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Original Article

Changes in Grades of Pre-Graduation Students due to the Spread of COVID-19
- Report from One Private University Physical Therapy Department -

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Abstract : [Purpose] To clarify the influences of the COVID-19 pandemic on student performance. [Subjects and Methods] Students of the Department of Physical Therapy, Faculty of Rehabilitation, Kobe Gakuin University, were examined to compare the distributions of their grades and grade point average (GPA) calculated from their grade points for specialized required subjects before and after the COVID-19 pandemic. [Results] Grade distributions varied after the COVID-19 pandemic and the GPA was higher after. [Conclusion] There were differences in grade distributions and GPA after the COVID-19 pandemic, demonstrating the necessity of interpreting student performance more carefully.

Key Words: COVID-19, education, GPA

(This article was submitted February.17, 2022, and was accepted March.24, 2022)

I. INTRODUCTION

As aging and the decrease in the birth rate are marked in Japan, the Ministry of Education, Culture, Sports, Science, and Technology (MEXT) is proceeding with measures to provide free higher education. To make these measures successful, the ministry emphasizes the importance of leveling student performance and conducting student evaluation based on grade point average (GPA)[1)]. In addition, GPA is often used for student guidance and the determination of advancement and tuition waivers in Japan[2,3)]. It is also used for student evaluation at universities in Japan and other countries[4-7)].

The coronavirus disease (COVID-19), which was first reported in December 2019, has had a marked impact not only on the economy, but also on student life. According to the MEXT report on the status of COVID-19 management measures among universities, 96.6% of the 1,070 universities/technical colleges were implementing or considering COVID-19 management measures as of May 2020[8)]. MEXT also conducted a survey on the status of university classes in the second semester of 2020, revealing that 80.1% of 1,060 target universities/technical colleges were planning to conduct classes by combining face-to-face and remote sessions as of September 2020[9)].

In its guidelines for COVID-19 management at universities, MEXT approves of awarding credits to students who do not commute to universities but attend classes at home online and complete the assignments given by faculty members at home, on the condition that educational effects similar to those in face-to-face class sessions can be achieved[10)].

Considering the risk of COVID-19 infection, Kobe Gakuin University decided to allow students to attend classes at home using computers and not to conduct regular examinations with strict requirements for students to acquire credits in 2020. The university also required its faculty members to achieve educational

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effects similar to those before the COVID-19 pandemic, but there have been few reports on the educational effects of the subjects provided in 2020, and the impact of not conducting regular examinations on student performance is unclear. It can be inferred that if there had been no spread of COVID-19, and the same faculty members had given lectures for students with the same contents (under the same subject names), the results of student evaluation would have been the same. However, the COVID-19 pandemic made it difficult for the university to conduct regular examinations despite the same contents to be taught. Therefore, we thought that we could clarify the influences of the COVID-19 pandemic on the students' performance by comparing their grades for specialized required subjects, where the same faculty members were in charge of teaching and evaluation under the same subject names, before and after the situation.

Therefore, to clarify some of the educational effects after the COVID-19 pandemic, this study compared grades for specialized required subjects at the Department of Physical Therapy, Faculty of Rehabilitation in 2018 and 2019 before and in 2020 after the pandemic.

II. PARTICIPANTS AND METHODS

The number of specialized required subjects available for students who entered the Department of Physical Therapy, Kobe Gakuin University in each year was as follows: 2017 and 2018: 66; 2019: 65; and 2020: 70. Among these subjects, to make sure that there were no differences in the contents of the relevant subjects, contents or difficulty levels of term-end examinations, or grading criteria, the study examined 32 specialized required subjects, which were provided with the same name and faculty members from 2018 to 2020, and 3, 15, and 14 of them targeted first-, second-, and third-year students, respectively (Table 1).

The participants were students who advanced without repeating the same year, and did not leave or withdraw from school after taking the relevant subjects. The number of first-year students who took the relevant subjects without leaving or withdrawing from school was 34 in 2018, 48 in 2019, and 38 in 2020. The number of second-year students who took the relevant subjects without repeating the same year or leaving or withdrawing from school was 42 in 2018, 29 in 2019, and 45 in 2020. Similarly, the number of third-year students who took the relevant subjects without repeating the same year or leaving or withdrawing from school was 42 in 2018, 37 in 2019, and 25 in 2020 (Table 2).

The students' academic records were obtained through the Educational Affairs Center after following the given procedure. Their grades, S, A, B, C, D, and "/", for the relevant subjects were scored as 4, 3, 2 ,1, 0, and 0, respectively, as grade points. Grading was performed based on the following criteria: S: a score of 90 or higher; A: 80 or higher and lower than 90; B: 70 or higher and lower than 80; C: 60 or higher and lower than 70; and D: lower than 60. Students not taking regular examinations, which are a requirement for the acquisition of credits, or not attending classes are graded "/" (i.e. "unevaluable"). Each student's grade point average (GPA) was calculated from their grade points for each relevant subject using the following formula: (Σ grade points for each subject × number of credits) / (Σ number of credits from each subject). The obtained GPAs were classified based on the school year. Furthermore, students who took the relevant subjects in 2018/2019 and 2020 were classified into pre- and post-COVID-19 groups, respectively, to compare grade distributions, grade points, and GPAs in each year for these subjects between the 2 groups.

As for statistical analysis, grade distributions were compared between the pre- and post-COVID-19 groups using the chi-square test. The GPAs in each year calculated from grade points for the relevant subjects were compared between the 2 groups using the Shapiro-Wilk test to examine data normality first. Second, after confirming that the data were normal, Levene's test was conducted to examine homoscedasticity. When the data were homoscedastic, the t-test was conducted, and when they were not, Welch's test was conducted. Third, when the Shapiro-Wilk test did not confirm data normality, the Mann-Whitney U test was conducted. The significance level was set at lower than 5%. The Statistical software used Excel-Toukei from Social Survey Research Information Co., Ltd.

After obtaining approval from the Ethics Committee for Research Involving Humans at the Faculty of Rehabilitation, Kobe Gakuin University (approval number: SORIN 20-18), explanations, including the following considerations, were presented to the participants through the website of this faculty: 1) the purpose and method of information use, 2) the content of the information used, 3) requirements for persons who use the information, 4) the name, institution, and contact address of the principal investigator, 5) term

of information use, 6) disuse of information that allows the identification of participants, and 7) the method to manage requests/claims from the participants specified in 6) or their representatives. Students who did not contact to notify of their refusal to participate were regarded as consenting to the study.

