International Journal of Medical Science and Clinical Invention 9(4): 6040-6045, 2022
DOI:10.18535/ijmsci/v9i04.02
https://valleyinternational.net/index.php/ijmsci

Research Article,

The Change of After Lifting the State of Emergency by COVID-19 on the Physical Activity of the Elderly Japanese People

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Abstract:

In April 2020, the spread of COVID-19 infectious disease in Japan issued a state of emergency, making it impossible for people to go out except for unnecessary and urgent matters. It has been reported that the declaration of self-restraint will significantly reduce the volume of physical activity (PA). However, since the volume of change in the volume of PA after 6 months or more after the declaration of self-control was lifted is unknown, the volume of PA was compared. The participants were 13 elderly people living in Hiroshima City. In October 2020, an activity meter with a 3-axis accelerometer was attached to the participant's waist, and PA and physical function were measured for one week and compared with the PA measured in October 2019. Six months after the declaration was issued, there was changes volume of moderate intensity walking PA, were no changes in the number of steps, activity time, volume of light intensity PA, and volume of total PA ($p \geq 0.07\%$). Six months have passed since the self-restraint of activities due to the state of emergency, and now that the number of infected people has decreased, it is possible that the volume of PA in the elderly has improved due to the improvement in the sense of security and happiness. This suggests that it is important to continue daily activities, hobbies, and exercises as much as possible while taking measures against infection in order to reduce the risk of cardiovascular events.

Keywords: COVID-19, after lifting state of emergency declaration, volume of physical activity

Introduction:

Since the infectious disease caused by a novel coronavirus (SARS-CoV-2) was confirmed in December 2019, it has spread all over the world and has become a pandemic [1 2]. Many countries have taken various strategies to prevent this epidemiological phenomenon, but the COVID-19 infection has not ended [3]. In Japan, the number of infected people has increased sharply since the first case was reported on January 16, 2020. On April 16 of the same year, a state of emergency was issued to all prefectures in Japan [4]. With the issuance of this declaration, the prefectural governors requested that they refrain from going out unnecessarily and urgently and requested businesses and others to restrict stores and facilities.

Residents under the declaration of self-restraint refrained from going out except when it was necessary to maintain their livelihood, such as going to a medical institution, buying groceries, or commuting to work. Leisure facilities and events were also closed or postponed due to this request [5]. It has been reported that the spread of COVID-19 reduces the volume of physical activity (PA) in people [6 7 8]. However, the measurement method uses a self-reported questionnaire and a pedometer, so the accuracy may be insufficient. Also, there are few reports that were measured. The volume of PA before the pandemic of COVID-19 and at the time of the announcement of the state of emergency (hereinafter referred to as the announcement) was compared and verified [9]. There is no report of how much the daily PA changed during 6 months after lifting a state of emergency (hereinafter, 6 months), as measured by a 3D accelerometer among the same participants. In this study, it was hypothesized that the daily PA of elderly people with diseases such as hypertension and dyslipidemia decreased even after lifting the declaration was issued. In addition, the purpose of this experiment was to measure and compare the volume of PA before the occurrence of COVID-19 and 6 months after lifting the issuance of the declaration.

Materials and Methods:

The participants were 13 elderly people (2 men and 12 women) aged 65 and over who lived in Hiroshima City, Hiroshima Prefecture, and performed light intensity (<2METs) exercises once a week. At the time of registration and measurement with an activity meter, the names of the diseases being treated were heard from the participants. Patients with thought to affect PA, patients with severe heart failure (AHA / ACC classification Stage C / D) [10], patients with end-stage renal disease, malignant tumors, dementia, patients with severe chronic lung disease, and patients who developed myocardial infarction within 12 weeks of the experiment were excluded. All the participants explained the purpose and procedure, and those who agreed were the participants of the experiment. This study was anonymized based on the protection of personal information and data was obtained with the approval of the Institutional Review Board of Hiroshima Cosmopolitan University (2019004).

In October 2019, all participants wore an activity meter with a 3D accelerometer for a week after measuring social background, body morphology and function, and receiving explanations on how to wear and how to wear it. The activity meter was attached for one week from October 19, 2019 (at the time of registration) and one week from October 19, 2020 (after the announcement). The activity meter was mailed together with an explanatory document describing how to wear it. Participants wore an activity meter on the lumbar region and measured for 7 days. After measuring the volume of PA, the participants returned a paper with an activity meter and changes in medication.

