Research Article

Suicidal Ideation and Its Associated Factors in Medical, Dental, and Pharmacy Students: A Cross-Sectional Study during COVID-19 Pandemic

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Objectives. This study is aimed at comparing the prevalence of suicidal ideation among Iranian medical, dental, and pharmacy students and determining the demographic and basic characteristics and mental and psychological issues associated with suicidal ideation in these students.

Methods. This cross-sectional online survey was conducted during the 2020-2021 academic year on medical, dental, and pharmacy students studying at the Tehran University of Medical Sciences (TUMS). The questionnaire consisted of six sections: Beck Hopelessness Scale (BHS), General Health Questionnaire (GHQ), Perceived Stress Scale (PSS), UCLA loneliness scale, Maslach Burnout Inventory-Student Survey (MBI-SS), and a questionnaire that was designed to evaluate students’ family history, current psychological status, and basic and demographic characteristics.

Results. In total, 419 students participated in our study, with 133 (31.7%) being medical students, 85 (20.3%) being pharmacy students, and 201 (48%) being dental students. In our study, the prevalence of suicidal ideation was 32%. Family history of psychological issues (OR = 2.186, P = 0.012), current or past smoking (OR = 2.155, P = 0.01), parents not living together (OR = 2.512, P = 0.046), and satisfaction with the current field (OR = 0.51, P < 0.001) were all independently associated with the presence of suicidal ideation. Also, higher scores in BHS (OR = 1.167, P < 0.001), PSS (OR = 1.081, P = 0.001), and UCLA loneliness scale (OR = 1.057, P < 0.001) were independently associated with a higher risk of suicidal ideation.

Conclusion. The prevalence of suicidal ideation among Iranian medical, dental, and pharmacy students is relatively high and has increased during recent years, which needs emergent action.

1. Introduction

Suicide is defined as an individual intentionally ending their own life and is one of the major public health issues worldwide [1, 2]. According to the global burden of disease study, in 2016, 817000 deaths due to suicide were recorded globally, indicating a 6.7% increase from 1990 [3]. In Iran, there has also been a similar increasing trend in the mortality and years of life lost (YLL) rates of suicide, especially in males, in recent years [4]. Even though suicide is a public health concern in all age groups, most suicides occur in individuals aged 20-25, most from low and middle-income countries [1]. Suicide is also the second cause of death in individuals aged 15 to 29 years [1]. Similarly, there has been a shift in the incidence of suicide from middle-aged to younger individuals in Iran, and Iran’s highest suicide attempt and suicide mortality rates have been in the 15-24 and 25-34 age groups, respectively, leading to the highest YLL compared to other age groups [4–6].

A suicide attempt is an endpoint of a complex process consisting of three premotivational, motivational, and volitional phases [7–9]. Multiple environmental, biological,
and psychological factors (premotivational phase) may lead to suicidal ideation (motivational phase) in an individual; however, the presence of suicidal ideation does not necessarily lead to a suicide attempt (volitional phase), with about 40% of individuals with suicidal ideation do not attempt suicide in a year after the development of these thoughts [8, 10, 11]. Other factors, such as impulsivity, play roles in someone with suicidal ideation acquiring suicide capability and committing suicide [8, 10]. Therefore, screening for suicidal ideation is important as these people benefit from preventive interventions. Also, identifying the risk factors of suicidal ideation and designing interventions to reduce their burden can be strategies to decrease the incidence of suicidal ideation [12, 13]. Interventions improving students’ mental health, such as those enhancing resilience and mindfulness, might also reduce the incidence of suicidal ideation [14, 15].

Some people are at higher risk of suicide which may be targeted in suicide prevention programs [16]. Healthcare providers are of these high-risk populations, and pharmacists, dentists, and doctors are among the high-risk occupations for suicide [17]. Studies on the prevalence of suicidal ideation and suicide risk among medical doctors of different countries have indicated a higher risk of suicide in this population compared to the general population [18–24]. In their first year at medical school, the prevalence of psychological issues, which are the main risk factors for suicidal ideation, in medical students is not significantly different from those of the same age [25–27]. However, the situation worsens during medical school education. In the later years of education, the prevalence of suicidal ideation increases in medical students, which may be a reason for the higher risk of suicidal ideation among doctors [23, 28]. Many studies have evaluated suicidal ideation and its possible risk factors among medical students. They have found several mental and psychological factors that may lead to suicidal ideation, including burnout, depression, anxiety, neuroticism, and obsessive-compulsive disorder [19, 28–31]. Affective temperamental dysregulation is also associated with higher levels of hopelessness, which can increase the risk of suicidal ideation [32]. However, despite the high prevalence of suicidal ideation in pharmacy and dental students, even comparable to medical students, there are only limited studies on the prevalence and predictors of suicidal ideation among these students [33–38], warranting more comprehensive studies on these students. It gets more important considering the rise in suicidal ideation among students during the COVID-19 pandemic [39]. The COVID-19 pandemic has put healthcare workers at a higher risk of psychological issues, fatigue, stress, and burnout [40]. For example, about 50% of medical students have experienced burnout during the COVID-19 pandemic, which can be a risk factor for suicidal ideation [41]. These findings warrant further action to address these psychological issues and students in the related fields to prevent further devastating consequences, such as suicidal ideation and suicide [41].

Studies on suicidal ideation in healthcare professions have been very limited in Iran. In two studies evaluating suicidal ideation among medical students, the prevalence of suicidal ideation was estimated to be about 16%, indicating a higher prevalence of suicidal ideation among Iranian medical students than the global average of 11% [29, 42, 43]. These studies also found that hopelessness and neuroticism are associated with higher risks of suicidal ideation among Iranian medical students [42, 43]. In another study in Iran, the prevalence of suicidal ideation among nursing, midwifery, and medical emergency students was about 26% [44].

To date, no study has evaluated the prevalence of suicidal ideation among Iranian dental and pharmacy students. Even on a global scale, there are limited studies on suicidal ideation in these populations. Also, most studies evaluating the psychological issues associated with suicidal ideation have focused on a limited number of factors. Only a few comprehensive studies have evaluated the associations of multiple psychological and mental factors with suicidal ideation in medical students. Therefore, this study was conducted to address three aims. First, determining the prevalence of suicidal ideation among Iranian pharmacy and dental students compared to medical students. Second, determining basic and demographic characteristics associated with suicidal ideation in Iranian medical, pharmacy, and dental students. Third, determining the mental and psychological factors, including hopelessness, stress, loneliness, and burnout, independently associated with suicidal ideation among Iranian medical, pharmacy, and dental students. We hypothesized that the prevalence of suicidal ideation is significantly different among medical, dental, and pharmacy students, and psychological issues are associated with a higher risk of having suicidal ideation among students.

2. Methods

2.1. Study Design and Setting. This cross-sectional study was conducted during the 2020-2021 academic year on medical, dental, and pharmacy students studying at the Tehran University of Medical Sciences (TUMS). Our study used convenience sampling methods. In the first step, we designed an online questionnaire using Google Forms, which contained questionnaires evaluating students’ basic and demographic characteristics, family and past medical and psychological history, hopelessness, loneliness, stress, burnout, and suicidal ideation. In the second step, we drafted a message containing the study goals and objectives, inviting the students to participate in the study if they were interested, and had a link to the online questionnaire. Finally, using convenience sampling, we sent the questionnaire to the available and known medical, pharmacy, and dental students’ groups and channels on social media, such as WhatsApp. We also asked them to share the message with their friends and colleague, if possible. Those interested in participating in the study could open the link and complete the questionnaire. The study was conducted according to the Declaration of Helsinki, and participation in the study was voluntary. The ethics committee of TUMS approved the study protocol (ethics code: IR.TUMS.MEDICINE.REC.1397.428).

