

**ORIGINAL****Characteristics of medical students who would like to be a generalist physician and contribute to remote area medicine**

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**Abstract :** We administered a questionnaire to 5<sup>th</sup> grade medical students to examine the effect of community-based clinical practice on their attitudes to remote area medicine and their course after the graduation. Data from 192 students were obtained. The intensity of students' attitudes was estimated by using visual analogue scale. The intensities of the interest and a sense of fulfillment in remote area medicine were significantly increased after the practice. A significantly lower level of the intensity to become a generalist than that to become a specialist was seen in the students with low intensity in a sense of fulfillment. The percentages of the students who answered that they can work for 5 years or more in remote area were significantly lower in students with low intensity of a sense of fulfillment than in those with high intensity. A significantly higher percentage in students who worked at a familiar prefecture to them after the graduation was seen in female than in male. This study shows that the community-based practice is meaningful in increasing motivation which desire to work in remote area medicine, and that the motivation may affect their course after the graduation. *J. Med. Invest.* 64 : 210-216, August, 2017

**Keywords :** the community-based clinical practice, remote area medicine, generalist, clinical clerkship

**INTRODUCTION**

A maldistribution of physicians which results in a shortage of them in remote area is a serious problem in Japan (1). Physicians are divided into the following two groups ; generalist physicians (generalists) and specialist physicians (specialists). Generalists have a broad range of clinical abilities which can correspond to primary care and play a vital role in health promotion. On the other hand, specialists have the specialized clinical abilities in a certain medical department (2). Therefore, generalists have been generally believed to have more important role than specialists in remote area because they have the greatest potential to redress the geographic imbalance of physicians (3). However, the number of specialists have been recently increased due to medical progress and subdivision in Japan (4).

The community-based education is important to increase the number of medical students who are interested in general medicine. The education, which has been introduced in most of medical universities in Japan (5, 6), has a role to provide medical students with opportunities to learn basic information about environments, health service and development of the community, and to experience an importance of interaction with people from a wide range of social and cultural backgrounds (7).

The lecture about community medicine, which started in Tokushima University in January, 2008, has been performed at the lecture room in the university for all medical students. On the

other hand, the community-based clinical practice in a clinical clerkship practice was introduced in our University in July, 2008 to experience the community medicine in remote area of Tokushima prefecture (8). Students have rounded a variety of hospitals, clinics and welfare facilities in remote area, and a visiting home care and health education for residents have been included in the schedule. During the schedule, they have learned the role of generalists there. It was useful to inform the charm and importance in working at medical facilities in remote area to medical students, but simultaneously may inform a variety of problems of medicine in remote area such as a shortage of doctors to them (9-12). Our previous report showed that the community-based practice is more meaningful in increasing the motivation in working in remote area medicine than the lecture, and suggesting that it is important to prepare more courses to experience community medicine to increase the number of physicians who desire to work in remote area (13).

In this study, we examined the effect of community-based practice on attitudes to remote area medicine of medical students by a questionnaire and evaluated the relation between the attitudes and their course after the graduation.

**MATERIALS AND METHODS***1. The community-based clinical practice*

This investigation conformed to the principles outlines in the Declaration of Helsinki. In our university, the community-based clinical practice was performed in the education of clinical clerkship for all 5<sup>th</sup> grade medical students. They stayed at Kaifu county, where is placed in remote area in south of Tokushima prefecture and 20,258 persons live in 525 km<sup>2</sup>, during one week, and visited various medical facilities to learn medicine and welfare, health

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care, nursing care and team work with medical staffs in community medicine.

2. A questionnaire

The same questionnaire was given twice to 269 medical students for 3 years from 2012 to 2014 before and after the community-based practice. One hundred ninety two students (71.4%) who completed the twice questionnaires were used in this study. Students consisted of 139 males and 53 females. The questionnaire was performed as a signature formula. The study protocols were approved by the ethics review board at our hospital. Table 1 shows a list of questionnaire entries which consists of 5 questions. In this study, when the community medicine is performed in rural area, it is called remote area medicine. The intensity of students' attitudes was estimated in each student by using visual analogue scale (VAS) (8). VAS is a simple method to obtain a self-rating. It is a horizontal 10 cm VAS, with endpoints of 10 (strongest state) at the right and 0 (weakest state) at the left.

