Medical and Dentistry Students' Viewpoints about Physician-Scientists as their Basic Science Educators

Majid Khadem Rezaiyan[1], Farnaz Zahedi Avval [2,3], Kiarash Ghazvini[4,5,6], Masoud Youssefi[4,5,6 *]

[a] Resident of Community Medicine and Public Health, Department of Community Medicine and Public Health, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.
[b] Department of Biochemistry, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.
[c] Biochemistry & Nutrition Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
[d] Antimicrobial resistance research center, Bu Ali research institute, Mashhad University of Medical Sciences, Mashhad, Iran.
[e] Department of Microbiology and Virology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.
[f] Educational Development Center, Mashhad University of Medical Science, Mashhad, Iran.

[*] ***Corresponding author:*** E-mail:youssefim@mums.ac.ir

[DOR: 20.1001.1.22519521.1395.9.23.3.4]

Abstract

Background and Objective: A growing concern has emerged that all is not completely well with undergraduate medical education in some parts of the world**.** An important neglected issue is about the basic science educators. We aimed to investigate the medical and dentistry students' viewpoints on basic science education by instructors with a background of medicine.

Materials and Methods: This cross-sectional study was performed on 205 medical and dentistry students studying in basic science stage (microbiology or biochemistry courses) in Mashhad, in 2014. Data was gathered with a questionnaire and was analyzed by SPSS 11.5. P<0.05 was considered as statistically significant.

Results*:* A total of 120 (71.4%) medical students and 48 (28.6%) dentistry students returned the questionnaires. MD-PhD educators are needed in educational programs and their emphasis on important issues got the highest scores with no gender nor major difference (4.2±0.7 and 4.1±0.7, respectively). Total teaching and clinical based teaching scores were not different in two majors. However, more preference for clinically oriented teaching was found in females (p=0.02).

Conclusion: This study highlights the medical students' preference for MD-PhD lecturers. This mainly stems from considering clinical aspects of the teaching topics**.**

Keywords: Medical, Dentistry, Education, Basic science, Educator.

Introduction

Globally a growing concern has emerged that things do not go well with undergraduate medical education (1). Medical education system is directly involved with population health, therefore a continuous, quantitative and qualitative evaluation of educational determinants is necessary (2,3). In many universities the educational curriculum is mainly divided into basic and practical parts.

The wide difference between these two parts had led to a deep gap between theoretical and clinical education contents. During basic science education the students are mostly prepared to pass the final exams and most of the basic knowledge might be forgotten in subsequent clinical period (4).

The main purpose of educational curricula is to ensure that graduated physicians have adequate competencies. Although the medical educational programs are generally revised and improved periodically, still some insufficiencies might be noted. For example, teaching nutrition has been shown to be still inadequate in most educational programs (5).

In our medical education programs, medical students should pass four main stages: basic sciences, physiopathology, externship and internship (6). Several studies have indicated a weak and obscure relation between basic and clinical stages (7,8).

Students' criticisms and viewpoints, should be considered as a main source for evaluation of educational system efficacy (9). The length of basic science education, topics, horizontal and vertical integration and many other aspects of basic science education (10,11) are still controversial and should be more explored preferably in multi centric investigations. One rather neglected issue is the basic science educators. Little is known about the possible different lecturing styles based on the lecturers' backgrounds. To evaluate a possible effect of teacher's lecturing style in basic science education, this study was performed to investigate the medical and dentistry students' viewpoints on basic science education by instructors with a background of medicine.

Materials and Methods

This cross-sectional study was conducted at medical and dentistry schools of basic sciences stage in Mashhad, northeast of Iran in 2014. A total of 205 (145 medical and 60 dentistry) students who took microbiology or biochemistry courses, were selected conveniently for participation in this study. In the selected semester and time of investigation, the educators of these two courses had relatively similar teaching experience. The response rate was 81%. Students were generally taught by educators with or without background of medicine.

