Original Article

Suicidal Ideation in Medical Students: Who Is at Risk?

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Abstract

Introduction: Suicide is one of the most tragic problems medical schools are facing today. It is an issue that has not escaped medical schools in either developing or developed nations. To combat this trend, medical educators require efficient and effective strategies for the immediate identification of students who are at an elevated risk of harming themselves. Materials and Methods: National Yang Ming University medical students were surveyed on various demographic, academic, personal, and extracurricular subjects as well as assessed for suicidal ideation. In addition, students completed the Chinese Health Questionnaire (CHQ, a translated and modified version of the General Health Questionnaire, GHQ), and the Taiwanese Depression Questionnaire (TDQ, a translated and modified version of the Center for Epidemiologic Studies' Depression Scale, CES-D). Results: The rate of suicidal ideation was significantly higher in second year students as opposed to first year students (P <0.01). Students of lower socioeconomic status (P = 0.04), with non-inflammatory joint pain (P = 0.02), with headache (P = 0.047), with sleep disorders (P = 0.04), who scored as depressed on the TDQ (P <0.01), and/or who scored abnormally on the CHQ (P <0.01) were all significantly more likely to have experienced suicidal ideation. Conclusion: A number of groups at high risk for suicidal ideation, and thus in greater need of support, were identified. Suicide intervention programmes and depression counselling should target older students and students of lower socioeconomic status. Students presenting to university clinics with non-inflammatory joint pain, headache, and/or sleep disorders should be evaluated for suicidal tendencies. The TDQ and CHQ are potentially valuable screening tests for early detection of potential suicidal students.

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Key words: CHQ, Depression, Socioeconomic status, Stress, TDQ

Introduction

It has long been acknowledged that medical students are at a greater risk for depression,[1] but their elevated risk for suicide is particularly alarming. Despite general agreement that an elevated risk does exist, previous studies have not been able to consistently quantify or qualify that risk. One study determined that the cross-sectional prevalence of students who have attempted suicide was 2.7%,[2] while another quoted 1.4%.[3] Other studies have instead looked at suicidal ideation in medical students and have found quite a spectrum of rates, ranging from 6.0% to 43.0%.[3-6]

Even from the very beginning of their medical education, medical students are confronted by incredibly high levels of stress due to the intensity of medical education, as well as the immense financial pressures levied by the high cost of medical education.[7] An important foundational study performed by Vitaliano et al[8] showed that not only do the rates of depression doubled by the start of the second year of medical school, but that medical students have on average higher levels of anxiety than psychiatric patients taken from the general population. Another study examined the prevalence of suicidal thoughts in medical students in comparison to the general population. An extraordinary 43.1% of medical students were found to have had experienced suicidal thoughts, while only between 4% and 18% of the general population had had similar thoughts.[9]

These feelings of depression and anxiety are likely exacerbated by the stigma that they caused. A recent study at the University of Michigan School of Medicine found that 53% of those who were identified as depressed felt that to tell a superior could put their competitiveness for

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residency at risk.[10] Many students also fear that starting mental health treatment may be detrimental to their career, or that they may be recognised by their colleagues who are mental health professionals.[11]

Moreover, numerous recent reports of Chinese medical students committing suicide have brought the issue to the centre stage in Asia, particularly in the medical communities. Studies have found that as many as 24.5% of Chinese medical students have experienced suicidal ideation at one point of time or another.[12] Other studies[13] have shown that out of every 10 Taiwanese university students, one has attempted suicide. This rate is even higher among Taiwanese medical students, with 14% of them having attempted suicide.

Kachur et al[14] pointed out that suicidal behaviour tends to follow a logical psychological process, starting from the idea of suicide, followed by suicidal ideation, suicide plans, suicide preparation, and finally, suicide attempts and/or death by suicide. According to Beck's[15] research, young people with suicidal ideation are 5 times more likely to attempt suicide. Though the levels of suicidal ideation are quite high amongst medical students, the actual suicide attempts are relatively low, there is significant room for intervention.[3] The identification of precise risk factors associated with suicidal ideation in medical students would enable medical school faculty to enact appropriate measures for early detection of at risk students. These students could then be referred to the appropriate counselling centers.

