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A cross-sectional survey on COVID-19 knowledge and *precautionary* measures of the pharmacists and patients in community pharmacies

Eriko Kobayashi[1*], Yusuke Kanemaru[1], Kotomi Shioya[1], Junichi Asaka[2], Satoshi Yuge[3], Kenzo Kudo[2] and Nobunori Satoh[1]

[1]Department of Social Pharmacy, Graduate School of Pharmaceutical Sciences, Chiba University; 1-8-1 Inohana, Chuo-ku, Chiba-shi, Chiba 260-8675 Japan.
[2]Division of Clinical Pharmaceutics and Pharmacy Practice, Department of Clinical Pharmacy, School of Pharmacy, Iwate Medical University; 1-1-1 Idaidori, Yahaba-cho, Shiwa-gun, Iwate 028-3694 Japan.
[3]Department of Educational Training and Medical Information, Nihon Chouzai Co., Ltd.; 37F GranTokyo North Tower, 1-9-1, Marunouchi, Chiyoda-ku, Tokyo 100-6737 Japan.

In the global pandemic of COVID-19, community pharmacists play key roles in implementing personal protective measures to control their own risk as well as the patient's risk of being infected with COVID-19. This study was designed to explore the COVID-19 knowledge and precautionary measures of the pharmacists and patients in community pharmacies. A cross-sectional survey was conducted on the pharmacists and patients in community pharmacies. Community pharmacists (N=597) and patients (N=779) from 162 community pharmacies were the subjects of the analysis. Though the pharmacists and patients had good COVID knowledge, the mean Knowledge score (K score) among the pharmacists (7.71±1.43) was statistically higher than that of patients (7.35±1.64, p<0.01). Regarding the precautionary measures, the mean precautionary measure score (P score) of the pharmacists (8.17±1.86) was statistically higher than that of the patients (7.91±2.04, p<0.05). Considering COVID knowledge of patients of different age groups (age: ≤39 and ≥40), no statistically significant differences were observed. Whereas regarding the precautionary measures, between these two age groups, several statistically significant differences were observed in the mean P score (≥40: 8.09±1.99, ≤39: 7.29±2.07, p<0.001) and in the implementing rates in some of the practices, avoiding crowded places, avoiding touching eyes/nose/mouth, etc. (p=0.043, p<0.001, respectively). The community pharmacists were found to have better knowledge and implemented better precautionary measures for the prevention of COVID-19 than the patients. The young generation patients should be educated on the essential protective measures for reducing the risk of becoming infected with COVID-19.

Key words: COVID-19, community pharmacy practice, pandemic, personal protective measures, patients, community pharmacists

INTRODUCTION

More than one year had passed since the global pandemic on coronavirus disease 2019 (COVID-19) was announced by the World Health Organization (WHO) on March 2020 (WHO, 2020a). In Japan, since the first laboratory-confirmed case of COVID-19 positive was reported on January 2020, the number of patients has

increased throughout Japan until it has reached 1,726,474 cases on November 22th, 2021 (MHLW, 2020a, b). At the early phase in 2020, all schools throughout Japan were closed due to the spread of COVID-19 (MEXT, 2020). Then, a state of emergency ("the 1st lockdown") was declared on April 7, 2020 (CAS, 2020). With a decrease in the number of patients (MHLW, 2020b), the 1st lockdown was lifted on May 25, 2020 and a new normal life with COVID-19 started from that time. As personal protective measures, including wearing masks, washing hands and keeping a distance from others were recommended by WHO (WHO, 2020b) the Ministry of Health, Labour and Welfare Japan (MHLW) also recommended the Japanese public to take personal protective measures, avoiding the Three Cs (crowded places, close contact settings, and closed spaces), wearing a mask and hand washing (MHLW, 2020c). Through the autumn season in 2020, the number of new daily diagnosed COVID-19 patients gradually increased and reached over 7,000 (total 7,537 newly diagnosed patients as of January 7, 2021) following the season of social gatherings for Christmas and New Year (MHLW, 2020b). Consequently, on January 7, 2021, the Japanese government declared the 2nd lockdown for 11 out of 47 prefectures, including Tokyo. With a focus on limiting social gatherings, MHLW issued a new statement on the "5 situations that increase the risk of infection" (MHLW, 2020d). Though COVID-19 vaccination has become available, the vaccination rate in Japan was low, only 29.4%, as of July 7, 2021 (WHO, 2020c). Therefore, taking personal precautionary measures is essential for the public in Japan.