The instrument was a researcher-designed questionnaire which was created based on 5 point Likert's scales including: completely agree, agree, no idea, disagree and completely disagree. Questionnaire's validity was approved by experts and reliability was confirmed with calculating the Cronbach's alpha (0.895). The questions were designed to assess students' views about teaching microbiology and biochemistry courses in basic science education of medical and dentistry students by MD-PhD lecturers. Verbal consent was obtained prior to filling the questionnaires. The questionnaires were distributed in a session and were returned in the nest week session of the course. A quick review of the questionnaire and a brief explanation about it including all terminology used in the questionnaire was performed by the researcher at the time of distribution. This study was approved by medical education department of Mashhad University of Medical Sciences.

The collected data were analyzed with SPSS version 11.5. Chi square and independent t-tests were used to analyze the data. Equal non-parametric tests were performed in case of not normally distributed variables. $P<0.05$ was considered statistically significant in all calculations.

Results

A total of 120 (71.4%) medical students and 48 (28.6%) dentistry students participated the

[DOR: 20.1001.1.22519521.1395.9.23.3.4]

study. Fifty-nine (40.4%) of all participants were male. There was no significant difference in age between the two genders. The medical and dentistry students all had obtained high scores in the national entry exam for governmental universities (400.6±303.2 and 256.5±178.1 among 500,000 nationally candidates, respectively). The score of dentistry students was higher than medical students in our university (p=0.005).

After categorizing the Likert scale, based on 5 to 1 points for "totally agree" through "totally disagree" comments, the first and second best scores were pertained to question 15 and 1 (4.2±0.7 and 4.1±0.7, respectively), which was not related to the field of study or gender of students. The least score was for question 14 (2.6±1.3) and also no gender difference was found.

We considered two main domains for this questionnaire: clinical based teaching score (questions 3,5,6,13) and overall teaching score (remaining questions). Although there was no significant difference between two genders for overall teaching score but a significant difference was found for clinical based teaching score in which females had selected higher points. (p=0.02)

There was no difference for these two measures in medical and dentistry students. Not surprisingly, teaching and clinical based teaching score were correlated (r=0.64, p<0.001).

Table 1: Frequency and percentage of responses regarding MD-PhD lecturer

	Totally Agree	**Agree**	**No Idea**	**Disagree**	**Totally Disagree**
1. Emphasizes on important issues	65(39.2)	75(45.2)	20(12)	6(3.6)	0(0)
2. More Understandable	57(34.3)	62(37.3)	36(21.7)	10(6)	1(0.6)
3. More motivation for clinical education	77(46.1)	56(33.5)	20(12)	13(7.8)	1(0.6)
4. Dedicate less time for inapplicable issues	56(33.3)	65(38.7)	35(20.8)	10(6)	2(1.2)
5. More success in joining basic science with clinical topics	52(31.3)	69(41.6)	39(23.5)	5(3)	1(0.6)
6. Basic science becomes more applicable	55(32.9)	67(40.1)	33(19.8)	10(6)	2(1.2)
7. More efficient education	63(38)	66(39.8)	31(18.7)	6(3.6)	0(0)
8. Better relationship with students	62(37.3)	58(34.9)	39(23.5)	6(3.6)	1(0.6)
9. Higher satisfaction	61(37.4)	60(36.8)	36(22.1)	6(3.7)	0(0)
10. They are preferred for theoretical classes	28(17.2)	41(25.2)	47(28.8)	39(23.9)	8(4.9)
11. They are preferred for practical classes	26(16)	39(23.9)	51(31.3)	34(20.9)	13(8)
12. More learning in their classes	65(38.9)	55(32.9)	38(22.8)	8(4.8)	1(0.6)
13. A better attitude towards your profession was obtained in these classes	64(38.6)	66(39.8)	31(18.7)	5(3)	0(0)

[DOR: 20.1001.1.22519521.1395.9.23.3.4]

14. Prefer to continue study in basic science field	20(12)	23(13.9)	46(27.7)	35(21.1)	42(25.3)
15. Faculties need their participation in educational programs	64(38.3)	78(46.7)	24(14.4)	0(0)	1(0.6)
16. They are very few	44(26.3)	45(26.9)	67(40.1)	6(3.6)	5(3)

Discussion

The main finding of this study was the clear emphasis on engaging MD-PhD educators in medical and dentistry schools. Generally, in medical and dentistry schools the background of medicine is known as MD degree or a physician graduated from a medical school. In order to prevent any bias due to this subject we chose the students taking two unrelated courses from these two faculties.

