Summary

Objective: To estimate, among Medical School intern students, the prevalence of depressive symptoms and their severity, as well as associated factors. Methods: Cross-sectional study in May 2008, with a representative sample of Medical intern students (n = 84) from Universidade Federal de Sergipe (UFS). Beck Depression Inventory (BDI) and a structured questionnaire containing information on sociodemographic variables, teaching-learning process, and personal aspects were used. The exploratory data analysis was performed by descriptive and inferential statistics. Finally, the analysis of multiple variables by logistic regression and the calculation of simple and adjusted ORs with their respective 95% confidence intervals were performed. Results: The general prevalence was 40.5%, with 1.2% (95% CI: 0.0-6.5) of severe depressive symptoms; 4.8% (95% CI: 1.3-11.7) of moderate depressive symptoms; and 34.5% (95% CI: 24.5-45.7) of mild depressive symptoms. The logistic regression revealed the variables with a major impact associated with the emergence of depressive symptoms: thoughts of dropping out (OR 6.24; p = 0.002); emotional stress (OR 7.43; p = 0.0004); and average academic performance (OR 4.74; p = 0.0001). Conclusion: The high prevalence of depressive symptoms in the study population was associated with variables related to the teaching-learning process and personal aspects, suggesting immediate preemptive measures regarding medical school graduation and student care are required.

Keywords: Depression; mental disorders; medical students; mental health; medical education.
INTRODUCTION

In medical schools with a standard curriculum following the Flexnerian model, the intern student has an opportunity to live the medical practice experience more realistically and intensely and to assume a new attitude towards patients. He/she is no longer a mere observer, supported by a mostly theoretical knowledge; now he/she can be active, intervene, criticize practices, and exercise an undiminished physician-patient contact, even though he/she is still under instructors’ guidance and mentoring1. Thus, the future health professionals are susceptible early on to stress and pressure sources inherent to the medical graduation process, which can possibly lead to mental illness2.

Some authors point out that medical students would be more predisposed than other university students to mental disorders, including depressive disorder, mainly at the final stage of the course, due to several factors, such as: individual personality characteristics favoring the choice of profession; chronic exposure to stressors from an occupation that deals with pain and death; and trouble with the teaching-learning process3-5.

The annual prevalence of depression in general population ranges from 3% to 11%, being two to three times more frequent in women than in men. Depression was identified as the fourth specific leading cause of disability in the 1990s by a global scale comparing several diseases6,7. However, in a recent survey published in a reputed international journal, mental disorders were considered the main cause of disability in Brazil, accounting for the most important loss of quality-adjusted life years in the country, with 18.8% of Brazilians reporting a depression diagnosis, thus being a relevant public health issue8.

The early detection of psychic distress symptoms or mental disorders is extremely important in order to avoid disorder chronicity4. Thus, aiming to estimate the prevalence and severity of depressive symptoms among medical intern students at Universidade Federal de Sergipe (UFS), in addition to identifying associated factors, the authors developed the current study, which may contribute to the reflection and planning of appropriate preemptive measures.

METHODS

STUDY SETTING

The study setting was the UFS, currently offering 100 places/year in its medical school. Students approved by the entrance exam get into medical school in order of ranking, with the first 50 approved students getting into the course in the first half of the year, and the 50 remaining students getting into the course in the second half of the year. The course is based on the traditional model for medical education, having 12 semesters: the 1st through 4th semesters comprise the basic science cycle; the 5th through 9th semesters comprise the pre-clinical cycle; and the 10th through 12th semesters are the internship.

SAMPLE

Among the 117 medical intern students in UFS, after calculating for a finite sample with a 5% margin of error, we reached a sample size of 87 students, selected through a simple ticket sampling.

STUDY DESIGN

Cross-sectional, exploratory, descriptive, analytical, and inferential study performed in May of 2008.

DATA COLLECTION

The ticket sampled students completed two closed questionnaires over the scientific meeting times: 1) Beck Depression Inventory (BDI)9, 2) a questionnaire designed by the lead author, already tested in a previous pilot study, and used in other studies on mental health of the medical school student at UFS8.

TOOLS

1 – Beck Depression Inventory (BDI)

Beck Depression Inventory (BDI) is a standardized self-administered questionnaire described by researchers at the Center for Cognitive Therapy (CCT) as a depression self-reported measure widely used both in research and clinical settings6. The scale consists of 21 items including, but not limited to sadness, pessimism, feelings of failure, lack of satisfaction, and feelings of guilt.

