Attitude of Basic Science Medical Students towards Post Graduation in Medicine and Surgery: A Questionnaire based Cross-sectional Study from Western Region of Nepal

Roy B[1], Banerjee I[2], Sathian B[3], Mondal M[4], Kumar SS[5], Saha CG[6]

1. Assistant Professor, Department of Physiology, Manipal College of Medical Sciences, Pokhara, Nepal

2. Lecturer, Department of Pharmacology, Manipal College of Medical Sciences, Pokhara

3. Assistant Professor, Department of Community Medicine, Manipal College of Medical Sciences, Pokhara, Nepal

4. Lecturer, Department of Physiology, Manipal College of Medical Sciences, Pokhara, Nepal

5. Lecturer, Department of Physiology, Manipal College of Medical Sciences, Pokhara

6. Professor and Head, Department of Physiology, Manipal College of Medical Sciences, Pokhara

Original Article

Corresponding Author:
Mr. Bedanta Roy
Assistant Professor
Department of Physiology
Manipal College of Medical Sciences
Pokhara, Nepal
Email: bedanta.roy@gmail.com

ABSTRACT

Background

Career choice of medical students plays a vital role for health care system of a country. It also plays a crucial role to bring medical specialties into mainstream focus.

Materials and Method

A cross-sectional, questionnaire-based study has been performed at Manipal College of Medical Sciences, during the period of 1st May to 31st August–2011. A self reported questionnaire was given to the undergraduate medical students of Basic sciences. Questionnaire included career choices, nature of career, reason for choice, and education level and occupation in their parents.

Results

Data was collected from 269 medical students, among them 145 males and 124 female students participated in the study. The mean age of Indian (85, 31.6%), Nepalese (110, 40.9%) and Sri Lankan (74, 27.5%) students were 18.3 ± SD 0.7, 18.6 ± SD 0.8 and 18.0 ± SD 1.5 years respectively. Education and Occupation of parents seems to influence the determination of career choice in case of Medical students ($p<0.01$). Females have 2.19 times preference of choosing Medicine and 0.22 times Surgery compared to males ($p<0.01$). In case of Nepali male students, Surgery (60.3%) was the most preferred Postgraduate subject followed by medicine (20.6%) and in female students, medicine (44.7%) and OBG (31.9%). But in case of Indian male students 58.0% & 31.4% female students want to choose surgery as their career. 53.1% of the Sri-Lankan male students want to choose medicine as their post graduation and apart from these 50% of the female students also, which is followed by surgery 46.9% (male) and 21.4% (female) respectively.

Conclusion

Our study supports that Post-graduation in clinical specialties is always preferred over Basic sciences due to more interaction with patients and the practical aspects of medical

Nepal Journal of Epidemiology 2011;1(4): 126-134

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profession. The relatively less popularity of some streams may show long-term impact on the health of health system of Nepal. Medical Universities have to modify their academic intervention activities to improve the basic science teaching learning programme in Nepal to turn around the deficiency of post graduates in this stream.

Key words: Medical education, Career, specialty, Nepal

Introduction

Medical students around the world often make the mistake of believing that they will find the perfect specialty by luck or good fortune, but this is not always the case. Choosing the ideal field for medical specialization requires time, research, proper guidance and systematic investigation[1]. Proper advice and guidance is required for medical graduates, for future scarcity or abundance in medical specialization fields[2].

There are several factors having strong influence on choice of career specialty among medical students[3-6]. Some of them are occupation of the parents, family background and quality of lifestyle, personality, type of medical school, experience in clerkships, and role-modeling of the tutors[7-17]. Some other influencing factors include gender, study debt, and academic performances [18-24].

Medical education system in Nepal includes a traditional way of teaching pattern which is lecture-based, teacher-centered, discipline-based, examination-driven, and hospital-oriented. Medical curriculum in Nepal is divided into basic sciences and clinical sciences. The Bachelor of Medicine and Bachelor of Surgery degree is a four and half year's program followed by a 1-year internship period. A large number of new medical colleges are coming up under Nepal medical Council guidelines to fulfill the demand of Physicians in Nepal. There are 17 medical colleges under Nepal Medical Council[25]. Among them, Manipal College of Medical Sciences is under Kathmandu University, one of the best and leading medical institutes in the country. This Institute is located in Pokhara. Students hailing from Nepal, India, Sri Lanka and other countries attend the four and a half year undergraduate medical (MBBS) course.