2.2. Participants. Our inclusion criteria were as follows: (1) studying medicine, dentistry, or pharmacy at TUMS during the 2020-2021 academic year, (2) Iranian nationality, (3)
understanding the Persian language, and (4) giving consent
to participate in the study. Medical residents and students
of other healthcare fields were excluded from the study.
Also, those students who were not from Iran were excluded.
The students were enrolled regardless of their history of psy-
chological diseases, suicide attempts, stage of education, and
ethnicity.

2.3. Data Collection Tools. The questionnaire consisted of six
sections: Beck Hopelessness Scale (BHS), General Health
Questionnaire (GHQ), Perceived Stress Scale (PSS), UCLA
loneliness scale, Maslach Burnout Inventory-Student Survey
(MBI-SS), and a questionnaire that was designed to evaluate
students’ family history, current psychological status, and
basic and demographic characteristics. We selected the ques-
tionnaire based on their validated Persian version’s availabil-
ity and use in previous studies evaluating suicidal ideation
and psychological issues among students to compare our
findings with previous studies.

The first questionnaire included students’ family history,
current psychological status, and basic and demographic
characteristics. It consisted of questions on students’ gender,
age, the year they entered the university, current residence,
marital status, reason for choosing their current field, and
whether they had investigated their current field before
choosing it. Students were asked to determine how satisfied
they were with their current field on a Likert scale from 1
(least satisfaction) to 5 (most satisfaction). The question-
naire also consisted of questions evaluating their family sta-
tus, including parents’ ages and educational status, parents’
death, family income per month, and whether their parents
are living together at the moment or not. There were also
questions evaluating students’ and their family history of
smoking, addiction, psychological issues, self-harm, and
suicide attempt.

2.3.1. The Beck Hopelessness Scale (BHS). BHS was designed
by Beck et al. for the evaluation of hopelessness. It consists of
20 true-false items, and 1 point belongs to the pessimism
answer to each item. The total score is the sum of all items’
scores and is calculated out of 20, with higher scores indicat-
ing more severe hopelessness [45]. The Persian version of
BHS was used in the current study, which has high reliability
and good internal consistency (Cronbach’s alpha of 0.79) in
evaluating hopelessness among Iranians [46, 47].

2.3.2. The General Health Questionnaire (GHQ). The GHQ,
designed by Goldberg and Goldberg and Hillier, is a reliable
and valid screening tool for psychological issues, consisting
of 28 items and four subscales, including social dysfunction,
depression, anxiety and insomnia, and somatic symptoms.
Each item is scored on a Likert scale from 0 to 3, with higher
scores indicating more severe symptoms in each subscale
[48, 49]. GHQ has been translated into Persian and is vali-
dated for use among Iranians. The Persian version of the
GHQ has a Cronbach’s alpha of 0.923. Also, Cronbach’s
alpha value was above 0.7 for all subscales [50].

We used four items from the Persian version of GHQ to
evaluate suicidal ideation in the past month. These items
were “Thought of the possibility that you might make away
with yourself,” “Found that the idea of taking your own life
kept coming into your mind,” “Felt that life isn’t worth liv-
ing,” and “Found yourself wishing you were dead and away
from it all.” A score of 2 or 3 for any of these items was con-
sidered suicidal ideation [43, 48, 49, 51].

2.3.3. The Perceived Stress Scale (PSS). PSS was designed by
Cohen et al. for the evaluation of perceived stress. This ques-
tionnaire consists of 14 items that are scored on a Likert
scale from 0 to 4. The total score is the sum of all items’
scores and is calculated out of 56, with higher scores indicat-
ing more severe perceived stress [52]. Our study used the
Persian version of PSS, a reliable tool with acceptable inter-
nal constancy (Cronbach’s alpha = 0.78) for evaluating per-
ceived stress in the past month among Iranian students [53].

2.3.4. The UCLA Loneliness Scale. The UCLA loneliness
scale, designed by Russell et al. and Russell DW, is a standard
tool for evaluating loneliness. This questionnaire consists of
20 items, with 11 scored on a Likert scale from 1 (never) to 4
(always), and the scoring is reversed for the remaining items.
The total score is the sum of all items’ scores and ranges
from 20 to 80, with higher scores indicating more severe
loneliness [54, 55]. Our study used the Persian version of
the UCLA loneliness scale, a reliable (Cronbach’s alpha = 0.91)
and valid tool evaluating loneliness among Iranians,
including students [56, 57].

2.3.5. The Maslach Burnout Inventory-Student Survey. The
MBI-SS was designed to evaluate burnout among students
and is a modified version of the Maslach Burnout
Inventory-General Survey. MBI-SS consists of three sub-
scales, exhaustion (five items), cynicism (four items), and
professional efficiency (six items). Each item is scored on a
Likert scale from 0 to 6. The total score of each subscale
is the sum of all related items’ scores, and for exhaustion
and cynicism, higher scores indicate more burnout. For
professional efficiency, lower scores indicate more burnout
[58, 59]. We used the Persian version of MBI-SS, a reliable
and valid tool for evaluating burnout among Iranian stu-
dents. All subscales also have a good internal consistency
with Cronbach’s alpha of higher than 0.8 for all subscales.
Also, the test-retest reliability of the Persian version of
MBI-SS is approved with a reliability coefficient higher
than 0.65 for all subscales [60].

2.4. Statistical Analysis. We calculated the mean and stand-
ard deviation (SD) for continuous variables and the num-
ber and percentage for categorical variables. We used the
Chi-square or Fisher’s exact tests to compare the categorical
variables across groups. Also, the Kolmogorov-Smirnov test
was used to determine whether continuous variables are dis-
tributed normally or not. As none of these variables were
distributed normally (P < 0.05), we used nonparametric tests
to compare continuous variables across groups, including
the Mann-Whitney and Kruskal-Wallis tests. We considered
P ≤ 0.05 as statistically significant. Two multiple backward
stepwise binary logistic regression models were used to
determine the basic characteristics associated with suicidal
ideation and questionnaire scores independently associated with suicidal ideation. SPSS software (version 22 for windows, SPSS inc., Chicago, Illinois) was used for analyses.

3. Results

In total, 419 students participated in our study, with 133 (31.7%) being medical students, 85 (20.3%) being pharmacy students, and 201 (48%) being dental students. In our study, the prevalence of suicidal ideation was 32%, and 18 (4.3%) students had attempted suicide. Forty-five medical students (33.8%), 29 pharmacy students (34.1%), and 60 dental students (29.9%) had suicidal ideation at the time of the study.

Family history and the basic and demographic characteristics of participants are shown in Table 1. Fifty medical students (37.6%), 50 pharmacy students (58.8%), and 117 (58.2%) dental students were female. The mean age of medical students was 24.15 (SD = 5.81), which was significantly higher than the mean age of pharmacy students (mean = 21.35, SD = 2.52, and P = 0.001), but was not significantly different with dental students (mean = 21.89, SD = 3.25, and P = 0.052). The prevalence of suicidal ideation was not significantly different between males and females (P = 0.465). However, the mean age of those with suicidal ideation was significantly higher than those without suicidal ideation (22.88 vs. 22.31, P = 0.006). The prevalence of suicidal ideation was significantly lower in those who had never smoked and those without a history of or current addiction (P < 0.01).

