Paying Tuition and Academic Performance of Students at Kragujevac University School of Medicine

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Aim. To assess whether the prospect of waiving tuition fees influenced the academic performance of students with the lowest admission test scores and consequent mandatory tuition.

Methods. We compared academic performance of 75 tuition-paying students with the students who did not have to pay tuition because they scored well on the 1996-1998 admission tests to the Kragujevac School of Medicine. We formed 3 control groups (high-, medium- and low-ranked students on the admission test), each with the similar number of students as the group of tuition-paying students. Students’ performance was assessed after the first two academic years on the basis of their average grades, number of tries to pass the same examination, the time needed to pass an examination after a course, and the number of repeated years.

Results. Of 75 tuition-paying students admitted to the School in the 1996-1998 period, 11 had their tuition permanently waived and were therefore excluded from the analysis after the first year. Tuition-paying students had the average grade of 6.8±3.2 (grade range 6-10), took each exam twice before passing it, needed more than four months of studying to pass an exam, and repeated 0.1 years per student. Their performance was statistically worse than the performance of the low-ranked group of control students in all parameters, except in the number of repeated years. The high-, medium-, and low-ranked student groups did not differ significantly in their performance, but all performed significantly better than the tuition-paying group in three following parameters: average grade (high-ranked group: 8.2±1.3), average number of tries to pass an exam (high-ranked group: 1.8±0.8), and average time of studying needed to pass an exam (high-ranked group: 119.6±65.9 days).

Conclusion. The prospect of waiving tuition fees has no influence on students’ performance. The students’ rank on the admission test is a major predictor of their subsequent academic performance.

Key words: achievement; education, medical, undergraduate; motivation; school admission criteria; schools, medical; students, medical

Although paying tuition at medical schools is common in developed countries (1), in transition countries most universities are state-owned, financed from state budget, and do not require students to pay tuition fees, or if they do, fees are only nominal (2). In FR Yugoslavia, due to the difficult economic situation caused by 10-year involvement in local wars and international sanctions, the state was not able to provide full financing of the universities from the budget, so approximately half of the medical students admitted since 1995 (those with low scores on admission test) have been paying tuition. In 1996, the Government of the Republic of Serbia (the Republic of Montenegro had not had a Medical school up to 1997) set a fixed fee of 3,600 dinars per academic year (around four average monthly salaries in Yugoslavia). In 2000, the Government divided the tuition-paying students into two groups according to their admission test score and increased the fee to 12,200 or 25,000 dinars, respectively, per academic year. The group of students with lower score at admission test had to pay higher fee (3-6).

The students’ performance in medical schools depends mostly on their high school grades, admission test scores, and the quality of high school education (7). At the Kragujevac University School of Medicine (School’s unpublished data), up to 1999, approximately 7% students repeated the first and another 6% each subsequent academic year. In 1999, due to the war and frequent student strikes in the country, the Ministry of Education of the Republic of Serbia has passed a ruling that all students should advance to the next academic year regardless of the number of exams they passed. This created a serious problem to the universities, since most students were not attending classes because of exams from previous academic years.

Students with lower high school grades and lower admission test scores who get admitted have to pay tuition fee. The current arrangement allows
them to be exempted from obligation to pay the tuition fee for the next academic year if they have passed all exams in the previous academic year. Since they are financially motivated, one would expect that their performance would differ from that of regular, “non-paying”, students. Our study of academic performance of tuition-paying students at the Kragujevac University School of Medicine was prompted by the report of Prka et al (2) from the Zagreb School of Medicine in Croatia. We wanted to assess the situation in Serbia, which was a part of former Yugoslavia and today is a country in postcommunist transition, like Croatia, but with different social and economic development. In cases when criteria in the School Statute for allowing students to enroll the next academic year were lowered, as determined by the Statute, we used the real data and not the Statute rules. In other words, if the School let a student into the next academic year although he/she has not fulfilled the criteria of the Statute, we considered that the student did not lose that year.

**Subjects and Methods**

**Setting**
The study was carried out at the Kragujevac University School of Medicine, the youngest and the smallest medical school in Serbia, founded in 1977.

**Admission Rules**
To enroll at the Kragujevac University School of Medicine, a student must pass the admission test. Students who fail the admission exam in July are not allowed to take the September admission test, which is primarily organized for foreign high school students in Serbia, founded in 1977. School of Medicine, the youngest and the smallest medical school in Serbia, founded in 1977.

One hundred-thirty to 200 student slots always get filled in July. Out of 10 slots reserved for foreign students taking the admission test in September, there are always 3-5 left and taken by domestic candidates who ranked just below the 130th or 200th position on admission test in July. Half of the admitted students (those who ranked the best on the admission test) do not pay tuition, unlike the other lower-ranking half. Students who pass all exams from the previous year are waived tuition fees for the next academic year. Those who fail to register for the next or any subsequent academic year must pay one third of the tuition fee for repeating the year (3-6).