During the current COVID-19 pandemic, the community pharmacists play an important part in the prevention of the spread of COVID-19 as frontline health care providers (Cadogan and Hughes, 2021; Ung, 2020; Novak et al., 2021; Elbeddini et al., 2020). Among the patients visiting community pharmacies, those who are elderly or have chronic diseases are more likely to become severe cases with COVID-19. Therefore, community pharmacists play a key role in implementing personal protective measures to control their own risk as well as the patient's risk of becoming infected with COVID-19 (FIP, 2020). Previous studies have shown that community pharmacy professionals have good knowledge of COVID-19 and that good knowledge was associated with good practice of precautionary measures (Yimenu et al., 2020; Hussain et al., 2020; Tasfaye et al., 2020). To date in Japan, though the status of the personal protective measures taken by ordinary Japanese public citizens from the early phase to the community transmission phase of COVID-19 has been reported (Machida et al., 2020a, b; Hatabu et al., 2020), the status of community pharmacists and patients in community pharmacies has not been clear. The aim of this study was to evaluate the COVID-19 knowledge and dairy practice of precautionary measures of community pharmacists and patients in community pharmacies in Japan.

MATERIALS AND METHODS

Participants

The cross-sectional survey was conducted in November 2020. The survey recipients were 844 community pharmacists and 975 patients of 191 community pharmacies belonging to the nationwide pharmacy corporation, NIHON CHOUZAI Co., Ltd. in Japan. The participants of the study were the patients who visited the community pharmacies in order to purchase their prescription medicines. During their visit to the pharmacy, the pharmacist approached the patients, explained the study, and stated that the survey was a voluntary, anonymous survey; completion of a survey was recognized as consent to study participation.

Measurement

The questionnaire consisted of 3 parts: demographics, COVID-19 knowledge and practices of precautionary measures of the participants. The demographic part included age, gender, pharmacist/non-pharmacist, prefecture of residence. The COVID-19 knowledge part included 9 questions on COVID-19 (K1-K9), which were validated by Zhong et al. (2021). Responses are made on a five-point Likert scale ranging from 5: "agree" to 1: "disagree" for each statement on COVID-19. The part on the participant's daily practices of precautionary measures consisted of 11 questions (P1-P11) regarding personal protective practices recommended by the WHO and the MHLW (WHO, 2020b, MLHW, 2020c). The practice of "working from home (P11)" was only asked of the patients since community pharmacists could not work from home. Responses were made on a five-point Likert scale ranging from 5: "agree" to 1: "disagree" for each statement on daily practice.

Statistical analysis

Regarding the participant's COVID-19 knowledge, a correct answer was assigned 1 point for participant responses of 5: "agree" or 4 : "somewhat agree" except for K3 and K6 and for participant responses of 1: "disagree" or 2: "somewhat disagree" on K3 and K6. The χ2 test was used to compare the correct rates, the percent of the participants given 1 point, between the community pharmacists/the patients, the 2nd lockdown declared prefectures/the other prefectures, and the age groups (≤39 years and ≥40 years). The knowledge score (K score) was calculated as the sum of the total score of K1-K9. The means of the K scores were compared between the community pharmacists/the patients, the 2nd lockdown declared prefectures/the other prefectures, and the age groups (≤39 years and ≥40 years) by T test. Regarding the participant's daily practice, 1 point was assigned for participant responses of 5:

*Corresponding author. E-mail: erikokob@faculty.chiba-u.jp Tel: +81-43-226-2884.

