Original Article

The Prediction of Alexithymia Using Depression, Anxiety, Stress, and Demographics in Undergraduate Students

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ARTICLE INFO   ABSTRACT

Introduction: Alexithymia is a psychiatric disorder in which people become emotionally frustrated. This study aims to model the role of depression, anxiety, and stress in alexithymia prediction.

Methods: In this cross-sectional study, 260 undergraduate students were selected via multi-stage cluster sampling. The Toronto Alexithymia Scale (TAS-20) and depression, anxiety and stress scale have been used to collect data. The association between qualitative variables was examined using Chi-square test and LASSO logistic regression was fitted for alexithymia prediction.

Results: The mean±SD of participants' age was 20.7±3.2 years. Of all, 197 (75.8%) students were female and 236 (90.8%) were single. According to the cutoff point for TAS-20, 30.8% of the students displayed signs of alexithymia. The rate of alexithymia was significantly higher among males (42.9% versus 26.9%, P=0.02) and among nursing (45.9%) and anesthesia (44.8%) students than other undergraduate students. The proportion of students with anxiety, depression, and stress were 45.0%, 15.8%, and 9.2%, respectively. 51.2% of the depressed students had alexithymia, while only 26.9% of non-depressed students were alexithymic (P=0.002). LASSO logistic regression showed that odds of alexithymia was significantly higher among male students (OR=1.40, 95% CI=1.03, 1.90), students with depression (OR=1.73, 95% CI=1.18, 2.54), students who had anxiety (OR=1.42, 95% CI=1.07, 1.89), and nursing students (OR=1.62, 95% CI=1.07, 2.45).

Conclusion: The results of this study indicate the importance role of anxiety and depression in predicting alexithymia. Due to the high prevalence of alexithymia among college students, we suggest the routine evaluation of college students for alexithymia.

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Introduction

The ability to understand the feelings of others and proper expression of feelings to people are two essential factors for communicating with others. In the early 1970s, psychiatrists developed the term alexithymia, which means the loss of words to express emotions. In psychosomatic patients, alexithymia disorder prevents them from venting out of the inner world and using supportive resources such as loving other people, which in turn can cause psychological problems and the process of illness. Alexithymia is a psychiatric disorder in which people become emotionally frustrated. This disorder consists of a series of features that are in the form of a multifaceted set.

Starting university is a challenging change for many young women and men in the transitional age between adolescence and adulthood, typically around the age of 20 years old.[1] Entrance to the university is associated with many problems that lead students to suffer from mental illnesses such as depression, anxiety, and stress. This can have a negative effect on their emotional state and as a result cause inability or difficulty in identifying, expressing, and describing personal feelings, thinking and communication with other people. On the other hand, campus life is full of stressful events such as the demands of the university, leaving home, making new friends, and financial problems. Accordingly, students' problems are faced with some psychological difficulties and may be at risk of depression, anxiety, and stress, which are emotionally affected by these factors.[2]

According to the previous studies, alexithymia has been distributed as a normal trait among all members of society, but high levels of alexithymia can provide a high risk of anxiety and physical illnesses.[3] Moreover, alexithymia is associated with areas such as depression, anxiety, Alzheimer's and substance abuse, sedentary lifestyle, malnutrition and poor eating habits, emotional intelligence, and suicidal thoughts. Also, students who experience alexithymia are more prone to exhibiting maladaptive behaviors such as suicide, substance abuse, low academic performance, and poor self-care.[4-6]

To our best knowledge, the association of depression, anxiety, and stress with alexithymia has been investigated in a few studies, therefore, the current research is devoted to determining the prevalence of alexithymia among undergraduate students and modeling the role of depression, anxiety, and stress in alexithymia prediction.

Methods

The present study is a cross-sectional study and its statistical population included all undergraduate students of Shahrekord University of Medical Sciences (SKUMS), who were students during the first semester of the 1398-99 academic year. Students who did not wish to participate in this survey were excluded. In this design, a multi-stage cluster sampling method was used. In the first stage, from the list of faculties of SKUMS, three faculties were randomly selected, and in the next stage, from each faculty, three educational groups and at least two different entrances were selected. As a general rule, regression models require at least 10 samples per variable. According to the number of variables in the current study,[13] the minimum required sample size is equal to 260 students.

The Toronto Alexithymia Scale (TAS) is

the most widely used self-report measure of alexithymia, which was developed in 1985 by Taylor and Bagby.[7] On this scale, by summing the scores of 20 questions on a five-point scale, the overall score of questions is obtained for the TAS. A score of 60 or higher is considered alexithymia and a lower score is considered no alexithymia.[2, 8] Besharat examined the validity and reliability of the Persian version of TAS in 2007. The Cronbach's alpha was 0.85 for TAS and it concurrent validity and construct validity were approved.[9]

In the DASS-21 (depression, anxiety and stress) scale, questions 1 to 7 measure depression, questions 8 to 14 measure anxiety, and questions 15 to 21 measure stress. Each question is scored on a four-point Likert scale from 0 to 3, and scores below 9, 7, and 14 are considered "normal" for depression, anxiety, and stress, respectively.[10, 11] The reliability of the questionnaire by Cronbach's alpha for the whole questionnaire was 0.94 and for the dimensions of depression and anxiety was 0.87 and 0.89, respectively. However, for the stress dimension, it was reported to be slightly lower.[2] In addition, factor load values for most items were reported to be 0.39-0.73 and the correlation between scales is between 0.54 and 0.68.[12]