Statistical analysis

Differences in measured variables were analyzed with the Wilcoxon signed-rank test. The results were regarded as significant when p value was < 0.05. All statistical analyses were performed using IBM SPSS statistics version 22 software.

RESULTS

1. The interest and a sense of fulfillment in remote area medicine

The intensity of students' attitudes was compared between before and after the community-based practice (Q1 and Q2 in Table 1) (Fig. 1). As shown in Fig.1A, the VAS intensity of the interest in remote area medicine was significantly ( $p < 0.001$ ) increased after the practice when compared with the value before the practice. The VAS intensity of a sense of fulfillment in remote area medicine was also significantly ( $p < 0.001$ ) higher after the practice than before the practice (Fig.1B). There was a significant correlation ( $r = 0.690, p < 0.001$ ) in the VAS intensities between the interest

Table 1. Questionnaire entries

- Q1) Do you have the interest in medicine in remote area?
- Q2) Do you feel a sense of fulfillment working in medicine in remote area?
- Q3) Do you want to become a generalist in the future?
- Q4) Do you want to become a specialist in the future?
- Q5) How long are you able to work in medicine in remote area?  
 1) less than 1 year   2) 1 year or more   3) 3 years or more   4) 5 years or more

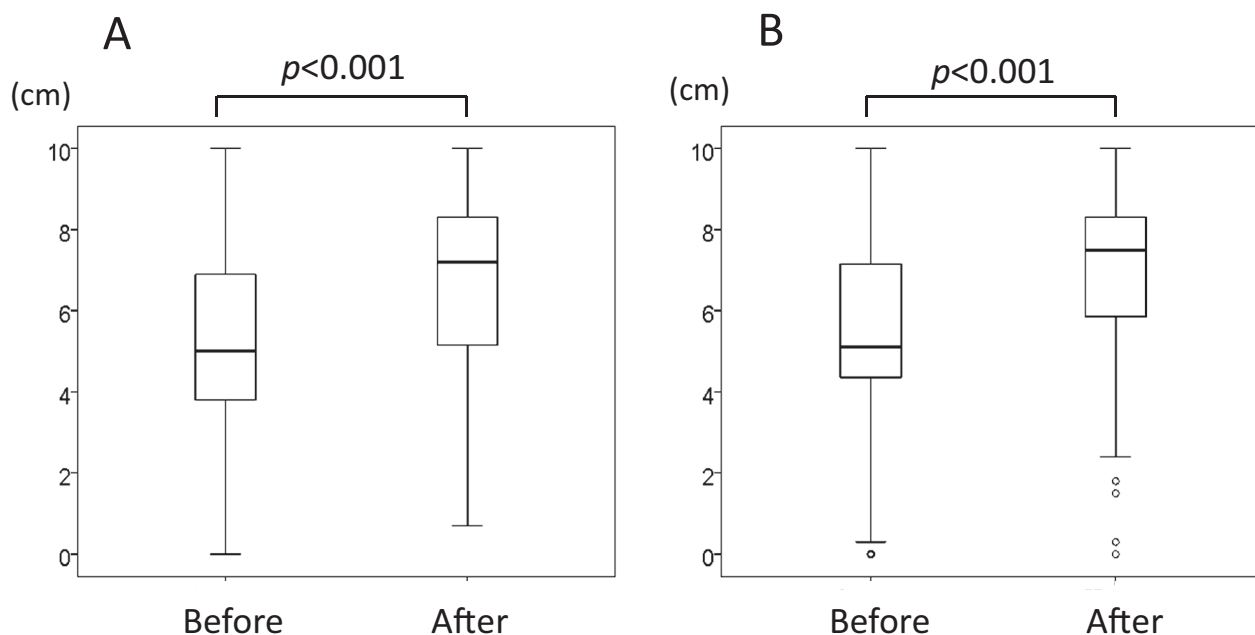


Figure 1. The intensity of the interest (A) and a sense of fulfillment in remote area medicine (B) was estimated in each student by using visual analogue scale (VAS). Data are presented as box plots, where the boxes represent the 25<sup>th</sup> to 75<sup>th</sup> percentiles, the lines within the boxes represent the median, and the lines outside the boxes represent the last data point that occurs below the 25<sup>th</sup> or above the 75<sup>th</sup> percentile and their respective inner fence (1.5 times the interquartile distance).

and a sense of fulfillment from data taken after the practice (Fig.2).