The MBBS course in Nepal is divided into nine semesters. Basic science subjects includes Anatomy, Physiology, Biochemistry, Microbiology, Pathology, Pharmacology and Community Medicine which are taught in an integrated, organ-system based manner during the first four semesters. Community Medicine continues as a part of syllabus till the seventh semester and the clinical subjects like Medicine, Surgery, OBG, Ophthalmology, Orthopedics, Dermatology etc. are taught during the last five semesters of the MBBS course.

At present Tribhuvan University (TU), Kathmandu University (KU), BP Koirala Institute of Health Sciences (BPKIHS) and NAMS (National Academy of Medical Sciences) are conducting postgraduate degree programs in different subjects. TU first started an MBBS program in Nepal in the year of 1978. TU is also the pioneer for starting postgraduate courses in IoM[26]. As there is a tremendous growth in advancement of medical science and technology, it is the time to bring medical specialties into focus[27]. Many variables like educational debt, mentorship experiences, income prospects have been researched previously by the other investigators [28-30].

Research studies carried out in Asia suggested that medical students choose hospital-based clinical specialties and they prefer to practice in main cites[31-37]. A study conducted among students, interns, and house officers in Nepal found that half of the participants of this study wished to migrate to a developed country after graduation[38]. The reasons are comparatively less remuneration, quality of training, and the working atmosphere of their home country[39]. The objective of our present study was to assess the Basic Science Medical Students attitudes towards Medicine, Surgery and other Post Graduate Subjects.

Materials and Methods

Study design and the participants

A cross-sectional, questionnaire-based study was performed in Manipal College of Medical Sciences (MCOMS), Pokhara, Nepal. The students of basic sciences voluntarily and anonymously completed a semi-structured questionnaire.

Questionnaire design

A multigraded Questionnaire was created on criteria like career choice in post graduation. Important reasons for career choice were prepared and a pilot study of 20 students was done and the results were discussed among the authors. It covered both personal aspects and academic aspects of the medical students. From the questionnaire, students were requested to choose the choices from the mentioned specialties.

Data collection

The present study was done between 1st May to 31st August–2011. Two investigators of our study collected data personally by distributing the questionnaires to the students of Basic Sciences (first and second year). They were asked to answer each question frankly, honestly and after understanding it properly. The identity of the student was kept confidential to avoid bias in this study.

Sample size calculation

For 99% confidence interval and, significance level $\alpha = 1\%$, P = 70%, Q = 30%, allowable error = 10%, required sample size

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was 218. P = percentage of students selected their PG as Medicine and surgery[40].

Outcome variables

The choice of subjects (Medicine, Surgery, OBG, Basic medical subjects, General practice and Social medicine/public health) was used as a dependant variable.

Explanatory variables

The demographic and cause of choice factors were defined at individual level. Factors at individual level were age, gender, nationality (Nepal, India and Srilanka), area of residence (Rural, Urban), educational status of father (Primary school, Intermediate, High school, Bachelors Degree, Masters Degree and PhD), educational status of mother (Illiterate, Primary school, Intermediate, High school, Bachelors Degree, Masters Degree and PhD), occupation of father (Doctor, Engineer, Teacher, Other service and Business), occupation of mother (Doctor, Engineer, Teacher, Other service, Business and House wife) and cause of choice (Interesting disease, Patient contact, Income & Good quality of life, Intellectual challenge, Early experience & Knowledge, Status or reputation and Prestige, Power & influence).

Ethical committee approval

Prior to the study, ethical committee approval was taken from college authorities.

Data management and statistical analysis

Descriptive statistics and testing of hypothesis were used for the analysis. The data collected was analyzed using Statistical Package for the Social Sciences (SPSS) for Windows Version 16.0 (SPSS Inc; Chicago, IL, USA) and EPI Info 3.5.1 Windows Version. The associations between the different variables were tested using the Chi-square test and strength of the relationship with logistic regression. We calculated odds ratios (OR) and their 95% confidence intervals (95% CI). A p value less than 0.01 was considered statistically significant.

Results

Response rate and Demographic Characteristics

269 students out of 338 answered the questionnaire, giving an overall response rate of 79.58%. Incorrectly filled up questionnaires were excluded from the analysis. The mean age of Indian (85, 31.6%), Nepalese (110, 40.9%) and Sri Lankan (74, 27.5%) were 18.3 ± SD 0.7, 18.6 ± SD 0.8 and 18.0 ± SD 1.5 years respectively. Majority of the students were Hindus in India (61.4%) and Nepal (89.6%) while in Srilanka the majority (53.8%) were Buddhist.