Psychological issues and suicidal ideation are compared between medical, dental, and pharmacy students in Table 2. BHS score was significantly lower (P < 0.05) in dental students (mean = 5.9 and SD = 4.17) than in medical (mean = 7.28 and SD = 4.72) and pharmacy students (mean = 7.8 and SD = 4.59). Also, the mean UCLA loneliness scale score was significantly higher in pharmacy students than in dental students (49.3 vs. 44.23, P = 0.007). The prevalence of diagnosed psychological issues was significantly higher in pharmacy students compared to other students (P = 0.046). Also, the mean scores of all questionnaires and the prevalence of diagnosed psychological issues were significantly higher in students with suicidal ideation than in those without (P < 0.001).

The results of the multiple binary logistic regressions are shown in Table 3. Family history of psychological issues, current or past smoking, parents not living together, and less satisfaction with the current field were all independently associated with a higher risk of having suicidal ideation (P < 0.05). Also, higher scores in PSS, UCLA loneliness scale, and BHS were independently associated with a higher risk of suicidal ideation (P < 0.05).

4. Discussion

We found that about 30% to 35% of these students experienced suicidal ideation at the time of the study, indicating concerning levels of suicidal ideation among them. We found that higher levels of hopelessness, loneliness, and stress are associated with a higher risk of suicidal ideation among students. Also, family history of psychological issues, separation of parents, dissatisfaction with the current field, and history of smoking during life were independently associated with suicidal ideation.

We found that the prevalence of suicidal ideation among Iranian medical, dental, and pharmacy students is 33.8%, 29.9%, and 34.1%, respectively, and there was no significant difference between groups in this regard. Suicidal ideation among Iranian pharmacy and dental students was not evaluated before. However, previous studies on suicidal ideation in Iranian medical students during the 2018-2019 academic year had found a prevalence of about 16% [42, 43], which is considerably lower than our findings in the 2020-2021 academic year. Also, the global average of suicidal ideation among medical students is estimated to be 11%, indicating the current high prevalence of suicidal ideation among Iranian students is worrying, warranting serious and emergency actions [29]. One possible explanation for such an increase in the prevalence of suicidal ideation among Iranian students may be due to conducting the study during the COVID-19 pandemic, which may lead to an increase in suicidal ideation among the population [61, 62]. However, a study on Bangladeshi medical students revealed no increase in the prevalence of suicidal ideation among them during the COVID-19 pandemic compared to the prepandemic situation [39]. Therefore, the COVID-19 pandemic may not justify this considerable increase in the prevalence of suicidal ideation among Iranian students. Also, recent sanctions and the economic crisis during the COVID-19 pandemic may have worsened Iranian people’s financial and socioeconomic status [63, 64], which can be another factor leading to psychological issues and subsequent increase in suicidal ideation considering the association between worse socioeconomic status and higher risk of having suicidal ideation [65, 66]. There is still a need for studies to evaluate further the role of possible underlying factors, such as curricula and workload [67, 68]. Also, considering the high prevalence of suicidal ideation, there is a need for actions, such as screening students and interventions targeting modifiable predisposing factors to avoid consequences. Several strategies, such as improving spirituality and implementing preventive measures in both academic and clinical settings, might be beneficial in reducing the incidence of suicidal ideation and psychological issues among students during the pandemic [69].