Table 1. Characteristics of the community pharmacists and the patients.

Characteristics	Pharmacists (N=597)		Patients (N=779)	
	N	%	N	%
Age				
under and 20's	213	35.7	66	8.5
30's	219	36.7	104	13.4
40's	111	18.6	120	15.4
50's	50	8.4	132	16.9
60's and over	4	0.7	357	45.8
Gender				
Male	235	39.4	305	39.2
Female	362	60.6	474	60.8
Region				
2nd Lockdown declared prefectures	219	36.7	241	30.9
other prefectures not in lockdown	378	63.3	538	69.1

"agree" or 4: "somewhat agree" with the statements of each practice. The χ2 test was used to compare the implementing rate, the percent of the participants given 1 point, between the groups as described in the COVID-19 knowledge analysis. The precautionary measure score (P score) was calculated as the sum of the total score of P1-P10. Means of the P score were compared between the groups as described in the knowledge analysis by T test. P values <0.05 were considered to indicate a statistical significance in all tests. All the statistical analyses were performed by SPSS ver 27.0 (IBM Japan, Tokyo, Japan). All the data were cross-checked at the data entry stage before the analysis.

Ethical approval

The study was approved by the Research Ethics Committee of the Graduate School of Pharmaceutical Sciences, Chiba University (R005, August 26, 2020).

RESULTS

Characteristics of respondents

A total of 844 community pharmacists and 975 patients of 191 community pharmacies were initial subjects of this study; 597 community pharmacists and 809 patients from 162 community pharmacies returned their answers, and finally, a total of 597 community pharmacists (response rate: 70.7%) and 779 patients (79.9%) were the subjects of the analysis (data of 30 patients were excluded due to missing characteristics information or over one-third of the answers) (Table 1). Females comprised 60.6% of the community pharmacists and 60.8% of the patients. Though over one-half of the community pharmacists (72.4%) were under age 40, only 21.9% of the patients were under age 40. Only 36.7% of the community pharmacists and 30.9% of the patients were from

prefectures under the 2nd lockdown.

COVID-19 knowledge and daily practices of precautionary measures: Comparison of the community pharmacists and the patients

Table 2 shows the COVID-19 knowledge and the daily practices of precautionary measures of the community pharmacists and the patients. Both the community pharmacists and patients had good COVID-19 knowledge with a K score of over 7 out of 9 points; the mean K score among community pharmacists was 7.71±1.43, which was statistically higher than that among the patients (7.35±1.64, p<0.01). As for wearing masks to prevent COVID-19 infection (K5), the correct rates were high in both the community pharmacists and the patients (94.6%, 95.8% respectively), with no significant differences. The correct rates were statistically higher among the community pharmacists than among the patients (p<0.01) regarding the knowledge of treatment for COVID-19 (K2), COVID-19 infectivity (K3), infection prevention for young and kids (K6) and avoiding crowded spaces (K7).

Table 3 shows the daily practices of COVID-19 precautionary measures of the community pharmacists and the patients. The mean P score of community pharmacists was 8.17±1.86, which was statistically higher than the mean of 7.91±2.04, of the patients (p<0.05), though both the patients and community pharmacists were good at implementing daily precautionary measures practices for the prevention of COVID-19 infection. The implementing percent of those checking their body temperature every morning (P5) was statistically higher in the pharmacy staff (84.4%) than in the patients (54.2%, p<0.01). However, the percent of the community pharmacists who were keeping a 2 m distance from

Table 2. Knowledge on COVID-19 among the community pharmacists and patients.

