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Original Article

Questionnaire survey about the effects of new lifestyles during the pandemic of COVID-19 on upper limb diseases

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ABSTRACT

Background: The novel coronavirus (COVID-19) that emerged in 2019 and spread globally in 2020 has resulted in the imposition of lockdowns or a state of emergency in many cities worldwide. In Japan, a “new lifestyle” is being advocated. We hypothesize that the new lifestyle has changed people’s use of their upper limbs during the COVID-19 pandemic. Therefore, through this questionnaire study, we aimed to determine the factors associated with exacerbation of symptoms during the pandemic and to investigate the current status of patients who require hand surgery.

Methods: This study was a prospective multi-center questionnaire survey. This study was conducted in Japan from December 2020 to July 2021 at university and general hospitals in nine prefectures. A questionnaire was administered to patients who visited a hospital with symptoms of nerve entrapment syndrome, osteoarthritis, or tenosynovitis.

Results: A total of 502 patients with a mean age of 63.8 years responded. The 240 patients who experienced exacerbation (exacerbated and markedly exacerbated) were compared with other patients (unchanged, improved, and markedly improved). An increase in the time spent on personal computers and smartphones was associated with exacerbation of hand symptoms. Patients who wanted to undergo surgery but were postponed due to COVID-19 accounted for 23.5% of the outpatients. The mean scores for pain, jitteriness, and anxious depression in these patients were significantly higher than those of patients who did not want surgery.

Conclusions: Our results suggest that an increase in the time spent on personal computers and smartphones is associated with exacerbation of hand symptoms during the COVID-19 pandemic. Patients who wanted to undergo surgery but were postponed by COVID-19 experienced greater pain, jitteriness, and anxious depression.

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1. Introduction

The novel coronavirus (COVID-19) that emerged in 2019 and spread globally in 2020 resulted in the imposition of lockdowns or a state of emergency in many cities worldwide. In Japan, a “new lifestyle” is being advocated; however, the effects of the new

Table 1
Questionnaire about changes in their lifestyles.

	increase	no change	decrease	not performed
personal computers	increase	no change	decrease	not performed
smartphones	increase	no change	decrease	not performed
cooking	increase	no change	decrease	not performed
cleaning	increase	no change	decrease	not performed
driving	increase	no change	decrease	not performed
washing	increase	no change	decrease	not performed
sewing	increase	no change	decrease	not performed
exercise	increase	no change	decrease	not performed
other hand-related activities	increase	no change	decrease	

lifestyle on health are concerning. One psychological effect is the increased risk of social isolation, especially among older adults living alone [1,2]. The increased time at home has resulted in either improvement or worsening of relationships with family members.

Concerns such as lack of exercise due to lockdown restrictions and exacerbation of symptoms such as shoulder stiffness and backache due to increased screen time have also emerged [3].

As expected, some patients have refrained from visiting hospitals during this pandemic period. Therefore, some hospitals have been offering online or telephone consultations (related to follow-up and medication) [4–6]. The effects of COVID-19 on orthopedic surgery have also been reported [7]. Some patients waiting for elective orthopedic surgery have opted to postpone surgery until after the pandemic subsides. Moreover, the government and prefectures have proposed to decrease the number of surgeries and hospital admissions during this pandemic period; instead, recommended orthopedic surgeons are involved in measures against COVID-19. Therefore, the number of orthopedic surgeries is expected to decrease.

We hypothesize that the new lifestyle has changed people's use of their upper limbs during the COVID-19 pandemic. Therefore,

Table 2
Comparison of “unchanged, improved, and markedly improved” group and “exacerbated and markedly exacerbated” group of symptoms.