Given rapid growth in the field of basic sciences, curriculum revision and rearrangement seems reasonable. (12) Generally, medical education should be planned based on professional needs, namely the curriculum should be established in such a way that whatever a doctor needs to know should be considered as higher priority in educational planning (13-17).

Applied and practical training in basic science has been emphasized by the researchers in the field of medical education (17-21). Also practical applications and clinical relevancy of the topics presented in basic science education has been reported to be medical students' interest (22). Considering that physiology, bacteriology and anatomy have been pointed out as more important with most application in clinical stages, clinically oriented teaching of these topics seems more reasonable (6,23).

Such strategy should be followed in dentistry students as well. Indeed, it seems that dentistry curriculum need even much more revisions in terms of content and quantity (24-28). Some studies have evaluated core basic science courses in dental schools of different countries (29,30,31). This stems from the great concern of educators about their future job (32). For example, they should learn many basic knowledge about unrelated topics, but they mostly complain of inadequate teaching about common microbes that could infect the oral cavity and cause complications. The clinical relevancy and professional applications of basic science courses underscores the need of basic science revision (26,33).

Science is expanding so rapidly and we are inevitable to choose the most needed information for learning. In addition, the needs of the community should be considered in any revision of medical programs.(25,34)

The results show that most students believe in the efficacy of education by MD-PhD educators as they mainly consider more clinical and practical issues in their teaching. Based on their background of medicine, they form theoretical topics into more useful clinical ones. This can lead to a better student-teacher relationship that in turn leads to more effective education. Considering the slight differences in learning processes of males and females (35,36) we checked the students' views according to the gender and no difference was found for overall teaching score. However, more preference for clinically oriented teaching was found in females. This might be due to different learning process in two genders or a consequence of more interest or attention to the topic by female students.

We also found that most of medical students do not intend to continue their education in

[DOR: 20.1001.1.22519521.1395.9.23.3.4]

basic sciences in contrast to Japanese medical students (37). Regardless of basic science role in clinical knowledge, this can be due to clinical attraction of various specialties (38). This problem can be solved by the possibility of continuing education for MD PhD students in one of medical specialties after their graduation. Considering the need of medical schools to MD PhD lecturers, such strategies should be planned to eliminate serious concerns about the lack of such lecturers in future.

The preference for lecturers with a background of MD which was found from medical and dentistry school is in line with such preference from nursing students' point of view. (39) That suggest that the education of every field which is strongly clinically related (i.e. the field that is related to the management of patients) such as medicine, dentistry or nursing should be clinically oriented even in the first years of education. Such preference could not be generalized in all fields of study. For example, lecturers with MD background may be not suitable for biology or laboratory science faculties. Although we tried to select a semester in which the length of lecturing practice of the educators was relatively similar, we cannot exclude some remaining confounders related to personalized teaching abilities of the lecturers.

To conclude, this study highlights the medical students' preference for MD-PhD lecturers. However, this does not mean that PhD educators should not be engaged in medical or dentistry students training. But it seems that even these lecturers should consider more clinical aspects of their topic for a better education.

Practice Points

- MD-PhD educators are preferred to other educators for basic science teaching.
- This is claimed by the two largest majors in medical field- i.e. medicine and dentistry students.
- Overall, any change in curriculum or education planning should be congruent with students' needs

References

1- Fraser RC. Undergraduate medical education: present state and future needs. *BMJ*. 1991 Jul 6;303(6793):41-3.

2- Albert NM. They're watching you! Performance measurement, staffing, and facilities requirements. *Crit Pathw Cardiol*. 2006 Mar;5(1):18-24.