From all participants at the time of registration: Disease (under treatment), medication, main means of transportation (car, etc.), housework (cleaning and washing by yourself, not), fall history within 1 year (yes, None) was obtained in writing. When the state of emergency was announced, when the activity meter was mailed, it was confirmed in writing whether there was any change in housework or transportation.

The volume of PA was evaluated using an activity meter with a three-dimensional accelerometer (HJA-750IT, OMRON) [11]. Participants were instructed to wear it on their left hip for at least 7 days for 24 hours. Using this activity meter, we evaluated the number of steps per day, activity time, walk every 10 seconds, and metabolic equivalents (hereinafter referred to as METs), which are the activity intensity of other daily activities. Regarding exercise intensity, less than 3 METs was defined as light intensity, and more than 3 METs was defined as moderate intensity[12 13]. The volume of PA was calculated as METs * time. The PA data was analyzed using Excel software (Microsoft). From the activity meter results, the days when the wearing time was less than 480 minutes per day were excluded from the data analysis as non-wearing days[12 13]. PA of 1.5 METs or more was defined as activity [12 13].
Commercially available software (SPSS ver.26 by IBM and Microsoft) was used for the analysis. In the data, the table shows the mean ± standard deviation. Continuous variables are shown as mean values, and categorical variables are shown as%. A paired t-test was used to analyze the volume of PA. P-values below 0.05 were considered statistically significant.

Results and Discussion:

Table 1 shows the measurement results and social background (excluding PA) obtained from all participants

Table 1. People characteristics data at the time of registration

	All
Number	13
Male gender, n(%)	2(15.4)
Age, yrs	77.5±3.5
Body mass index, kg/m2	23.1±3.4
SBP, mmHg	128.7±4.6
Heart rate, bpm	70.7±3.8
Social background, n(%)	
Car user	4(30.8)
Housework	7(53.8)
fall down history within 1 years	0(0)
Comorbidities, n(%)	
Hypertention	7(53.8)
Dyslipidemia	5(38.5)
Coronary artery disease	0(0)
Medication, n(%)	
ARB/ACE-inhibitors	7(53.8)
CCB	2(15.4)
Statin	4(30.8)

Values are mean ± SD or n (%);SBP= systolic blood pressure; ARB= Angiotensin II receptor antagonists; ACE= angiotensin converting receptor; CCB= Calcium channel blocker.

Changes in physical activity in all participants (table.2)

The volume of PA 6 months after the announcement showed an increase in METs during walking compared to the time of registration. The volume of walking PA more than 3 METs showed a decrease compared to the time of registration. There were no significant differences in the number of steps, activity time, the volume of light intensity walking and LA PA, the volume of light intensity PA, the volume of moderate LA PA, the volume of moderate intensity PA, and the volume of total PA ($p \geq 0.07$). The change in the number of steps after 6 months from the time of registration of each PA volume decreased by 19.2% (5742.7 ± 1393.4 steps / day vs. 4639.0 ± 2208.9 steps / day). Activity time decreased by 13.5% (475.3 ± 55.4 min / day vs. 411.1 ± 158.8 min / day). The volume of moderate intensity PA decreased by 26.7% (5.5 ± 1.0 METs * hours / day vs. 4.0 ± 2.2 METs * hours / day). The volume of light intensity PA decreased by 10.9% (13.3 ± 1.7 METs * hours / day vs. 11.9 ± 4.3 METs * hours / day). The volume of total PA increased by 15.5% (18.8 ± 2.2 METs * hours / day vs. 15.9 ± 6.4 METs * hours / day).

Table 2. The change of volume of physical activity at registration and after lifting the state of emergency declaration

	before	6 months	p value
Step, step/d	5742.7±1393.4	4639.0±2133.9	0.07
Activity time(≧1.5METs), min/d	475.3±55.4	411.1±112.4	0.10
Average walking METs, METs	2.7±0.2	2.5±0.2	0.01
Average LA METs, METs	2.3±0.1	2.2±0.1	0.23
Moderate intensity, METs*h/d			
Total moderate PA	5.5±1.0	4.0±2.2	0.07
walking PA	1.5±0.8	1.0±0.8	0.03
LA PA	3.9±1.0	3.0±1.6	0.18
Light intensity, METs*h/d			
Total light PA	13.3±1.7	11.9±2.9	0.15
walking PA	2.0±0.4	2.2±0.7	0.46
LA PA	11.3±1.6	9.7±2.5	0.09
Total PA, METs*h/d	18.8±2.2	15.9±4.9	0.08