There are several suggestions of different cut-off points to distinguish depression symptoms levels by using BDI. The present study used the cut-off points recommended by CCT: 9/10, 18/19, and 29/30. Scores below 10 were considered to correspond to a person with no depression symptoms or having marginal symptoms; a score between 10 and 18, mild to moderate depression symptoms; a score between 19 and 29, moderate to severe depression symptoms; a score from 30 up to 63, profound depression symptoms.

BDI has no intention of being diagnostic. As a standardized tool, it can fail in detecting “masked depression and anxiety” in patients denying their emotional distress. On the other hand, many patients have physical causes for fatigue and as other somatic symptoms constitute important factors in any tool used in detecting emotional disorders – which has already been warned of by some researchers –, BDI may overestimate the disorder10.

2 – Specific questionnaire

This is a self-administered questionnaire consisting of 54 closed and pre-coded questions covering sociodemographic characteristics, the teaching-learning process and
personal aspects. In this study, the association between the dependent variable (depressive symptom by BDI) and the explanatory variables (period, gender, age, steady partner, religion, origin, income, whom he/she lives with, other occupation, satisfaction with the choice, feelings towards the course, thoughts of dropping out, academic performance, skill acquisition, satisfaction with teaching strategies, feelings towards the school activities, present physical disease, previous mental disease, self-medication, self-reported emotional stress, education as a source of pleasure, leisure time, emotional support, future expectation, feelings of happiness) was investigated through both simple and adjusted odds ratio (OR) calculation and their respective 95% confidence intervals.

**Data Analysis**

Based on completed questionnaires, designed so that the responses would already be coded, a database was built by using the software Statistical Package for the Social Science (SPSS), version 16.

Initially, the data exploratory analysis was performed by a population description through descriptive statistics, followed by bivariate analysis with the raw odds ratio (OR) calculation.

Finally, the analysis of multiple variables was performed by means of logistic regression. The variables showing an association with the endpoint and \( p \leq 0.25 \) were included into the model. Independent variables maintaining an association with the endpoint after adjustment (\( p \leq 0.05 \)) by backward stepwise were kept in the model.

**Ethical Considerations**

This study was submitted to the Ethical Committee on Research with Humans of the UFS and approved under the report no. 0018.0.107.000-06. All proposed and approved ethical procedures were strictly followed by the investigators.

**Results**

From the total of 117 medical intern students at the UFS, 87 were selected by ticket sampling to participate in the study. As three of them did not fully complete the BDI, they were excluded.

Four different groups were obtained regarding depressive symptom severity. However, only two were used for logistic regression: marginal depressive symptoms or no symptoms (Group I) and mild to moderate symptoms (Group II), since the number of subjects pertaining to the other categories, i.e., moderate to severe depressive symptoms (Group III), and profound depressive symptoms (Group IV) was not statistically significant for comparison. However, the authors considered those two small groups (III and IV) of great clinical-epidemiological importance, and they will be discussed below.

The prevalence of depressive symptoms in the study sample (\( n = 84 \)) was 40.5%. Mild to moderate symptoms were found in 34.5% (95% CI: 24.5-45.7); moderate to severe depressive symptoms in 4.8% (95% CI: 1.3-11.7); and profound depressive symptoms in 1.2% (95% CI: 0.0-6.5). No depressive symptoms were observed in 59.5% of the students (95% CI: 48.3-70.1) (Table 1).

The subjects were young and the average age (years) was 24 ± 3.9 in Group I and 25.2 ± 3.6 in Group II. There was no significant difference between genders.

Most students declared to have some kind of religion – 61.2% in Group I and 60.7% in Group II. As for the origin, both groups came mostly from the capital, 76.0% and 75.9% subjects in Groups I and II, respectively. Among those coming from the countryside of the state, 14% were in Group I and 17.2% in Group II; among the subjects coming from other states, 10.0% were in Group I and 6.9% in Group II (Table 2).

As for the satisfaction with the course choice, 98.0% of the students in Group I and 86.2% in Group II stated they were satisfied with their choice. Regarding the expectations over the course, 62.0% of the students in Group I and 31.0% in Group II said medical school corresponded to their expectations.

In the category skill acquisition to become a good physician, 82.0% of the subjects in Group I and 64.3% in Group II declared they were succeeding in getting those skills; as for the satisfaction with the teaching strategies, 79.2% of subjects in Group I and 86.2% in Group II revealed they were not satisfied. About feeling comfortable with the school activities, 71.4% of positive responses were achieved in Group I, but only 37.9% in Group II (Table 2).