Table - 1: Cross tabulation of country and gender with choice of subjects.

Variable	Gender	Country [Number]		
		Nepal	India	Srilanka
Medicine	Male	13	8	17
	Female	21	12	21
	Total	34	20	38
Surgery	Male	38	29	15
	Female	10	11	9
	Total	48	40	24
OBG	Male	5	1	0
	Female	15	6	3
	Total	20	7	3
Basic medical subjects	Male	2	1	0
	Female	0	4	0
	Total	2	5	0
General practice	Male	3	9	0
	Female	1	1	9
	Total	4	10	9
Social medicine/ public health	Male	2	2	0
	Female	0	1	0
	Total	2	3	0
Total	Male	63	50	32
	Female	47	35	42
	Total	110	85	74
P value	0.0001†			

† p<0.01, statistically significant

Table 1 depicts that in Nepal, most opted PG by males were Surgery (60.3%) and by female medicine (44.7%), OBG (31.9%) and followed by Medicine (20.6%). Among Indians 58.0% males & 31.4% females chose surgery, followed by general practice 18.0% & medicine 16.0% for males & 31.4% surgery and 17.1% OBG for females. Among Srilankans, 53.1% males & 50% females shown interest in medicine, which is followed by surgery 46.9% and 21.4% respectively.

Table 2 depicts that most of the medical students came for MBBS were from Urban areas 228 (84.8%). Compared to rural students, urban students were more interested in OBG 28 (93.3%) followed by general practice 21 (91.3%) and medicine 79 (85.9%) and surgery 92 (82.1%).

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Table – 2: Cross tabulation of Choice of subjects and Area of Residence

	Area of Residence [Number (%)]		Total	P value
	Rural	Urban		
Medicine	13 (14.1)	79 (85.9)	92 (100.0)	0.0001†
Surgery	20 (17.9)	92 (82.1)	112 (100.0)	
OBG	2 (6.7)	28 (93.3)	30 (100.0)	
Basic medical subjects	3 (42.9)	4 (57.1)	7 (100.0)	
General practice	2 (8.7)	21 (91.3)	23 (100.0)	
Social medicine/ public health	1 (20.0)	4 (80.0)	5 (100.0)	

† p<0.01, statistically significant

Table – 3: Cross tabulation of education level of father and choice of subjects among medical students

Father's Education	Choice of subjects [Number (%)]						Total
	Medicine	Surgery	OBG	Basic medical subjects	General practice	Social medicine / public health	
Primary school	0 (0.0)	0 (0.0)	4 (100)	0 (0.0)	0 (0.0)	0 (0.0)	4
Inter mediate	0 (0.0)	4 (66.7)	2 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	6
High school	11 (31.4)	15 (42.9)	6 (17.1)	0 (0.0)	2 (5.7)	1 (2.9)	35
Bachelors Degree	49 (42.2)	41 (35.3)	5 (4.3)	2 (1.7)	18 (15.5)	1 (0.9)	116
Masters Degree	30 (29.1)	49 (47.6)	13 (12.6)	5 (4.9)	3 (2.9)	3 (2.9)	103
PhD	2 (40.0)	3 (60.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5
Total	92 (34.2)	112 (41.6)	30 (11.2)	7 (2.6)	23 (8.6)	5 (1.9)	269
P value	0.0001†						

† p<0.01, statistically significant

Table – 4: Cross tabulation of education level of mother and choice of subjects among medical students

Mother's Education	Choice of subjects [Number (%)]						Total
	Medicine	Surgery	OBG	Basic medical subjects	General practice	Social medicine / public health	
Illiterate	4 (66.7)	2 (33.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6
Primary school	3 (30.0)	1 (10.0)	5 (50.0)	0 (0.0)	0 (0.0)	1 (10.0)	10
Inter mediate	6 (18.2)	21 (63.6)	4 (12.1)	0 (0.0)	2 (6.1)	0 (0.0)	33
High school	31 (43.1)	30 (41.7)	6 (8.3)	0 (0.0)	4 (5.6)	1 (1.4)	72
Bachelors Degree	39 (36.1)	35 (32.4)	15 (13.9)	3 (2.8)	14 (13.0)	2 (1.9)	108
Masters Degree	8 (20.5)	23 (59.0)	0 (0.0)	4 (10.3)	3 (7.7)	1 (2.6)	39
PhD	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1
Total	92 (34.2)	112 (41.6)	30 (11.2)	7 (2.6)	23 (8.6)	5 (1.9)	269
P value	0.0001†						

† p<0.01, statistically significant

Table 3 and 4 explains that students with father educated bachelor have tendency of choosing Medicine 49 (42.2%) and Masters preferred Surgery 49 (47.6%) compared to other educational qualifications. But the students with mother's education bachelor chose Medicine 39(36.1%) and for Surgery 35 (32.4%) compared to other educational qualifications.

