DOES ACADEMIC PERFORMANCE IN THE PREMEDICAL YEAR PREDICT THE PERFORMANCE OF THE MEDICAL STUDENT IN SUBSEQUENT YEARS?

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هدف الدراسة: عملت هذه الدراسة لمعرفة ما إذا كان الطلاب الذين سبق ترشيحهم للقبول في كلية الطب وحصلوا على معدل تراكمي منخفض خلال السنة الإعدادية هم أكثر قابلية للتعثر الأكاديمي في السنوات اللاحقه.

طريقة الدراسة: عملت دراسة مقطعية في عام 2004م على جميع الطلاب الذين قبلوا في كلية الطب بجامعة الملك سعود خلال (5) أعوام أكاديمية (1994-1998). تمت مقارنة نسب التخرج والانسحاب من الكلية بين مجموعتين من   الطلاب قسمتا طبقاً لمعدلاتهم التراكمية خلال السنة الإعدادية (ذات المعدل المرتفع(أعلى من 3.75 من 5) وذات المعدل المنخفض (أقل من 3.75).

النتائج: قبل في الكلية 739 طالباً خلال أعوام الدارسة؛ منهم 120 (16%) طالباً يمثلون المجموعة ذات المعدل المنخفض. كان عدد الخريجين إجمالاً 624 طالباً (84%) .لوحظ أن نسبة الخريجين بين المجموعة ذات المعدل المرتفع هي (88% ؛ 619/545   ) مقارنة بـ (66% ؛ 120/79) بين ذوي المعدل المنخفض (P<0.0001). انسحب من الكلية 28 طالباً (3.8%). وجد أن معدل الإنسحاب بين أفراد المجموعة ذات المعدل المنخفض أعلى منه بين أفراد المجموعة ذات المعدل المرتفع (8.3%) مقارنة بـ (2.9%) (p = 0. 01)

الإستنتاجات: تدعم نتائج هذه الدارسة اشتراط كليات الطب الحصول على حد أدنى من المعدل التراكمي خلال السنة الإعدادية لقبول الطلاب. كما توضح أن الحصول على معدل منخفض خلال هذه السنة يمثل مؤشرا للتعثر الأكاديمي لاحقاً.

الكلمات المرجعيه : القبول في كلية الطب؛ التعثر الأكاديمي؛ المعدل التراكمي؛ السنة الإعدادية؛ الانسحاب من الكلية

Background: Student admission into the College of Medicine at King Saud University (KSU) is dependent on the achievement of a grade point average (GPA) of ≥3.5 /5 by the end of the premedical year. This study was undertaken to ascertain whether pre-selected medical students who achieve a relatively low GPA (≤3.75/5) in the premedical year are at risk of having academic difficulties in subsequent years.

Method: A cross-sectional study of all students admitted to the College of Medicine at KSU during 5 academic years (1994 to 1998) was conducted in 2004. The likelihood of completing the program by 2004 and the dropout frequency were compared in the two groups based on their GPA in the premedical year: High GPA (>3.75) and Low GPA (≤3.75).

Results: During the study period, 739 students were admitted to the college. Of these, 619 (84%) were in High GPA group, and 120 (16%) in the Low GPA group. Of the students with High GPA, 545 (88%) out of 619 graduated compared with 79 (66%) of 120 in the Low GPA group (OR 3.822 [95% CI: 2.44, 5.99]: P<0.0001). Overall, 28 students (3.8%) dropped out, but there was a significantly greater frequency of dropping out in the Low GPA group (10/120; 8.3%) compared with the High GPA group (18/619; 2.9%: OR 3.035 [95% CI: 1.37, 6.75], P=0.01).

Conclusion: Our results support the prerequisite of a minimum GPA in the premedical year before proceeding to the higher levels. The GPA of premedical year is a useful predictor of students who need close monitoring and academic support. The use of GPA in the premedical year for admission into medical colleges should help optimize the use of resources and reduce student wastage.

Key Words: Medical student selection, GPA, Pre-medical year, drop-out; academic performance.

