ORIGINAL ARTICLE

How Does the Entrance Exam Have Influence on Educational Success of Doctoral Medical Students in Basic Science Grade?

Background: Considering the importance of entering doctoral students to universities with hard competition, in order to detect the predictive power of entrance exam grade in educational achievement in early years, we attempted to investigate the efficacy of entrance exam with basic scientific test.

Methods: The existing data from national organization for education testing and education center of Kerman University of medical sciences were collected in 300 students (medical, dental, pharmacology) in consecutive years (2005-6). Pearson correlation and linear regression analysis were used.

Results: In multivariate regression model, the only two predictive lessons for success in basic scientific test in medical students were biology and Arabic language with determine coefficient (DC) 0.44, in dental students was chemistry (DC=0.48) and in pharmacology students were biology and physics (DC=0.46).In addition, there was no correlation between ranking in entrance exam and basic scientific test grade in all groups.

Conclusion: As we did not predict, there was no strong relationship between entrance exam grades and basic scientific test. This is the important point that we must know about this weak relationship. These issues could show the low validity of entrance exam, basic scientific tests or remarkable changes in educational level of students before entering university and early years of entering universities.

Key words: Entrance Exam, Comprehensive Basic Science Test, Educational Achievement, Medical Students

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درابه تخمين الحصول على الموقيه في الامتحان الجامع لمرحله المقدمات في الطب العام من خلال علامات امتحان دخول الجامعه في جامعه كرمان للعلوم الطبيه

التمهيد و الهدف : نظرا لأهميه اسلوب اختبار طلاب الطب الذي يتم عبرامتحان صعب جدا تم السعي في هذه الدراسه الى قدره التخمين مستوى التوفيق الدراسي في السنه الاولى من خلال علامات اختبار دخول الجامعه، اي مقايسه ارتباط علامات السنه الاولى مع علامه اختبار دخول الجامعه بين طلاب الطب في جامعه كرمان للعلوم الطبيه .

الأسلوب : تم تجميع المعلومات من المؤسسه الإختباريه التابعه للوزاره و اداره التعليم في جامعه كرمان للعلوم الطبيه ٣٠٠ طالب و طب اسنان و صيد و خلال عامين ٥-١٣٨٤ . و تم استعمال ضريب بيرسون و الرجع الخطي لتحليل المعطيات.

النتائج : الدروس التي كان له متغير واضح عبر اسلوب الرجع الخطي لتخمين التوفيق في اختبار مرحله المقدمات في الطب كان العلوم الطبيعه و الفه العربيه بضريب ٤٤.٠ .وفي طب الاسنان كان درس الكيميا بضريب ٤٨.٠ . و في الصيدله كان درس العلوم الطبيعيه و الفيزيا بضريب ٤٦.٠ لم يتم رصد اين علاقه بين درجه اختبار الدخول الى الجامعه و اختبار مرحله المقدمات في الجامعه.

الإستنتاج: كما كان المتصور لم يكن هناك ارتباط قوي بين علامات امتحان دخول الجامعه و امتحان مرحله المقدمات في الجامعه. إنه موضوع قابل للتأمل يجب الحصول على ادله عدم وجود ارتباط بين هذين الاختبارين. هل الأمر متعلق بنفس مستوى الاختبارات ام متعلق باسلوب الدرس عند الطلاب في المرحلتين. يجب ان يتم دراسات اكثر في هذا المجال.

الكلمات الرئيسيه: اختبار دخول الجامعه، اختبار مرحله المقدمات، الترابط.

بررسی پیش بینی نمرات کنکور سراسری در موفقیت امتحان جامع علوم پایه دانشجویان دکتری حرفه ای دانشگاه علوم پزشکی کرمان

زمینه و هدف: با توجه به اهمیت شیوه گزینش دانشجویان دکتری حرفه ای که با رقابتی سنگین موفق به ورود به دانشگاه می شوند، در این تحقیق سعی شد به منظور تعیین قدرت پیش گویی نمرات کنکور در موفقیت تحصیلی سالهای اول تحصیل، همبستگی نمرات ایشان را با نمرات دروس علوم پایه در دانشجویان علوم پزشکی کرمان بررسی کنیم.