We found no significant difference in the prevalence of suicidal ideation among medical, dental, and pharmacy students. Few studies are comparing suicidal ideation among students in these fields. In a study in Brazil, Alexandrino-Silva et al. found no significant difference in suicidal ideation among pharmacy and medical students [33]. Similarly, in another study, the prevalence of suicidal ideation among medical and pharmacy students in the United States (US) was 4.7% and 2.2%, respectively, and there was no significant difference between groups in this regard [70]. Alexandrino-Silva et al. hypothesized that unmeasured confounding factors might have led to a lack of difference between groups [33]. However, studying in one of the mentioned fields was not independently associated with suicidal ideation in our
| Variable                                      | Medical students (N = 133) | Pharmacy students (N = 85) | Dental students (N = 201) | Without suicidal ideation | With suicidal ideation | P value |
|-----------------------------------------------|-----------------------------|-----------------------------|---------------------------|---------------------------|------------------------|---------|
| Gender                                        |                             |                             |                           |                           |                        |         |
| Female                                        | 50 (37.6%)                  | 50 (58.8%)                  | 117 (58.2%)               | 144 (50.5%)               | 73 (54.5%)             | 0.465   |
| Male                                          | 83 (62.4%)                  | 35 (41.2%)                  | 84 (41.8%)                | 141 (49.5%)               | 61 (45.5%)             |         |
| Age (year)                                    | 24.15 (5.81)                | 21.35 (2.52)                | 21.89 (3.25)              | 0.001                     | 22.31 (4.56)           | 22.88 (3.61) | 0.006 |
| Years at university                           |                             |                             |                           |                           |                        |         |
| 1 year                                        | 22 (16.5%)                  | 15 (17.6%)                  | 40 (19.9%)                | 54 (18.9%)                | 23 (17.2%)             |         |
| 2 years                                       | 36 (27.1%)                  | 23 (27.1%)                  | 38 (18.9%)                | 75 (26.3%)                | 22 (16.4%)             |         |
| 3 years                                       | 26 (19.5%)                  | 22 (25.9%)                  | 14 (7%)                   | 33 (11.6%)                | 29 (21.6%)             |         |
| 4 years                                       | 17 (12.8%)                  | 8 (9.4%)                    | 34 (16.9%)                | <0.001                    | 45 (15.8%)             | 14 (10.4%) | 0.014 |
| 5 years                                       | 10 (7.5%)                   | 9 (10.6%)                   | 25 (12.4%)                | 28 (9.8%)                 | 16 (11.9%)             |         |
| 6 years                                       | 4 (3%)                      | 6 (6.1%)                    | 35 (17.4%)                | 25 (8.8%)                 | 20 (14.9%)             |         |
| 7 years or more                               | 18 (13.5%)                  | 2 (2.4%)                    | 15 (7.5%)                 | 25 (8.8%)                 | 10 (7.5%)              |         |
| Residence                                     |                             |                             |                           |                           |                        |         |
| Home with family                              | 67 (50.4%)                  | 61 (71.8%)                  | 124 (61.7%)               | 162 (56.8%)               | 90 (67.2%)             |         |
| Home alone                                    | 17 (12.8%)                  | 1 (1.2%)                    | 12 (6%)                   | 20 (7%)                   | 10 (7.5%)              | 0.15    |
| Dormitory                                     | 45 (33.8%)                  | 19 (22.4%)                  | 61 (30.3%)                | 95 (33.3%)                | 30 (22.4%)             |         |
| Other                                         | 4 (3%)                      | 4 (4.7%)                    | 4 (2%)                    | 8 (2.8%)                  | 4 (3%)                 |         |
| Marital status                                |                             |                             |                           |                           |                        |         |
| Single                                        | 112 (84.2%)                 | 81 (95.3%)                  | 178 (88.6%)               | 250 (87.7%)               | 121 (90.3%)            | 0.512   |
| Married                                       | 21 (15.8%)                  | 4 (4.7%)                    | 23 (11.4%)                | 35 (12.3%)                | 13 (9.7%)              |         |
| Reason for choosing this field                |                             |                             |                           |                           |                        |         |
| Family pressure                               | 16 (12%)                    | 3 (3.5%)                    | 11 (5.5%)                 | 13 (4.6%)                 | 17 (12.7%)             |         |
| Social position                               | 22 (16.5%)                  | 10 (11.8%)                  | 38 (18.9%)                | 49 (17.2%)                | 21 (15.7%)             |         |
| High salary                                   | 21 (15.8%)                  | 11 (12.9%)                  | 64 (31.8%)                | <0.001                    | 58 (20.4%)             | 38 (28.4%) | 0.001 |
| Personal interest                             | 67 (50.4%)                  | 52 (61.2%)                  | 71 (35.3%)                | 145 (50.9%)               | 45 (33.6%)             |         |
| Other                                         | 7 (5.3%)                    | 9 (10.6%)                   | 17 (8.5%)                 | 20 (7%)                   | 13 (9.7%)              |         |
| Investigation about the field before choosing it |                             |                             |                           |                           |                        |         |
| No                                            | 37 (27.8%)                  | 21 (24.7%)                  | 34 (16.9%)                | 0.049                     | 51 (17.9%)             | 41 (30.6%) | 0.005 |
| Yes                                           | 96 (72.2%)                  | 64 (75.3%)                  | 167 (83.1%)               | 234 (82.1%)               | 93 (69.4%)             |         |
| Father’s age (year)                           | 56.56 (7.45)                | 54.96 (4.99)                | 54.27 (5.26)              | 0.064                     | 54.83 (6.12)           | 55.77 (5.94) | 0.059 |
| Mother’s age (year)                           | 51.17 (7.33)                | 49.78 (5.34)                | 49.06 (5.3)               | 0.074                     | 49.42 (6.21)           | 50.65 (5.56) | 0.006 |
| Father’s education                            |                             |                             |                           |                           |                        |         |
| Diploma or lower                              | 27 (20.3%)                  | 27 (31.8%)                  | 48 (23.9%)                | 0.154                     | 62 (21.8%)             | 40 (29.9%) | 0.087 |
| Higher than diploma                           | 106 (79.7%)                 | 58 (68.2%)                  | 153 (76.1%)               | 223 (78.2%)               | 94 (70.1%)             |         |
| Mother’s education                            |                             |                             |                           |                           |                        |         |
| Diploma or lower                              | 42 (31.6%)                  | 25 (29.4%)                  | 72 (35.8%)                | 0.514                     | 86 (30.2%)             | 53 (39.6%) | 0.06  |
| Higher than diploma                           | 91 (68.4%)                  | 60 (70.6%)                  | 129 (64.2%)               | 199 (69.8%)               | 81 (60.4%)             |         |
| Parents living together                       |                             |                             |                           |                           |                        |         |
| Yes                                           | 125 (94%)                   | 77 (90.6%)                  | 192 (95.5%)               | 0.273                     | 273 (95.8%)            | 121 (90.3%) | 0.044 |
| No                                            | 8 (6%)                      | 8 (9.4%)                    | 9 (4.5%)                  | 12 (4.2%)                 | 13 (9.7%)              |         |
| Father has passed away                        | 4 (3%)                      | 7 (8.2%)                    | 5 (2.5%)                  | 0.057                     | 11 (3.9%)              | 5 (3.7%)  | 1     |
| Mother has passed away                        | 3 (2.3%)                    | 0 (0%)                      | 1 (0.05%)                 | 0.162                     | 2 (0.7%)               | 2 (1.5%)  | 0.596 |
| Family income per month                       |                             |                             |                           |                           |                        |         |
| < 5 million Toman                             | 4 (3%)                      | 15 (17.6%)                  | 25 (12.4%)                | 24 (8.4%)                 | 20 (14.9%)             |         |
| 5-9.99 million Toman                          | 32 (24.1%)                  | 24 (28.2%)                  | 65 (32.3%)                | <0.001                    | 87 (30.5%)             | 34 (25.4%) | 0.323 |
| 10-14.99 million Toman                        | 44 (33.1%)                  | 21 (24.7%)                  | 36 (17.9%)                | 70 (24.6%)                | 31 (23.1%)             |         |
| 15-19.99 million Toman                        | 17 (12.8%)                  | 9 (10.6%)                   | 34 (16.9%)                | 40 (14%)                  | 20 (14.9%)             |         |
regression models. In another study in Saudi Arabia, the prevalence of suicidal ideation in the year before the study was significantly higher in dental students (38%) than medical (29%) students [71]. In contrast, studies in the UK indicated a higher prevalence of suicidal ideation and suicide attempts among medical students than pharmacy and dental students [72, 73]. Overall, these studies indicate that except in the UK, the prevalence of suicidal ideation is not much different between medical, pharmacy, and dental students, and the prevalence of suicidal ideation in these students is higher than in the general population [73]. The situation also gets more complicated considering healthcare field students have low intention to seek help for their psychological issues, including suicidal ideation [70]. These fields share

| Variable                                | Medical students (N = 133) | Pharmacy students (N = 85) | Dental students (N = 201) | P value | Without suicidal ideation | With suicidal ideation | P value |
|------------------------------------------|---------------------------|----------------------------|----------------------------|---------|---------------------------|------------------------|---------|
| ≥ 20 million Toman                       | 36 (27.1%)                | 16 (18.8%)                 | 41 (20.4%)                 |         | 64 (22.5%)                | 29 (21.6%)             |         |
| Family history of psychological issues   | 19 (14.3%)                | 15 (17.6%)                 | 24 (11.9%)                 | 0.435   | 27 (9.5%)                 | 31 (23.1%)             | <0.001  |
| Family history of self-harm              | 7 (5.3%)                  | 4 (4.7%)                   | 6 (3%)                     | 0.554   | 8 (2.8%)                  | 9 (6.7%)               | 0.067   |
| Family history of suicide attempt        | 4 (3%)                    | 4 (4.7%)                   | 6 (3%)                     | 0.735   | 11 (3.9%)                 | 3 (2.2%)               | 0.563   |
| Smoking                                  |                           |                            |                            |         |                          |                        |         |
| Never                                    | 121 (91%)                 | 68 (80%)                   | 165 (82.1%)                |         | 255 (89.5%)               | 99 (73.9%)             |         |
| Quite                                    | 3 (2.3%)                  | 2 (2.4%)                   | 9 (4.5%)                   | 0.09    | 10 (3.5%)                 | 4 (3%)                 | <0.001  |
| Yes                                      | 9 (6.8%)                  | 15 (17.6%)                 | 27 (13.4%)                 |         | 20 (7%)                   | 31 (23.1%)             |         |
| Family history of smoking                |                           |                            |                            |         |                          |                        |         |
| Never                                    | 131 (98.5%)               | 84 (98.8%)                 | 192 (95.5%)                |         | 281 (98.6%)               | 126 (94%)              |         |
| Quite                                    | 0 (0%)                    | 0 (0%)                     | 4 (2%)                     | 0.272   | 0 (0%)                    | 4 (3%)                 | 0.007   |
| Yes                                      | 2 (1.5%)                  | 1 (1.2%)                   | 5 (2.5%)                   |         | 4 (1.4%)                  | 4 (3%)                 |         |
| Family history of addiction              |                           |                            |                            |         |                          |                        |         |
| No                                       | 93 (69.9%)                | 59 (69.4%)                 | 146 (72.6%)                | 0.803   | 202 (70.9%)               | 96 (71.6%)             | 0.908   |
| Yes                                      | 40 (30.1%)                | 26 (30.6%)                 | 55 (27.4%)                 |         | 83 (29.1%)                | 38 (28.4%)             |         |
| Satisfaction with current field          | 3 (1)                     | 4 (1)                      | 4 (2)                      | 0.003   | 4 (1.5)                   | 3 (2)                  | <0.001  |