**Admission Test**
The candidates are ranked based upon the points earned, with 100 points being the highest score possible. A student can earn 40 points on the basis of high school general average grade, school-leaving examination grade, and grades in Biology and Chemistry (grades range 2-5; 1 is a failure). Another 60 points can be earned at the admission test, which contains 60 multiple-choice questions – 30 questions covering Biology and 30 covering Chemistry. Each correct answer brings one point and there are no negative points for incorrect answers.

In general, the best-ranked candidates score between 80 and 100 points, the lowest-ranked score between 55 and 70, and those who have to pay tuition usually score below 80 points in total (the School’s unpublished data). The candidates who score less than 55 points in total cannot be enrolled (8).

**General Outline of the Curriculum**
Academic year is divided into two semesters. Each academic year starts on October 1 and ends on September 30. Medical school lasts 6 years, and the program comprises a total of 36 courses. After each course, a student must pass the exam and the final grade from that exam is included in the calculation of total average grade. Passing grades range from 6 to 10. A student who fails has to take the exam again and earn at least grade 6 to pass it (9).

There are four regular examination terms during the academic year: in January, April, June, and September. The Dean can arrange additional terms. A student must pass the examinations from most courses attended during the given academic year to be promoted to the next year of studies. A student is allowed to take the exam from each course four times, ie, a student may fail the examination three times without any consequences. The fourth time, the exam is taken before a three-member committee, and in case of failure each subsequent exam, which is taken in the front of the same committee, is subject to 500 dinars fee (9).

**Study Groups**
We compared the achievement of the tuition-paying students with that of the students who did not have to pay tuition because they scored well (upper half of the ranking list) on July admission test. The group of tuition-paying students consisted of 25 students, starting from the highest-ranked tuition-paying student and followed with every third student on the list downwards. Since the tuition-paying students had the worst admission test score, the most appropriate control group to compare them with were the students who were ranked between 51st and 75th place on the July admission list, just above the tuition-paying students. They formed the low-ranked group (lower cohort). For better control of the significance of student performance on the admission test, we included two additional comparison groups: students positioned in the middle of the admission list (middle cohort: 26th to 50th place on the list), and those who scored the best at the admission test (upper cohort: 1st to 25th place on the list (Table 1). Those students did not have to pay tuition. Performance of all students was followed during the first two years of studies.

<table>
<thead>
<tr>
<th>Year of admission</th>
<th>Cohorts (No. of students)</th>
<th>tuition-paying group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>upper</td>
<td>middle</td>
</tr>
<tr>
<td>1996</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>1997</td>
<td>25</td>
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<tr>
<td>1998</td>
<td>25</td>
<td>24</td>
</tr>
</tbody>
</table>

The groups have been formed according to the students’ ranking at the admission tests in 1996, 1997, and 1998.

**Inclusion Criteria**
The students admitted before 1996 were not included in the study due to abnormal socio-economic situation produced by sanctions of United Nations against FR Yugoslavia. The extreme inflation rate made the tuition fees meaningless, and majority of the students could not afford lodging and travel expenses. After the sanctions were lifted in the beginning of 1996, the studying and living conditions of the students changed for the better. Therefore, we analyzed the cohorts of students admitted to Kragujevac University School of Medicine in 1996, 1997, and 1998 (Table 1). The cohorts were followed only for the first two years of their studies.

**Exclusion Criteria**
The tuition-paying students who passed all exams from the previous academic year were exempted from paying fees for the next academic year (Table 1), and therefore excluded from the study after the first academic year, since their status became exactly the same as that of the students not paying the tuition.

**Outcome Measures**
We assessed students’ performance in the first two years of their studies by comparing the average values of four variables for each study cohort: the average passing grade, number of tries to
pass the examination, time required to pass an examination, and number of repeated study years. Exam grades from the following courses were analyzed: Medical Chemistry, Biology and Human Genetics, Biophysics, Anatomy I, Sociology, Foreign Language I, and Statistics and Informatics in Medicine (the first year courses); and Physiology, Biochemistry, Histology and Embryology, Anatomy II, Foreign Language II, Social Medicine, and Introduction to Medicine and Ethics (the second year courses) (9).

Average grade. The average grade was calculated from all the exam grades (grades 6-10); exams that were not passed were not included in the calculation. The overall average grade for a study group was calculated from the average grades of each student.

Average number of tries to pass an exam. The average number of tries to pass an examination was determined per course for each student and then calculated for a whole cohort.

Average time needed to pass an exam. One-semester courses (Medical Chemistry, Biology and Human Genetics, Biophysics, Foreign Language I, Statistics in Medicine, Foreign Language II, Informatics in Medicine) end on January 30 or June 15, and two-semester courses finish on June 15. The average period of studying needed to pass an exam was calculated from the time interval between the end of course and passing the exam. The average period (in days) was then calculated for each study group.