روش: اطلاعات مورد لزوم از سازمان سنجش کشوری و اداره آموزش دانشگاه علوم پزشکی کرمان از ۳۰۰ دانشجوی پزشکی، دندانپزشکی و داروسازی در دو سال متمادی ۵-۱۳۸۴ جمع آوری گردید. از همبستگی پیرسون و رگرسیون خطی برای آنالیز داده ها استفاده گردید.

یافته‌ها: تنها دروس پیش بینی کننده معنی‌دار در مدل رگرسیون چند متغیره برای پیش‌بینی موفقیت در آزمون جامع علوم پایه در رشته پزشکی؛زیست شناسی و عربی با ضریب همبستگی۰/۴۴در رشته دندانپزشکی ؛ شیمی با ضریب تعیین ۰/۴۸؛ و در رشته داروسازی؛ زیست شناسی و فیزیک با ضریب تعیین ۰/۴۶تعیین گردید. بعلاوه هیچ همبستگی بین رتبه در آزمون ورودی دانشگاه و امتحان جامع علوم پایه در تمام گروهها مشاهده نشد.

نتیجه‌گیری: نتایج آنگونه که انتظار می‌رفت رابطه قوی بین نمرات کنکور در دروس مختلف با نمره امتحان علوم پایه را نشان نداد. این مهم نکته قابل تاملی است که باید در مورد دلایل پایین بودن این همبستگیها که یا منتج از اعتبار پایین نمرات کنکور و یا امتحان جامع علوم پایه است و یا به دلیل تغییر قابل ملاحظه سطح درسی دانشجویان دکتری حرفه‌ای قبل از قبولی در دانشگاه در سالهای اول تحصیل دانشگاهی است، مطالعاتی انجام گردد.

واژه‌های کلیدی: آزمون ورودی دانشگاه، امتحان جامع علوم پایه، همبستگی

ملک گیر امتحانات کے نمبروں سے کرمان یونیورسٹی کے میڈیکل اسٹوڈنٹس کے نمبروں کا پتہ لگانا

بیک گراونڈ: پیشہ ورانہ طبی طلباء کے شیلیکشن کے اہمیت کے پیش نظر اس تحقیق میں کوشش کی گئی ہے کہ ملک گیر امتحانات کے نمبروں سے طلباء کے سلیکشن کی پیشین گوئی کی جائے اور ان نمبروں سے میڈیکل طلباء کے نمبروں کا موازنہ کیا جائے اور ان میں مماثلت دیکھی جائے۔

روش: اس تحقیق کے لئے ضروری معلومات سرکاری تعلیمی اداروں سے جو ملک گیر امتحانات کے ذمہ دار ہیں اور کرمان میڈیکل یونیورسٹی سے حاصل کی گئی تھیں۔ یہ معلومات کرمان یونیورسٹی آف میڈیکل سائنس کی جنرل میڈیکل کالج، ڈینٹل کالج اور دوا سازی کالج کے تین سو طلباء کے بارے میں حاصل کی گئیں۔ ان معلومات کا تجزیہ پیئرس اور ریگریشن سے کیا گیا۔

نتیجے: اس تحقیق سے پتہ چلا کہ ملک گیر امتحانات اور یونیورسٹی کے داخلہ کے لئے ہونے والے امتحانات میں کسی طرح کی مماثلت نہیں پائی جاتی ہے اور ان میں کوئی رابطہ نہیں ہے۔

سفارش: جیسا کہ تحقیق سے توقع کی جارہی تھی ملک گیر امتحانات اور یونیورسٹی کے داخلے کے امتحانات میں کسی طرح کا ربط دیکھنے میں نہیں آیا۔ اس کے متعدد دلائل ہوسکتے ہیں ان کے بارے تحقیقات ا انجام دئے جانے کی ضرورت ہے۔

کلیدی الفاظ: ملک گیر امتحانات،مماثلت

INTRODUCTION

In different countries, schools of medicine have different admission procedure, including cognitive and non-cognitive domains (1). Reforming admission procedures in different majors such as medicine, dentistry and pharmacology might lead to success in profession and as a result improve public health.

