

Reduction of the anxiety of medical students after curricular reform

Redução da ansiedade de estudantes de medicina após reforma curricular

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Abstract

Objectives: Curricular structure may interfere in students' anxiety level at medical schools. The objective of this study was to assess anxiety levels in medical students before and after a curriculum reform at the Medical School of Ribeirão Preto and to compare them with students at other courses that had no curricular changes in the same university campus. **Method:** Study samples were obtained in two moments: 1) two years before the reform; 2) after the reform when the reformed curriculum completed its fourth year. The pre-sample (former curriculum) consisted of 307 medical students and 217 students from psychology and biology courses. The post-sample (new curriculum) was composed of 330 medical students and 194 students from psychology and biology courses. Anxiety was assessed by the State-Trait Anxiety Inventory (STAI). **Results:** Comparing the pre with the post sample, we found STAI-T scores of the students under the former curriculum were significantly higher in the first ($42.9 + 1.08$) and second ($41.9 + 1.1$) years than the STAI-T scores of the medical students under the new curriculum ($38.1 + 1.0$ and $37.9 + 1.06$, respectively). Students from other courses and 5th year medical students, who followed the same curriculum, did not show any significant differences between different samples. **Conclusion:** These results suggest that changes to medical school curricula may reduce the medical student' levels of anxiety in the first two years of the course.

Descriptors: Education, medical; Curriculum; Anxiety; Students, medical; Training, education

Resumo

Objetivos: Características da estrutura curricular podem interferir no nível de ansiedade dos alunos do curso médico. O objetivo deste estudo foi avaliar o nível de ansiedade nos alunos do curso médico, antes e depois de uma reforma no currículo da Faculdade de Medicina de Ribeirão Preto, comparando com outros cursos, do mesmo campus da universidade, que não tiveram mudanças curriculares. **Método:** As amostras do estudo foram obtidas em dois tempos distintos: 1) dois anos antes da reforma; 2) pós a reforma, quando o currículo reformado se encontrava em seu quarto ano de funcionamento. Da amostra pré (currículo prévio) participaram 307 alunos do curso médico e 217 alunos dos cursos de psicologia e biologia; e da amostra pós (currículo novo), 330 alunos do curso médico e 194 alunos dos cursos de psicologia e biologia. A ansiedade foi avaliada pelo Inventário de Ansiedade Traço-Estado, formulário Traço (IDATE-T). **Resultados:** Comparando-se as amostras pré e pós pode-se observar que os estudantes que seguiam o primeiro currículo apresentaram escores do IDATE-T significativamente maiores, no primeiro ($42,9 + 1,08$) e segundo ($41,9 + 1,1$) anos, do que os estudantes sob o novo currículo ($38,1 + 1,0$ e $37,9 + 1,06$, respectivamente). Os alunos dos demais cursos e os alunos do quinto ano do curso médico, que seguiam o mesmo currículo, não apresentaram diferenças significativas entre as duas amostras. **Conclusão:** Estes resultados sugerem que algumas alterações introduzidas no currículo de uma escola médica podem diminuir o nível de ansiedade de seus alunos, nos dois primeiros anos do curso.

Descritores: Educação médica; Currículo; Ansiedade; Estudantes de medicina; Treinamento, educação

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Introduction

The undergraduate course of medicine has been associated to high anxiety levels in medical students.¹⁻³ However, comparative studies have not shown differences between the level of anxiety of medical students and students from other undergraduate courses,^{4,5} suggesting that the higher levels of anxiety would be associated with the period of university life itself and not specifically with the medical course.

Nonetheless, several characteristics of the medical course have been described as stressful to the students, such as the amount of material to be studied in short time; the frequent evaluations; the contact with acute patients; and the difficulties involved in clinical practice.^{1,6} It has also been reported that medical students experience changes in anxiety levels throughout the phases of the course, with differences between the basic and clinical training.⁵ These data suggest that features of the curricular structure could interfere in the students' anxiety level.

The Faculty of Medicine of Ribeirão Preto (FMRP) implemented a comprehensive broad curricular change in 1993. The main changes included the restructuring of traditional disciplines into new disciplines, organized by systems and articulated with each other; the establishment of new disciplines, which provided an early contact with the health system; and the increase of the period of internship training. The course has been organized into three phases - basic, clinic, and internship, each lasting two years.⁷ These curricular changes have been associated with improvements in last-year-students' performance.⁸

Since it has been observed that the implementation of the new curriculum was related to an enhancement in medical students' academic performance, we decided to verify if curricular changes have also interfered in medical students' level of anxiety when compared to students from other university courses in the same University Campus, which have not had curricular changes.

Method

Databases collected during studies aimed at detecting participants with high levels of anxiety for pharmacological challenges, have been used in the present study. The protocol for these studies was approved by the local Ethical Committee. The data from the first sample had been collected in the second semester of 1991, when undergraduate medical students were following the pre-reform curriculum (pre-sample). In the same year, data from psychology and biology students from the first three years at the Faculty of Philosophy, Sciences, and Languages of Ribeirão Preto (FFCLRP) had also been obtained. The data of the second sample had been acquired in the second semester of 1996, when the new medical curriculum was in its fourth year (post-sample). At that moment, medical students in the 5th year were still following the former curriculum, Sixth year students were excluded from the study due to difficulties to assess them jointly, since they were engaged in the internship training. Concurrently, data from psychology and biology students from FFCLRP had also been obtained.