Knowledge		Pharmacists (N=597)		Patients (N=779)		p value
		N	%	N	%	
K1	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.	456	76.4	602	77.3	0.604
K2	There currently is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.	498	83.4	587	75.4	0.001*
K3	Persons with COVID-19 cannot transmit the virus to others when a fever is not present.	564	94.5	624	80.1	<0.001*
K4	The COVID-19 virus spreads via respiratory droplets of infected individuals.	524	87.8	671	86.1	0.625
K5	General residents can wear general medical masks to prevent the infection by the COVID-19 virus.	565	94.6	746	95.8	0.243
K6	It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus.	569	95.3	696	89.3	<0.001*
K7	To prevent the infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportation.	441	73.9	486	62.4	<0.001*
K8	Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.	537	89.9	691	88.7	0.538
K9	People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. In general, the observation period is 14 days.	446	74.7	595	76.4	0.447
	K score (mean ± S.D.)	7.71±1.43		7.35±1.64		<0.001*

N and % mean the number and % of the respondents choosing correct answers. K score: the sum of the total score of K1-K9; where 1 point represents choosing the correct answer. *p<0.05 χ2 test (%) or t-test (K score).

Table 3. The COVID-19 daily practices of precautionary measures in the community pharmacists and patients.

Practice		Pharmacists (N=597)		Patients (N=779)		p value
		N	%	N	%	
P1	I am avoiding crowded places as the 3Cs.	557	93.3	712	91.4	0.262
P2	I am keeping a 2-m distance from others	409	68.5	589	75.6	0.003*
P3	I am wearing a mask when going outside.	583	97.7	752	96.5	0.732
P4	I am opening a window for a ventilation.	493	82.6	651	83.6	0.511
P5	I am checking my body temperature every morning.	504	84.4	422	54.2	<0.001*
P6	I am avoiding taking public transportation.	364	61.0	531	68.2	0.004*
P7	I am avoiding having a meal with many people.	568	95.1	696	89.3	<0.001*
P8	I am following good respiratory etiquette.	584	97.8	741	95.1	0.018*
P9	I am avoiding touching my eyes, nose and mouth.	386	64.7	491	63.0	0.572
P10	I am washing my hands with soap and water.	430	72.0	550	70.6	0.631
P11	I am working from home	-	-	103	13.2	-
	P score (mean ± S.D.)	8.17±1.86		7.91±2.04		0.016*

N and % mean the number and % of the respondents implementing each practice. P score: the sum of the total score of P1-P10; where 1 point represents agreeing or somewhat agreeing with each practice. *p<0.05 χ2 test (%) or t-test (P score).

others (P2) was statistically lower than in the patients (68.5%, 75.6%, respectively, p<0.01). A majority of the community pharmacists as well as the patients were practicing wearing masks (P3), with no statistical difference (97.7%, 96.5% respectively).

COVID-19 knowledge and the daily practices of precautionary measures among the community pharmacists

Tables 4 and 5 show the COVID-19 knowledge and the daily practices of precautionary measures according to the characteristics of the community pharmacists. Between the community pharmacists residing in the prefectures under the 2nd lockdown compared with those from other prefectures, no statistical differences were observed in the COVID-19 knowledge except for question K7, avoiding crowded places (p<0.01). Also, no statistical differences were observed according to the age of the community pharmacists.

Regarding the daily precautionary measures, the mean P score was statistically higher in the other prefectures compared to that in the 2nd lockdown prefectures, and

Table 4. Community pharmacists' knowledge on COVID-19 (N=597).

Knowledge		2nd Lockdown declared prefectures (N=219)		Other prefectures (N=378)		p value	39≤ (N=432)		≥40 (N=165)		p value
		N	%	N	%		N	%	N	%	
K1	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.	165	75.3	291	77.0	0.689	332	76.9	124	75.2	0.668
K2	There currently is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.	182	83.1	316	83.6	0.909	355	82.2	143	86.7	0.219
K3	Persons with COVID-2019 cannot transmit the virus to others when a fever is not present.	208	95.0	356	94.2	0.853	409	94.7	155	93.9	0.693
K4	The COVID-19 virus spreads via respiratory droplets of infected individuals.	189	86.3	335	88.6	0.407	379	87.7	145	87.9	1.000
K5	General residents can wear general medical masks to prevent the infection by the COVID-19 virus.	211	96.3	354	93.7	0.189	408	94.4	157	95.2	0.841
K6	It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus.	207	94.5	362	95.8	0.548	412	95.4	157	95.2	1.000
K7	To prevent the infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportation.	146	66.7	295	78.0	0.003*	319	73.8	122	73.9	1.000
K8	Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.	195	89.0	342	90.5	0.575	382	88.4	155	93.9	0.048
K9	People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. In general, the observation period is 14 days.	157	71.7	289	76.5	0.205	325	75.2	121	73.3	0.674
	K score (mean ± S.D.)	7.58±1.46		7.78±1.42		0.107	7.69±1.49		7.75±1.26		0.599