The World Health Organization (WHO) noted that many complex factors can increase a person's risk for suicidal ideation, including psychological, social, physiologic, cultural, and environmental factors. A few studies have examined the precise factors associated with suicidal ideation in medical students. Dyrbye[5] found that medical students who have experienced burnout are more likely to also have suicidal ideation. Another study found that body dissatisfaction, though not BMI, is associated with both suicidal ideation and suicide attempts in adolescents.[16] Korean medical students who have experienced emotional abuse, particularly parental emotional abuse, are more likely to exhibit suicidal behaviour.[17] Chinese male medical students who have experienced insomnia, physical abuse, bad moods, feelings of hopelessness, or who engaged in risky sexual behaviour are more likely to experience suicidal ideation.[18] Tyssen et al[3] found that being unmarried, having experienced negative life events, and mental distress, both of anxious and depressive variety, are all associated with suicidal ideation in medical students.

Additionally, one study examined factors associated with suicide attempts in Taiwanese youths. Female gender, low self esteem, weekly alcohol use, illicit drug use, depression, family conflicts, low maternal education, poor family function, and poor interaction in peer groups all significantly increase the risk that an adolescent will attempt suicide.[19]

Although there are previous studies examining risk factors for suicidal behaviour in medical students and a few studies examining risk factors for suicidal behaviour among Taiwanese youths, there are no studies examining risk factors for suicidal behaviour among Taiwanese (of Chinese descent) medical students. Therefore, the purpose of this study is to determine those specific factors that place medical students at risk for suicidal ideation. Appropriate interventional strategies can thus be designed to target high-risk students for suicidal ideation before they have the opportunity to attempt suicide.

Materials and Methods

This study examined medical students admitted to the National Yang Ming University School of Medicine between the years 2003 and 2007. Ninety-four (75.8% response rate) students admitted in 2003, 95 (76.6% response rate) students admitted in 2005, 124 (98.4% response rate) students admitted in 2006, and 122 (96.1% response rate) students admitted in 2007 were surveyed by questionnaire. Students admitted in 2005, 2006, and 2007 completed the questionnaire upon matriculation. Students admitted in 2003 did not complete the questionnaire until their second year.

Suicidal ideation was defined by students' response to the statement "I feel that things are too hard, and I want to die." Of the 435 students, 12 (2.8%) students responded positively, 38 (8.7%) students did not respond, and 385 (88.5%) students responded negatively. Students who did not respond negatively were considered to have suicidal ideation. Thus, 50 (11.5%) students were determined to have suicidal ideation.

In addition to the question measuring suicidal ideation, the questionnaire included questions concerning parental education and career, personal preferences, extracurricular experiences, physical ailments, psychological conditions, and stress. The Chinese Health Questionnaire (CHQ, a translated and modified version of the General Health Questionnaire) and the Taiwanese Depression Questionnaire (TDQ, a translated and modified version of the Center for Epidemiologic Studies Depression Scale, CES-D) were also included (Appendix 1).[20-23] The CHQ is a multidimensional test with 4 subscores that respectively evaluate somatic disorders, anxiety and insomnia, social disorders, and severe depression. It has a total of 30 questions, and each question is measured on a 4-point Likert scale.[20] The TDQ has a total of 18 questions and also uses a 4-point Likert scale.[23]

Additionally, descriptive data including admission route, gender, and year of admission were collected. Finally, admission exam score and first year Grade Point Average (GPA) were obtained as measures of academic performance.

The association between each of the aforementioned variables and suicidal ideation was evaluated using the independent samples T test or the chi-square test where appropriate. Fisher's exact test was used when the chi-square 2x2 contingency table showed an expected value of less than 5.

Results

Table 1 lists the various characteristics of the students and shows whether or not students had suicidal ideation by these characteristics. The rate of suicidal ideation was higher in second year students (for the class admitted in 2003) than in first year students (P <0.01). Though 43.6% of the students took the survey in their second year reported suicidal ideation, only 3.2%, 3.2%, and 1.6% of students respectively in the classes that took the survey in their first year (classes admitted in 2005, 2006, and 2007) reported suicidal ideation.