Values are reported as number (percentage), except for age, father’s age, and mother’s age that are reported as mean (SD), and satisfaction with the current field that is reported as median (IQR).

| Variable                                | Medical student (N = 133) | Pharmacy student (N = 85) | Dental student (N = 201) | P value | Without suicidal ideation | With suicidal ideation | P value |
|------------------------------------------|---------------------------|----------------------------|----------------------------|---------|---------------------------|------------------------|---------|
| BHS                                      | 7.28 (4.72)               | 7.8 (4.59)                 | 5.9 (4.17)                 | <0.001  | 5.2 (3.68)                | 9.97 (4.39)            | <0.001  |
| PSS                                      | 28.19 (8.65)              | 29.69 (8.84)               | 26.91 (7.94)               | 0.069   | 25.11 (7.18)              | 33.76 (7.8)            | <0.001  |
| UCLA loneliness scale                    | 45.45 (13.42)             | 49.3 (12.95)               | 44.23 (12.57)              | 0.01    | 41.57 (11.53)             | 54.31 (11.78)          | <0.001  |
| MBI-SS-exhaustion                        | 13.9 (7.06)               | 14.77 (6.82)               | 13.65 (6.96)               | 0.4     | 12.7 (6.57)               | 16.62 (7.03)           | <0.001  |
| MBI-SS-cynicism                          | 10.87 (5.97)              | 12.85 (6.39)               | 11.01 (5.89)               | 0.034   | 10.22 (5.82)              | 13.73 (5.86)           | <0.001  |
| MBI-SS-professional efficacy             | 17.72 (7.47)              | 16.75 (7.49)               | 17.86 (7.48)               | 0.453   | 19.08 (7.07)              | 14.43 (7.35)           | <0.001  |
| History of psychological issues          | 17 (12.8%)                | 19 (22.4%)                 | 23 (11.4%)                 | 0.046   | 19 (6.7%)                 | 40 (29.9%)             | <0.001  |
| History of self-harm                     | 7 (5.3%)                  | 12 (14.1%)                 | 15 (7.5%)                  | 0.059   | 18 (6.3%)                 | 16 (11.9%)             | 0.056   |
| History of suicide attempt               | 2 (1.5%)                  | 7 (8.2%)                   | 9 (4.5%)                   | 0.057   | 8 (2.8%)                  | 10 (7.5%)              | 0.038   |
| Suicidal ideation                        | 45 (33.8%)                | 29 (34.1%)                 | 60 (29.9%)                 | 0.668   | —                         | —                      | —       |

Values are reported as mean (SD), except for history of psychological issues, history of self-harm, suicidal ideation, and history of suicide attempt that are reported as number (percentage). BHS: Beck Hopelessness Scale; PSS: Perceived Stress Scale; MBI-SS: Maslach Burnout Inventory-Student Survey.

Table 1: Continued.
common stressors and predisposing factors for suicidal ideation, such as high academic expectations from students, performance pressure, heavy workload, information overload, and higher psychological issues, leading to a higher prevalence of suicidal ideation among students compared to the general population [74–78]. In addition, there may be some specific stressors and risk factors for suicidal ideation in each field, that are needed to be determined in future studies, especially in dental and pharmacy students that there are limited studies on specific risk factors of suicidal ideation among them.

We found several characteristics independently associated with a higher risk of suicidal ideation among students, including family history of psychological issues, current or past smoking, and separation of parents, which can be utilized in the programs designed to find students at high risk of suicidal ideation. Smoking, in particular, is a possible risk factor for suicidal ideation in students. Sathian et al. found a dose-response relationship between the average number of cigarettes smoked during the week and the presence of suicidal ideation in young adults [79]. Waters et al. found an association between smoking and suicidal ideation among college students independent of substance or alcohol abuse and major depressive disorders [80]. Therefore, primary preventive programs to prevent students start smoking and smoking cessation interventions may also be beneficial in reducing the prevalence of suicidal ideation among students.

We found that hopelessness, stress, and loneliness are independently associated with increased odds of suicidal ideation among students, while burnout was not an independent factor associated with suicidal ideation. It is one of the strengths of the current study as we took several important factors into account while evaluating the factors associated with suicidal ideation. Our findings align with previous studies, as suicidal ideation’s associations with hopelessness, stress, and loneliness were previously evaluated and established among different students [19, 33, 43, 71, 81]. Our findings may have several practical implications. First, symptoms of loneliness, hopelessness, and stress can be used to screen students to determine those at a higher risk of suicidal ideation. Second, the learning environment affects hopelessness and perceived stress among students [82, 83]. Therefore, future studies on characteristics of the learning environment in Iranian universities and their associations with hopelessness and perceived stress may be beneficial to guide future interventions, to optimize the learning environment, and to reduce the stress and hopelessness levels and subsequent suicidal ideation among students. Third, high workloads in the medical, dental, and pharmacy fields in Iran may be a factor leading to stress and subsequent suicidal ideation among the students [84]. This point should be considered in designing these fields’ curricula in the future, as adjusting curricula and reducing the workload may benefit students’ mental health and decrease the risk of suicidal ideation.

This study had a few limitations. First, this study was cross-sectional, which cannot demonstrate the causal relationship between the variables, and future longitudinal studies are needed. Second, less than 100 pharmacy students participated in the study, which is not optimal, and more comprehensive studies are needed evaluating suicidal ideation in this population. Third, this study was conducted during the COVID-19 pandemic, a major confounding factor, and future studies in the nonpandemic situation are indicated. Fourth, we evaluated psychological and mental issues using self-administered questionnaires; however, they might not be as accurate for evaluating these issues as an interview with an expert psychologist. Fifth, this study was conducted at TUMS, the best-known university in Iran, and students at TUMS may have different characteristics than students at other Iranian universities. Therefore, future multicenter studies in Iran may help in better evaluation of suicidal ideation in Iranian students. Sixth, we only evaluated students of three major healthcare fields, and our findings may not be applicable to other fields, especially those not related to healthcare and medicine. More studies are needed to evaluate the prevalence of suicidal ideation among Iranian students of other fields. Finally, we used convenience sampling methods in our study, which increases the risk of bias and chance error in this study, and future studies using random sampling methods are needed in the future. Despite these limitations, to the best of our knowledge, this was the first study evaluating the prevalence of suicidal ideation among Iranian pharmacy and dental students and

| Independent variable | OR       | 95% CI         | P value |
|----------------------|----------|----------------|---------|
| Family history, basic and demographic characteristics |          |                |         |
| Family history of psychological issues | 2.186    | 1.184-4.036    | 0.012   |
| Current or past smoking | 2.155    | 1.197-3.881    | 0.01    |
| Parents not living together | 2.512    | 1.018-6.199    | 0.046   |
| Satisfaction with current field | 0.51     | 0.41-0.634     | <0.001  |
| Questionnaires’ scores |          |                |         |
| BHS                  | 1.167    | 1.083-1.258    | <0.001  |
| PSS                  | 1.081    | 1.032-1.132    | 0.001   |
| UCLA loneliness scale | 1.057    | 1.032-1.084    | <0.001  |

The presence of suicidal ideation was the dependent variable.
comparing them with medical students, which can be a basis for further studies on the issue.