2. Individual change after the community-based clinical practice

Next, changes of the VAS intensities of the interest and a sense of fulfillment after the community-based clinical practice were examined, showing the individual data. The VAS intensity was divided into 2 groups ; data of 5 cm or more were classified as High, and data less than 5 cm as Low. As shown in Fig. 3, according to this division, students were divided into 4 groups : Group A ; High in both before and after the practice, Group B ; Low in before and High in after, Group C ; Low in both before and after, and Group D ; High in before and Low in after.

High in after, Group C ; Low in both before and after, and Group D ; High in before and Low in after. Fig.4 shows individual data of the VAS intensity about the interest and a sense of fulfillment in remote area medicine before and after the practice. As shown in Fig.4A, in the VAS intensity of the interest, 120 (62.5%) students were divided in Group A, 48 (25.0%) were in Group B, 14 (7.3%) were in Group C, and 10 (5.2%) were in Group D. These results showed that the number of students in High group was increased from 130 (67.8%) to 168 (87.5%) after the practice. Fig.4B shows the VAS intensity of a sense of fulfillment. Ninety (46.9%) students were

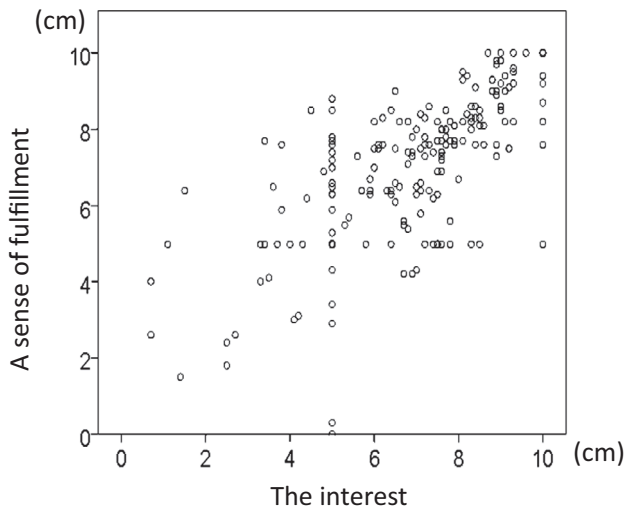


Figure 2. The correlation between the VAS intensity of the interest (left) and a sense of fulfillment in remote area medicine (right) from data taken after the practice.

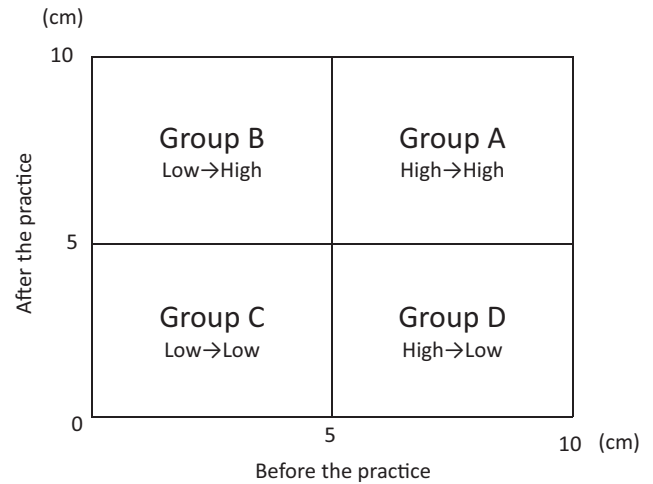


Figure 3. Grouping of students according to the VAS intensity before and after the community-based practice. The VAS intensity was divided into 2 levels ; data of 5 cm or more were classified as High, and data less than 5 cm as Low. According to this division, students are divided into 4 groups ; Group A ; High in both before and after, Group B ; Low in before and High in after, Group C ; Low in both before and after, and Group D ; High in before and Low in after.