Females (13.5%) were slightly more likely than males (10.3%) to have suicidal thoughts. However, the difference in suicidal ideation across gender was not statistically significant. Students with parents who were not educated beyond high school had significantly higher rates of suicidal ideation. This was true for both students' mothers (P = 0.048) and fathers (P = 0.040); 7.4% of students who had a father who never received education beyond high school reported suicidal ideation, while only 9.5% of students who had a father who received a college education reported suicidal ideation; 15.5% of students who had a mother who never received education beyond high school reported suicidal ideation, while only 9.1% of students who had a mother who received a college education reported suicidal ideation.

Table 1. Student Characteristics

Characteristics		Year of Admission				
		Total	2003	2005	2006	2007
Suicidal Ideation	No	385	56.4%	96.8%	96.8%	98.4%
	Yes	50	43.6%	3.2%	3.2%	1.6%

Characteristics		Suicidal Ideation		*P* value
		Yes (%)	No (%)	
Gender	Male	10.3	89.7	0.34
	Female	13.5	86.5	
Father's Education	High School and Below	17.4	82.6	0.04*
	College and Above	9.5	90.5	
Mother's Education	High School and Below	15.5	84.5	0.048*
	College and Above	9.1	90.9	

A P value <0.05* was considered statistically significant; if the 20% expected value was less than 5, Fisher's exact test was used.

Table 2 shows suicidal ideation rates in students who both had and did not have certain physical illnesses. Students with non-inflammatory joint pain (P <0.010) and sleep disorders (P = 0.030) were significantly more likely to have experienced suicidal ideation.

Table 2. Physical Factors

Physical Factors		Suicidal Ideation		*P* value
		Yes (%)	No (%)	
Non-Inflammatory Joint Pain	No or Slight	10.7	89.3	<0.01*
	Yes	50	50	
Headache	No or Slight	11.0	89.0	0.07
	Yes	28.6	71.4	
Sleep Disorders	No or Slight	10.5	89.5	0.03*
	Yes	25.9	74.1	

A P value <0.05* was considered statistically significant; if the 20% expected value was less than 5, Fisher's exact test was used.

Table 3 shows suicidal ideation rates as a function of various psychological factors. Students who had low confidence levels (P = 0.010), felt jumpy or nervous (P = 0.010), felt useless (P <0.010), did not feel hopeful about the future (P = 0.010), felt hopeless about the future (P = 0.010), felt dissatisfied about their life (P <0.010), felt that they could not overcome their frustrations nor face their own challenges (P = 0.010), and felt high levels of fatigue (P <0.010) were all significantly more likely to have experienced suicidal ideation. Additionally, students with persistent mental stress (P <0.010) and living stress (P = 0.010) were significantly more likely to have experienced suicidal ideation. However, students with academic stress were not significantly more likely to have experienced suicidal ideation than students without academic stress.

Table 4 shows the relationship between TDQ and CHQ scores and risk of suicidal ideation. Those who scored as depressed on the TDQ (P <0.010) were significantly more likely to have experienced suicidal ideation. Those who scored abnormally on the CHQ (P <0.010) were also significantly more likely to have experienced suicidal ideation. Furthermore, all 4 of the CHQ subscores showed significant associations with risk of suicidal ideation. Students with abnormal somatic disorders (P <0.010), anxiety and insomnia (P <0.010), social disorders (P = 0.020), and depression (P <0.010) subscores were all significantly more likely to have experienced suicidal ideation.