5. Conclusion

The prevalence of suicidal ideation among Iranian medical, dental, and pharmacy students is relatively high and has increased during recent years, requiring emergent action. Supportive and screening systems may be beneficial to provide early interventions for those at higher risk of suicidal ideation. Also, increasing the students, university officials, and educators’ awareness about the prevalence of suicidal ideation and its associated factors can be another beneficial action in this regard. Those with a family history of psychological issues and separated parents are at a higher risk of having suicidal ideation, which should be noticed in screening programs. Smoking, hopelessness, loneliness, stress, and dissatisfaction with the current field were other factors that were independently associated with suicidal ideation in our study, and interventions for smoking cessation and improvements in curricula to reduce stress and increase their satisfaction with their fields may be beneficial to reduce the prevalence of suicidal ideation.

Data Availability

The data that support the findings of this study are available from the corresponding author, MHS, upon reasonable request.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

References

[1] Organization WHO, Suicide in the World: Global Health Estimates, 2019.
[2] Y. Gvion and A. Apter, “Suicide and Suicidal Behavior,” Public health reviews, vol. 34, no. 2, p. 9, 2012.
[3] M. Naghavi, “Global, regional, and national burden of suicide mortality 1990 to 2016: systematic analysis for the global burden of disease study 2016,” BMJ, vol. 364, 2019.
[4] N. Izadi, S. D. Mirtorabi, F. Najafi, B. Nazparvar, H. N. Kangavari, and S. S. H. Nazari, “Trend of years of life lost due to suicide in Iran (2006–2015),” International journal of public health, vol. 63, no. 8, pp. 993–1000, 2018.
[5] A. Mirahmadizadeh, F. Rezaei, A. M. Mokhtari, S. Gholamzadeh, and A. Baseri, “Epidemiology of suicide attempts and deaths: a population-based study in Fars, Iran (2011–16),” Journal of Public Health, vol. 42, no. 1, pp. e1–e11, 2020.
[6] K. Mobaraki and J. Ahmadzadeh, “The comparison trend of suicide in Hamadan province in 2006 to 2010: a death registry system-based study,” Studies in Medical Sciences, vol. 30, no. 1, pp. 41–48, 2019.
[7] R. C. O’Connor and O. J. Kirtley, “The integrated motivational–volitional model of suicidal behaviour,” Philosophical Transactions of the Royal Society B: Biological Sciences, vol. 373, no. 1754, p. 20170268, 2018.
[8] K. Wetherall, S. Cleare, S. Eschle et al., “From ideation to action: differentiating between those who think about suicide and those who attempt suicide in a national study of young adults,” Journal of Affective Disorders, vol. 241, pp. 475–483, 2018.
[9] R. C. O’Connor, The Integrated Motivational-Volitional Model of Suicidal Behavior, vol. 32, no. 6, 2011Hogrefe Publishing, 2011.
[10] E. D. Klonsky, B. Y. Saffer, and C. J. Bryan, “Ideation-to-action theories of suicide: a conceptual and empirical update,” Current Opinion in Psychology, vol. 22, pp. 38–43, 2018.
[11] M. K. Nock, G. Borges, E. J. Bromet et al., “Cross-national prevalence and risk factors for suicidal ideation, plans and attempts,” The British journal of psychiatry, vol. 192, no. 2, pp. 98–105, 2008.
[12] C. M. McAuliffe, “Suicidal ideation as an articulation of intent: a focus for suicide prevention?,” Archives of Suicide Research, vol. 6, no. 4, pp. 325–338, 2002.
[13] N. Oexle and N. Ruesch, “Stigma-risk factor and consequence of suicidal behavior: implications for suicide prevention,” Der Nervenarzt, vol. 89, no. 7, pp. 779–783, 2018.
[14] M. Kizilgec, K. Batra, M. Yildirim et al., “Role of resilience in psychological adjustment and satisfaction with life among undergraduate students in Turkey: a cross-sectional study,” Journal of Health and Social Sciences, vol. 7, no. 2, 2022.
[15] K. Petrie, J. Crawford, S. T. Baker et al., “Interventions to reduce symptoms of common mental disorders and suicidal ideation in physicians: a systematic review and meta-analysis,” The Lancet Psychiatry, vol. 6, no. 3, pp. 225–234, 2019.
[16] G. Lewis, K. Hawton, and P. Jones, “Strategies for preventing suicide,” The British Journal of Psychiatry, vol. 171, no. 4, pp. 351–354, 1997.
[17] S. E. Roberts, B. Jaremin, and K. Lloyd, “High-risk occupations for suicide,” Psychological Medicine, vol. 43, no. 6, pp. 1231–1240, 2013.
[18] N. K. Menon, T. D. Shanafelt, C. A. Sinsky et al., “Association of physician burnout with suicidal ideation and medical errors,” JAMA network open, vol. 3, no. 12, article e2028780, 2020.
[19] R. Tyssen, P. Vaglum, N. T. Grønrovold, and Ø. Ekeberg, “Suicidal ideation among medical students and young physicians: a nationwide and prospective study of suicidal ideation and predictors,” Journal of affective disorders, vol. 64, no. 1, pp. 69–79, 2001.
[20] E. Hem, N. T. Grønrovold, O. G. Aasland, and Ø. Ekeberg, “The prevalence of suicidal ideation and suicidal attempts among Norwegian physicians. Results from a cross-sectional survey of a nationwide sample,” European Psychiatry, vol. 15, no. 3, pp. 183–189, 2000.
[21] T. D. Shanafelt, C. M. Balch, L. Dyrbye et al., “Special report: suicidal ideation among American surgeons,” Archives of surgery, vol. 146, no. 1, pp. 54–62, 2011.
[22] A. Fridner, K. Belkic, M. Marinini, D. Minucci, L. Pavan, and K. Schenck-Gustafsson, “Survey on recent suicidal ideation among female university hospital physicians in Sweden and Italy (the HOUPE study): cross-sectional associations with work stressors,” Gender Medicine, vol. 6, no. 1, pp. 314–328, 2009.
[23] E. Schernhammer, “Taking their own lives—the high rate of physician suicide,” The New England Journal of Medicine, vol. 352, no. 24, pp. 2473–2476, 2005.
[24] O. G. Aasland, Ø. Ekeberg, and T. Schweder, “Suicide rates from 1960 to 1989 in Norwegian physicians compared with other educational groups,” Social Science & Medicine, vol. 52, no. 2, pp. 259–265, 2001.
[25] A. J. Carson, S. Dias, A. Johnston et al., “Mental health in medical students: a case control study using the 60 item general health questionnaire,” Scottish Medical Journal, vol. 45, no. 4, pp. 115-116, 2000.
[26] N. Ibrahim, N. Amit, N. C. Din, and H. C. Ong, “Gender differences and psychological factors associated with suicidal ideation among youth in Malaysia,” Psychology Research and Behavior Management, vol. 10, pp. 129–135, 2017.