Table 5 and 6 shows that students with father's occupation other services chose Medicine 33 (34.7%) and Surgery 43 (45.3%) compared to other occupations. Students with mother's occupation house wife chose Medicine 50 (30.3%) and Surgery 78 (47.3%) compared to other occupations.

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Table – 5: Cross tabulation of choice of subjects and occupation of Father

Father's occupation	Choice of subjects [Number (%)]						Total
	Medicine	Surgery	OBG	Basic medical subjects	General practice	Social medicine / public health	
Doctor	16 (34.8)	19 (41.3)	4 (8.7)	1 (2.2)	6 (13.0)	0 (0.0)	46
Engineer	13 (48.1)	4 (14.8)	5 (18.5)	1 (3.7)	3 (11.1)	1 (3.7)	27
Teacher	6 (23.1)	13 (50.0)	5 (19.2)	0 (0.0)	1 (3.8)	1 (3.8)	26
Other service	33 (34.7)	43 (45.3)	3 (3.2)	3 (3.2)	10 (10.5)	3 (3.2)	95
Business	24 (32.0)	33 (44.0)	13 (17.3)	2 (2.7)	3 (4.0)	0 (0.0)	75
Total	92 (34.2)	112 (41.6)	30 (11.2)	7 (2.6)	23 (8.6)	5 (1.9)	269
P value	0.10×						

× p>0.05, statistically not significant

Table – 6: Cross tabulation of choice of subjects and occupation of Mother

Mother's occupation	Choice of subjects [Number (%)]						Total
	Medicine	Surgery	OBG	Basic medical subjects	General practice	Social medicine /public health	
Doctor	8 (61.5)	0 (0.0)	0 (0.0)	0 (0.0)	3 (23.1)	2 (15.4)	13
Engineer	0 (0.0)	2 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2
Teacher	12 (30.8)	15 (38.5)	4 (10.3)	3 (7.7)	5 (12.8)	0 (0.0)	39
Other service	14 (41.2)	14 (41.2)	2 (5.9)	1 (2.9)	3 (8.8)	0 (0.0)	34
Business	8 (50.0)	3 (18.8)	3 (18.8)	0 (0.0)	2 (12.5)	0 (0.0)	16
House wife	50 (30.3)	78 (47.3)	21 (12.7)	3 (1.8)	10 (6.1)	3 (1.8)	165
Total	92 (34.2)	112 (41.6)	30 (11.2)	7 (2.6)	23 (8.6)	5 (1.9)	269
P value	0.007†						

† p<0.01, statistically significant

Table -7: Cross tabulation of choice of subjects and cause of choice

Choice of subjects	Cause of choice [Number (%)]						
	Interesting disease	Patient contact	Income & Good quality of life	Intellectual challenge	Early experience & Knowledge	Status or reputation	Prestige, Power & influence
Medicine (92)	19 (20.7)	8 (8.7)	10 (10.8)	29 (31.5)	13 (14.1)	6 (6.5)	7 (7.6)
Surgery (112)	22 (19.6)	11 (9.8)	12 (10.7)	25 (22.3)	19 (17)	10 (8.9)	13 (11.6)
OBG (30)	11 (36.7)	10 (33.3)	0 (0.0)	3 (10.0)	5 (16.6)	1 (3.3)	0 (0.0)
Basic medical subjects (7)	0 (0.0)	1 (14.3)	3 (42.9)	0 (0.0)	1 (14.3)	2 (28.6)	0 (0.0)
General practice (23)	3 (13.0)	3 (13.0)	9 (39.1)	4 (17.4)	1 (4.3)	3 (13.0)	0 (0.0)
Social medicine /public health(5)	0 (0.0)	0 (0.0)	0 (0.0)	2 (40.0)	3 (60.0)	0 (0.0)	0 (0.0)
Total (269)	55 (20.4)	33 (12.3)	34 (12.7)	63 (23.4)	42 (15.6)	22 (8.2)	20 (7.4)
P value	0.0001†						

† p<0.01, statistically significant

Table 7 explains that each specialty was related to some reason, so that students opted it. In case of medicine and surgery it was intellectual challenge 29 (31.5%), & 25 (22.3%) respectively. Most of the students opted OBG for interesting disease 11 (36.7%), good quality of life and Status or reputation is an important factor for those whose preference was Basic medical subjects 2(28.6%). General practice was preferred for good quality of life, 8(34.8%) and Social medicine/public health was opted for knowledge 3 (60%).