3- Eleazer GP, Stewart TJ, Wieland GD, Anderson MB, Simpson D. The national evaluation of senior mentor programs: older adults in medical education. *J Am Geriatr Soc*. 2009 Feb;57(2):321-6.

4- Biabangardy Z, Soltani Arabshahi S, Amini A, Shekarabi R, Yadavar Nikravesh M. Role of Basic Science Courses on Promoting the Medical Graduate's Competencies in Medical Schools of Iran. *Iranian Journal of Medical Education* .2005;5(1):13-23.

5- Schwarz MR, Wojtczak A. Global minimum essential requirements: a road towards competence-oriented medical education. *Med Teach*. 2002;24(2):125-9.

[DOR: 20.1001.1.22519521.1395.9.23.3.4]

6- Hasanzade Gh, Alipour Heidari M. Evaluation of medical students in clinical stages of Ghazvin Medical University. *The Journal of Ghazvin Medical Sciences*. 2000;3(1):67-70.

7- Mohammadi M, Zinaloo A A, Geranmayeh M, Soheili A, Arefanian H. Review of the viewpoints of the faculty members of Tehran University of Medical Sciences on the current problems in educational programming at the university. *Iranian Journal of Medical Education*. 2002;2:39-39.

8- Derakhshan A, Abrishami M. Evaluation of common practical skills in medical students. *Medical Journal of Mashhad University of Medical Sciences.* 2001;44(71):3-7.

9- Nasir EF, Astrøm AN, David J, Ali RW. HIV and AIDS related knowledge, sources of information, and reported need for further education among dental students in Sudan-a cross sectional study. *BMC Public Health*. 2008 Aug;14(8):286.

10- Naderi N, Abedini S, Asghari N, Hoseini Teshnizi S, Jahangiri Zarkani Z, Namazi S. Assessment of education quality of basic sciences based on medical students' perspective. *Journal of Hormozgan medical university.* 2010;14(3):206-212.

11- Siabani S, Moradi M, Siabani H, Rezaii M, Siabani S, Amlai Kh, Karimi E. Kermanshah medical school shortenings form medical students' viewpoint Journal of Kermanshah Medical University (behbood) 2006;13(2):162-171.

12- Zallen RD. How much basic science should be taught? The discussion continues. *J Dent Educ*. 2006, 70(4):353; author reply 353-4.

13- Brass EP. Basic biomedical sciences and the future of medical education: implications for internal medicine. *J Gen Intern Med*. 2009;24(11):1251-4.

14- Fincher RM, Wallach PM, Richardson WS. Basic science right, not basic science lite: medical education at a crossroad. *J Gen Intern Med*. 2009;24(11):1255-8. Epub 2009 Sep 23.

15- Finnerty EP, Chauvin S, Bonaminio G, Andrews M, Carroll RG, Pangaro LN. Flexner revisited: the role and value of the basic sciences in medical education. *Acad Med*. 2010;85(2):349-55.

16- Grande JP. Training of physicians for the twenty-first century: role of the basic sciences. *Med Teach*. 2009 Sep;31(9):802-6.

[DOR: 20.1001.1.22519521.1395.9.23.3.4]

17- Pawlina W. Basic sciences in medical education: why? How? When? Where? Med Teach. 2009;31(9):787-9.

18- Lloyd-Jones G. Beyond ‘tomorrow’s doctors’: a review of basic medical education in the UK. *Ann Trop Paediatr*. 2005;25(2):71-8.

19- Alam A. How do medical students in their clinical years perceive basic sciences courses at King Saud University? *Ann Saudi Med*. 2011;31(1):58-61.

20- Hoppe A, Persson E, Birgegård G. Medical interns’ view of their undergraduate medical education in Uppsala: an alumnus study with clear attitude differences between women and men. *Med Teach*. 2009;31(5):426-32.

21- Custers EJ, Cate OT. Medical students’ attitudes towards and perception of the basic sciences: a comparison between students in the old and the new curriculum at the University Medical Center Utrecht, The Netherlands. *Med Educ*. 2002;36(12):1142-50.