Table 1. Survey of required subjects

Year	Name of subject
First year	Public Health (1)
	Kinematics I (1)
	Clinical Psychology (1)
Second year	Neuroscience (1)
	Internal Medicine I (1)
	Orthopaedics I (1)
	Psychiatry I (1)
	Pathology (2)
	Human Development (2)
	Measurement and Evaluation in Physical Therapy (2)
	Kinematic Practice (1)
	Internal Medicine II (1)
	Orthopaedics II (1)
	Clinical Neurology I (1)
	Clinical Neurology II (1)
	Exercise Therapy (1)
	Prosthetics and Orthotics (1)
	Activities of Daily Living (1)
Third year	Emergency Medicine (1)
	Medical Safety Management (1)
	Rehabilitation Medicine (2)
	Research Theory of Physical Therapy (2)
	Practice of Measurement and Evaluation in Physical Therapy (1)
	Practice of Exercise Therapy (1)
	Practice of Prosthetics and Orthotics (1)
	Practice of Activity of Daily Living (1)
	Physical Therapy in Bone and Joint Disorders (1)
	Physical Therapy in Neurology (1)
	Physical Therapy in Pediatrics (1)
	Management Science of Physical Therapy (1)
	Community Rehabilitation Theory (1)
	Practice of Community Rehabilitation Theory (1)

The number in parentheses is the number of units.

Table 2. Subjects

	Pre-COVID-19 group		Post-COVID-19 group
	2018	2019	2020
First year	34	48	38
Second year	42	29	45
Third year	42	37	25

Unit: people

III. RESULTS

Grade (S, A, B, C, and D) distribution markedly varied among 30 out of the 32 subjects (Table 3).

The post-COVID-19 group achieved significantly higher-grade points for 20 subjects and significantly lower grade points for 3 subjects than the pre-COVID-19 group. The 9 other subjects did not have significant differences between the groups. When focusing on the school year, the grade points for 2 out of the 3 subjects of the post-COVID-19 group, <Public Health> and <Kinematics I>, were significantly higher, but there were no significant differences between the groups in grade points for <Clinical Psychology> in the first year. In the second year, the grade points for 11 subjects of the post-COVID-19 group, <Neuroscience>, <Internal Medicine I>, <Orthopaedics I>, <Pathology>, <Measurement and Evaluation in Physical Therapy>, <Kinematic Practice>, <Internal Medicine II>, <Orthopaedics II>, <Clinical Neurology II>, <Prosthetics and Orthotics>, and <Activities of Daily Living>, were significantly higher, but their grade points for <Human Development> were significantly lower. The 3 other subjects, <Psychiatry I>, <Clinical Neurology I>, and <Exercise Therapy>, did not significantly differ between the groups. In the third year, the grade points for 7 subjects of the post-COVID-19 group, <Emergency Medicine>, <Rehabilitation Medicine>, <Research Theory of Physical Therapy>, <Practice of Measurement and Evaluation in Physical Therapy>, <Practice of Exercise Therapy>, <Physical Therapy in Neurology>, and <Physical Therapy in Pediatrics>, were significantly higher, but their grade points for 2 subjects, <Medical Safety Management> and <Practice of Activity of Daily Living>, were significantly lower. The 5 other subjects, <Practice of Prosthetics and Orthotics>, <Physical Therapy in Bone and Joint Disorders>, <Management Science of Physical Therapy>, <Community Rehabilitation Theory>, and <Practice of Community Rehabilitation Theory>, did not significantly differ between the groups. (Table 4).

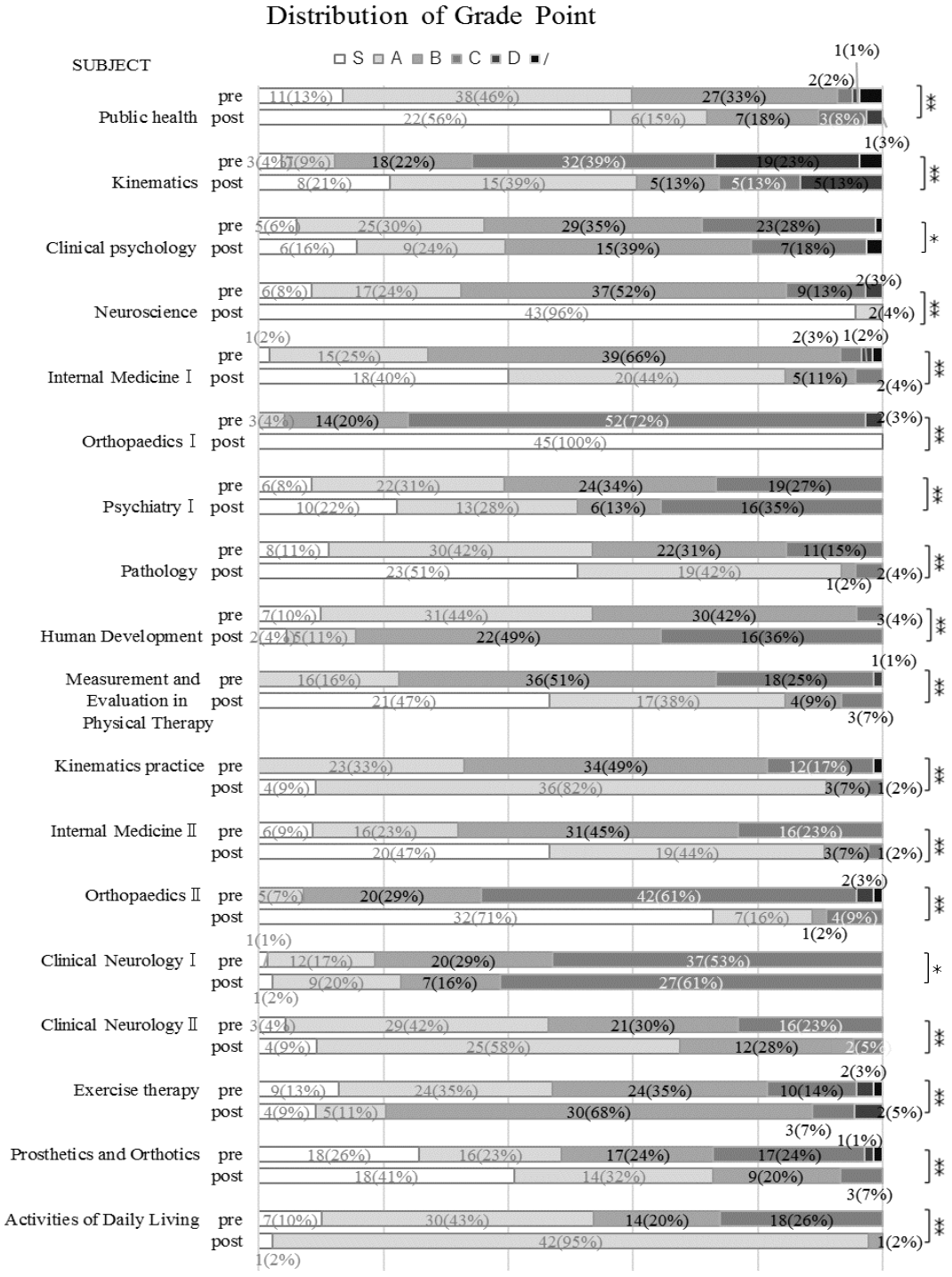
In addition, the GPAs of the post-COVID-19 group calculated from their grade points for the specialized required subjects were significantly higher than those of the pre-COVID-19 group in all years (Table 5).