[27] E. Olié, S. Guillaume, I. Jaussent, P. Courtet, and F. Jollant, “Higher psychological pain during a major depressive episode may be a factor of vulnerability to suicidal ideation and act,” Journal of Affective Disorders, vol. 120, no. 1-3, pp. 226–230, 2010.
[28] T. L. Schwenk, L. Davis, and L. A. Wimsatt, “Depression, stigma, and suicidal ideation in medical students,” Journal of the American Medical Association, vol. 304, no. 11, pp. 1181–1190, 2010.
[29] L. S. Rotenstein, M. A. Ramos, M. Torre et al., “Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: a systematic review and meta-analysis,” Journal of the American Medical Association, vol. 316, no. 21, pp. 2214–2236, 2016.
[30] L. N. Dyrbye, M. R. Thomas, F. S. Massie et al., “Burnout and suicidal ideation among US medical students,” Annals of Internal Medicine, vol. 149, no. 5, pp. 334–341, 2008.
[31] A. R. Torres, L. M. Campos, M. C. P. Lima, and A. T. A. Ramos-Cerqueira, “Suicidal ideation among medical students: prevalence and predictors,” The Journal of Nervous and Mental Disease, vol. 206, no. 3, pp. 160–168, 2018.
[32] G. Serafini, M. Pomplii, M. Innamorati et al., “Gene variants with suicidal risk in a sample of subjects with chronic migraine and affective temperamental dysregulation,” European Review for Medical and Pharmacological Sciences, vol. 16, no. 10, pp. 1389–1398, 2012.
[33] C. Alexandrino-Silva, M. L. G. Pereira, C. Bustamante et al., “Suicidal ideation among students enrolled in healthcare training programs: a cross-sectional study,” Brazilian Journal of Psychiatry, vol. 31, no. 4, pp. 338–344, 2009.
[34] C. M. Mospan, R. Hess, R. Blackwelder, S. Grover, and C. Dula, “A two-year review of suicide ideation assessments among medical, nursing, and pharmacy students,” Journal of Interprofessional Care, vol. 31, no. 4, pp. 537–539, 2017.
[35] F. Galán, J. V. Rios-Santos, J. Polo, B. Rios-Carrasco, and P. Bullón, “Burnout, depression and suicidal ideation in dental students,” Medicina Oral, patología oral y cirugía bucal, vol. 19, no. 3, pp. e206–e211, 2014.
[36] G. R. Deeb, S. Braun, C. Carrico, P. Kinser, D. Laskin, and D. J. Golob, “Burnout, depression and suicidal ideation in dental and dental hygiene students,” European Journal of Dental Education, vol. 22, no. 1, pp. e70–e74, 2018.
[37] M. Bathla, M. Singh, P. Kulhara, S. Chandna, and J. Aneja, “Evaluation of anxiety, depression and suicidal intent in undergraduate dental students: a cross-sectional study,” Contemporary Clinical Dentistry, vol. 6, no. 2, pp. 215–222, 2015.
[38] S. Almoammar, K. A. Alqarni, A. A. Alnazez et al., “Depression and suicidal ideation among dental students of southern Saudi Arabia: a cross sectional study,” Journal of Dental Education, vol. 85, no. 12, pp. 1837–1846, 2021.
[39] R. Tasnim, M. S. Islam, M. S. H. Sujan, M. T. Sidker, and M. N. Potenza, “Suicidal ideation among Bangladeshi university students early during the COVID-19 pandemic: prevalence estimates and correlates,” Children and Youth Services Review, vol. 119, article 105703, 2020.
[40] M. D. Ruiz-Fernández, J. D. Ramos-Pichardo, O. Ibáñez-Masero, J. Cabrera-Troya, M. I. Carmona-Rega, and A. M. Ortega-Galán, “Compassion fatigue, burnout, compassion satisfaction and perceived stress in healthcare professionals during the COVID-19 health crisis in Spain,” Journal of Clinical Nursing, vol. 29, no. 21-22, pp. 4321–4330, 2020.
[41] P. Peng, Y. Hao, Y. Liu et al., “The prevalence and risk factors of mental problems in medical students during COVID-19 pandemic: a systematic review and meta-analysis,” Journal of Affective Disorders, vol. 321, pp. 167–181, 2023.
[42] M. Khosravi and R. Kasaeyyan, “The relationship between neuroticism and suicidal thoughts among medical students: moderating role of attachment styles,” Journal of Family Medicine and Primary Care, vol. 9, no. 6, pp. 2680–2687, 2020.
[43] M. H. Sadeghian, F. Etesam, A. Nakhostin-Ansari, S. Akbapour, and M. Akhlaghi, “Association between hopelessness and suicidal ideation in Iranian medical students: a cross-sectional study,” Health Psychology Research, vol. 9, no. 1, article 27579, 2021.
[44] N. Mohammadinia, M. Rezaei, T. Sameizadehtoosi, and F. Darban, “Assessing suicidal ideation frequency in medical students,” Quarterly Journal of Nursing Management, vol. 1, no. 1, pp. 83–91, 2012.
[45] A. T. Beck, A. Weissen, D. Lester, and L. Tredler, “The measurement of pessimism: the hopelessness scale,” Journal of Consulting and Clinical Psychology, vol. 42, no. 6, pp. 861–865, 1974.
[46] M. Goudarzi, “The Study of Reliability and Validity of Beck Hopelessness Scale in a Group of Shiraz University Students,” Social Sciences and Humanities, no. 2, pp. 27–39, 2002.
[47] B. Eslam, A. H. Kovacs, P. Moons, K. Abbasi, and J. L. Jackson, “Hopelessness among adults with congenital heart disease: cause for despair or hope?,” International Journal of Cardiology, vol. 230, pp. 64–69, 2017.
[48] D. P. Goldberg, The detection of psychiatric illness by questionnaire, Maudsley monograph, 1972.
[49] D. P. Goldberg and V. F. Hillier, “A scaled version of the general health questionnaire,” Psychological Medicine, vol. 9, no. 1, pp. 139–145, 1979.
[50] M. Nazifi, H. R. Mokarami, A. Akbaritabar, M. Faraji Kujeri, R. Tabrizi, and A. Rahi, “Reliability, validity and factor structure of the persian translation of general health questionnaire (ghq-28) in hospitals of Kerman University of Medical Sciences,” Journal of Fasa University of Medical Sciences, vol. 3, no. 4, pp. 336–342, 2014.
[51] D. Watson, R. Goldney, L. Fisher, and M. Merritt, “The measurement of suicidal ideation,” Crisis: The Journal of Crisis Intervention and Suicide Prevention, vol. 22, no. 1, pp. 12–14, 2001.
[52] S. Cohen, T. Kamarck, and R. Mermelstein, “A global measure of perceived stress,” Journal of Health and Social Behavior, vol. 24, no. 4, pp. 385–396, 1983.
[53] B. Moieni, F. Shafii, A. Hidarnia, G. R. Babaii, B. Biareshk, and H. Allahverdipour, “Perceived stress, self-efficacy and its
relations to psychological well-being status in Iranian male high school students,” Social Behavior and Personality: an international journal, vol. 36, no. 2, pp. 257–266, 2008.

[54] D. Russell, L. A. Peplau, and M. L. Ferguson, "Developing a measure of loneliness," Journal of personality assessment, vol. 42, no. 3, pp. 290–294, 1978.

[55] D. W. Russell, "UCLA loneliness scale (version 3): reliability, validity, and factor structure," Journal of personality assessment, vol. 66, no. 1, pp. 20–40, 1996.

[56] M. Hojat, "Psychometric characteristics of the UCLA loneliness scale: a study with Iranian college students," Educational and Psychological Measurement, vol. 42, no. 3, pp. 917–925, 1982.