### Table 1 – Prevalence of depressive symptoms in medical intern students (\( n = 84 \)) in a public university in Northeastern Brazil, 2008

<table>
<thead>
<tr>
<th></th>
<th>Group I* n (%)</th>
<th>Group II** n (%)</th>
<th>Group III*** n (%)</th>
<th>Group IV**** n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>50 (59.5)</td>
<td>29 (34.5)</td>
<td>4 (4.8)</td>
<td>1 (1.2)</td>
</tr>
<tr>
<td>OR 95% CI</td>
<td>48.3-70.1</td>
<td>24.5-45.7</td>
<td>1.3-11.7</td>
<td>0.0-6.5</td>
</tr>
</tbody>
</table>

* No depressive symptoms or marginal symptoms; ** mild to moderate depressive symptoms; *** moderate to severe depressive symptoms; **** profound depressive symptoms.
In the personal aspects category, one of the questions regarded any present worrisome physical disease, with 88% of the subjects in Group I and 86.2% in Group II responding negatively. Students in Group I (42.0%) and in Group II (82.8%) stated they were feeling tense; however, most subjects in both groups (84% in Group I and 82.8% in Group II) responded positively when inquired whether or not the course had been a pleasure source for them (Table 2).

The analysis of multiple variables, after adjusting for the logistic regression final model, revealed that the independent variables with major impact on depressive symptom emergence in evaluated students were: thoughts of dropping out, emotional status, and academic performance (Table 3).

In the current study, those students reporting thoughts of dropping out (49.3%) had a 6.24 times higher chance of developing depressive symptoms than those admitting such an idea had never occurred to them. Regarding emotional status, those admitting they felt tense (58.5%) had a 7.43 times higher probability of developing depressive

---

Table 2 – Sociodemographic variables, teaching-learning process, personal aspects, and prevalence of depressive symptoms in medical intern students in a public university in Northeastern Brazil, 2008

<table>
<thead>
<tr>
<th>Variables</th>
<th>Group I* n (%)</th>
<th>Group II** n (%)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>50 (60.2)</td>
<td>29 (34.9)</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>22 (44.0)</td>
<td>15 (51.7)</td>
<td>0.51</td>
</tr>
<tr>
<td>Male</td>
<td>28 (56.0)</td>
<td>14 (48.3)</td>
<td></td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td>0.97</td>
</tr>
<tr>
<td>Yes</td>
<td>30 (61.2)</td>
<td>17 (60.7)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>19 (38.8)</td>
<td>11 (39.3)</td>
<td></td>
</tr>
<tr>
<td>Origin</td>
<td></td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>Capital</td>
<td>38 (76.0)</td>
<td>22 (75.9)</td>
<td></td>
</tr>
<tr>
<td>Countryside</td>
<td>7 (14.0)</td>
<td>5 (17.2)</td>
<td></td>
</tr>
<tr>
<td>Other state</td>
<td>5 (10.0)</td>
<td>2 (6.9)</td>
<td></td>
</tr>
<tr>
<td>Satisfaction with the choice</td>
<td></td>
<td></td>
<td>0.06</td>
</tr>
<tr>
<td>Yes</td>
<td>49 (98.0)</td>
<td>25 (86.2)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>1 (2.0)</td>
<td>4 (3.8)</td>
<td></td>
</tr>
<tr>
<td>Expectation related to medical school</td>
<td></td>
<td></td>
<td>0.008</td>
</tr>
<tr>
<td>As expected or even better</td>
<td>31 (62.0)</td>
<td>9 (31.0)</td>
<td></td>
</tr>
<tr>
<td>Less than expected</td>
<td>19 (38.0)</td>
<td>20 (69.0)</td>
<td></td>
</tr>
<tr>
<td>Acquisition of skills to become a good physician</td>
<td></td>
<td></td>
<td>0.08</td>
</tr>
<tr>
<td>Yes</td>
<td>41 (82.0)</td>
<td>18 (64.3)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>9 (18.0)</td>
<td>10 (35.7)</td>
<td></td>
</tr>
<tr>
<td>Satisfaction with teaching strategies</td>
<td></td>
<td></td>
<td>0.44</td>
</tr>
<tr>
<td>Yes</td>
<td>10 (20.8)</td>
<td>4 (3.8)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>38 (79.2)</td>
<td>25 (86.2)</td>
<td></td>
</tr>
<tr>
<td>Feelings towards medical school activities</td>
<td></td>
<td></td>
<td>0.004</td>
</tr>
<tr>
<td>Comfortable</td>
<td>35 (71.4)</td>
<td>11 (37.9)</td>
<td></td>
</tr>
<tr>
<td>Uncomfortable</td>
<td>14 (28.6)</td>
<td>18 (62.1)</td>
<td></td>
</tr>
<tr>
<td>Course as a pleasure source</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>42 (84.0)</td>
<td>24 (82.8)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>8 (16.0)</td>
<td>5 (17.2)</td>
<td></td>
</tr>
<tr>
<td>Physical disease presence</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Yes</td>
<td>6 (12.0)</td>
<td>4 (13.8)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>44 (88.0)</td>
<td>25 (86.2)</td>
<td></td>
</tr>
<tr>
<td>Consider himself/herself</td>
<td></td>
<td></td>
<td>0.0004</td>
</tr>
<tr>
<td>Calm</td>
<td>29 (58.0)</td>
<td>5 (17.2)</td>
<td></td>
</tr>
<tr>
<td>Tense</td>
<td>21 (42.0)</td>
<td>24 (82.8)</td>
<td></td>
</tr>
</tbody>
</table>