Values are mean ± SD or n (%). Before indicates the time of registration; After indicates after lifting the state of emergency declaration; PA= Physical Activity; LA = Living Activity; METs= Metabolic Equivalents; p value indicates before vs. 6 months

The volume of PA before the occurrence of COVID-19 and after 6 months of self-restraint due to the state of emergency was compared and verified. The measurement results obtained by wearing an activity meter with a 3-axis accelerometer on the waist of the elderly were compared. As a result, there were no changes in the total daily PA, light intensity PA of less than 3 METs, moderate intensity PA of 3 METs or more, daily activity time, and number of steps. The volume of walking PA more than 3 METs after the announcement showed a decrease compared to the time of registration. In 2014, Miyahara et al. Measured the activity of cases with the same disease of the same age (AHA / ACC classification Stage A / B), and reported that the total PA was 15.4 ± 4.6 METs * hours / day. It was the same before the outbreak, and after 6 months, the volume of PA was higher than reported [9]. Daily activity leads to maintenance and improvement of athletic performance and cardiovascular function. AHA recommends 500 METs * min / week of exercise [14]. In addition, Hegde et al. Recommend twice the volume of PA as AHA (1000 METs * min / week), which states that patients who maintain left ventricular morphological function have a 19% lower risk of readmission [15]. When the PA unit in this study was converted to the same unit as AHA, the volume of PA after 6 months was 953.2 METs * minutes. It was found that there is a PA volume for maintaining and improving the motor ability and cardiovascular function recommended by AHA. Among them, the volume of light intensity PA (<3 METs) is 713.4 METs * minutes (74.9%), and it is considered important to maintain the opportunity of activity even with light intensity movement. This survey was a one-year and short-term survey, and the volume of PA of the participants was high, and no events such as the onset of the disease were observed. In this study, PA did not change after 6 months, but Castañeda Babarro et al. reported that self-reported PA decreased by 16.8% and sedentary time increased by 23.8%[16]. However, in this survey, no decrease in the above items was found 6 months after the cancellation of the state of emergency. At the time of the state of emergency, the PA of the participants was lower than that before the outbreak of COVID-19 (≤38.9%). Constandt et al. report that decreased exercise is associated with shorter activity time and increased sitting time [17]. The decrease in PA of participants under the emergency time reduction declaration was as reported by Castañeda Babarro et al. and Constandt et al[16 17]. However, because the state of emergency was lifted, it is possible that the PA of the participants returned to a level close to that at the time of registration, but more than 3 METs walking PA decreased. Suzuki et al. argue that the volume of PA is strongly associated with subjective well-being [18]. It is considered that the increase in the volume of PA after 6 months was related to the feeling of happiness and security due to the end of the living environment due to the state of emergency and the decrease in the number of people infected with COVID-19. Although the volume of PA tends to decrease due to the number of people infected with COVID-19 and social conditions such as state of emergency and lockdown, it is necessary to set up an environment where daily PA and quality of life can be maintained.

Conclusion:

The global voluntary restraint caused by COVID-19 is unprecedented. Self-restraint of PA can be quarantined and quarantined, but it also causes physical health hazards (such as increased cardiovascular risk). In this experiment, the volume of PA was measured by periodically wearing an activity meter on the waist of the elderly instead of listening by questionnaire. As a result, it was found that the volume of PA of the elderly 6 months after the cancellation of the state of emergency was not different from that before the occurrence of COVID-19. It was also found that the end of the state of emergency may have improved the sense of well-being and security of the elderly. In the future, the volume of PA will decrease over time, and the volume of PA will be lower than the volume recommended by AHA, which may lead to cardiovascular events. It was suggested that in daily medical care and rehabilitation, listening to daily activities and hobbies (leisure time) and recommendations in various forms may be useful for maintaining the volume of PA and quality of life, and predicting the prognosis of other diseases.

Acknowledgements

I thank the following for expertise and assistance throughout all aspects of our study in writing the manuscript.
Hiroshima Cosmopolitan University

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