Among different academic fields of study, these three majors play a crucial role in public health. It is attempted that motivated and interested students pass entrance exam and study these majors.

One of the problems of admission procedure via entrance exam is range of acceptance criteria; only the participants who have gained special ranges pass the exam. According to the current condition, the question is whether this type of admission is right or not.

In a study conducted in Britain, it was concluded that there is a significant relationship between the results of academic achievement tests and medical students' future profession (2).

In Iran, medical, dental and pharmacology students pass basic sciences courses for 2 – 2.5 years after entering the system of professional doctorate; then they should prepare for the comprehensive examination of basic sciences which is a nationwide and standard exam. Students' educational achievement is assessed based on this exam. According to the study of Fatehi (1) and Roodbari (3), the influential factors of comprehensive exam were age, marital status, proportion, time of basic sciences course, and average of basic sciences courses (1, 3). Ferduson et al. study had a systematic review over the previous studies and realized that there were also other influential factors that lead to medical students' educational achievement including learning method, female gender and White race (4).

Since the educational system of Iran in admitting the students and basic sciences comprehensive examination is different from other countries, few studies have been conducted to find correlation between entrance exam grade and comprehensive basic sciences exam. For instance, a study conducted in 2000 showed that chemistry (correlation coefficient: 0.56) had the highest correlation with the students' educational achievement. Mathematics, physic, biology, and language correlation coefficient were 0.53, 0.50, 0.48, and 0.39, respectively. In regression analysis, among professional examination, language and gender variables, only chemistry and mathematics had significant correlation in basic sciences test (5). Another study was done in Kuwait to determine factors of medical students' performance and concluded that average of high school and average of medicine courses had no statistical significant relationship (6).

In other countries, university entrance examination are assessed differently. For example, the study of Kreiter et al (2007) showed that Medical College Admission Test (MCAT) and Grade Point Average (GPA) had positive predictive relationship with clinical skills in these majors (7). Shahidi and his colleague essay showed that most of the students who had different proportion (42.8 %) and entered the university, had worse educational achievement. Among the students who had the proportion of region 2, 57.6% of them whose diploma average was higher than 15 and lower than 18, gained good grade in basic sciences test and were good at educational achievement (8). Another study held in Iran concluded that creativity, responsibility and the excellence should be considered in selecting talented students (3). Therefore, it could be concluded that in selecting students in the mentioned majors that are especially important, beside average, other factors should be considered as well.

Accordingly, in order to determine the influence of entrance exam scores on educational achievement, the correlation between entrance exam and basic sciences test was analyzed in Kerman University of Medical Sciences (2008 – 2009).

METHODS

This is a retrospective cohort study. Firstly, the required data of medical, dental and pharmacology students, who entered the university in 2005 – 2006 were gathered including age, gender, proportion of the mentioned year, number of participation in the entrance exam, their grade in the country, and their scores in specific and general courses. The data were collected from the files in Central Evaluation Office; then, for each person, the raw score of basic sciences test was received form Directorate General of Kerman University of Medical Sciences.

On the condition that the person could not pass the exam in the first time, his/her first score is considered in this study. Moreover, demographic data of the participants were collected form the files. The data were organized based on a checklist that was specially designed for the study and were analyzed.

Meanwhile, the students who had serious physical or mental problems, the ones whose information were not complete or those who transferred to another place during studying basic sciences were extracted from the study. T-test, chi-square test and analysis of variance were used in the study, also, all the variants were evaluated by multivariate linear regression model and the one that were not significant were omitted through stepwise method. Determine coefficient was used to present goodness of fit. Inclusion criteria for each variant was less than 0.1 p-value. SPSS (15th version) analyzed the data.