Table 8 depicts, Females have 2.19 times preference of choosing Medicine and 0.22 times Surgery compared to males. Srilankan students have 1.67 times tendency of choosing Medicine and 0.82 times Surgery compared to other countries. Urban students have 0.835 times tendency of

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choosing Medicine and 1.157 times Surgery compared to other countries. Students with father educated bachelor have 1.198 times tendency of choosing Medicine and Masters have 1.631 times for Surgery compared to other educational qualifications. But the students with mother's education bachelor have 0.692 times tendency of choosing Medicine and 1.207 times for Surgery compared to other educational qualifications. Students with father's occupation other services have 1.030 times tendency of choosing Medicine and 1.142 times for Surgery compared to other occupations. Students with mother's occupation house wife have 0.872 times tendency of choosing Medicine and 1.336 times for Surgery compared to other occupations.

Table – 8: Logistic regression table

Characteristic	Medicine	Surgery
Country	1.678(1.180, 2.386) †	0.829(.577, 1.191) ×
Gender	2.190 (1.260, 3.807) †	0.223 (0.127,0.394) †
Area of Residence	0.835(0.375, 1.859) ×	1.157(0.541, 2.474) ×
Fathers Education	1.198(0.828, 1.733)×	1.631(1.124, 2.365) *
Mothers Education	0.692(0.519,0.922) *	1.207(0.909, 1.602) ×
Fathers Occupation	1.030(0.843, 1.257) ×	1.142(0.928, 1.406) ×
Mothers Occupation	0.872(0.718, 1.060) ×	1.336(1.075, 1.661) †

† p<0.01, statistically significant

* p<0.05, statistically significant

× p>0.05, statistically not significant

Discussion

Hauer et al did a study in US on medical students career choices in 2007. According to this study done with 1177 respondents in US, 23.2% planned career in medicine and 24% in surgery[41]. In our study of comparison of students of Nepali, Indian and Srilankan students showed that 20.6% of male and 44.7% female Nepali students, 16% male and 34.3% female Indian students, 53.1% male and 50% female Srilankan students decided to take Medicine as their first choice for post graduation. Whereas in case of Surgery our study showed that 60.3% of male and 21.3% female Nepali students, 58% male and 31.4% female Indian students, 46.9% male and 21.4% female Srilankan students decided to go for Surgery as their foremost choice as career.

In Asian countries, the students enter into medical school after completion of 10 + 2 course. From this study it has been observed that the majority of the students' decision to choose medical science was taken between 15 – 18 years of age[42]. A survey done on 2911 of NMC registered or NMA member doctors showed that 38% had trained in India, 22 % in USSR, 22% in Nepal, 10% in Bangladesh, 3.7% in China and rest of the world and 2.5% in Pakistan[43]. There are different Institutions who are running PG programs and awarding certificate[26].

Role of gender and country

A steady feminization of medicine is flourishing everywhere in the world[44-46]. Formerly some specialties were dominated by male, but nowadays the whole scenario has changed[47]. In medicine, the number of women are increasing day by day so lifestyle and income will continue to get priority for choice of specialty [48,49]. A controllable lifestyle has an impact on career choice. This trend is not only limited in medical field, but also observed in business and Engineering[41,50,51]. Studies done in 2001 reported that women occupy almost 50% of the medical school class. But only 21% of the categorical general surgery residents were women[52]. Child bearing and maternity leave were more significantly issues for a women rather than men[53]. So it is a crucial time to revise the maternity leave and family leave policies. Another important factor, surgical field is strenuous comparing with medicine. Choosing medicine in contrast with surgery is also helpful to manage family because a woman's contribution to children and family is more than man. Prestige and career opportunities are two important factors that always continue to create a center of attention of medical students to the field of surgery, but gender issues will also prevail.

Parents Influence

Education of Parents

Parents play a key role in the decisions of their children with critical advice and supervision. Our data supports these facts and is statistically significant. In our study, most of the parents have Bachelor & Masters degree levels of education, because in this private college, most of the students come from relatively educated and affluent family background.