* No depressive symptoms or marginal symptoms; ** mild to moderate depressive symptoms.
symptoms compared with those assuming they felt calm. As for the academic performance, those reporting an average performance (41.3%) had a 4.74 times higher probability of presenting with depressive symptoms compared with those who admitted they had a good academic performance (Table 3).

The following variables showed no association with depressive symptomatology: gender, religion, origin, course as a pleasure source, physical activity practice, satisfaction with the teaching-learning process, steady partner, having physicians in the family, and satisfaction with the course.

**DISCUSSION**

In the present study, the prevalence of depressive symptoms found among medical students at UFS was elevated, although it was slightly lower than that found at Universidade da Região de Joinville (SC, Brazil) using the same cut-off points. It was higher than that found at Universidade Federal de Goiás and that found by some investigators in the general population, between 3% and 11%.

In a study from China, the investigator used BDI in medical students in Hong Kong, with cut-off points of 9/10 and 29/30, and found that 50% of the students had depression (BDI > 10), and 2% of them had severe depression (BDI > 30). In our study, by using the same cut-off points, we found similar results, although the prevalence was lower, demonstrating that the problem is relevant.

Several studies point at a higher prevalence of depressive symptoms in medical students compared with the general population, and this has also been found in the present study, in accordance with other national and international studies mentioned above.

No significant differences were found associated with depressive symptoms between genders; this was also shown in a Finnish longitudinal study involving medical students followed-up over the six years of the course. However, other studies show a higher depressive symptom prevalence among female medical students.

When the family income variable was evaluated, mild to moderate depressive symptoms were ascertained among those students with a lower family income, with increased prevalence of depressive symptoms as the family income decreased. Such finding agrees with another study on the same theme. Thus, we can deduce financial difficulties might be behind this finding, interfering with the student’s mood.

A higher percentage of mild to moderate depressive symptoms could also be identified among those students who had thoughts of dropping out and who considered the course below their expectations; those who said their academic performance was average; those who said they had not developed the skills required to be good physicians in the future; those who said they were uncomfortable with the course activities; those who felt emotional stress; those who were not given the required emotional support; those who had average expectations for the future; and those who did not feel happy.

These findings suggest that, in addition to the inherent difficulties of medical school, those resulting from individual characteristics can lead to the emergence of depressive symptoms. Millan reported that medical students showing a better school performance are the most demanding and, as a consequence, they are more likely to suffer imposed pressure when any failure occurs. This results in feelings of worthlessness, thoughts of dropping out, suicidal ideation, and depression. Feelings like these were identified by other authors in students who used to be top of their classes and suddenly began to face frustration due to bad grades, lack of mastery of the subject studied, and loss of patients.
Investigators report that the time when the greatest psychological distress is experienced by the students corresponds to that when they come in contact with seriously ill patients. In our reality, this corresponds to the last semesters of the course, the final stage of medical training in graduate school, when contact is strict and exhaustively intensified. This is the moment when students face their incapacity to master medical knowledge as well as they did in secondary and elementary school; in addition, they often find their grades do not reflect the real acquisition of knowledge, and this makes them feel frustrated.