Anxiety levels had been assessed through Spielberg's State-Trait Anxiety Inventory⁹ - trait form, which has been validated into Portuguese by Biaggio et al.¹⁰ (STAI-T). This instrument is a 20-item self-administered scale, whose items are rated in four levels, and assess the anxiety level in a period larger than the state form.¹¹

The scale was administered inside the classrooms, just before normal academic activities. Students attending regular activities

had been invited to voluntarily participate in the study. Those who were not willing to participate should simply return the scales unmarked (the number of unmarked scales was smaller than five for each sample). This study has been approved by the University's Research Ethics Committee.

The data were tested with the Kolmogorov-Smirnov Z-test. Continuous data with normal distribution were analyzed by the two-tailed Student's test (t) and univariate analysis of variance (ANOVA). ANOVA has been performed, followed by Tukey's test, to compare STAI-T scores among different courses and course years in the pre-sample and post-sample. Student's t-test has been used to compare the two samples of the first four years of medical school and the first three years at FFCLRP (psychology and biology). Differences were considered significant at $p \leq 0.05$.

Results

The pre-sample consisted of 307 undergraduate medical students (75% of all students in the first five course years) and 217 students from FFCLRP (90% of all psychology and biology students in the first three course years). The post-sample consisted of 330 undergraduate medical students (69% of all students in the first five course years) and 194 students from FFCLRP (80% of all psychology and biology students in the first three course years). Students' mean age (\pm s.e.) was 20.9 (± 0.11) years, with no significant differences between the two samples and between courses. Percentages of male students in the pre and post samples were, respectively, 66.5% and 68.2% for FMRP students, and 23.3% and 33.5% for FFCLRP students.

There were significant anxiety score differences between male and female students in the pre-sample ($F_{1,522} = 7.06$; $p = 0.008$). In both samples, scores were higher among female students (41.7 ± 0.5 and 41.0 ± 0.4) than among male students (39.7 ± 0.6 and 38.9 ± 0.5).

In the pre-sample, there were no significant differences between courses in the levels of anxiety. However, in the post-sample, a significant difference between courses has been found ($F_{3,520} = 2.9$; $p = 0.02$), with psychology students showing significantly higher levels of anxiety (43.0 ± 1.1) than medical (38.6 ± 0.5) and biology (39.1 ± 0.9) students. The percentage of female students in the psychology course (77.1%) was higher than in medical (31.8%) and biology (58.6%) courses.

When comparing the STAI-T scores across different course years, no significant differences between the course years were detected, except for the medical course in the pre-sample ($F_{4,302} = 4.69$; $p = 0.001$). In the former curriculum, younger medical students (first- and second-year) showed significantly higher scores than older students (third- and fourth-year) (Tukey's test).

Figure 1 shows the mean STAI-T scores for the first four years of medical school in both samples. Comparing the pre with the post sample, it can be observed that STAI-T scores of the students under the former curriculum were significantly higher in the first ($42.9 + 1.08$) and second ($41.9 + 1.1$) years than the STAI-T scores of the medical students under the new curriculum ($38.1 + 1.0$ and $37.9 + 1.06$, respectively). In the fifth year of the medical course, in which students in both samples followed the former curriculum, there were no significant differences in STAI-T scores between the pre (37.1 ± 1.2) and the post (36.5 ± 1.1) samples.

No significant differences in the mean STAI-T scores have been found between the two periods in the first years of FFCLRP courses (biology and psychology).

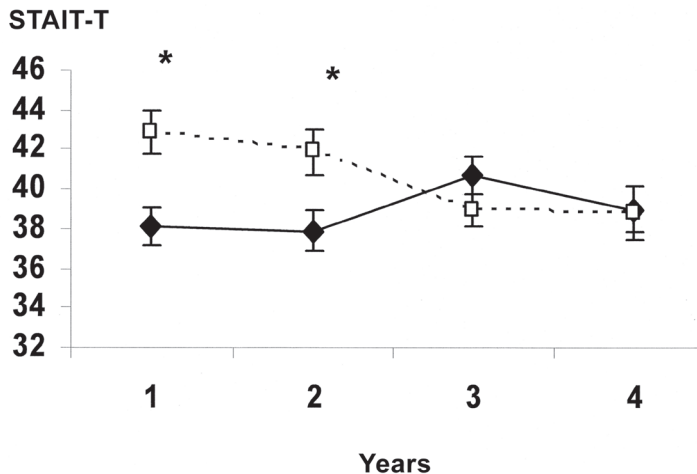


Figure 1 - Average STAI-T values (\pm s. e.) in medical students in the first four course years, before (— ♦ —) and after (--- □ ---) curriculum reform. Asterisks (*) indicate significant differences between the two assessments (Student's t test)

Discussion

The levels of anxiety, as evaluated by STAI-T, in university students from both samples, as well as the observed gender differences obtained in this study corroborate previously published findings.⁹ It has also been observed that medical students are not more anxious than students from other courses (psychology, biology), which is in line with previous studies.^{4,5} Anxiety was highest among psychology students from the post-sample. This is likely due to a gender difference, since there was a clear prevalence of female students in the undergraduate course of Psychology.

