0.03 (0.18)	0.7070
Q9. To what extent has it been difficult to put on and take off trousers and pants?	0.08 (0.27)	0.13 (0.36)	0.1091
Q10. To what extent has it been difficult to use the toilet?	0.02 (0.15)	0.05 (0.21)	0.3192
Q11. To what extent has it been difficult to wash your body in the bath?	0.02 (0.12)	0.04 (0.20)	0.2585
Q12. To what extent has it been difficult to go up and down stairs?	0.48 (0.76)	0.42 (0.74)	0.2498
Q13. To what extent has it been difficult to walk briskly?	0.51 (0.81)	0.57 (0.87)	0.2780
Q14. To what extent has it been difficult to keep yourself neat?	0.04 (0.20)	0.05 (0.25)	0.7643
Q15. How far can you keep walking without rest? (please select the closest answer)	0.68 (1.04)	0.61 (0.92)	0.3678
Q16. To what extent has it been difficult to go out to visit neighbours?	0.06 (0.33)	0.06 (0.33)	1.0000
Q17. To what extent has it been difficult to carry objects weighing approximately 2 kg (2 standard milk bottles or 2 PET bottles each containing 1 l)?	0.31 (0.71)	0.42 (0.86)	0.0576
Q18. To what extent has it been difficult to go out using public transportation?	0.13 (0.40)	0.15 (0.47)	0.5337
Q19. To what extent have simple tasks and housework (preparing meals, cleaning up, etc.) been difficult?	0.07 (0.29)	0.11 (0.36)	0.2267
Q20. To what extent have load-bearing tasks and housework (cleaning the yard, carrying heavy bedding, etc.) been difficult?	0.31 (0.61)	0.37 (0.76)	0.3036
Q21. To what extent has it been difficult to perform sports activity (jogging, swimming, gate ball, dancing, etc.)?	0.55 (0.91)	0.79 (1.09)	0.0021
Q22. Have you been restricted from meeting your friends?	0.24 (0.61)	1.11 (1.18)	<0.0001
Q23. Have you been restricted from joining social activities (meeting friends, playing sports, engaging in activities and hobbies, etc.)?	0.50 (0.96)	1.43 (1.42)	<0.0001
Q24. Have you ever felt anxious about falls in your house?	0.24 (0.44)	0.39 (0.66)	0.0023
Q25. Have you ever felt anxious about being unable to walk in the future?	0.46 (0.70)	0.66 (0.83)	0.0016

Data are presented as means (standard deviation). The paired samples *t*-test was used to compare variables between survey years.

own friends', $P < 0.001$), Q23 ('restricted from joining social activities', $P < 0.001$), Q24 ('anxious about falling in own house', $P = 0.0023$), and Q25 ('anxious about being unable to walk in the future', $P = 0.0016$).

DISCUSSION

In this study, we investigated the mental and physical changes related to activities of daily living in community-dwelling older adults before (2019) and during the

COVID-19 pandemic (2020) using the Locomo 25 questionnaire. As a result, Locomo 25 items Q21–Q25 each showed a significant increase in 2020 compared to 2019. Regarding Q21, ‘difficult to perform sports activity’, Q22, ‘restricted from meeting own friends’, and Q23, ‘restricted from joining social activities’, we presume that the participants in 2020 experienced a decline in social participation due to restrictions on going out because of the state of emergency.

Furthermore, we observed a significant increase in the anxiety-related items Q24, ‘anxious about falling in own house’, and Q25, ‘anxious about being unable to walk in the future’, in 2020. An increase in the Q24 score indicates that the fear of falling (FOF) in the house has increased during the COVID-19 pandemic. Falls and fractures are the third leading cause of becoming bedridden in the elderly. The underlying cause is often an overestimation of the older person’s own motor function. On the other hand, the amount of physical activity may decrease due to excessive FOF, resulting in a fall. Older adults with FOF have reduced activity due to a combination of reduced range of activity, decreased activity frequency,¹² and less frequent outdoor activities,¹³ leading to a poor quality of life.^{14,15} FOF may be associated with decreased physical and social activity, along with physical conditions such as dizziness, other illnesses,¹⁶ gait function and imbalance, as well as fracture experience, rather than direct fall experience.^{17–19} The increase in FOF may be due to physical and psychological changes caused by deterioration of physical and social activities during the COVID-19 pandemic. FOF is associated with frailty, sarcopenia, and impaired cognitive function.^{16,20–22} Maintenance of daily physical activity prevents anxiety, including FOF, and prevents deterioration of physical function.²³ Therefore, maintaining physical activity and psychological care is important for preventing frailty syndrome and disease onset due to the COVID-19 pandemic.

An increase in the score on item Q25, ‘anxious about being unable to walk in the future’, indicates that the COVID-19 pandemic increased anxiety about future walking. More than half of the participants in other studies on the impact among the elderly of COVID-19 reported exacerbated depression and increased loneliness associated with anxiety.^{24,25} These results reflect the relationship between a sedentary lifestyle and anxiety^{26,27} and depression.²⁸ On the other hand, a significant correlation is present between frailty and subjective, self-judged weakness in the leg muscles by older

community-living Japanese during the COVID-19 pandemic.^{29,30} This result indicates that the evaluation of self-weakness by older participants is highly reliable. We speculate that uncertainty associated with the self-restraint restriction period due to the COVID-19 pandemic may have led to a loss in confidence in the walking function of the elderly. In addition, we speculate that the increase in the score for ‘difficulty walking in the house’ (Q7) is also behind the increase in the score for these types of anxiety.

In conclusion, about 2 months after the declaration of the first state of emergency due to the COVID-19 pandemic in Japan, older adults showed almost no changes in body pain and locomotive disabilities, but the increases in their anxieties about walking ability and falling were remarkable.

LIMITATIONS

The present study has a number of limitations. First, there is a bias in the selection of subjects. The subjects of this research were those who participated in the health check so far and are highly conscious of their health. Second, the present results are only based on individual subjective assessments, as Locomo 25 is a self-administered questionnaire. In the future, investigation of objective indicators will be necessary. Third, because the details of the behavioural regulation imposed by the declaration of emergency due to the COVID-19 pandemic are unique to Japan, careful interpretation of these results is required.

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AUTHOR CONTRIBUTIONS

The present work was carried out in collaboration among all authors. M.N. wrote the manuscript; M.I.,

H.N., M.H., R.I., and F.T. contributed to the study design and management; M.T. contributed to the discussions.

ETHICAL STANDARDS

The Ethics Committee of Osaka Kawasaki Rehabilitation University approved the study protocol (Reference No. OKRU20-A013). All participants provided written informed consent.

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