Regarding the progressive impairment of mental health in medical students over the course, some investigators demonstrated that freshmen had a prevalence of depressive symptomatology which was similar to that of the general population. However, as they carried on the course, their complaints increased and so did the prevalence of common mental disorders (CMD) (depressive, anxiety, and somatoform disorders), with a substantial increase in stress and psychological distress reports.

A study with the whole population of medical students from the same university revealed a CMD prevalence of 42.5%. After the final model adjustment of the logistic regression, the key factors were evidenced to be associated with the teaching-learning process and personal aspects, which were also implicated in the present study.

Other studies conducted at the University of Iowa showed enhanced complaints about the excessive class load, insufficient time to study, and lack of social life. This suggests medical school curriculum can play an important role in increasing the prevalence of depressive and anxiety symptoms in students, mostly in the final stage of graduate school.

Another important piece of information was that religiosity did not represent a protection factor from depressive symptoms, contrary to what is revealed in many literature studies. Maybe the positive answer of our respondents about having a religion does not characterize a real belief, but only a linking with no further commitment.

Emotional distress in medical students is not limited to themselves, but it has an emotional impact on their relationship with patients. Many studies demonstrate the negative influence of emotional distress on the empathy of medical students towards patients. A cross-sectional multicenter study in the USA involving 1,098 students from various medical schools demonstrated the negative and positive relationships of emotional distress and well-being, respectively, with the medical student’s empathy towards his/her patients.

The authors believe it is also very important to consider the repercussion of data regarding students pertaining to Group III (moderate to severe depressive symptoms) and Group IV (profound depressive symptoms). Although they represent a small proportion with no statistical significance, they belong to categories with more severe symptoms and, therefore, they have higher risks, including suicide. Therefore, these are categories with great clinical and epidemiologic significance that alone would warrant a more thorough care from institutions educating future physicians. Thus, we would not allow the investment in a human life, with an important social feedback to the community, to be abruptly discontinued in the course of professional education from the disability generated by the depressive symptoms or, even suicide.

Although there is no psychopedagogical support service for the medical student in the study institution, we believe that the acknowledgment of the present study results by the academic community can lead to reconsidering the role of the institution, the medical school curriculum and professors in eliciting, maintaining, and preventing the detected symptoms.

The BDI used in the current study aims to detect depressive symptoms, rather than the presence or absence of a depressive episode and, thus, many false-positive results can be found. Therefore, a diagnostic tool could have been used additionally to BDI, as some investigators in a multicenter study did, using psychiatrists trained in the diagnosis of a depressive episode in the positive cases. However, this would be expensive and time-consuming for the present study, implying the identification of the study subjects, and the authors chose not to, as this could lead to dissimulation and refusal to answer truthfully in the face of more embarrassing questions.

Another limitation is that we cannot establish causality between the associations found, since we analyzed end-point and exposition at the same time, which is a feature of cross-sectional studies. Yet the findings in this study are useful to promote a greater reflection on the teaching-learning process in medical education and to support preemptive strategies aimed at student emotional distress. We understand, however, that further studies on the subject, especially with a longitudinal and qualitative design, are required.

**Conclusion**

The high prevalence of depressive symptoms among medical intern students at UFS associated with factors related to the teaching-learning process and personal aspects point at the need for changes in medical education, including the implementation of preemptive measures for the future physician.

More elucidative answers will come after the conclusion of another study already started by the authors in a medical class who entered the same institution in 2006 (for the 2006–2011 period), which is being evaluated each semester from the first day of school until the end of the in-
ternship. Other studies conducted in different settings and with other student populations will contribute to finding the consistency of the results achieved in the current study.

The group classification by symptom severity with individuals who met the criteria for groups with moderate (Group III) and profound (Group IV) depressive symptoms is important. Although with lower prevalence and no statistical significance, this has expressive clinical-epidemiologic significance and shows the problem is relevant.

The high satisfaction level with the medical school choice, the good future expectations, and the happiness feeling reported by most subjects at the end of the course, despite the difficulties, suggest certain ambivalence that is characteristic of young people experiencing a transition moment. These students are similar to adolescents about to move onto the next phase in life, with all the fear, misery, joy, and hope implicated, and this also points at the good resilience many of them display.

Thus, we believe that deep reflection on the medical education model adopted and the creation of a psychopedagogic support service for medical students, like those found in reference centers in medical education in Brazil and other countries, will contribute to ameliorate the students’ emotional distress, as well as appropriately strengthen their defensive strategies to cope with the problems inherent to the occupation they have chosen.

References