	n	unchanged, improved, and markedly improved	n	exacerbated and markedly exacerbated	P-value
Age	252	64.1±12.2	239	63.2±11.5	0.403a
Sex	252		240		0.219b
Male		81,32.1		65,27.1	
Female		171,67.9		175,72.9	
personal computers	247		235		0.000b
increase		26,10.5		66,28.1	
no change		109,44.1		79,33.6	
decrease		6,2.4		10,4.3	
not performed		106,42.9		80,34.0	
smartphones	247		235		0.000b
increase		47,19.0		94,40.0	
no change		120,48.6		84,35.7	
decrease		5,2.0		5,2.1	
not performed		75,30.4		52,22.1	
cooking	248		238		0.025b
increase		57,23.0		75,31.5	
no change		132,53.2		114,47.9	
decrease		20,8.1		27,11.3	
not performed		39,15.7		22,9.2	
cleaning	248		238		0.243b
increase		43,17.3		53,22.3	
no change		170,68.5		147,61.8	
decrease		18,7.3		25,10.5	
not performed		17,6.9		13,5.5	
driving	247		238		0.300b
increase		15,6.1		14,5.9	
no change		140,56.7		128,53.8	
decrease		36,14.6		50,21.0	
not performed		56,22.7		46,19.3	
washing	248		238		0.875b
increase		36,14.5		35,14.7	
no change		171,69.0		170,71.4	
decrease		7,2.8		6,2.5	
not performed		34,13.7		27,11.3	
sewing	248		236		0.019b
increase		17,6.9		33,14.0	
no change		90,36.3		90,38.1	
decrease		17,6.9		21,8.9	
not performed		124,50.0		92,39.0	
exercise	248		237		0.978b
increase		26,10.5		23,9.7	
no change		124,50.0		123,51.9	
decrease		72,29.0		67,28.3	
not performed		26,10.5		24,10.1	
other hand-related activities	248		237		0.066b
increase		58,23.4		62,26.2	
no change		160,64.5		131,55.3	
decrease		30,12.1		44,18.6	

mean ± sd; n, %.

P-value: a, unpaired t test; b, Chi-squared test.

through this questionnaire study, we aimed to determine the factors associated with exacerbation of symptoms during the pandemic and investigate the current status of patients who require hand surgery.

2. Materials and methods

This study was a prospective multi-center questionnaire survey. This study was conducted in Japan from December 2020 to July 2021 at university and general hospitals in nine prefectures and was approved by the ethics committees (institutional review boards) of all hospitals.

A questionnaire was administered to patients who visited a hospital with symptoms of nerve entrapment syndrome (carpal tunnel and cubital tunnel syndrome), finger/hand osteoarthritis (osteoarthritis of the carpometacarpal joint of the thumb, Heberden's nodes, and Bouchard's nodes), or tenosynovitis (trigger finger and De Quervain's tenosynovitis). The respondents were asked about changes in their symptoms after the first declaration of a state of emergency in each region due to the COVID-19 pandemic. They were also asked about changes in their lifestyles during the pandemic.

Lifestyle changes included changes in time spent on personal computers, smartphones, cooking, cleaning, driving, washing, sewing, exercise, and other hand-related activities (Table 1). The association between lifestyle changes and symptom exacerbation was examined.

Pain, jitteriness, and anxious depression worsened after the first declaration of a state of emergency in 2020, and during this study were examined on a 10-point scale (0, no symptoms; 10, worst symptoms) for the present study. Patients who wanted to undergo surgery but postponed it because of the pandemic (Group A) and those who did not want to undergo surgery (Group B) were compared.

2.1. Statistical analysis

Continuous data are presented as mean \pm standard deviation (SD). Categorical data are presented as numbers and percentages. Between-group comparisons for continuous variables were made by unpaired t-test and for categorical variables by Chi-squared test. Factors for worsening of symptoms were analyzed using logistic regression models with forward selection, based on the likelihood ratio, or forced entry method with significance for entry of variables. Differences were considered statistically significant at $P < 0.05$. All statistical analyses were performed using SPSS version 22.0, for Windows (IBM Japan, Tokyo, Japan).

3. Results

Overall, 502 patients (150 men and 352 women) with a mean age of 63.8 years responded. The number of patients with carpal tunnel syndrome was 148; cubital tunnel syndrome, 33; tenosynovitis, 249; finger osteoarthritis, 86; and osteoarthritis in the carpometacarpal joint of the thumb, 85 (including duplicates).