Finally, extracurricular interests were examined (data not shown). Out of all of the extracurricular interests examined,

Table 3. Psychological Factors

Psychological Factors		Suicidal Ideation		*P* value
		Yes (%)	No (%)	
Low Confidence	No	9.8	90.2	0.01*
	Yes	20.9	79.1	
Feel Jumpy or Nervous	No	10.1	89.9	0.01*
	Yes	21.4	78.6	
Feel Useless	No	2.6	97.4	<0.01*
	Yes	23.1	76.9	
Feel Hopeful About the Future	Positive	9.7	90.3	0.01*
	Negative	24.1	75.9	
Feel Hopeless About the Future	No	10.6	89.4	0.01*
	Yes	33.3	66.7	
About My Life, I Feel:	Satisfied	9.3	90.7	<0.01*
	Dissatisfied	32.4	67.6	
Toughness: I Believe I Can Overcome My Frustrations and Face My Own Challenges	Yes	9.5	90.5	0.01*
	No	21.6	78.4	
Stress				
Persistent Mental Stress	No	7.3	92.7	< 0.01*
	Yes	20.5	79.5	
Living Stress	No & Normal	8.5	91.5	0.01*
	Yes	16.7	83.3	
Academic Stress	No & Normal	8.9	91.1	0.14
	Yes	13.4	86.6	

*A *P* value <0.05 was considered statistically significant; if the 20% expected value was less than 5, Fisher's exact test was used.

Table 4. Health Questionnaires

		Suicidal Ideation		*P* value
		Yes (%)	No (%)	
TDQ	Normal	1.4	98.6	<0.01*
	Depressed	26.9	73.1	
CHQ	Normal	8.7	91.3	<0.01*
	Abnormal	33.3	66.7	
Somatic Disorders	Normal	10.3	89.7	<0.01*
	Abnormal	55.6	44.4	
Anxiety & Insomnia	Normal	8.0	92.0	<0.01*
	Abnormal	35.2	64.8	
Social Disorders	Normal	10.6	89.4	0.02*
	Abnormal	33.3	66.7	
Depression	Normal	10.5	89.5	<0.01*
	Abnormal	46.2	53.8	

*A *P* value <0.05 was considered statistically significant; if the 20% expected value was less than 5, Fisher's exact test was used.

TDQ: Taiwanese Depression Questionnaire; CHQ: Chinese Health Questionnaire

only "Have you been to art museums in Taiwan in the past year?", "Do you have hobbies outside of class?", and "Do you exercise regularly?" were significantly associated with suicidal ideation at $\alpha = 0.050$, with students who had been to art museums in the past year ($P < 0.010$), who had no hobbies outside of class ($P = 0.030$), and who did not exercise regularly ($P = 0.040$) were more likely to have experienced suicidal ideation.

Discussion

Suicide rates continue to rise all over the world, particularly in adolescents. One group at high risk for suicide is medical students.[5,6,24] Like the rest of the world, medical students in Taiwan and China are an outstanding group of young people. They represent the best and the brightest of the local educational system, with a profound record of excellence both inside and outside of the classroom. However, the high rate of suicidal ideation in this group of population warrants our attention.

Identification of certain high-risk groups can allow for the early detection of students who may harm themselves. Students in such groups can then be referred for appropriate counselling or assessed more stringently for suicide risk. Previous studies[3, 17-19] of youngsters' suicide risk focused on psychological and emotional stress. Our results indicate that a number of factors, including physical health, are significantly associated with suicidal ideation.

Students with certain physical complaints, including non-inflammatory joint pain and sleep disorders, are at an increased risk of having experienced suicidal ideation. Thus, students with these physical complaints represent a high-risk group that could be targeted for intervention. Students who present to university clinics with the aforementioned symptoms should be assessed thoroughly for depression and suicidal ideation. If suicide risk is determined to be high, appropriate referral should be made.

TDQ and CHQ scores, including all 4 CHQ subscores, are all significantly associated with suicidal ideation. Thus these mental health measures may be able to serve as appropriate screening tools for the identification of high-risk students. Medical schools may wish to administer these, or similar, tests to their students. Those students who score abnormally can then be referred for appropriate counselling as well as for assessment of suicide risk.