RESULTS

In this study, 156 medical, 78 dental and 116 pharmacy students, who have passed the entrance exam and were accepted in Kerman University of Medical Sciences in 2005 – 2006, were analyzed.

Gender, the year of entrance to university, their grade in the country, their scores in specific and general courses were analyzed (Table 1).

The total number of students was 212 from three fields of studies, 94 were female and 118 were male. The number of male students was significantly higher than girls. (P <0.05).

There was a significant difference between the three majors in literature, Arabic language, theology, biology, physics, chemistry and geology; in all mentioned subjects, the dental students gained better scores except for geology, while the pharmacy students gained better score

p-value	Total	Pharmacy	Dentistry	Medicine	
۰/۰۰۱	(%۶۴/۲) ۲۱۲	(%۵۱/۷) ۶۰	۳۴ (%۵۸/۶)	(%۷۶/۱) ۱۱۸	(%) Gender female
	(%۳۸/۵) ۱۱۸	(%۴۸/۳) ۵۶	۲۴ (%۴۱/۴)	(%۲۴/۴) ۳۸	male
۰/۱۶	(%۴۵/۲) ۱۴۹	(%۳۹/۷) ۴۶	۲۴ (%۴۱/۴)	(%۵۰/۶) ۷۹	Year of entrance ۱۳۸۴
	(%۵۰/۸) ۱۸۱	(%۶۰/۳) ۷۰	(%۵۸/۶) ۳۴	(%۴۹/۴) ۷۷	۱۳۸۵
۰/۰۲	۶۴/۹	۶۲/۴	۶۷/۵	۶۵/۸	Literature
۰/۰۵	۶۱/۶	۵۸/۷	۶۵/۶	۶۲/۱	Arabic
۰/۰۰۵	۶۴/۴	۶۰/۹	۶۷/۶	۶۵/۹	Theology
۰/۴۵	۵۴/۲	۵۲/۸	۵۶/۲	۵۴/۶	English
۰/۰۰۱	۱۵/۵	۲۳/۱	۱۱/۲	۱۱/۴	Geology
۰/۱۴	۳۹/۶	۳۷/۵	۴۲/۷	۴۰/۱	Mathematics
۰/۰۰۱	۷۳/۶	۶۹/۶	۷۷/۸	۷۵/۸	Biology
۰/۰۰۱	۵۷/۴	۵۱/۶	۶۱/۳	۶۰/۳	Physics
۰/۰۰۱	۷۴/۵	۷۱/۲	۷۷/۵	۷۶	Chemistry
۰/۰۰۱	۸۷۴/۹	۱۱۶۶/۲	۵۳۱/۳	۷۸۶/۱	The rate in Proportion
۰/۰۶	۵۲۱۲/۷	۷۴۶۴/۹	۴۶۴۹/۵	۳۷۴۷/۳	Total score
۰/۰۰۰۱	۱۱۶/۵	۱۲۱/۴	۱۱۳/۹	۱۱۳/۲	Mark of basic sciences

Table 1. the comparison of gender, the entrance year, different courses percentage, rank in the country, and score of basic sciences among the students who have entered Kerman University of medical sciences in consecutive year (2005-6) are presented.

in geology.

There was also significant difference (P<0.05) in comparing proportion's grade in medical, dentistry and pharmacology majors; the dental students gained the lowest score.

In the first part of Table 2, the average of basic sciences in three majors, genders and the entrance year are presented. In the second part of it, each variant is analyzed by a linear regression model. Biology is the most important subject, since the score of basic sciences has 0.37 increase for one percent boost of biology, while literature and mathematics had the lowest importance in basic sciences.

The overall marks were skewed, the overall mark of 25 people were higher than 10000.