22- Ghorbani R, Mir Mohammad Khani M, Hadji Aghajani S. The opinions of physicians and interns of Semnan University of Medical Sciences about applications of basic sciences in clinical problems, JSSU 2000;8(2):78-82.

23- Ghorbani R, Mirmohamadkhani M, HajiAghaJani S. A Survey On The Opinios Of physicians And Interns Of Semnan Medical Sciences University About Applications Of Medical Basic Sciences In Clinical Problems (1999) *Journal of Yazd Medical University*. 2000;8(2):78-82.

24- Haden NK, Hendricson WD, Kassebaum DK, Ranney RR, Weinstein G, Anderson EL, Valachovic RW. Curriculum change in dental education, 2003-09. *J Dent Educ*. 2010;74(5):539-57.

25- Haden NK, Hendricson WD, Kassebaum DK, Ranney RR, Weinstein G, Anderson EL, Valachovic RW. Chanqes in dental school curricula, 2003-2009. *J Am Coll Dent*. 2010;77(2):27-33.

26- Humphrey SP, Mathews RE, Kaplan AL, Beeman CS. Undergraduate basic science preparation for dental school. *J Dent Educ.* 2002;66(11):1252-9.

27- Martínez-Alvarez C, Sanz M, Berthold P. Basic sciences education in the dental curriculum in Southern Europe. Eur J Dent Educ. 2001 May;5(2):63-6.

28- Pakshir HR. Dental education and dentistry system in Iran. *Med Princ Pract*. 2003;12 Suppl 1:56-60.

[DOR: 20.1001.1.22519521.1395.9.23.3.4]

29- Guttmann GD. The current status of the anatomical sciences curriculum in U.S. and Canadian dental schools. *J Dent Educ*. 2003;67(3):375-9.

30- Baghdady MT, Carnahan H, Lam EW, Woods NN. Integration of basic sciences and clinical sciences in oral radiology education for dental students. *J Dent Educ*. 2013;77(6):757-63.

31- Scheven BA. Perceived relevance of oral biology by dental students. *Eur J Dent Educ*. 2012;16(1):e64-72.

32- Mortazavi SMJ, Vafa MR, Rashidi HR, Sajjadi SMA. A New look at the old educational problem of poor attendance. 6th National Congress on Medical Education and First International Conference on Reform and Change Management in Medical Education 2003:161.

33- Fischer JA, Muller-Weeks S. Physician perceptions of the role and value of basic science knowledge in daily clinical practice. *Med Teach*. 2012;34(9):744-7.

34- Nasri K, Kahbazy M, Noroozy A, Nasri S. The medical education problems and possible Solutions in stagers and intern's view points of Arak University of Medical Sciences, 2006-07. *Arak University of Medical Sciences Journal* .2010;12(4):111-121.

35- Andreano JM , Cahill L. Sex influences on the neurobiology of learning and memory. *Learn Mem*. 2009;16(4):248-66.

36- Hoppe A, Persson E, Birgegård G. Medical interns' view of their undergraduate medical education in Uppsala: an alumnus study with clear attitude differences between women and men. *Med Teach*. 2009;31(5):426-32.

37- Yamazaki Y, Uka T, Shimizu H, Miyahira A, Sakai T, Marui E. Japanese medical students' interest in basic sciences: a questionnaire survey of a medical school in Japan. *Tohoku J Exp Med*. 2013;229(2):129-36.

38- de Bruin AB, Schmidt HG, Rikers RM. The role of basic science knowledge and clinical knowledge in diagnostic reasoning: a structural equation modeling approach. *Acad Med*. 2005;80(8):765-73.

39- Khadem-Rezaiyan M, Zahedi Avval F, Youssefi M. Nursing Students' Viewpoints about Basic Sciences Education. *International Journal of Education and Research*. 2015 Oct;3(10):109-116.

[DOR: 20.1001.1.22519521.1395.9.23.3.4]