IV. DISCUSSION

On comparing grade distributions after the COVID-19 pandemic, the rate of students graded S or A was higher in the post-COVID-19 group, leading to a skewed grade distribution for many subjects. Such a difference in grade distributions between the pre and post-COVID-19 groups may be explained by student evaluation based on the rating of reports, rather than regular examination results, which was conducted for an increased number of subjects after the COVID-19 pandemic. The rating of reports tends to be qualitative, not quantitative, where the results are easily influenced by subjective opinions. In addition, MEXT required universities to prevent student evaluation by faculty members from being detrimental to students10). These factors may have resulted in the difference in grade distributions between the pre- and post-COVID-19 groups, and the higher rate of students graded S or A in the latter.

The GPA is drawing attention as an index to comprehensively evaluate students' performance with the aim of appropriately managing their academic achievements, objectively grading them, and harmonizing grading criteria among subjects. MEXT recommends that all universities in Japan apply this measure to students as much as possible. It also notified the launch of many support measures, including school fee reduction systems and scholarships, as a new support system in higher education[11], advising educational institutions to adopt the GPA as a criterion for support. Achieving a GPA higher than the top half is defined as a requirement to receive study support, and the support is discontinued if a student achieves a GPA below the bottom quartile for 2 consecutive years. Thus, the GPA is not only an indicator of academic achievements at school, but it is also a criterion to receive subsidies. A previous study reported that almost normal distributions of grades are correlated with the results of the national certification examination students take after graduation[12]. Differences in grade distributions after the COVID-19 pandemic may also affect the validity of student evaluation.

Table 3. Distribution of Grade point



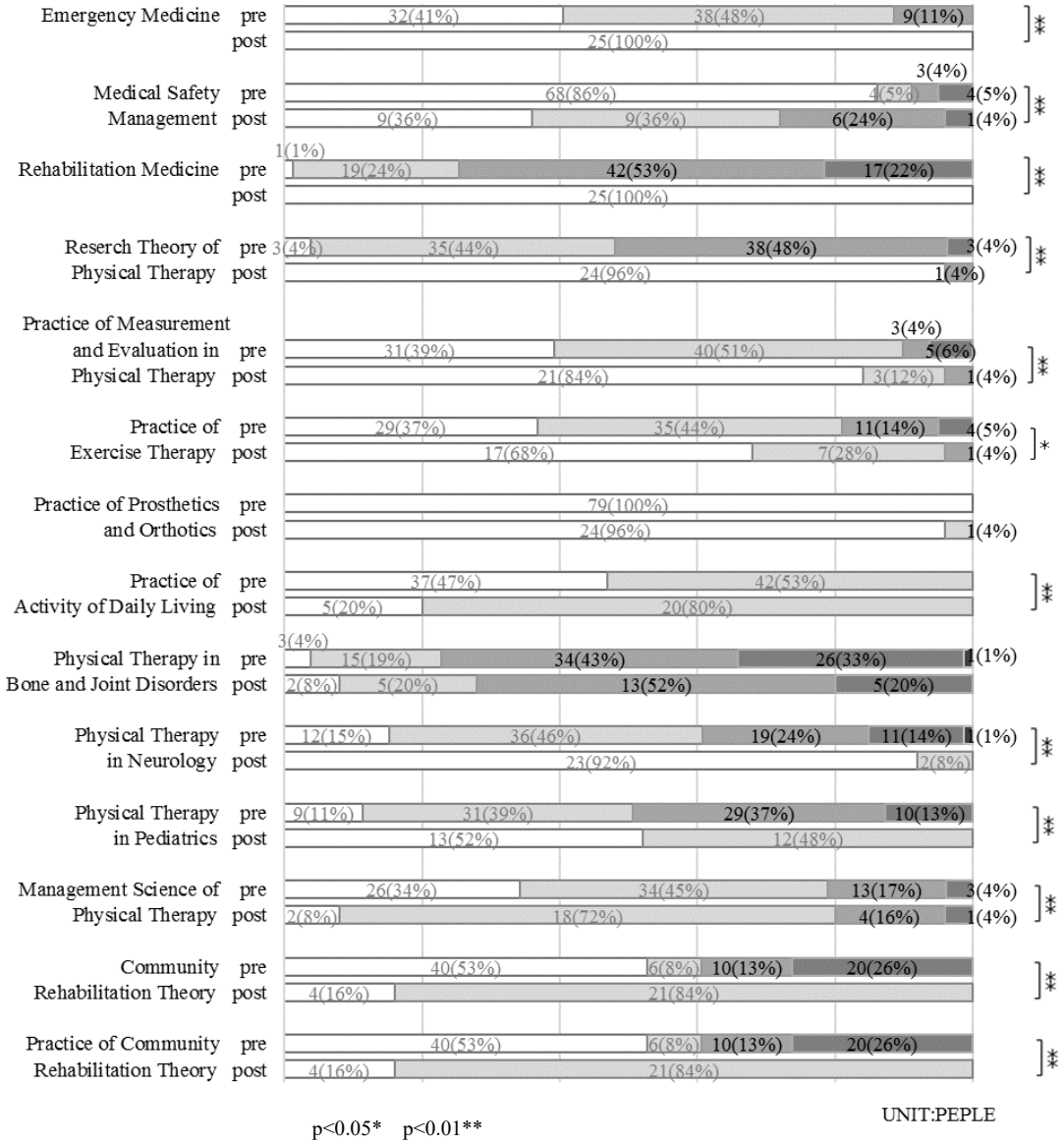

Emergency Medicine pre 32(41%) 38(48%) 9(11%) **
post 25(100%)
Medical Safety Management pre 68(86%) 3(4%) 4(5%) 4(5%) **
post 9(36%) 9(36%) 6(24%) 1(4%)
Rehabilitation Medicine pre 1(1%) 19(24%) 42(53%) 17(22%) **
post 25(100%)
Reserch Theory of Physical Therapy pre 3(4%) 35(44%) 38(48%) 3(4%) **
post 24(96%) 1(4%)
Practice of Measurement and Evaluation in Physical Therapy pre 31(39%) 40(51%) 3(4%) 5(6%) **
post 21(84%) 3(12%) 1(4%)
Practice of Exercise Therapy pre 29(37%) 35(44%) 11(14%) 4(5%) *
post 17(68%) 7(28%) 1(4%)
Practice of Prosthetics and Orthotics pre 79(100%)
post 24(96%) 1(4%)
Practice of Activity of Daily Living pre 37(47%) 42(53%) **
post 5(20%) 20(80%)
Physical Therapy in Bone and Joint Disorders pre 3(4%) 15(19%) 34(43%) 26(33%) 1(1%)
post 2(8%) 5(20%) 13(52%) 5(20%)
Physical Therapy in Neurology pre 12(15%) 36(46%) 19(24%) 11(14%) 1(1%) **
post 23(92%) 2(8%)
Physical Therapy in Pediatrics pre 9(11%) 31(39%) 29(37%) 10(13%) **
post 13(52%) 12(48%)
Management Science of Physical Therapy pre 26(34%) 34(45%) 13(17%) 3(4%) **
post 2(8%) 18(72%) 4(16%) 1(4%)
Community Rehabilitation Theory pre 40(53%) 6(8%) 10(13%) 20(26%) **
post 4(16%) 21(84%)
Practice of Community Rehabilitation Theory pre 40(53%) 6(8%) 10(13%) 20(26%) **
post 4(16%) 21(84%)
p<0.05* p<0.01**
UNIT:PEPLE