Moreover, the current study revealed that there is negative relationship between the overall mark of university entrance exam and the score of basic sciences test that present the higher mark has negative influence on basic sciences exam. It means that the higher scores in entrance exam, the less success in basic sciences examination.

Table 3 presents the complete model based on all subjects, gender and the year of entrance. The coefficient of determination in medical, dental, pharmacology and the total were 0.55, 0.65, 0.56, and 0.46, respectively (the coefficient of determination indicates how well data points fit a statistical model, the closer it is to number 1, the better the model is). The statistics show that these variables can accurately estimate the mark of basic sciences of dental students. However, when non-significant variables were deleted from the model via stepwise regression, only

biology and Arabic were left (CD = 0.44); in dentistry, only chemistry predicted the basic sciences' mark (CD = 0.48); and biology and physics were influential in pharmacology (CD = 0.46). In general, biology, geology and Arabic (coefficient determine = 0.42) remained among all of the professional doctorate students.

In table 3, the highest regression coefficient is for chemistry in dentistry (0.76), that shows for every one percent increase in the score in entrance exam, the dental students' score of basic sciences increases for 0.76. On the contrary, the lowest regression coefficient is for Arabic among all of the professional doctorate students (0,12) which reveals although there is significant relations, the increase of Arabic score in entrance exam has the least significant relation with the score of basic sciences.

DISCUSSION

The main and most significant purpose of university entrance examination is to select qualified students, so that students gain better achievements and career according to their knowledge and interests. In fact, the entrance exam should predict students' educational achievements as far as possible.

The results of the study shows that the students who had higher score were less successful in basic sciences exam. Moreover, it presented the lessons of entrance exam that can estimate the score of basic sciences exam: biology and Arabic in medicine, chemistry in dentistry and biology and physics in pharmacology.

Table 2. relationship between gender, the year of entrance, major, different courses percentage in entrance exam and the score of basic sciences among the students who have entered Kerman University of medical sciences in consecutive year (2005-6).

p-value	Average of Basic sciences	Student information
۰/۰۰۰۱	(۱۶/۶) ۱۱۳/۲	Major Medicine
	(۱۸/۸) ۱۱۳/۹	Dentistry
	(۱۱/۷) ۱۲۱/۴	Pharmacy
۰/۱۱۵	(۱۵/۷) ۱۱۷/۸	Gender Female
	(۱۵/۸) ۱۱۴/۵	Male
۰/۳۱	(۱۴/۷) ۱۱۷/۶	Entrance year 2005
	(۱۶/۷) ۱۱۵/۶	2006

p-value	Regression coefficient	Lesson
۰/۱۷	۰/۱۱	Literature
۰/۰۰۱	۰/۱۹	Arabic
۰/۰۰۱	۰/۲۲	Theology
۰/۰۴	۰/۱۲	English
۰/۰۰۰۱	۰/۲۷	Geology
۰/۰۶	۰/۱۱	Mathematics
۰/۰۰۰۱	۰/۳۷	Biology
۰/۰۰۲	۰/۱۸	Physics
۰/۰۰۴	۰/۲۴	Chemistry
۰/۱۱	۰/۰۰۳	The rate in Proportion
۰/۰۰۰۱	-۰/۰۰۱	Total score

Table 3. Students'' variables and different courses percentages in entrance exam and the rank, basic sciences score of doctoral students of Kerman university of medical sciences in consecutive year (2005-6).

	Regression coefficient	p-value	Coefficient determine of the model
Medicine			
Biology	0.41	0.001	0.44
Arabic	0.26	0.006	
Dentistry			
Chemistry	0.76	0.0001	0.48
Pharmacy			
Biology	0.28	0.003	0.46
Physics	0.23	0.004	
Total			
Biology	0.35	0.0001	
Geoglogy	0.28	0.0001	0.42
Arabic	0.12	0.019	

Hajian (2000) studied how entrance exam's special lessons can predict the basic sciences exam among medical students, the results presented that chemistry and mathematics are more valid predictors, physics and biology are in lower ranks (5). Erfan et al (2010) demonstrated biology, physics, mathematics, chemistry and English as predictor variables of students' achievement (9).