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INTRODUCTION

In most countries, admission to medical schools is a very competitive process. The number of applicants usually far exceeds the number of available places. Most schools rely upon academic criteria alone or in combination with other requirements to determine admission.[1-3]

Numerous studies have addressed the value of prior academic achievement as a predictor of the future performance of medical students.[3-17] Some of these studies reported the use of achievement at pre-university school exit examinations.[4-10,15-17] Others used undergraduate grade point average (GPA) in graduate school entry programs.[11-14] Some investigators have recommended that each medical school should assess the predictive value of these academic criteria in its own applicants.[5]

At King Saud University (KSU), admission to the medical college is dependent on the achievement at the high school exit examination, performance on a written admission test, and a semi-structured interview conducted by at least two faculty members. In addition, achievement of a GPA of ≥3.5 out of five at the end of the first year of university (premedical year) is a pre-requisite for joining the program.

The requirement of a minimum GPA in the premedical year has been in practice at KSU and some other medical schools in Saudi Arabia for several years. To our knowledge, no data have been published to support the validity of this practice. This study was initiated to find out if pre-selected students who achieve a relatively low GPA in the premedical year in comparison with those who have high GPA are more prone to encounter academic difficulties in subsequent years.

MATERIAL AND METHODS

Design and sample

This was a cross-sectional study of all students admitted to the College of Medicine at KSU during five academic years (1994 to 1998). At the time of the study (2004), all students were at least six years post-admission and were expected to graduate during or before the end of the year of the study. Students were classified into two groups according to their GPA (5-point scale) at the end of the premedical year: ≤3.75 (Low GPA) and >3.75 (High GPA). The proportion of graduates and the frequency of dropouts and dismissals were compared in the two groups.

The College of Medicine at KSU awards a Bachelors Degree of Medicine and Surgery after the completion of a total of 260 credit hours followed by a year of rotating internship. The College follows a traditional curriculum and uses an annual system with two years of preclinical sciences and three years of clinical courses. The premedical year consists of two semesters. In the first semester, the student takes an intensive course in English Language worth nine credit hours that are not included in the GPA. In the second semester, the student takes 18 credit hours of the following subjects (credit hours): Biology (4), Physics (4), Chemistry (4), Biostatistics (2), Arabic Language (2) and Islamic Culture (2). Arabic Language and Islamic Culture are not included in the computation of GPA as a requirement for entry into medical school. In addition, the student is automatically dismissed if he requires more than twice the time allowed for the completion of the whole program, or if his GPA drops below two (out of 5) for two successive years.

Statistical method

Chi-square test was used for the comparison of proportions. A p-value ≤0.05 was considered significant.

RESULTS AND ANALYSIS

For the academic years 1994 to 1998, 739 students successfully completed the premedical year at KSU and were admitted to the College of Medicine. Of these, 565 (76%) were males and 174 (24%) were females. No differences were found between male and female students with respect to the proportions of high GPA achievers, overall graduation, or overall dropout (Table 1). Of the total, 619 (84%) achieving a GPA >3.75 during the premedical year constituted the High GPA group. The remaining 120 students (16%) formed the low GPA group (≤ 3.75). The total number of graduates by the end of 2004 was 624 (84%; Table I). Of these, 471 (75.5%) were male and 153 (24.5%) were female. No significant difference was detected in the graduation rate between male and female students (83% vs. 88%, p=0.2, Table I).

The likelihood of graduating at the time of the study differed significantly between students whose GPA during the premedical year was high and those with a low GPA (p<0.0001). Of those with a high GPA, 545 of 619 (88%) had

Table 1: *Number and proportions of male and female students enrolled (1994-1998), graduated and dropped out from the College of Medicine by 2004*

Enrolled	Male No. (%)	Female No. (%)	p*	Total No. (%)
Overall	565	174		739
High GPA	470 (83)	149 (86)	0.52	619 (84)
Low GPA	95 (17)	25 (14)		120 (16)
Graduated	471 (83)	153 (88)	0.20	624 (84)
Dropped-out	24 (4.2)	4 (2.3)	0.34	28 (3.8)