Table 4. Comparative table of grade point

Year	Name of subject	grade point of required subject median(interquartile range)(number of subjects)			
		Pre-COVID-19 group	post-COVID-19 group	p value	
First year	Public Health	3(2-3)(n=82)	4(2-4)(n =37)	p<0.01	**
	Kinematics Ⅰ	1(0-2)(n=82)	3(1-3)(n =37)	p<0.01	**
	Clinical Psychology	2(1-3)(n=82)	2(2-3)(n =38)	NS:p=0.35	
Second year	Neuroscience	2(2-3)(n=71)	4(4-4)(n=45)	p<0.01	**
	Internal Medicine Ⅰ	2(2-2)(n=71)	3(3-4)(n=45)	p<0.01	**
	Orthopaedics Ⅰ	1(1-1)(n=71)	4(4-4)(n=45)	p<0.01	**
	Psychiatry Ⅰ	2(1-3)(n=71)	3(1-3)(n=45)	NS:p=0.47	
	Pathology	3(2-3)(n=71)	4(3-4)(n=45)	p<0.01	**
	Human Development	3(2-3)(n=71)	2(1-2)(n=45)	p<0.01	**
	Measurement and Evaluation in Physical Therapy	2(1-2)(n=71)	3(3-4)(n=45)	p<0.01	**
	Kinematic Practice	2(2-3)(n=70)	3(3-3)(n=44)	p<0.01	**
	Internal Medicine Ⅱ	2(2-3)(n=69)	3(3-4)(n=43)	p<0.01	**
	Orthopaedics Ⅱ	1(1-2)(n=70)	4(3-4)(n=44)	p<0.01	**
	Clinical Neurology Ⅰ	1(1-2)(n=70)	1(1-2)(n=44)	NS:p=0.63	
	Clinical Neurology Ⅱ	2(2-3)(n=69)	3(2-3)(n=43)	p<0.01	**
	Exercise Therapy	2(2-3)(n=70)	2(2-2)(n=44)	NS:p=0.11	
	Prosthetics and Orthotics	2(1-3.75)(n=70)	3(2-3)(n=44)	p<0.01	**
	Activities of Daily Living	3(1-3)(n=69)	3(3-3)(n=44)	p<0.01	**
Third year	Emergency Medicine	3(3-4)(n=79)	4(4-4)(n=25)	p<0.01	**
	Medical Safety Management	4(4-4)(n=79)	3(2-4)(n=25)	p<0.01	**
	Rehabilitation Medicine	2(2-2.5)(n=79)	4(4-4)(n=25)	p<0.01	**
	Reserch Theory of Physical Therapy	2(2-3)(n=79)	4(4-4)(n=25)	p<0.01	**
	Practice of Measurement and Evaluation in Physical Therapy	3(3-4)(n=79)	4(4-4)(n=25)	p<0.01	**
	Practice of Exercise Therapy	3(3-4)(n=79)	4(3-4)(n=25)	p<0.01	**
	Practice of Prosthetics and Orthotics	4(4-4)(n=79)	4(4-4)(n=25)	NS:p=0.08	
	Practice of Activity of Daily Living	3(3-4)(n=79)	3(3-3)(n=25)	p<0.05	*
	Physical Therapy in Bone and Joint Disorders	2(1-2)(n=79)	2(2-3)(n=25)	NS:p=0.22	
	Physical Therapy in Neurology	3(2-3)(n=79)	4(4-4)(n=25)	p<0.01	**
	Physical Therapy in Pediatrics	3(2-3)(n=79)	4(3-4)(n=25)	p<0.01	**
	Management Science of Physical Therapy	3(3-4)(n=76)	3(3-3)(n=25)	NS:p=0.10	
	Community Rehabilitation Theory	4(1-4)(n=76)	3(3-3)(n=25)	NS:p=0.79	
	Practice of Community Rehabilitation Theory	4(1-4)(n=76)	3(3-3)(n=25)	NS:p=0.79	
	p<0.05* p<0.01**				

Table 5. Comparative table of GPA by grade

Year	Median (interquartile range) (number of subjects)		P-value
	Pre-COVID-19 group	Post-COVID-19 group	
First year	2.00 (1.33-2.33) (n=85)	2.83 (2.00-3.33) (n=38)	p<0.01 **
Second year	2.17 (1.78-2.50) (n=69)	2.94 (2.72-3.25) (n=43)	p<0.01 **
Third year	2.88 (2.63-3.19) (n=76)	3.50 (3.44-3.56) (n=25)	p<0.01 **

p<0.05* p<0.01**

The post-COVID-19 group achieved significantly higher-grade points for many subjects, possibly as a result of the increased rate of students graded S or A for many subjects after the COVID-19 pandemic. The GPAs of the post-COVID-19 group calculated from their grade points for the relevant specialized required subjects were significantly higher than those of the pre-COVID-19 group in all 3 years. According to another report, GPAs calculated from grade points for specialized required subjects are correlated with national certification examination results and advancement/withdrawal rates[13-16]. However, as the COVID-19 pandemic affected grade points and GPAs calculated from such points for specialized required subjects in each school year, it is unclear whether the grade distributions observed in the post-COVID-19 group and the GPAs calculated from grade points for the specialized required subjects are correlated with national certification examination results and advancement/withdrawal rates. In this respect, higher grade points or higher GPAs calculated from such points for specialized required subjects may not necessarily reflect favorable educational effects. Higuchi et al. noted that the quality of learning varies among individuals according to the remote class session style, content, number of attendees, and each student's skills for ICT use[17].

As the COVID-19 situation continues, school classes are likely to continue combining face-to-face and remote sessions. However, for grading, it may be desirable to conduct regular examinations with sufficient reliability and validity, and comprehensively evaluate students with factors other than regular examination results taken into consideration.