The change in symptoms was markedly improved in 8 patients, improved in 47 patients, unchanged in 197 patients, exacerbated in 194 patients, and markedly exacerbated in 46 patients. The 240 patients who experienced exacerbation (exacerbated and markedly exacerbated) were compared with other patients (unchanged, improved, and markedly improved). An increase in the time spent on personal computers and smartphones was associated with exacerbation of hand symptoms (Tables 2–4).

Patients who wanted to undergo surgery but postponed it because of the pandemic (Group A) accounted for 23.5% of the

Table 3

Univariate analysis for “exacerbated and markedly exacerbated group” (vs. unchanged, improved, and markedly improved group”).

	univariate			
	n	OR	95% CI	P-value
age (per 1y)	491	0.994	0.979,1.009	0.402
sex_female (vs. male)	492	1.275	0.865,1.881	0.220
personal computers	482			
increase	92	3.502	2.044,6.000	0.000
no change	188	1.000	ref	
decrease	16	2.300	0.803,6.589	0.121
not performed	186	1.041	0.691,1.569	0.847
Smartphones	482			
increase	141	2.857	1.826,4.470	0.000
no change	204	1.000	ref	
decrease	10	1.429	0.401,5.090	0.582
not performed	127	0.990	0.631,1.554	0.967
cooking	486			
increase	132	1.524	0.995,2.333	0.053
no change	246	1.000	ref	
decrease	47	1.563	0.832,2.936	0.165
not performed	61	0.653	0.366,1.166	0.150
cleaning	486			
increase	96	1.425	0.901,2.255	0.130
no change	317	1.000	ref	
decrease	43	1.606	0.843,3.061	0.150
not performed	30	0.884	0.416,1.882	0.750
driving	485			
increase	29	1.021	0.474,2.198	0.958
no change	268	1.000	ref	
decrease	86	1.519	0.930,2.482	0.095
not performed	102	0.898	0.568,1.420	0.647
washing	486			
increase	71	0.978	0.586,1.631	0.932
no change	341	1.000	ref	
decrease	13	0.862	0.284,2.619	0.794
not performed	61	0.799	0.462,1.382	0.422
sewing	484			
increase	50	1.941	1.009,3.733	0.047
no change	180	1.000	ref	
decrease	38	1.235	0.612,2.495	0.556
not performed	216	0.742	0.499,1.104	0.141
exercise	485			
increase	49	0.892	0.483,1.648	0.715
no change	247	1.000	ref	
decrease	139	0.938	0.619,1.422	0.763
not performed	50	0.931	0.506,1.710	0.817
other hand-related activities	485			
increase	120	1.306	0.853,1.999	0.220
no change	291	1.000	ref	
decrease	74	1.791	1.067,3.008	0.028

OR: Odds ratio, 95% CI: 95% confidence interval, ref: reference standard.

outpatients. The mean scores of pain, jitteriness, and anxious depression were significantly higher in Group A than in Group B (6.7 vs 5.8, 5.4 vs 4.4, and 4.9 vs 4.1, $P < 0.05$, respectively). The mean scores of pain and anxious depression during this study with postponement of surgery remained high in Group A (5.5 and 4.2, $P < 0.05$, respectively).

4. Discussion

Owing to the COVID-19 pandemic, a new lifestyle has emerged. Many people have changed their working styles and have experienced changes in routines in and out of their homes. Patients have refrained from visiting hospitals, and hospital visits have been restricted [8]. All of this has resulted in various effects on health [9].

A critical issue in the field of orthopedics is the provision of emergency trauma care which has taken precedence during the pandemic [10]. As a result, there has been a decrease in the number of elective surgeries, including joint prosthesis implantation [11].

Table 4

Logistic regression analysis for “exacerbated and markedly exacerbated group” (vs. unchanged, improved, and markedly improved group”).