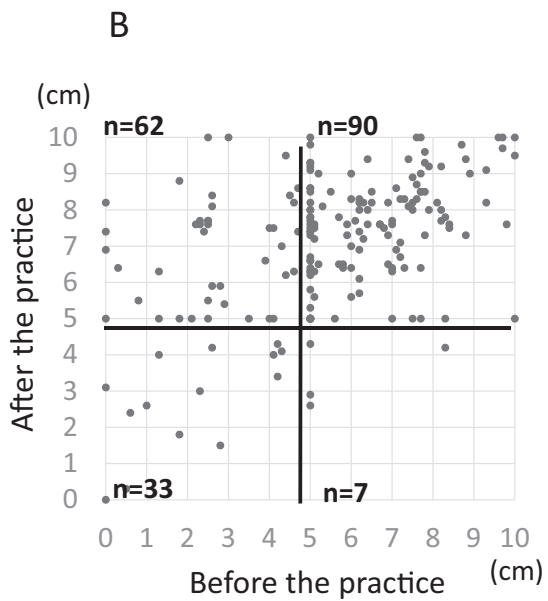
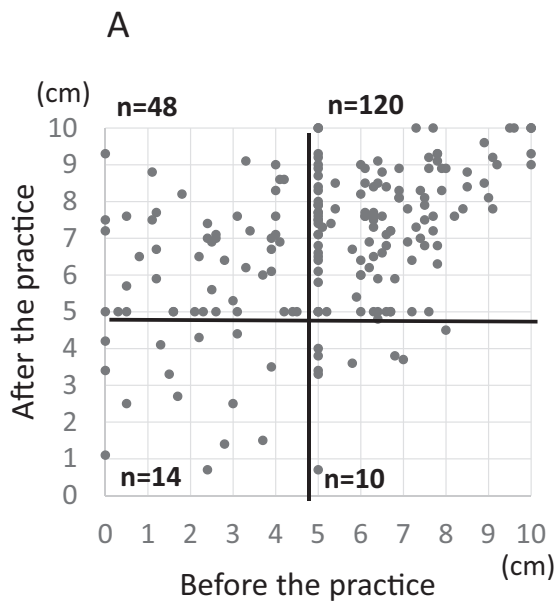


Figure 4. The individual data about VAS intensity of the interest (A) a sense of fulfillment in remote area medicine (B) before and after the community-based practice.

divided in Group A, 62 (32.3%) were in Group B, 33 (17.2%) were in Group C, and 7 (3.6%) were in Group D, showing that the number of students in High group was increased from 97 (50.5%) to 152 (79.2%) after the practice.

3. generalist or specialist

Fig.5 shows the VAS intensity, which was taken after the practice, of will which would like to become a generalist or a specialist (Q3 and Q4 in Table 1), comparing in Groups A, B and C. Medical students took a lecture to learn the definition of generalists and specialists before the questionnaire was given. There was no significant difference between the VAS intensity to become a specialist and a generalist in any Groups divided by the interest (Fig. 5 A). On the other hand, a significantly lower level of the VAS intensity to become a generalist when compared with that to become a specialist was seen only in Group C divided by a sense of fulfillment in remote area medicine (Fig. 5B). Next, we asked how long you are able to work in remote area medicine (Q5 in Table 1), and percentages of students who answered "5 years or more" from data taken after the practice was shown in Fig. 6. There was no significant difference in the percentage among Group A, B or C divided by the interest though it tended to be lower in Group C when compared with that of Group A and B (Fig. 6A). On the other hand, a significantly lower percentage of students who answered that they can work for "5 years or more" was observed in Group C divided by the value of a sense of fulfillment in remote area medicine than that in Group A or B (Fig. 6B).