[57] A. H. Sadeghi, K. Aslani, S. Saadat, and H. Khodayari, "Validity and reliability of the UCLA loneliness scale version 3 in Farsi," Educational Gerontology, vol. 42, no. 1, pp. 55–64, 2016.

[58] W. B. Schaufeli, A. M. Martinez, A. M. Pinto, M. Salanova, and A. B. Bakker, "Burnout and engagement in university students," Journal of cross-cultural psychology, vol. 33, no. 5, pp. 464–481, 2002.

[59] Z. Rostami, M. R. Abed, W. B. Schaufeli, S. A. Ahmadi, and A. H. Sadeghi, "The Psychometric Characteristics of Maslach Burnout Inventory Student Survey: A Study Students of Isfahan University," Zahedan Journal of Research in Medical Sciences, vol. 16, no. 9, 2014.

[60] W. D. Killgore, S. A. Cloonan, E. C. Taylor, M. C. Allbright, and N. S. Dailey, "Trends in suicidal ideation over the first three months of COVID-19 lockdowns," Psychiatry Research, vol. 293, article 113390, 2020.

[61] M. É. Czeisler, R. I. Lane, E. Petrosky et al., "Mental health, substance use, and suicidal ideation during the COVID-19 pandemic—United States, June 24–30, 2020," Morbidity and Mortality Weekly Report, vol. 69, no. 32, pp. 1049–1057, 2020.

[62] O. Gharehgozli, "An estimation of the economic cost of recent sanctions on Iran using the synthetic control method," Economics Letters, vol. 157, pp. 141–144, 2017.

[63] J. Yoosofei Lebni, J. Abbas, F. Moradi et al., "How the COVID-19 pandemic affected economic, social, political, and cultural factors: a lesson from Iran," International Journal of Social Psychiatry, vol. 67, no. 3, pp. 298–300, 2021.

[64] A. P. Fan, R. O. Kosik, G. A. Mandell et al., "Suicidal ideation in medical students: who is at risk?", Annals of the Academy of Medicine-Singapore, vol. 41, no. 9, pp. 377–382, 2012.

[65] B. E. Czeisler, R. I. Lane, E. Petrosky et al., "Mental health, substance use, and suicidal ideation during the COVID-19 pandemic—United States, June 24–30, 2020," Morbidity and Mortality Weekly Report, vol. 69, no. 32, pp. 1049–1057, 2020.

[66] O. Gharehgozli, "An estimation of the economic cost of recent sanctions on Iran using the synthetic control method," Economics Letters, vol. 157, pp. 141–144, 2017.

[67] J. Yoosofei Lebni, J. Abbas, F. Moradi et al., "How the COVID-19 pandemic affected economic, social, political, and cultural factors: a lesson from Iran," International Journal of Social Psychiatry, vol. 67, no. 3, pp. 298–300, 2021.

[68] A. P. Fan, R. O. Kosik, G. A. Mandell et al., "Suicidal ideation in medical students: who is at risk?", Annals of the Academy of Medicine-Singapore, vol. 41, no. 9, pp. 377–382, 2012.

[69] R. Coentre and C. Góis, "Suicide ideation in medical students: recent insights," Advances in medical education and practice, vol. 9, pp. 873–880, 2018.

[70] M. Osmani, M. Y. Islam, S. A. Hussain et al., "Suicide ideation among medical students of Pakistan: a cross-sectional study," Journal of forensic and legal medicine, vol. 27, pp. 65–68, 2014.

[71] K. Sobowale, A. N. Zhou, J. Fan, N. Liu, and R. Sherer, "Depression and suicidal ideation in medical students in China: a call for wellness curricula," International journal of medical education, vol. 5, pp. 31–36, 2014.

[72] F. Fekih-Romdhane, A. Tounsi, R. Ben Rejeb, and M. Cheour, "Is religiosity related to suicidal ideation among Tunisian Muslim youth after the January 14th revolution?,” Community Mental Health Journal, vol. 56, no. 1, pp. 165–173, 2020.

[73] R. Fischbein and N. Bonfine, "Pharmacy and medical students’ mental health symptoms, experiences, attitudes and help-seeking behaviors," American journal of pharmaceutical education, vol. 83, no. 10, p. 7758, 2019.

[74] K. Abolashmat, W. Salman, R. Almehman et al., “The relationship between loneliness and suicidal ideation in private medical and dental students in Jeddah, Saudi Arabia,” Saudi Arabia. Journal International Medicine Dentistry, vol. 5, no. 1, pp. 11–19, 2018.

[75] E. G. Lewis and J. M. Cardwell, “The big five personality traits, perfectionism and their association with mental health among UK students on professional degree programmes,” BMC psychology, vol. 8, pp. 1–10, 2020.

[76] E. G. Lewis and J. M. Cardwell, “A comparative study of mental health and wellbeing among UK students on professional degree programmes,” Journal of Further and Higher Education, vol. 43, no. 9, pp. 1226–1238, 2019.

[77] K. H. Al-Samadani and A. Al-Dharrab, “The perception of stress among clinical dental students,” World Journal of Dentistry, vol. 4, no. 1, pp. 24–28, 2013.

[78] S. Acharya, "Factors affecting stress among Indian dental students," Journal of dental education, vol. 67, no. 10, pp. 1140–1148, 2003.

[79] J. Newton, F. Baghaienaini, S. Goodwin, J. Invest, M. Lubbock, and N. Marouf Saghakhaneh, “Stress in dental school: a survey of students,” Dental update, vol. 21, no. 4, pp. 162–164, 1994.

[80] P. P. Vitaliano, R. D. Maiuro, J. Russo, and E. S. Mitchell, “Medical student distress: a longitudinal study,” Journal of Nervous and Mental Disease, vol. 177, no. 2, pp. 70–76, 1989.

[81] V. Yiu, “Supporting the well-being of medical students,” CMAJ, vol. 172, no. 7, pp. 889–890, 2005.

[82] B. Sathian, R. G. Menezes, M. Asim et al., “Cigarette smoking dose-response and suicidal ideation among young people in Nepal: a cross-sectional study,” Nepal journal of epidemiology, vol. 10, no. 1, pp. 821–829, 2020.

[83] A. F. Waters, M. R. Peltier, M. R. Roys, S. A. Stewart, and A. L. Copeland, “Smoking and suicidal ideation among college students: smoking expectancies as potential moderators,” Journal of American college health, vol. 69, no. 8, pp. 1–8, 2021.

[84] F. Asghari, A. Sadeghi, K. Aslani, S. Saadat, and H. Khodayari, “The survey of relationship between perceived stress coping strategies and suicide ideation among students at University of Guilan, Iran,” International Journal of Education and Research, vol. 1, no. 11, pp. 111–118, 2013.

[85] H. A. Elsayes and H. K. Obied, "Association between senior nursing students’ perceived stress and learning environment in clinical practice," Journal of Nursing Education and Practice, vol. 8, no. 3, p. 126, 2017.

[86] A. C. Frenzel, R. Pekrun, and T. Goetz, "Perceived learning environment and students’ emotional experiences: a multilevel analysis of mathematics classrooms,” Learning and Instruction, vol. 17, no. 5, pp. 478–493, 2007.

[87] C. Yang, A. Chen, and Y. Chen, “College students’ stress and health in the COVID-19 pandemic: the role of academic workload, separation from school, and fears of contagion,” PLoS one, vol. 16, no. 2, article e0246676, 2021.