As a study limitation, this study did not clarify whether grade distributions, grade points, or GPAs are correlated with advancement/withdrawal rates or national certification examination scores after the COVID-19 pandemic. This is a future challenge and it requires continued research. The study has another limitation, as it only reported the results from a single department of a single university, which cannot be generalized to other universities/departments. Similar studies are expected to be conducted at other universities/departments in the future. Moreover, the study did not strictly confirm that student performance was the same. In order to prove that student performance is the same among students who entered university in different years, it is necessary to evaluate them based on their scores for an examination with the same content and difficulty at the same point after entrance. In practical terms, it is impossible to resolve the above limitation, as there is no examination with the same content or difficulty in the curriculum for students admitted to the Department of Physical Therapy, Kobe Gakuin University. In addition, there are limitations related to subjects and methods. In order to verify clear differences, it may be more appropriate to compare raw scores (under scores) before adjustment to grade points. However, such a validation using raw scores is difficult, as they do not allow us to calculate GPAs or compare data between this and other domestic universities or those in other countries.

Lastly, the differences in grade distributions and GPAs after the COVID-19 pandemic observed in this study indicate the necessity of interpreting student performance more carefully.

FUNDING and CONFLICT of INTEREST

There are none.

REFERENCES

1) Ministry of education. Outline of ministerial ordinance based on the Act on Support for Study at Universities, etc. https://www.mext.go.jp/component/a_menu/education/micro_detail/__icsFiles/afieldfile/2019/05/28/1417253_002.pdf: 2020:5 (Accessed Dec. 12,2021)
2) Hayashi N: University education governance and grading criteria (volume 2) - Quality assurance and the GPA system. KEIEI SHIRIN (The Hosei Journal of Business). 2010, 47:57-72
3) Goto K: GPA (Grande Point Average)'s definitions and its meaning, and its generalization Tottori University Education Center bulletin.2006,3:11-27
4) Raymond D.C, Leslie G.E: Using reciprocal determinism to improve first-year college GPA and retention: College Student Journal:2021,55:89-103
5) Michael A.B, Jeffrey S.R, Albert H.Y: Grades and incentives: assessing competing grade point average measures and postgraduate outcomes: Studies in Higher Education:2016,41:1548-1562
6) Ido Millet: The relationship between grading leniency and grading reliability: Studies in Higher Education:2018,43:1524-1535
7) William R.G, Ting D, Anthony R.A, et al.: Relationship Between Admissions Committee Review and Student Performance in Medical School and Internship: MILITARY MEDICINE:2012,177:21-25
8) Ministry of education. Regarding the response status of universities, etc. regarding measures against COVID-19. https://www.mext.go.jp/content/202000513-mxt_kouhou01-000004520_3.pdf. :2020;1 (Accessed Oct. 13,2021)
9) Ministry of education. For implementation policies of classes in the second semester, etc.at universities, etc. Survey on. https://www.mext.go.jp/content/20200915_mxt_kouhou01-000004520_1.pdf. :2020;1 (Accessed Nov. 7,2021)
10) Ministry of education. Guidelines for dealing with COVID-19 at universities, etc. https://www.mext.go.jp/content/20200605-mxt_kouhou01-000004520_5.pdf. 2021;17 (Accessed Oct. 12,2021)
11) Ministry of education. Guidelines for dealing with COVID-19 at universities of the Ministry of Education. https://www.mext.go.jp/content/20200916-mxt_kouhou01-000004520_1.pdf. 2020 (Accessed Oct. 12,2021)
12) Ministry of education. About the new system for supporting higher education. 20200124-mxt_sigasanji-1411620_0000.2_001.pdf. 2021 (Accessed Dec. 12,2021)
13) Murao H: Relationship between scores in the national examination for physical therapists and grades of compulsory specialized courses in Kobe Gakuin University.Kobegakuinn Journal of Rehabilitation Research: 2014;9:13-20
14) Murao H: Relationships between scores of entrance examinations for the Physical Therapy Course of Kobe Gakuin University and national physical therapy examinations-Based on data of students who graduated in 2013 and 2014. Kobegakuinn Journal of Rehabilitation Research, 2015, 10: 129-136.
15) Murao H, Iwai N: Relationship between scores in the national examination for physical therapists and grade point average (GPA) every semester. Rehabilitation kyoiku kenkyu, 2017, 22: 248-252.
16) Murao H, Iwai N: Usefulness of the Grade-Point Average for Required Subjects to Predict Withdrawal from the Faculty of Physical Therapy- A 4-year Observational Study -. Journal of Allied Health Sciences, 2018, 9 : 90-95.
17) Higuchi H, Etchu K, Kubo J, et al.: On-line Classes at University under COVID-19 Pandemic: Based on the Quantitative and Qualitative Analysis of the Survey [in Japanese]. Bulletin of Miyagi University of Education Graduate School for Teacher Training. 2020.2:53-72

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Original Article

Disaster Prevention Consciousness Research and Disaster Support for Disabled Persons

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Abstract : [Purpose] We investigated disaster prevention consciousness of the disabled persons who need assistance at a disaster. [Participants and methods] A questionnaire survey with 9 items were performed for 45 people using physically disabled persons support facilities. [Results] Over a half of the subjects answered that they had not participated in disaster prevention events and communication with the local community while they did not always take disaster prevention measures and were not able to understand the situation at the time of a disaster and make decisions. Moreover, 80% of them answered they had anxiety for disasters; for refuge life, securing of medical service and evacuation behavior from physically disabled persons and refuge life and securing of medical service from mentally-disabled and impaired persons. Further, 67.5% of them answered that they had things that they want surrounding people to do at the time of a disaster; physically disabled persons wished for assistance for transfer to refuge, refuge life support and securing of medical service, mentally disabled persons wished for securing of safe place and guidance for it, refuge life support and support for home refuge and mentally impaired persons wished for refuge life support, assistance for transfer to refuge and securing of medical service. [Conclusion] Physically disabled persons' consciousness and anxiety for disaster prevention has been clarified. It has been suggested necessary to establish a system to capture disabled people's feeling such as relationship with community residents is important for problem solving, verbal interaction with physically disabled persons living in local community and watching them.