4. The relation between home prefecture and training destination

Students were classified by a home prefecture into 2 groups : Tokushima (Tokushima prefecture) and not Tokushima, and were classified by a training destination after the graduation into 3 groups : Tokushima (Tokushima prefecture), Home (Home prefecture), and not Tokushima or Home. Then, students could be divided into 5 groups according to the classification of their home prefecture and training destination after the graduation : Group I ; Tokushima to

Tokushima, Group II ; not Tokushima to Tokushima, Group III ; not Tokushima to Home, Group IV ; Tokushima to not Tokushima, and Group V ; not Tokushima to not Tokushima or Home (Table 2). The number of students classified into Group I, II, III, IV and V were 36 (18.8%), 28 (14.6%), 63 (32.8%), 20 (10.4%), and 45 (23.4%), respectively. Students in Groups I, II and III were considered to choose a hospital which was present at a familiar prefecture to them as the training destination. On the other hand, students in Group IV and V were considered to choose a hospital at an unfamiliar prefecture to them as the training destination. There was a significantly higher percentage in female (81.1%) in percentages of students who chose a familiar prefecture to them after the graduation than that in male (56.4%) (Fig. 7). There was no relation between training destination after the graduation and the VAS intensity of the interest or a sense of fulfillment in remote area medicine (data not shown).

DISCUSSION

A significantly lower VAS intensity to become a generalist than to become a specialist was seen in students who had low VAS intensity divided by a sense of fulfillment in remote area medicine but not in those who had high intensity. Moreover, the percentage of students who answered that they could work in remote area for 5 years or more was significantly lower in those with low VAS intensity divided by a sense of fulfillment in medicine than in those with high VAS intensity. These results indicated that students who showed low VAS intensity in a sense of fulfillment in remote area medicine had a low desire to become a generalist and to work in remote area for a long period.

It is important to increase physicians who work in remote area medicine. Especially in Japan, the necessity for generalists has been increasing by the following two reasons. First, a severe aging society is progressing in Japan. The population of aged people is estimated to be increasing, and people aged 75 or over will occupy approximately 20% in 2030 (14). Since aged people have various

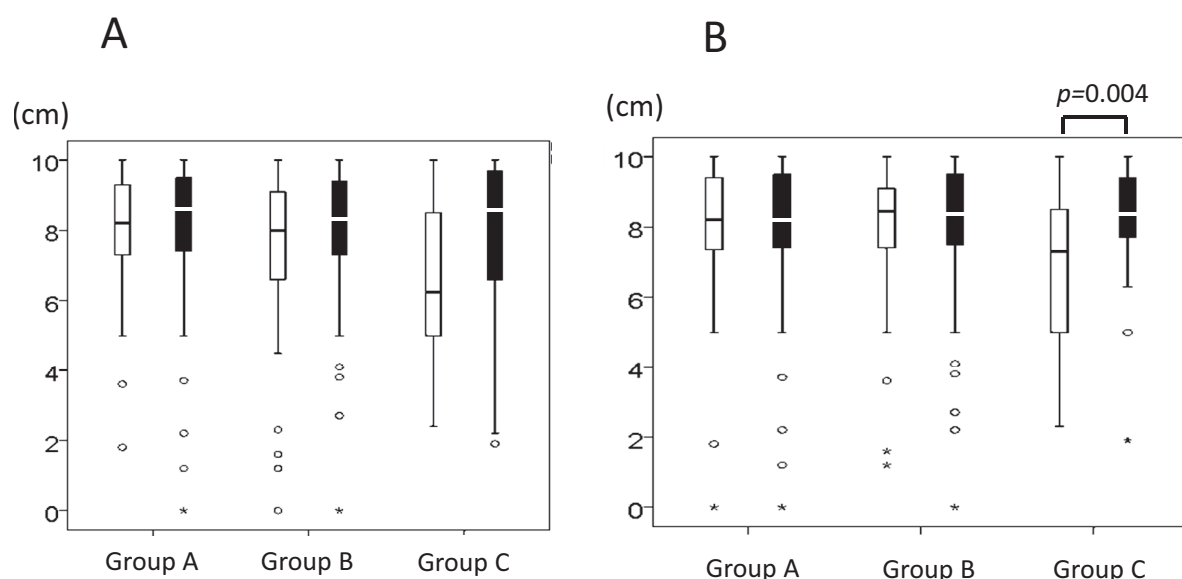


Figure 5. The comparison of VAS intensity of desire to become a generalist (white boxes) and a specialist (black boxes) among Groups A, B, and C divided by the interest (Fig. 5A) and a sense of fulfillment in remote area medicine (Fig. 5B). Data are presented as box plots, where the boxes represent the 25<sup>th</sup> to 75<sup>th</sup> percentiles, the lines within the boxes represent the median, and the lines outside the boxes represent the last data point that occurs below the 25<sup>th</sup> or above the 75<sup>th</sup> percentile and their respective inner fence (1.5 times the interquartile distance).