N and % mean the number and % of the respondents choosing correct answers. K score: the sum of the total score of K1-K9; where 1 point represents choosing the correct answer. *p<0.05 χ2 test (%) or t-test (K score).

Table 5. Community pharmacists' daily practices of COVID-19 precautionary measures (N=597).

Practice		2nd Lockdown declared prefectures (N=219)		Other prefectures (N=378)		p value	39≤ (N=432)		≥40 (N=165)		p value
		N	%	N	%		N	%	N	%	
P1	I am avoiding crowded places as the 3Cs.	204	93.2	353	93.4	1.000	402	93.1	155	93.9	0.855
P2	I am keeping a 2-m distance from others	136	62.1	273	72.2	0.013*	294	68.1	115	69.7	0.768
P3	I am wearing a mask when going outside.	217	99.1	366	96.8	0.095	422	97.7	161	97.6	1.000
P4	I am opening a window for a ventilation.	186	84.9	307	81.2	0.265	350	81.0	143	86.7	0.117
P5	I am checking my body temperature every morning.	189	86.3	315	83.3	0.352	361	83.6	143	86.7	0.379
P6	I am avoiding taking public transportation.	81	37.0	283	74.9	0.010*	257	59.5	107	64.8	0.260
P7	I am avoiding having a meal with many people.	209	95.4	359	95.0	0.846	409	94.7	159	96.4	0.524
P8	I am following good respiratory etiquette.	216	98.6	368	97.4	0.392	421	97.5	163	98.8	0.531
P9	I am avoiding touching my eyes, nose and mouth.	141	64.4	245	64.8	0.929	267	61.8	119	72.1	0.021*
P10	I am washing my hands with soap and water.	159	72.6	271	71.7	0.850	299	69.2	131	79.4	0.014*
	P score (mean ± S.D.)	7.94±1.80		8.31±1.88		0.017*	8.06±1.89		8.46±1.75		0.020*

N and % mean the number and % of the respondents implementing each practice. P score: the sum of the total score of P1-P10; where 1 point represents agreeing or somewhat agreeing with each practice. *p<0.05 χ2 test (%) or t-test (P score).

in ≥40 compared to in ≤39 (p<0.05 for both). The implementation rate of the community pharmacists at keeping a 2 m distance from others (P2) was statistically higher in the other prefectures (72.2%) than in the 2nd lockdown prefectures (62.1%, p=0.01). A big difference was observed in the implementation rates of avoiding

Table 6. Patients' knowledge on COVID-19 (N=779).