*Chi-square test for difference between male and female students

Table 2: *Number and percentage of students graduated from the College of Medicine by 2004 based on enrollment year and premedical year GPA*

Enrollment	High GPA (>3.75)		Low GPA (≤3.75)		OR (95% CI)	p*
	Graduated	No. (%)	Graduated	No. (%)		
1994	104	107 (97)	13	15 (87)	5.33 (0.81, 34.95)	0.22
1995	104	112 (93)	20	24 (83)	2.60 (0.71, 9.47)	0.27
1996	115	130 (88)	20	23 (87)	1.15 (0.31, 4.34)	0.89
1997	118	130 (91)	20	34 (59)	6.88 (2.78, 17.02)	<0.0001
1998	104	140 (74)	6	24 (25)	8.67 (3.19, 23.53)	<0.0001
Total	**545**	**619 (88)**	**79**	**120 (66)**	**3.82 (2.44, 5.99)**	**<0.0001**

CI=Confidence interval, GPA=grade point average, OR=Odds ratio

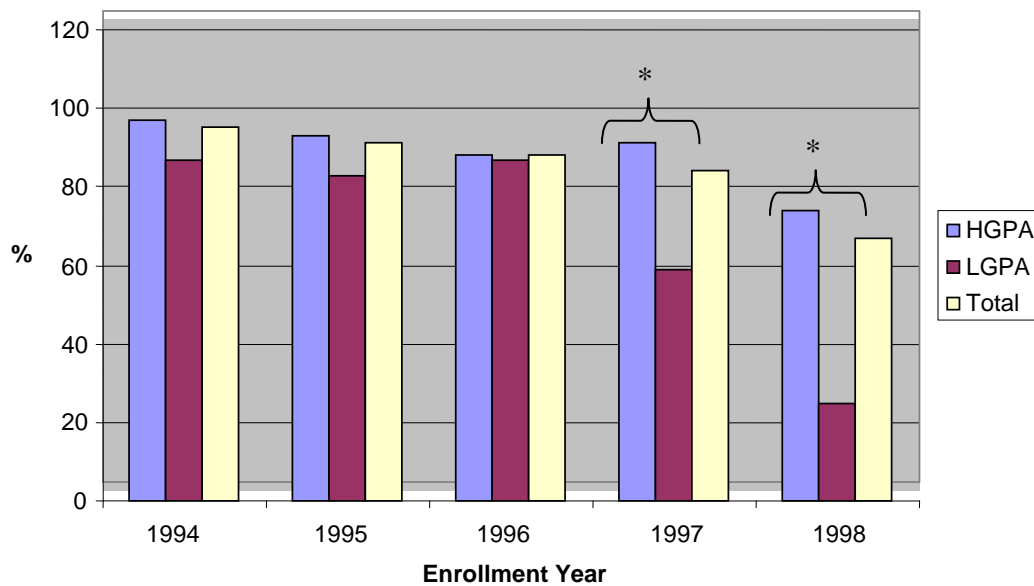*Chi-square test comparing proportions of high and low GPA students within enrollment years

Figure 1: *Percent of class graduated by 2004*

graduated, compared with 79 of 120 (66%) students with the Low GPA (OR 3.822 [95% CI: 2.44, 5.99]: p<0.0001; Table 2). The difference in the graduation rate between the two groups was quite marked in the last two matriculation years (1997 and 1998; Figure 1). At the time of the study (2004), only 25% of the low GPA group from the batch that enrolled in 1998 had graduated, compared with 74% of those in the high GPA group (OR 8.667 [95% CI: 3.19, 23.53]: p<0.0001; Table 2). The difference between the two groups persisted even after remaining in college for an extra year, as the cumulative graduation rate for the 1997 cohort was also significantly lower in the Low GPA group (59% vs. 91%, OR 6.883 [95% CI: 2.78,17.02]: p<0.0001).