Keywords: disaster, disabled person, questionnaire survey

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I. INTRODUCTION

In recent years, Great earthquake disasters such as 1995 the Great Hanshin-Awaji Earthquake in January, 1995 and the Great East Japan Earthquake in March, 2011 occurred in succession in Japan. The situation in which victims are forced to live in refuge has occurred almost every year after that. Further, the probability of occurrence of the Nankai Trough Great Earthquake for which record-breaking huge damage is assumed in the area from Shikoku to Kinki districts within the future 30 years is said to be 70-80% [1)]. The need of protection of weak people at the time of a disaster has been recognized since the past great earthquake disasters. In the Great East Japan Earthquake, the death rate of disabled persons exceeded overall mortality in most municipalities [2, 3)]. It is highly possible that damages on disabled persons are

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more likely to be serious in even future disasters. Vulnerable people at the time of a disaster [4] is a generic name of people who have some kind of handicap at normal time, being unable to take risk aversion, refuge, life as an evacuee, restoration and restoration at the time of a disaster, and need protection by others. Specifically, it refers to persons who have various handicaps such as disabled persons, elderly persons, infants, children, pregnant women, persons with injuries or diseases and foreigners. No matter how much science progresses, we cannot beat the violence of nature, and therefore it is important for us to prepare for a disaster in normal time and protect ourselves at the time of a disaster so as to minimize their damages. For a person with disability in particular, everyday disaster prevention preparation such as mental attitude for emergency countermeasure or refuge life is required and therefore in order to conduct effective support immediately after disaster occurrence, it is needed to analyze situations of possible disasters and necessary assistance beforehand and deepen knowledge for preparation that would be actually needed.

This time, we conducted a survey to grasp physically disabled persons' awareness for disaster prevention and extract necessary support and problems, aiming at obtaining material for considering future disaster prevention aid package.

II. PARTICIPANTS AND METHODS

2.1. Participants

The participants are 77 persons with mental, intellectual and/or physical disabilities who use 2 facilities of Work Continuation Support Type B of City X in Hyogo prefecture, 1 local action support center facility and 1 life care facility, 4 facilities in total. These facilities provide people who always need support with care for bathing, excretion and meal, and opportunities for creation and life activities while they provide persons having difficulty in working in a general enterprise with workplaces and training required for improving knowledge and capability.

For ethical consideration, the subjects were informed both orally and in document from the facilities staff of the purpose of the questionnaire survey, and that the survey was in anonymous form and therefore anonymity was maintained, their cooperation with the survey was arbitrary, and no disadvantaged would be caused even if they did not submit the questionnaire. Submission of the questionnaire was regarded that their informed consent was obtained. Further, this study was approved by Kobe International University Research Ethical Review Board (G2017-059).

2.2. Methods

The anonymous questionnaire survey sheets were kept in the facilities from June to August, 2017, the survey purpose and entry method were explained to the facilities staff, and the staff, users and families were asked to distribute and collect the questionnaire sheets. The questionnaire content consisted of the following 9 items; "Respondents' attribute", "Experience in participation in a local disaster prevention event such as disaster prevention drills", "Situation of communication with local people", "Know evacuation route at the time of a disaster", "Regularly take disaster prevention measures", "Being able to make decisions while understanding the surrounding situation at the time of a disaster", "Being able to protect themselves at the time of a disaster", "Things that they are anxious about at the time of a disaster", and "Things that they want surrounding people to do at the time of a disaster". The participants answered for each item with "Yes" or "No. Further, for "Things that they are anxious about at the time of a disaster" and "Things that they want surrounding people to do at the time of a disaster", the participants were asked to give their opinion, which was analyzed later.

Statistical analysis were performed using Fisher's exact test for each question item in three groups: mental, intellectual, and physical disabilities, and Bonferroni's multiple comparisons were performed only when significant differences were found. Statistical analyses were performed with the EZR[5]. The significance level was determined as less than 5%. For the free opinion, a qualitative analysis based on the method of the content analysis[6] was performed. We carefully read the obtained free opinions, segmented the sentences into one meaning unit, collected those with similar contents, categorized them and counted the number of descriptions. Further, in the procedure of sentence segmenting and categorization, discussion was performed among plural researchers for securing reliability so as to minimize bias of the analysis caused by subjective view of one researcher. Categories are indicated with " ", subcategories are indicated with ' ' and the number of descriptions is indicated with ( ).

III. RESULTS

The questionnaire sheets were collected from 45 subjects, and the collection rate was 58.4%. The classifications of respondents were 21 persons concerned (46.7%), 20 helpers (44.4%) and 4 no-entries (8.9%). For subjects' gender, 27 were males (60%), 16 were females (35.6%) and 2 were no-entry (4.4%). The average age of people concerned was 37.9 ± 12.1 years old. For type of disability, 20 were mental disability (44.5%), 11 were intellectual disability (24.4%), 11 were physical disability (24.4%) and 3 were no-entry (6.7%) (Table 1).

Table 1. Respondents' basis attribute (n=45)

Respondent's classification	Person concerned	21（46.7）
	Caregiver	20（44.4）
	No-entry	4（8.9）
Age（yr.）		37.9 ± 12.1
Sex	Male	27（60）
	Female	16（35.6）
	No-entry	2（4.4）
Disability category	Physical	11（24.4）
	Intellectual	11（24.4）
	Mental	20（44.5）
	No-entry	3（6.7）

n：No. of persons. （ ）：％. Age: Average ± standard deviation

For situation of the survey items, 54.8% did not have experience in participating in a disaster prevention event, 54.1% had no communication with the local community, 40.5% did not know evacuation route and 58.3% did not take disaster prevention measures in a regular basis. Moreover, 51.3% were not able to understand the situation at the time of a disaster and make decisions and 35％ were not able to protect themselves at the time of a disaster. Further, 80% answered that that had things that they are anxious about at the time of a disaster", and 67.5％ answered that they had things they want surrounding people to do at the time of a disaster" (Table 2).

Respondents who answered that they knew refuge route tended to be more prevalent among those with physical disabilities($p=0.06$), and those who answered that they were able to understand the situation at the time of a disaster and make decisions and were able to protect themselves at the time of a disaster tended to be more prevalent among those with mental disabilities($p=0.09$, $p=0.06$); however, the relationship between the survey items and disability classification was not significantly different. The percentage of respondents who answered the questionnaire themselves was significantly higher among those with mental disabilities ($p<0.01$) (Table 2).

The content analysis revealed that 10 physically disabled persons gave their opinions for what they felt anxious about at the time of a disaster and the number of descriptions was 10. The categories extracted in the analysis were "Refuge life" (5), "Securing of medical service" (4) and "Refuge behavior" (1). As for subcategories, 'Maladjustment to the environment' and 'Disability in mutual understanding' were obtained for "Refuge life", 'Withdrawing urine and disimpaction' was obtained for "Securing of medical service" and 'Stairway' was obtained for "Refuge behavior". 7 intellectually disabled persons gave opinions which

were segmented into 12 descriptions. The categories extracted in the analysis were "Refuge life" (9) and "Securing of medical service" (3). As for subcategories, 'Hyperkinesis and loud voice', 'Maladjustment to the environment', 'Incontinence', 'Caregiver lacking movement' and 'Acquisition of diapers' were obtained for "Refuge life", and 'Securing of medicines' was obtained for "Securing of medical service". 6 mentally disabled persons gave opinions, which were segmented into 8 descriptions. The categories extracted in the analysis were "Refuge life" (5), "Securing of medical service" (1) and "Others" (2). As for subcategories, 'Maladjustment to the communal living', 'Nervous', 'Insomnia' and 'Panic' were obtained for "Refuge life", 'Securing of medicines' was obtained for "Securing of medical service", and 'Ensuring safety of aged mother' and 'All' were obtained for "Others" (Table 3).