As it is clear, the previous researches only studied medical students, while medical and pharmacology students were not studied before.

The purpose of the current study was to estimate the influence of entrance exam's lessons on the students' educational achievement. On the condition that the entrance exam be programed well we can gain better results through better and more influential budgeting. The most available method was to evaluate the students by basic sciences examination. Mohammadi and his colleagues

(2002) studied basic sciences examination as a predictor variable in assessing the students' educational achievements and demonstrated that the mark of basic sciences has significant correlation with pre-internship comprehensive exam which could be considered a valid tool to identify medical students' educational achievement (10). Panahandeh et al gained similar results in the same year (11).

Undoubtedly, there are various different factors that influence students' educational achievements, which include: age, marital status, housing, family and economic affairs (3). According to the limitations of the current study on medical, dental and pharmacology students in two consecutive years, all of the information were not available. The purpose of the study was to determine the correlation between entrance exam's lessons and students' educational achievements in basic sciences comprehensive exam that were held for the three majors in the country.

CONCLUSION

The results did not present a significant relationship between the entrance exam's scores in different lessons with the basic sciences comprehensive exam, as it was expected. This is an important point and the reasons of the low correlation should be studied carefully. There might be different reasons which include, low credit of entrance exam's scores or basic sciences comprehensive exam, or due to considerable change of professional doctoral lessons and the students' knowledge before and after they enter the university.

REFERENCES

1. Fatehi F, Hadadgar A, Changiz T, Shahkarami M A, Kianimehr G, Haq Jooy Javavnmard Sh, et al. Determining and Prioritizing Admission Criteria for Talented Students Office in Isfahan University of Medical Sciences Using Analytical Hierarchy Process Model. Iranian Journal of Medical Education. 2007;1(7):101-108.

2. McManus IC, Smithers E, Partridge Ph, Keeling A, Fleming P. A levels and intelligence as predictors of medical careers in UK doctors: 20 year prospective study. BMJ 2003; 327(7407):139-42.

3. Roudbari M, Dadgar F. Effective factors on the results of the basic sciences examinations at Zahedan University of Medical Sciences. The Journal of Qazvin University of Medical Sciences & Health Services. 2004; 30: 39-32.

4. Ferguson E, James D, Madeley L. Factors associated with success in medical school: systematic review of the literature. BMJ 2002;324(7343):952-7.

5. Hajian K. The predictive validity of specific admission tests in success of medical students in the basic science comprehensive exam. The Journal of Qazvin Univ. of Med Sc. 2000;13:3-7.

6. Ahmed B, Ahmed LB, al-Jouhari MM.Factors determining the performance of medical students of the Faculty of Medicine, University of Kuwait.Med Educ 1988;22(6):506-8.

7. Kreiter CD, Kreiter YA validity generalization perspective on the ability of undergraduate GPA and the medical college admission test to predict important outcomes. Teach Learn Med. 2007; 19 (2):95-100.

8. Shahidi M, Ghasri S .Evaluation the educational progress of medical students in various sharing in Kurdistan University of Medical Sciences. Scientific Journal of Kurdistan University of Medical Sciences. 1999; 13(4): 44-38.

9. Irfan A, Yusufi A, Mousavi SA, Rostami A. The predctive validity of specialized courses in the university entrance exam of medical students. Iranian Journal of Medical Education.1389,10(5)(special issue on educational development)

10. Panahandeh Z, Behboudi F. Predictive validity of the comprehensive basic science examination mean score for assessment of medical students' performance . IJME. 2002; 2 (0) :44-44.

11. Mohammadi M, Ahmadi J. Predictive validity of the comprehensive basic science examination (CBSE) for success assessment of comprehensive preintership examination (CPIE) in medical students. IJME.2002; 2 (0) :40-40.