Of the 115 students who had not graduated at the time of the study, 84 (73%) were still enrolled in the college and 31 (27%) were not. Of those

who were no longer enrolled, three were deceased (all from the high GPA group) and 28 (3.8% of the admission total) had either been dismissed or had dropped out. The frequency of dismissal or dropout was significantly greater in the low GPA group compared with the high GPA group: 10 of 120 (8.3%) vs. 18 of 619 (2.9%), respectively (OR 3.035 [95% CI: 1.37, 6.75]: P=0.01). The difference was still significant even when the three deceased students were counted in the group with high GPA (8.3% vs. 3.4%; OR 2.589 [95% CI: 1.19, 5.65], p=0.026).

DISCUSSION

The process of medical student selection aims at enrolling candidates who have a high predictability of success in the course in the medical college. Different medical schools apply different sets of criteria for selection. Previous academic achievement, however, is widely used in the process.[1-4]

Several studies have demonstrated the predictability of successful completion of the medical courses using grades obtained in high school.[4-9,15,17] Similar findings were reported in studies evaluating undergraduate GPA when a previous college degree was a pre-requisite for admission to medical school.[11,14] Most of these studies, however, showed that this correlation was limited to the early years of the medical curriculum, with little or diminished effect in later years.[4, 7-10, 13-16]

The current study showed that student's achievement in the premedical year was predictive of continuous progress in subsequent years. Students with a GPA ≤3.75 in science subjects during the premedical year were less likely to graduate on time, and were more likely to drop out of the course compared to students with a GPA >3.75.

The delayed graduation of those with Low GPA was demonstrated by comparing the graduation rate in the enrollment cohorts of the last two years. Among the 1998 cohort, only 25% of those with low GPA graduated on time compared with 74% of those with high GPA. Even after an extra year in college, the cumulative graduation rate in the low GPA group enrolled in 1997 was still significantly lower than that of the High GPA group (59% vs. 91%). The smaller differences between the two groups in the cumulative graduation rates for the 1996 and preceding cohorts would indicate that the majority of students with low GPA require one or two additional years to complete the program compared with those with high GPA. In a previous study of the impact of high school GPA on the progress of a medical student, it was found that a 1-point increase in GPA was associated with approximately 6-month reduction in the time needed for graduation.[6]

Dropping out of medical school is an unfortunate event for the student, the institution, and the society. The impact of previous academic achievement on the risk of dropping out of medical school has been studied before.[15,17-19] In one study, no relationship between high school grades and the risk of dropout was identified.[6] In our study, the frequency of dropout in the group with low GPA was more than double that of the group with high GPA (8.3% vs. 2.9%; p=0.01).

The overall dropout rate of 3.8% is similar to that reported by some investigators.[16,17] Other studies, however, found higher dropout rates ranging between 6.5% and 14%.[5,10,13,19-21]. The overall low dropout rate in this study could be explained by the fact that our data included students who had successfully completed the premedical year by achieving the required minimum GPA. The higher dropout rate in the group with low GPA in this study suggests that the overall rate is likely to be higher if students with even lower GPAs were allowed to proceed into the course. Furthermore, our data included only dropouts after the first year, while previous studies have shown that most dropouts from medical courses occur in the first year of the medical course.[19, 22]

The findings in this study support the practice of a minimum GPA requirement in the premedical year as a condition to proceeding into the medical course. Postponement of student selection for enrollment into the medical school until the completion of the preparatory year may provide the chance to enroll students with higher GPAs. Furthermore, identification of students at risk at an early stage of their study, with close monitoring of their progress and the provision of academic counseling and support, would help them to overcome their difficulties.

A possible limitation of this study is that it analyzed data from only one medical school, which may or may not reflect the situation in other schools. Further studies, preferably at the national level, are urgently needed to identify other important factors related to the success of medical students in order to refine the selection process and minimize resource wastage.

Finally, we would like to emphasize that previous academic achievement should not be the sole criterion in the selection of medical students. Personal attributes as well as other non-cognitive criteria should still be considered in selecting prospective physicians for training.

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