Parents' education, both father's and mother's, are both associated with suicidal ideation, with students with parents who did not complete college being at a significantly greater risk of having experienced suicidal ideation. Using parents'

education as a proxy for socioeconomic status (SES), our results imply that students of lower SES are at an increased risk of having experienced suicidal ideation. Students from families of lower SES may be under additional burdens that students from families of higher SES do not experience. For example, financial strains can be a particularly high source of stress for medical students. Additionally, students from families of higher SES may find home to be a source of support. If their parents are in the medical field, they can offer guidance with career planning, and even if they are from another profession, the fact that they have completed college leaves them with a broader base of understanding from which they can support their child in terms of university life. Medical school administrators may wish to keep a particularly close eye on students of lower SES for signs of depression and/or suicidal ideation.

Students who do not have hobbies outside of class and who do not exercise regularly are at a significantly greater risk of having experienced suicidal ideation. Students with suicidal ideation may be too depressed to have or to find time for these extracurricular interests. Conversely, students who visited art museums in the past year are at a significantly greater risk of having experienced suicidal ideation. Art museums may appeal to students with suicidal ideation in a way that other hobbies and exercise do not. Perhaps it is the deeply introspective, self-examining nature of art that attracts these students. A suicidal student may wish to explore the meaning of his/her life on a deeper level, and visiting an art museum can offer such an opportunity.

Females are not significantly more likely to have experienced suicidal ideation than males, although the females in our sample do have a slightly higher rate of suicidal ideation. This finding is somewhat surprising given that prior research has shown suicidal behaviour to be more common in females. Because our sample is quite large, it is unlikely that statistical power is an issue, but rather that sociocultural phenomena in Taiwan and in Taiwanese medical institutions have altered the gender-based risk factors for suicidal behaviour.

Survey assessment of suicidal ideation is naturally prone to the effects of recall bias. A particular student may have experienced suicidal ideation at one point but may have been unable to recall having such feelings at the time he or she complete the survey. Thus, due to recall bias, it is likely that the identified suicidal ideation rate is lower than the actual rate in our sample.

After giving careful credence to Taiwanese cultural norms, it was decided that all students who did not respond negatively to the statement "I feel that things are too hard, and I want to die," would be included in the suicidal ideation group, instead of merely those who responded positively. Taiwanese students who have experienced psychiatric disturbances are generally reluctant to acknowledge those disturbances to their seniors. Many fear that admitting such feelings would lead to prejudice, suspension, or even outright expulsion from the university. Students have valid reasons to hold such fears. It is the unexpressed practice of the admissions committee at our university as well as at a number of other institutions in Taiwan to reject applicants who admit to or who outwardly display signs of mental disturbances. For this reason, no applicant can be accepted to the university without undergoing an interview with a faculty member from the Department of Psychiatry. Furthermore, students who develop mental disturbances following admission tend to be recommended for transfer to other graduate programmes or placed on suspension from clinical activities. Thus, students who completed the entire survey with the sole exception of the one question assessing suicidal ideation, should be assumed to have done so intentionally. Through private discussions with students who did not respond to the suicidal ideation question, this was confirmed. Five students admitted that they were unwilling to disclose whether or not they had experienced suicidal ideation due to the fear of negative consequences. Two students approached the principal investigator on their own to acknowledge a history of visiting psychiatrists, depression since high school, and suicide attempts. Unfortunately, one student successfully committed suicide during her tenure at our university.

While most of the students completed the surveys at the time of matriculation, one class completed the surveys during their second year. The students who completed the surveys during their second year had more than one year of medical school experience (and all of the stressors that come along with it) than those who completed the surveys upon matriculation. It would thus be expected that these students would be more prone to depressive and suicidal behaviour, and indeed the rate of suicidal ideation was significantly greater in the class that completed the surveys during their second year.

Further research is necessary to examine whether or not physical health, socioeconomic status, and extracurricular involvement are risk factors for suicidal ideation in medical students outside of Taiwan and China, and thus relevant for early identification of such students in other countries like the United States.

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Appendix 1

Cronbach's α	Score	Range
CHQ-30	0.90	0 to 25
Somatic Symptoms	0.78	0 to 7
Anxiety and Worrying	0.79	0 to 6
Social Dysfunction	0.72	0 to 4
Depression / Poor Family Relation	0.67	0 to 4