A positive relationship has been found in previous studies between lower socioeconomic status of the parents and level of education and family medicine as a choice of post graduation career[54]. Parents' awareness about medicine and surgery makes these two subjects popular to their children. Some work has been done in BP Koirala Institute of Health Sciences, Dharan, Nepal in the year of 1996, 1997 and 1998 to

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investigate the motivating factors which help Nepalese students to choose medicine as a career[42].

Occupation of Parents

Parents occupation seems to influence the career choice of medical students. According to our study, it showed that the father's occupation plays a larger role than the mother's occupation. Students with father's occupation like government officers, private companies preferred Medicine 33 (34.7%) and Surgery 43 (45.3%) compared to other occupations. Students whose mothers are housewives chose Medicine 50 (30.3%) and Surgery 78 (47.3%) compared to other occupations. Thus the occupation of parents influence their children's establishment of educational objective in life[55].

Specialization subjects and reason for choice

It was seen that the choices seen were mainly for their own interest in the practical aspects of medical science and to help people. This desire has been further strengthened because poor patients are always deprived of medical facilities and are vulnerable for negligence. As compared to other professions, medical field is the most prestigious & respected in Nepal. There is a acute shortage of doctors in Nepal with a doctor population ratio of 1:62000. It is not sufficient even for primary medical service. Situation becomes worse when a particular specialty is considered. As there are less number of doctors, and medical facilities are not so good in village areas, in developing countries like Nepal, doctors have highest socioeconomic status. Lack of doctors in the society and the poor condition of health care system motivate students to choose medical profession for the future fulfillment of the health status of the society [42].

Some subjects were less interesting to students of different countries like community medicine. Study was done by Banerjee et al in Nepal medical college suggests that students liking Anatomy wanted to go into surgical fields [56].

In our study, we tried to deduce the influential factors behind their choice, like interesting diseases, patient interaction, good quality of life, intellectual challenge, knowledge, income, status or reputation, prestige, power & influence, early experience etc. Among these, intellectual challenge, interesting disease, Patient interaction and knowledge was the important most for the students.

Future scope of the study

Outcomes of our study are interesting enough to encourage other researchers to do further broad spectrum studies. Students are optimistic about the future. In our study we found that most of the students have an attitude to select surgery and medicine, apart from these any other clinical subject for their post graduation. It might be because of the quality and deficiency of infrastructure (animal lab and patients) and methodology of teaching learning activities in this country[56,57]. So this study should be done in a multicentre setting to detect the factors affecting the students' attitude towards basic science or clinical post graduation. Kathmandu University recently introduced PBL (Problem Based Learning) in Medical Schools of Nepal from their few years experience from the home institution. Even though it is the worldwide best approved method for teaching MBBS students and the method widely used in western countries, a drawback of this method is the requirement of huge number of faculty in basic science departments. So this trend of selecting clinical subjects only for post graduation will cause major problem in the Medical Education system in Nepal and also in India and Srilanka.

Conclusion

Career choice pattern among medical students observed in our study is quite similar with studies done in other countries. Clinical Specialties are always preferred for patient interaction, practical aspects, and better socioeconomic status, comparing with basic Sciences. The relative less popularity of some streams are due to complexity in taking decisions, which is a dynamic and individualized process. So if this pattern of career choice continues for few more years, it will cause chronic deficit of medical professionals in some specialties which is not good for a developing country. With the number of medical graduates increasing day by day, it will be very important to focus more into the preferences of students of a medical school for the increasing demand to match the career preferences for the gradually increasing demand of specialist doctors[58]. So, Medical Universities have to gear up their academic intervention activities to improve the basic science teaching learning in Nepal to cure the deficiency of post graduates in this stream.

Acknowledgment

The authors are thankful to Dr. B. M. Nagpal, Dean & CEO, MCOMS, Nepal & Mr. Miraj Ahmed, Assistant Professor, Department of Community Medicine, the teachers and students of MCOMS who helped and participated in the study.

Authors contributions

BR & CGS designed the questionnaire, interpreted the data, drafted the manuscript, and revised it. BR conceived of the study with IB, acquired the data, conducted the data analysis, interpreted the data, and revised the manuscript. CGS revised the manuscript; BS participated in data analysis, interpreted the data, and revised the manuscript. MM & SSK interpreted the data and critically revised the manuscript. All authors approved the final manuscript.

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Article Information	
Article history	
Received	10 September 2011
Received in revised form	21 September 2011
Accepted	25 September 2011

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