Knowledge		2nd Lockdown declared prefectures (N=241)		Other prefectures (N=538)		p value	≤39 (N=170)		≥40 (N=609)		p value
		N	%	N	%		N	%	N	%	
K1	The main clinical symptoms of COVID-19 are fever, fatigue, dry cough, and myalgia.	190	78.8	412	76.6	0.576	133	78.2	469	77.0	0.917
K2	There currently is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection.	185	55.6	402	64.9	0.526	128	75.3	459	75.4	0.840
K3	Persons with COVID-19 cannot transmit the virus to others when a fever is not present.	196	58.9	428	69.1	0.625	143	84.1	481	79.0	0.190
K4	The COVID-19 virus spreads via respiratory droplets of infected individuals.	206	61.9	465	75.1	0.731	150	88.2	521	85.6	0.306
K5	General residents can wear general medical masks to prevent the infection by the COVID-19 virus.	228	68.5	518	83.7	0.233	160	94.1	586	96.2	0.181
K6	It is not necessary for children and young adults to take measures to prevent the infection by the COVID-19 virus.	219	65.8	477	77.1	0.253	154	90.6	542	89.0	0.776
K7	To prevent the infection by COVID-19, individuals should avoid going to crowded places such as train stations and avoid taking public transportation.	140	42.0	346	55.9	0.093	111	65.3	375	61.6	0.421
K8	Isolation and treatment of people who are infected with the COVID-19 virus are effective ways to reduce the spread of the virus.	207	62.2	484	78.2	0.086	147	86.5	544	89.3	0.278
K9	People who have contact with someone infected with the COVID-19 virus should be immediately isolated in a proper place. In general, the observation period is 14 days.	189	56.8	406	65.6	0.412	123	72.4	472	77.5	0.153
	K score (mean ± S.D.)	7.33±1.60		7.36±1.66		0.784	7.34±1.69		7.36±1.62		0.904

N and % mean # and % of the respondents choosing correct answers. K score: the sum of the total score of K1-K9; where 1 point represents choosing the correct answer. *p<0.05 χ2 test (%) or t-test (K score).

taking public transportation (P6), 74.9% in the other prefectures and 37.0% in the 2nd lockdown prefectures (p=0.01).

COVID-19 knowledge and the daily practices of precautionary measures among the patients

Tables 6 and 7 show the COVID-19 knowledge and the daily practices of precautionary measures depending on the characteristics of the patients. Between the residents of the 2nd lockdown declared prefectures and those of other prefectures, or in the ≤39 and the ≥40, no statistical differences were observed in the mean of the K scores and the rates of correct answers for each question on COVID-19 knowledge.

Regarding the daily practices of precautionary measures, the implementation rate of the patients avoiding taking public transportation was statistically higher in those of the other prefectures (71.7%) than those of the 2nd lockdown prefectures (60.2%, p<0.01). Interestingly, between the ≤39 and ≥40 groups, several statistical differences were observed. The mean P score was statistically higher in those ≥40 (8.09±1.99) than in those ≤39 (7.29±2.07) (p<0.001). Also, the patients avoiding

Table 7. Patients' daily practices of COVID-19 precautionary measures (N=779).

		2nd Lockdown declared prefectures (N=241)		Other prefectures (N=538)		p value	≤39 (N=170)		≥40 (N=609)		p value
		N	%	N	%		N	%	N	%	
P1	I am avoiding crowded places as the 3Cs.	220	91.3	492	91.4	0.890	148	87.1	564	92.6	0.043*
P2	I am keeping a 2-m distance from others	190	78.8	399	74.2	0.206	104	61.2	485	79.6	<0.001*
P3	I am wearing a mask when going outside.	235	97.5	517	96.1	0.634	164	96.5	588	96.6	0.431
P4	I am opening a window for ventilation.	202	83.8	449	83.5	0.916	137	80.6	514	84.4	0.192
P5	I am checking my body temperature every morning.	136	56.4	286	53.2	0.436	86	50.6	336	55.2	0.258
P6	I am avoiding taking public transportation.	145	60.2	386	71.7	0.002*	108	63.5	423	69.5	0.135
P7	I am avoiding having a meal with many people.	219	90.9	477	88.7	0.450	147	86.5	549	90.1	0.155
P8	I am following good respiratory etiquette.	234	97.1	507	94.2	0.142	160	94.1	581	95.4	0.409
P9	I am avoiding touching my eyes, nose and mouth.	159	66.0	332	61.7	0.296	84	49.4	407	66.8	<0.001*
P10	I am washing my hands with soap and water.	181	75.1	369	68.6	0.074	94	55.3	456	74.9	<0.001*
P11	I am working from home.	32	13.3	71	13.2	0.400	30	17.6	73	12.0	0.316
	P score (mean ± S.D.)	7.98±1.96		7.88±2.07		0.526	7.29±2.07		8.09±1.99		<0.001*