Number of repeated years. According to the School’s Statute (10), a student has failed a year if she or he did not pass all the exams from that year, except two, by the September 30 (the end of the academic year). The number of failed academic years was then expressed as the average number of failed years during the first two academic years per student in each of the study groups.

In cases when criteria for admitting students to the next academic year were lowered (ie, students were admitted to the next semester regardless of the fact that they did not pass the exams required by the Statute), we used the real data, ie, we considered that the student did not fail the respective year.

Statistics
Wilcoxon’s nonparametric unpaired test was used in the analysis of the four parameters measured in the study groups (p<0.05).

Results
A total of 298 students were included in the study. The upper and the middle cohort from 1996, 1997, and 1998 comprised 74 students each, whereas the lower cohort and the tuition-paying group each comprised 75 students. However, 11 students from the tuition-paying group were excluded from the study after the first academic year, since they were exempted from paying tuition and consequently gained the same status as the students who did not have to pay tuition at all (Table 1).

After the first two years of studies, the tuition-paying students achieved an average grade of 6.8 ± 3.2, took each exam 2.0 ± 1.1 times before passing it, needed more than four months to pass the exam after the course ended, and repeated 0.1 ± 0.1 years per student during the first two years (Table 2). Their performance was statistically worse than the performance of the lower cohort in all parameters (p<0.001, p<0.001, and p = 0.036, respectively), except in the number of repeated years (p = 0.989).

The upper, middle, and lower cohort did not significantly differ among themselves in performance, but all of them performed significantly better than the tuition-paying group in three parameters: average grade, average number of tries to pass an exam, and average time needed to pass a exam (Table 2). Again, the number of repeated did not differ among the four groups.

Discussion
Our analysis of students’ performance during the first two years of medical studies showed that students paying tuition fees did not perform any better, despite the possibility of tuition exemption if the criteria of good performance were fulfilled. This indicates that paying tuition generally did not motivate students to perform better. This corresponds to results of Prka et al (2) obtained at the Zagreb University School of Medicine in Croatia. After each year of studies, the tuition-paying group had the possibility to become permanently exempted from paying tuition fees, provided they had passed all exams from the academic year. Nevertheless, this did not show to be stimulating enough for the students. One of the reasons could be a relatively small tuition fee, which equaled 4 average salaries in Republic of Serbia (around 200 EUR). However, we could not assess whether that was expensive fee or not, because significant portion of family income in Serbia in that time came from illegal economy. Monthly living expenses of a four-member family in Serbia were around 200 EUR in 1996-1999 period.

We showed that high school grades were a good predictor of academic performance in the early stages of medical undergraduate education (11), much more relevant than financial motivation of the students. High correlation between medical school admission test grades and subsequent performance during the medical program was also confirmed in another study (12). These results emphasize the importance of previous general education for future performance in Medical School. Another study showed that special training courses for students with low admission test scores were the only effective means for improving their medical school performance (13). The results of our study support these findings, although there are

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Table 2. Students’ academic performance in the first two years of studies at the Kragujevac University School of Medicine, according to their ranking on the admission tests in 1996, 1997, and 1998

<table>
<thead>
<tr>
<th>Performance parameters</th>
<th>Students’ ranking positions (cohorts) at the admission test (mean ± SD)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>upper</td>
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<tr>
<td>Average mark</td>
<td>8.21</td>
</tr>
<tr>
<td>No. of times repeating the same examination</td>
<td>1.78</td>
</tr>
<tr>
<td>No. of days to pass examination</td>
<td>119.6</td>
</tr>
<tr>
<td>Failed academic year</td>
<td>0.10</td>
</tr>
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</table>

Wilcoxon’s nonparametric unpaired test.
Average grade (range 6-10) of all the exams passed in the 1st and 2nd year of studies.
Average number of trials before an exam was passed.
Average number of days of studying needed to pass an exam after the lectures had finished.
Average number of failed years (1st or 2nd) per student.

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some other studies, which did not confirm the relationship between previous education and students’ performance in medical schools (14,15).

Like the study of Prka et al (2), our analysis showed that extending the ranking list downwards would, in general, result in admission of the candidates who would be less successful in fulfilling their academic obligations. This certainly calls for the analysis of the possible underlying causes, and the Ministry of Education of the FR Yugoslavia should reevaluate the medical schools admission policy.

In distinction to Prka et al (2), we did not find significant differences in the number of repeated years among our four studied student groups. The reason for this difference probably lies in different criteria for the advancement into the next academic year.

Our results showed that a quantitative and unbiased admission test might serve as a powerful tool to select the best candidates. Indeed, the admission test score and the first two years of studies are among the most powerful discriminants of human qualities and profile of future physicians (2,16,17). Furthermore, in state-owned schools and free education system, economically inadequate tuition fees do not present an incentive for better studying, at least not for students who scored low according to admission criteria. With the development of private universities and schools with tuitions based on real costs of studying, it would be interesting to see if such attitude towards tuition in transitional countries would change.

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