Table 2. Relationship between survey items and disability classification

Survey content		Disability category			
		Physical	Intellectual	Mental	
Participation in disaster prevention event (n=42)	Yes（19）	4	5	10	n.s
	No（23）	7	6	10	
Communication with the local community (n=37)	Yes（17）	7	4	6	n.s
	No (20）	4	6	10	
Know refuge route (n=37)	Yes（22）	9	7	6	p=0.06
	No（15）	2	3	10	
Take daily disaster prevention measures (n=36)	Yes（15）	6	4	5	n.s
	No（21）	5	5	11	
Understand the situation at the time of a disaster and make decisions (n=39)	Yes（19）	4	3	12	p=0.09
	No（20）	6	8	6	
Behave to protect themselves at a disaster (n=40)	Yes（26）	4	6	16	p=0.06
	No（14）	6	5	3	
Have anxiety at the time of disaster (n=40)	Yes（32）	10	8	14	n.s
	No（ 8）	0	3	5	
Things that they want surrounding people to do at the time of a disaster (n=40)	Yes（27）	8	8	11	n.s
	No（13）	3	2	8	
Respondent’s classification (n=41)	Person concerned (21)	2	1	18	p<0.01
	Caregiver (20)	9	10	1	

n：No. of persons． n.s：no significant．

Table 3. Anxious at the time of disaster

Physically disabled person n=10				**Intellectually disabled person** n=12				**Mentally disabled person** n=8			
Category	n	Subcategory	n	Category	n	Subcategory	n	Category	n	Subcategory	n
Refuge life	5 (50)	Maladjustment to the environment	4	**Refuge life**	9 (75)	Hyperkinesis and loud voice	4	**Refuge life**	5 (62.5)	Maladjustment to the communal living	2
		Disturbance in mutual understanding	1			Maladjustment to the environment	2			Nervous	1
Securing of medical service	4 (40)	Withdrawing urine and disimpaction	4			Incontinence	1			Insomnia	1
Refuge behavior	1 (10)	Stairway	1			Caregiver lacking movement	1			Panic	1
						Acquisition of diapers	1	**Securing of medical service**	1 (12.5)	Securing of medicines	1
				Securing of medical service	3 (25)	Securing of medicines	3				
								Others	2 (25)	Ensuring safety of aged mother	1
										All	1

n : No. of descriptions. ( ) : %.

Table 4. Things that they want surrounding people to do at the time of a disaster

Physically disabled person n=12				**Intellectually disabled person** n=11				**Mentally disabled person** n=12			
Category	n	Subcategory	n	Category	n	Subcategory	n	Category	n	Subcategory	n
Assistance for transfer to refuge	8 (66.7)	Assistance for moving on steps or stairs	5	**Securing of safe place and guidance for it**	6 (54.5)	Securing of safe environment	2	**Support for refuge life**	5 (41.7)	Securing of private space	2
		Transfer to refuge	3			Guidance to safe place	2			Verbal communication for living information	2
						Simple verbal interaction	2			Food supply	1
Support for refuge life	3 (25)	Securing of private space	2								
		Assistance for transfer	1			Transportation of relief supplies	2			Accompaniment at the time of transfer	2
				Support for refuge life	4 (36.4)	Understanding on disability	1	**Assistance for transfer to refuge**	4 (33.3)	Kind verbal interaction	1
Securing of medical service	1 (8.3)	Securing of medicines	1			Taking care of child on behalf of the parents	1			Verbal interaction for refuge information	1
				Support for home refuge	1 (9.1)	Transportation of relief supplies to home	1	**Securing of medical service**	3 (25)	Securing of medicines	3

n：No. of descriptions.　（ ）：%.

As for "Things that they want surrounding people to do at the time of a disaster", 7 physically disabled persons gave opinions, which were segmented into 12 descriptions. The categories extracted in the analysis were "Assistance for transfer to refuge " (8), "Support of refuge life" (3) and "Securing of medical service"(1). As for subcategories, 'Assistance for moving on steps or stairs' and 'Transfer to refuge' were obtained for "Assistance for transfer to refuge", 'Securing of private space' and 'Assistance for transfer ' were obtained for "Support of refuge life" and 'Securing of medicines' was obtained for "Securing of medical service". 6 intellectually disabled persons gave opinions, which were grafted into 11 descriptions. The categories extracted in the analysis were "Securing of safe place and guidance for it" (6), "Support for refuge life" (4), and "Support for home refuge" (1). As for subcategories, 'Securing of safe environment', 'Guidance to safe place' and 'Simple verbal interaction' were obtained for "Securing of safe place and guidance for it", 'Transportation of relief supplies', 'Understanding on disability' and 'Taking care of child on behalf of the parents' were obtained for "Support for refuge life", and 'Transportation of relief supplies to home' was obtained for "Support for home refuge". 9 mentally disabled persons gave opinions, which were segmented into 12 descriptions. The categories extracted in the analysis were "Support for refuge life" (5),"Assistance for transfer to refuge" (4) and "Securing of medical service" (3). As for subcategories, 'Securing of private space', 'Verbal communication for living information' and 'Food supply' were obtained for "Support for refuge life", 'Accompaniment at the time of transfer', 'Kind verbal interaction' and 'Verbal interaction for refuge information' were obtained for "Assistance for transfer to refuge" and 'Securing of medicines' was obtained for "Securing of medical service" (Table 4).

IV. DISCUSSION

In Japan, where natural disasters frequently occur, situations in which victims are forced to live in refuge occur almost every year. In our survey in this study, 80% of the subjects answered that they had anxiety for disasters, indicating that each disabled person had anxiety for "Refuge life" and "Securing of medical service". For refuge life, physically disabled persons pointed out maladjustment to the environment and disturbance in mutual understanding while intellectually disabled persons mentioned hyperkinesis, loud voice, and maladjustment to the environment, and mentally disabled persons mentioned maladjustment to the communal living and panics. The above suggest that physically disabled persons seem to feel anxiety for daily living environment that may suddenly change, such as the barrier-free problem in refuge and problems on information acquisition and communication due to their visual and hearing disabilities. Intellectually and mentally disabled persons seem to feel anxiety for the possibility that they may not be able to adapt themselves to environmental variation at refuge since they have intense commotion and recognize emergencies insufficiently. For securing of medical service, they have anxiety for continuation of medical at refuge, arrangement of healthcare workers, periodical treatment, installation of specific medical devices and acquisition of medicines. It has been reported that degradation of QOL at refuge affected degradation of disabled persons' psychosomatic state [7], and it might become an obstacle for later life reconstruction and therefore the above suggests that appropriate support during refuge life is essential.