The main finding of this study was the lower level of anxiety of first- and second-year undergraduate medical students after the curricular reform. The hypothesis that changes in the levels of anxiety of medical students would be associated with curricular changes is reinforced by the fact that there were no significant differences between the two samples in fifth-year students, who were subjected to the former curriculum. Moreover, there were no differences in FFCLRP students, whose curriculum suffered no changes in that period.

The large amounts of complex materials to be learned in short time have been considered as an anxiogenic factor in medical courses.^{1,12} The new curriculum introduced in the FMRP-USP allowed a more integrated approach in teaching conventional disciplines and more rational time use, resulting in a better academic performance of the students⁸ and probably contributed to reduce the anxiety.

Another reason to lower levels of anxiety of the medical students after the curricular reorganization could be the implementation of disciplines that provided early contact with the primary health care system.⁷ An investigation of the perception of the students about their learning environment revealed that they considered that learning basic sciences would be necessary, but the focus given in their teaching did not sufficiently emphasize how to apply that knowledge.¹³ In a consensus qualitative research, a group of medical students and teachers suggested that early exposure to a clinical care context could contribute to learn theoretical contents in a deeper and more contextualized manner, facilitating the transition to the clinical environment.¹⁴ These indications have been confirmed in a recent systematic review¹⁵ that analyzed 73 empirical studies on

early experiences in health professionals' basic education. The conclusions of that study reported that early primary care experience strengthens and contextualizes learning and provides students with higher motivation. Moreover, students are pleased with their curriculum, confident and less anxious when in contact with patients.¹⁵

This study has the shortcoming of using a single scale for anxiety evaluation instead of more specific instruments for the assessment of stress, burnout and depressive and anxious symptoms in undergraduate students. Moreover, interference from external factors cannot be completely disregarded. Nevertheless, the results of the present study strongly suggest that changes in a medical school curriculum, such as disciplines organized by systems with a growing level of complexity and the early contact with the health system can reduce the levels of anxiety of medical students.

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References

- Mosley TH Jr, Perrin SG, Neral SM, Dubbert PM, Grothues CA, Pinto BM. Stress, coping and well-being among third-year medical students. *Acad Med.* 1994;69(9):765-7.
- Coles C. Introduction: medicine and stress. *Med Educ.* 1994;28(1):3-4.
- Firth-Cosens J. Stress in medical undergraduates and house officers. *Br J Hosp Med.* 1989;41(2):161-4.
- Heins M, Fahey SN, Leiden LI. Perceived stress in medical, law, and graduate students. *J Med Educ.* 1984;59(3):169-79.
- Helmert KF, Danoff D, Steinert Y, Leyton M, Young SN. Stress and depressed mood in medical students, law students and graduate students at McGill University. *Acad Med.* 1997;72(8):708-14.
- Toews JA, Lockyer JM, Dobson DJ, Simpson E, Brownell AK, Brenneis F, MacPherson KM, Cohen GS. Analysis of stress levels among medical students, residents, and graduate students at four Canadian schools of medicine. *Acad Med.* 1997;72(11):997-1002.
- Prado WA. Desenvolvimento e implantação da nova estrutura curricular na Faculdade de Medicina de Ribeirão Preto: dificuldades e avanços. *Medicina (Ribeirão Preto).* 1996;29:373-82.
- Figueiredo JF, Troncon LE, Rodrigues M de L, Cianflone AR, Colares MF, Peres LC, Piccinato CE. Effect of curriculum reform on graduating student performance. *Med Teach.* 2004;26(3):244-9.
- Spielberger CD. *Manual for the state-trait anxiety inventory.* Palo Alto, CA: Consulting Psychologist Press; 1987.
- Biaggio AM, Natalicio L, Spielberger CD. The development and validation of an experimental Portuguese form of the State-Trait Anxiety Inventory. In: Spielberger CD, Dias-Guerrero R, editors. *Cross-cultural research on anxiety.* Washington, DC: Hemisphere/Wiley; 1976. p. 29-40.
- Andreatini R, Seabra ML. A estabilidade do IDATE-traço: avaliação após cinco anos. *Revista ABP-APAL.* 1993;15:21-5.
- Toews JA, Lockyer JM, Dobson DJ, Brownell AK. Stress among residents, medical students and graduate science (MSc/PhD) students. *Acad Med.* 1993;68(10 Suppl):S46-8.
- Seabrook MA. Clinical students' initial reports of the educational climate in a single medical school. *Med Educ.* 2004;38(6):659-69.
- Dornan T, Bundy C. What can experience add to early medical education? Consensus survey. *BMJ.* 2004;329(7470):834.
- Dornan T, Littlewood S, Margolis SA, Scherpbier A, Spencer J, Ypinazar V. How can experience in clinical and community settings contribute to early medical education? A BEME systematic review. *Med Teach.* 2006;28(1):3-18.