	Model 1: forced entry method with significance for entry of variables			Model 2: logistic regression models with forward selection, based on the likelihood ratio		
	OR	95% CI	P-value	OR	95% CI	P-value
personal computers						
increase	2.156	1.166,3.985	0.014	2.225	1.219,4.064	0.009
no change	1.000	ref		1.000	ref	
decrease	0.909	0.562,1.471	0.699	0.915	0.571,1.467	0.713
not performed	1.729	0.566,5.277	0.336	1.995	0.667,5.965	0.216
smartphones						
increase	2.244	1.258,4.004	0.006	2.197	1.252,3.857	0.006
no change	1.000	ref		1.000	ref	
decrease	1.096	0.647,1.858	0.733	1.019	0.609,1.705	0.942
not performed	1.565	0.398,6.156	0.521	1.410	0.374,5.314	0.612
sewing						
increase	2.256	1.123,4.535	0.022			
no change	1.000	ref				
decrease	1.376	0.898,2.107	0.143			
not performed	1.572	0.741,3.333	0.238			
other hand-related activities						
increase	0.573	0.293,1.121	0.104			
no change	1.000	ref				
decrease	0.675	0.376,1.215	0.190			

OR: Odds ratio, 95% CI: 95% confidence interval, ref: reference standard.

Thus, our challenge is to address the needs of patients who require such surgeries. There have been detrimental changes in health in patients who have postponed elective procedures during the COVID-19 pandemic [12].

In this study, we revealed the adverse effects of the COVID-19 pandemic on upper limb disease for the first time. This study was conducted on the premise that most people have changed their daily life because of the pandemic. We thought that the question about the change in working style (telework or remote work) would have the same result as the change in the use of personal computers or smartphones, so we adopted the latter items. An increase in the time spent on personal computers and smartphones has been associated with the exacerbation of upper extremity symptoms. It is likely that an increase in remote work and online activities has brought about changes in the use of the upper limb, leading to an impact on finger-related symptoms. Patients with tenosynovitis and osteoarthritis may experience increased pain if they use their hands and fingers more often. The symptoms of carpal tunnel syndrome and cubital tunnel syndrome worsen when the wrist and elbow joints are flexed for long periods of time. Using personal computers and smartphones in a flexed position may lead to deterioration of neurological symptoms.

Patients who wanted to undergo surgery but postponed it because of the pandemic accounted for approximately one-fourth of the outpatients. These patients experienced strong pain, anxious depression, and jitteriness. In addition, during this study, patients continued to have strong pain and anxious depression with postponement of surgery.

The limitations of this study are as follows: first, this was not a nationwide study, and the number of participating institutions was small. However, the patient data were obtained from institutions in different prefectures; therefore, the data were not significantly biased by regional characteristics. Second, the participating institutions consisted of general and university hospitals, and clinics were not included in this study. However, this was unlikely to affect the results because patient characteristics are similar between clinics and hospitals in Japan. Third, owing to the long study period, there may have been a change in patients' attitudes during the

course of the pandemic (increasing or decreasing of COVID-19). Fourth, all patients with hand diseases were included to increase the sample size for statistical analysis. A separate analysis for each disease was not performed in this study because the sample size of each disease was small; thus, future studies should include more cases of each disease. Fifth, there are many upper limb disorders (tennis elbow, medial epicondylitis of the humerus, ulnar abutment syndrome, and so on). Because it would be impossible to conduct a questionnaire survey for all hand diseases, we needed to limit the subjects.

In conclusion, our results suggest that an increase in the time spent on personal computers and smartphones during the COVID-19 pandemic is associated with the exacerbation of hand symptoms. We investigated patients who wanted to undergo surgery but postponed it because of the pandemic. Our challenge during the COVID-19 pandemic is to provide safe and effective care for such patients.

Ethical statements

Ethical approval/informed consent

This study was approved by the ethics committees (institutional review boards) of all hospitals. The patients were informed that data from the research would be submitted for publication, and gave their consent.

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Declaration of competing interest

Nothing to disclose.

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