Further, 67.5% answered that they had things that they want surrounding people to do at the time of a disaster. The opinions given most according to the type of disabilities were "Assistance for transfer to refuge" from physically disabled persons, "Securing of safe place and guidance for it" from intellectually disabled persons and "Support for refuge life" from mentally disabled persons. The opinions given second most were "Support for refuge life" from physically and intellectually disabled persons and "Assistance for transfer to refuge" from mentally disabled persons. These opinions indicate that persons who need time for transfer and cannot make circumstantial judgment need assistance for primary evacuation to the refuge. Moreover, persons who cannot understand situation at the refuge and those with strong mental excitement cannot adapt themselves to the environment with groups and therefore they need verbal interaction, securing of private space and support such as food supply, which must be considered. Schools, gymnasiums, public citizen's halls are used as a shelter at the time of a disaster.

Since victims are forced to live with a number of other people at a place which cannot necessarily be an

environment suitable for life, there remain a number of problems in refuge life. Since degradation of QOL of disabled persons' who need assistance might become a disturbance for later life reconstruction, appropriate support during refuge life is essential. While the need of barrier-free constructions in the living environment and facilities, environmental control that guarantees health care, maintenance of the health care system, securing of security, privacy protection, life support, arrangement of persons who are capable of working for disabled persons and distribution of plural types of information according to the type of disabilities has been pointed out for realizing an ideal refuge for disabled persons[8], similar results have been derived in this study.

Looking at the type of awareness for daily disaster prevention and level of daily disaster prevention behaviors of individuals, 55% of the subjects did not participate in disaster prevention events, 54% did not have communication with local communities, and 58% did not take daily disaster prevention, indicating that awareness for disaster prevention and disaster prevention behaviors were not seriously considered. In order to solve these situations, as Ikuta[9] reported, distributing information and information sharing are essential as a pre-stage of refuge support for local disabled persons. It is also necessary to create a structure of refuge that utilized information of disabled persons living in the local community and construct a system to assist them in a visible manner in the local community such as verbal interaction, watching disabled persons and so on. Further, since 41% of the participants did not know evacuation route, 51% were not able to understand the situation at the time of a disaster and make decisions and 35% were not able to protect themselves at the time of a disaster, reflecting the impact of recognition of the efficiency of disaster prevention behavior. It is needed to practice public relations on the basis of characteristics of each disability an improve awareness of disasters. As for the difference in awareness by type of disability, more people with physical disabilities knew about evacuation routes, and more people with mental disabilities thought that they could understand their surroundings, make decisions, and take actions to protect themselves in the event of a disaster. Moreover, the number of mentally disabled persons who answered this questionnaire survey was significantly high.

It has been clarified that since physically disabled persons needed assistance for transfer to refuge and life at refuge, and intellectually disabled people cannot make circumstantial judgment, they needed guidance to a safe place, understanding disabilities and supporting for refuge life. Further, mentally disabled persons were found to need private space in refuge life and guidance to refuge in addition to verbal interaction and information supplement. The mentally disabled persons answered the questionnaire by themselves and therefore they are probably able to understand situations, make judgments and protect themselves better than other disabled persons. However, this survey was performed in peacetime when they could use medicines, and some of them feel anxiety for securing of medicines at the time of a disaster [10, 11]. Therefore, it might become difficult to acquire regular medicine, which would make their symptoms worsen at the time of an actual disaster, we presume.

Although maintenance of welfare refuge, grasp of persons needing assistance for refuge and preparation of an individual refuge project are progressing presently, in the case that a disaster actually occurs, it is local people who can rush to the place and help each other. This survey has revealed the actual situation of disabled persons' awareness and behavior for disaster prevention. It is said that community activity leads to disaster prevention measures though there are few places where disabled persons and community residents can communicate[10]. The above is backed up by the situation of participation in disaster prevention events and communication with the local community in this survey. It is expected in the future that disaster prevention-related events that disabled persons can join will be actively held in the local community.

The findings of this study could not be generalized because of the small sample size, and the accuracy of the questionnaire results by each disabled person is not guaranteed sufficiently. In the future study, it is necessary to clarify characteristics of each disability by increasing subjects of disabled persons so as to consider support for each disability and to consider the differences in the ideas of disabled persons and their supporters. Moreover, it is also needed to investigate understanding on disabled persons by community residents as a refuge supporter.

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There are no conflict of interests to be disclosed in this study.

REFERENCES

1) Headquarters for Promotion of Seismicity Survey (Ministry of Education, Culture,Sports,Science and Technology): Earthquakes in Nankai Trough. https://www.jishin.go.jp/regional_seismicity/rs_kaiko/k_nankai/ (referred on September 14, 2021)
2) NHK Welfare Information Site Heart Net: Evacuation of elderly and disabled persons at the time of a disaster - Not to repeat "double mortality? https://www.nhk.or.jp/hearttv-blog/hntv/291670.html#a (referred on September 14, 2021)
3) Japan Disability Forum (JDF): Resident mortality , fatality of persons with physical disability certificates and disaster mortality in Miyagi. https://www.dinf.ne.jp/doc/JDF/20120323_miyagi/miyagiken_hisai.html (referred on January 13, 2022)
4) Japan Red Cross: Persons who need assistance at the time of a disaster. Guideline of measure for persons who need assistance at the time of a disaster, Tokyo, 2006, p1. https://www.jrc.or.jp/vcms_lf/saigaikyugo-3.pdf (referred on September 14, 2021)
5) Kanda Y: Investigation of the freely available easy-to-use software 'EZR' for medical statistics. Bone Marrow Transplant. 2013, 48(3): 452-458.
6) Berelson B (author), Inaba M, Kim K (translation): Content analysis. Misuzu Publishing, Tokyo, 1957, pp1-79. (in Japanese)
7) Kosaka S, Shiono K, Miyano M, et al.: Extraction of earthquake disaster prevention problems in the aging society - From the actual situation of the Great Hanshin-Awaji Earthquake and disaster prevention measures survey in Tokyo suburban. Institute of Social Safety Science journal, 1995, 5:275-282. (in Japanese)
8) Kashiwabara S, Morita T, Ueno J: Study on refuge in the Great Hanshin-Awaji Earthquake. Osaka University Press, 1998, pp175-176. (in Japanese)
9) Ikuta E: Vulnerable people and information. The Japanese Society for Dementia Care journal, 2016, 14:756-762. (in Japanese)
10) Yoshikawa Y, Akiyama N, Sebata M: Project aiming at local exchange, enlightenment of mental disorder, reinforcement of awareness for disaster prevention and disaster reduction - Extraction of problems by a case study -. Japanese Psychiatric Nurses Association journal, 2015, 58:258-262. (in Japanese)
11) Yoshikawa Y, Akiyama N, Sebata M, et al.: Action for disaster prevention note making into which opinions of persons concerned are incorporated. Japanese Psychiatric Nurses Association journal, 2016, 59:92-96. (in Japanese)