N and % mean # and % of the respondents implementing each practice. P score: the sum of the total score of P1-P10; where 1 point represents agreeing or somewhat agreeing with each practice.
*$p<0.05$ χ2 test (%) or t-test (P score).

crowded places as the 3Cs (P1), keeping a 2 m distance from others (P2), avoiding touching your eyes/nose/mouth (P9), and washing hands (P10) were statistically higher in the patients in ≥40 than in ≤39 ($p=0.043$, $p<0.001$, $p<0.001$, $p<0.001$, respectively).

DISCUSSION

This study was conducted to evaluate the COVID-19 knowledge and the daily practices of precautionary measures of community pharmacists and the patients of the community pharmacies in Japan. The results showed that the community pharmacists as well as the patients of the community pharmacies had good overall COVID-19 knowledge and good implementation of daily precautionary measures to prevent COVID-19 infection.

Higher correct rates of the COVID-19 knowledge were observed in the community pharmacists than in the patients, regarding some professional knowledge of treatment for COVID-19, infectivity from the people without fever, prevention measures for the young and children, and avoiding crowded spaces. Also, the community pharmacists implemented practices better than the patients, especially in checking their body temperature every morning, avoiding having a meal with many people and following respiratory etiquette. These findings indicate that the community pharmacists followed and implemented good hygienic conditions adopting these precautionary measures, advocated by Japanese governments (MHLW, 2020c, d). As previous studies have shown that community pharmacists are always in contact with the patients, they are a vulnerable population for COVID-19 and also face the risk of becoming infected with COVID-19 as frontline health care

workers (Ung, 2020; Zheng et al., 2021), thus it is critical for community pharmacists to reduce their own risk of becoming infected with COVID-19 by implementing these essential precautionary measures.

This finding also corresponded with previous studies showing that pharmacists adopt good preventive practices such as avoiding unnecessary close contact with others, and following personal protective measures, etc. (Hussain et al., 2020; Tesfaye et al., 2020). As shown in the International Pharmaceutical Federation Guideline, the community pharmacists play key roles to educate patients on basic infection prevention and control measures and to promote measures for the prevention of infection among the public (FIP, 2020), the community pharmacists have better knowledge and implementation practices for prevention and can create awareness among patients for promoting precautionary measures.

Only on the knowledge of wearing masks to prevent COVID-19 infection, no difference was observed between the community pharmacists and the patients due to high correct rates (94.6%, 95.8% respectively) in both groups. These rates were higher than previous studies on the public in China (73.9%) by Zhong et al. (2021), Malaysia (76.7%) by Azlan et al. (2020) and USA (54.9%) by Clements (2020), but corresponded with the findings of the high correct rates of the pharmacists from Ethiopia (82.6%) by Yimenu et al. (2020) and Pakistan (95.6%) by Hussain et al. (2020). Since these previous studies were conducted during the early stage of COVID-19 pandemic (first half of the year 2020), they show that the public knowledge level has been improving over time, whereas pharmacists have always had a good knowledge as a health professional. Also, only for the practices of keeping a 2 m distance from others, the implementation rate was higher in the patients than in the community pharmacists (75.6%, 68.5% respectively). This implies two aspects. One is that the community pharmacists were not able to keep a 2 m distance in the cramped quarters of the staff area of the community pharmacy. The other is that the patients were carefully following these precautionary measures because of recognizing their high risk of becoming infected with COVID-19. These situations in both groups may lead to the differences.