complicated diseases, they need generalists who can care a variety of diseases. For this reason, more geriatric specialists would be also needed in the future. Second, the number of physicians distributes more in urban area than in remote area, resulting in an uneven distribution of physicians in each prefecture (15). Accordingly, the shortage of physicians is now a serious social problem in remote area medicine of Japan. Generalists are needed in community medicine especially in remote area medicine where physicians are insufficient.

Although patients in remote area usually need primary care medicine by generalists, they sometimes need the specialized clinical ability by specialists. Therefore, in the medical facilities in remote area, the establishment of the sharing system which plays the role of generalists and specialists, like a full-time generalist and a part-time specialist, may be important. It should be also important to secure young physicians in remote area medicine who want to become a specialist with the high intensity of the interest in work-

ing there.

This study clarified that the mean value of students' attitudes about interest and a sense of fulfillment in remote area medicine was significantly increased after the community-based clinical practice, and the number of students with high VAS intensity of the interest and a sense of fulfillment was also increased. These results were supported by previous reports which showed the importance of a primary care experience for medical students to increase and maintain their motivation for remote area medicine (16,17). Therefore, repeated community-based clinical practices since the early exposure education may be important to increase and maintain the motivation for medicine there.

There was a significant correlation in the VAS intensity between the interest and a sense of fulfillment in remote area medicine taken after the community-based clinical practice. However, percentages of students with high VAS intensity taken before the practice were higher in interest (68%) than in a sense of fulfillment (51%).

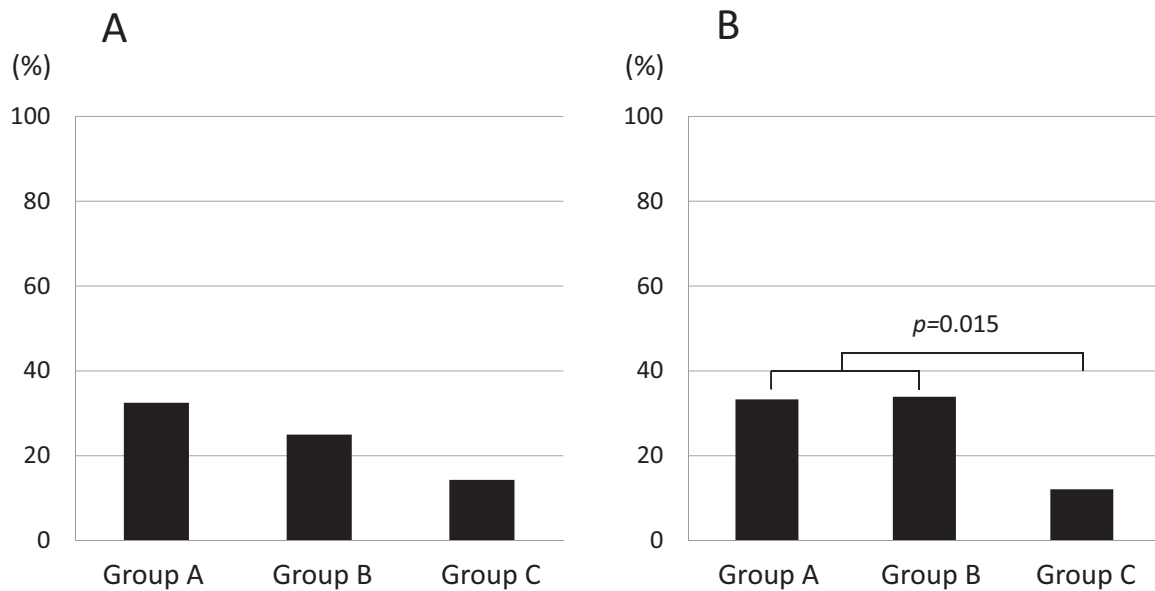


Figure 6. The percentages of students who answered that I am able to work in remote area medicine for 5 years or more, comparing among Groups A, B, and C divided by the interest (Fig. 6B) and a sense of fulfillment in remote area medicine (Fig.6A).