Regarding the COVID-19 knowledge and the practices of precautionary measures among the community pharmacists, the knowledge and the practice on avoiding public transportation differed between in the 2nd lockdown prefectures and the other prefectures. It was shown that only 37.0% of the community pharmacists could avoid public transportation in the 2nd lockdown areas whereas 74.9% could as residents of other prefectures. This trend was also observed in the patients between the 2nd lockdown prefectures and the other prefectures, though not as big a difference as in community pharmacists. The 2nd lockdown areas were the rural areas with high population densities, such as Tokyo, including the top 7 prefectures in population (SBJ, 2019). In such rural areas, public transportation is an essential tool for community pharmacists to go for a work and they could not stop taking public transportation in place of cars. Therefore, the reason is that the community pharmacists in rural areas could not help but to take public transportation.

Regarding the COVID-19 knowledge and the practices of precautionary measures among the patients, no differences were observed in the knowledge of COVID-19 between the residents of 2nd lockdown prefectures and those of other prefectures, or the age groups ($\leq$39 and $\geq$40). However, it was shown that the implementation rates in patients aged $\leq$39 was lower than that in patients aged $\geq$40, in essential practices for COVID-19 prevention, such as avoiding crowded places as the 3Cs, keeping a 2 m distance from others, and washing hands. Among the community pharmacists, not much difference was observed in these practices between these two age groups. Actually, in Japan the COVID-19 positive cases were most reported in those in their 20's (132,490 cases) and 30's (89,672 cases) among all the generations, consisting of 36.9% of all the positive cumulative cases and the rate has increased to around 50% after April 2021 at the time point of May 5, 2021 (MHLW, 2021). The finding of a poor precautionary practice regardless of a better knowledge in young generation corresponds to a previous study in Bangladesh (Pervez et al., 2021). Therefore, improving the practices in the young age patients may improve and lower the high incidence of COVID-19 infection in these age groups. Since the community pharmacists implemented each practice well regardless of their age as a health professional and as community pharmacists are playing a key role to control the risk of becoming infected with COVID-19 as frontline community pharmacists (Cabas et al., 2021; Zaidi and Hasan, 2021), the pharmacist should educate and promote the essential prevention measures to the young patients. Further, the COVID-19 vaccination rate is still low in Japan; only 29.4% of the population in Japan have received a COVID-19 vaccination as of July 7, 2021 (WHO, 2020c), due to delay in vaccine distribution. Afterwards, by the cooperation of the Japanese government, medical professionals and Japanese public, the vaccine date has reached 78.4% on November 21st, 2021 (WHO, 2021c). However, even if the public are fully vaccinated, to maximize protection from the Delta variant and prevent possibly spreading it to others (CDC, 2021), fundamental prevention measures will continue to be essential tools for the management of COVID-19 for the time being. Therefore, further continuous patient education is and will be one of the critical roles for community pharmacists.

There are several limitations to our study. First, the subjects were recruited from among the patients visiting community pharmacies and only those who agreed to participate in the study returned the survey. The result may be affected by a selection bias. Second, this study was conducted in November 2020, between the 2nd and the 3rd wave of COVID-19. Since that time, several factors related to the COVID-19 situation have changed: the big 4th wave of COVID-19, several types of variants have appeared, and vaccinations are becoming more widely available; thus, the findings of the study on COVID-19 knowledge and the practice of precautionary measures may change over time. Finally, this study focused on the community pharmacists and the patients in community pharmacies. Further study is needed to explore COVID-19 knowledge and the precautionary practices in other health care professionals.

Conclusion

The community pharmacists as well as the patients in community pharmacies had good COVID-19 knowledge

and implemented good daily practices of precautionary measures for the prevention of COVID-19 infection. Among the patients, though no difference was observed in COVID-19 knowledge between those aged ≤39 and those ≥40, the implementation rates of some essential precautionary measures were lower in the patients aged ≤39 than in those age ≥40. The young age population should be educated on these essential precautionary measures for reducing the risk of their own infection and for the prevention of public transmission of COVID-19 infection. Since here the community pharmacists were found to have better COVID-19 knowledge and they implemented better precautionary measures than the patients, community pharmacists should play a key role in the promotion of essential precautionary measures and patient education.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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