Table 2. Grouping of students according to their home Prefecture and training destination after the graduation. Students in Group I, II and III are considered to work in familiar place, and them in Group IV and V are to work in unfamiliar place

Group	Home	Training destination after the graduation	n (%)	M/F
I	Tokushima	Tokushima (familiar)	36 (18.8)	29/7
II	not Tokushima	Tokushima (familiar)	28 (14.6)	19/9
III	not Tokushima	home (familiar)	63 (32.8)	36/27
IV	Tokushima	not Tokushima (unfamiliar)	20 (10.4)	16/4
V	not Tokushima	not Tokushima or home (unfamiliar)	45 (23.4)	39/6
Total			192(100)	139/53

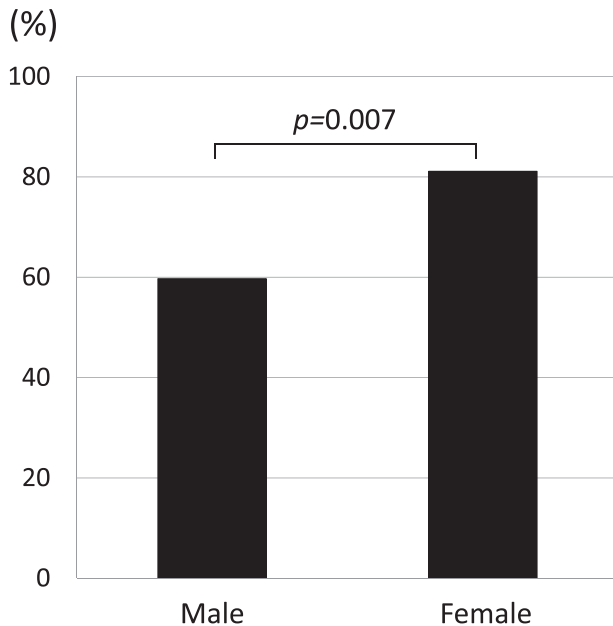


Figure 7. Percentages of medical students who started to work at a familiar prefecture (Group I, II, and III in Table 2) after the graduation, comparing between male and female students.

Moreover, significantly lower VAS intensity to become a generalist and significantly lower percentage of students who answered “can work in remote area for a long time” were seen in those with low VAS intensity divided by the value of a sense of fulfillment in remote area medicine but not by that of the interest. These data suggest that the intensity of a sense of fulfillment in remote area medicine is more related to the motivation to work in remote area medicine than that of the interest, and activities to increase a sense of fulfillment in remote area medicine is more effective than those to increase the interest.

There was a significantly higher percentage in female in percentages of students who chose a familiar prefecture to them than that in male. Since female medical students and physicians have been increased in Japan (4), the result suggests that the environmental developments and supports for female physicians to live and work in remote area is important.

Jichi Medical University, which was established in 1972, has been a specialized university to produce rural physicians in which students have contracts with their home prefecture to work in rural areas of the prefecture (3). Medical students of Jichi Medical University got many times medical practices in the rural area of their prefecture after they entered the university (18). Therefore, they are suggested to have higher motivation in working in remote area than medical students of other universities. Next, we would like to plan the study that the same questionnaire is performed to medical students of Jichi Medical University and the results are compared with those in this study.

In conclusion, this study showed that community-based clinical practice motivates students to work in remote area medicine. The curriculum of the practice needs to be evaluated from the students' viewpoint and to be improved, and it is important to prepare more courses to learn community medicine as the early exposure education to increase the number of physicians who want to work in remote area medicine.

## CONFLICT OF INTEREST

None of the authors have any conflicts of interest to declare.

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