In the Persian version of this questionnaire, Cronbach's alpha coefficients for the whole questionnaire and three subscales of difficulty in identifying emotions, difficulty in describing emotions, and external intellectual orientation were respectively 85%, 82%, 75%, and 72%, which represent a desirable internal consistency of the scale. In other words, the validity of internal consistency according to Cronbach's alpha in the Iranian sample is reported to be 0.79 and the test-retest method has been reported to be 0.77.[13, 14]

Descriptive statistics were reported as number (%) and the association between qualitative variables was examined using Chi-square or Fisher's exact test using SPSS software version 21.0 and the significant level set at .05. Logistic regression is a common approach to investigate the effect of potential independent variables on the binary outcome but instead of traditional variables selection techniques, LASSO (least absolute shrinkage and selection operator) was implemented for statistical modeling. Compared to the traditional regression models, LASSO performs simultaneous variable selection and estimation which leads to a robust estimation. Also, LASSO is capable to manage highly correlated variables resulting in more reliable coefficients. In order to calculate the %95 confidence intervals, the bootstrap method with 10000 replicates was performed.

Ethical considerations

At the beginning of the sampling process, explanations about the objectives of the study and how to complete the questionnaire were provided, assuring the confidentiality of the collected information. This research project was approved by the Ethics Committee of SKUMS (Ethics code: IR.SKUMS.REC.1398.108).

Results

The mean±SD of participants' age was 20.7±3.2 years. Of all, 197 (75.8%) students were female and 236 (90.8%) were single. According to the cutoff point for TAS-20, 30.8% of the students displayed signs of alexithymia. The rate of alexithymia was significantly higher among males (42.9% versus 26.9%, P=0.02) and among nursing (45.9%) and anesthesia (44.8%)

students than other undergraduate students (Table 1).

The proportion of students with anxiety, depression, and stress were 45.0%, 15.8%, and 9.2%, respectively, and 10 (3.8%) students had signs of all anxiety, depression, and stress (Figure 1).
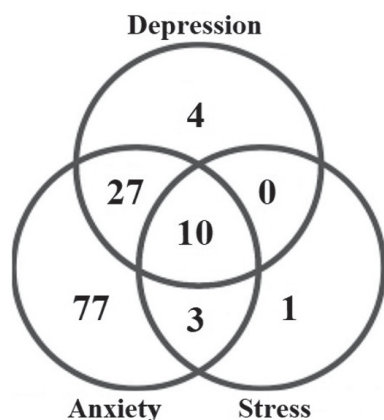

Figure 1. The number of depression, anxiety, and stress among the understudy students

There was a significant association between depression and alexithymia as more than half (51.2%) of the depressed students had alexithymia, while only 26.9% of non-depressed students were alexithymic (P=0.002). Also, the rate of anxiety was higher among students with alexithymia compared to the other students (39.3% versus 23.8%, P=0.007), but no significant association between stress and alexithymia was observed (P=0.192, Table 2).

Results of LASSO logistic regression are summarized in Table 3. Odds of alexithymia was significantly higher among male students (OR=1.40, 95% CI=1.03, 1.90), students with depression (OR=1.73, 95% CI=1.18, 2.54), students who had anxiety (OR=1.42, 95% CI=1.07, 1.89), and nursing students (OR=1.62, 95% CI=1.07, 2.45).

To assess the prediction accuracy, the

Table 1. Demographic characteristics of undergraduate students

Variables	Subgroup	With alexithymia (n=80)	Without alexithymia (n=180)	P-value
		Frequency (%)	Frequency (%)	
Age	< 20 years (n=83)	26 (31.3)	57 (68.7)	0.314*
	20- 22 years (n=149)	42 (28.2)	107 (71.8)	
	> 22 years (n=28)	12 (42.9)	16 (57.1)	
Gender	Female (n=197)	53 (26.9)	144 (73.1)	0.019*
	Male (n=63)	27 (42.9)	36 (57.1)	
Marital status	Single (236)	72 (30.5)	164 (69.5)	0.818*
	Married (n=24)	8 (33.3)	16 (66.7)	
Major	Public health (n=30)	10 (33.3)	20 (66.7)	0.020**
	Environmental health (n=28)	9 (32.1)	19 (67.9)	
	Laboratory sciences (n=26)	10 (38.5)	16 (61.5)	
	Nursing (n=37)	17 (45.9)	20 (54.1)	
	Radiologic Technology (n=35)	6 (17.1)	29 (82.9)	
	Anesthesia (n=29)	13 (44.8)	16 (55.2)	
	Surgical technology (n=38)	10 (26.3)	28 (73.7)	
	Midwifery (n=37)	5 (13.5)	32 (86.5)	

*Chi-square test,
**Fisher's exact test

Table 2. The association between depression, anxiety, and stress with alexithymia

Variables		With alexithymia (n=80)	Without alexithymia (n=180)	P-value
		Frequency (%)	Frequency (%)	
Depression status	No (n=219)	59 (26.9)	160 (73.1)	0.002*
	Yes (n=41)	21 (51.2)	20 (48.8)	
Anxiety status	No (n=143)	34 (23.8)	109 (76.2)	0.007*
	Yes (n=117)	46 (39.3)	71 (60.7)	
Stress status	No (n=246)	73 (29.7)	173 (70.3)	0.192*
		7 (50.0)	7 (50.0)	

*Chi-square test

Table 3. Results of multiple LASSO logistic regression

	Subgroup	OR (95% CI)
Gender	Female	---
	Male	1.40 (1.03, 1.90)
Age	< 20 years	---
	20- 22 years	0.89 (0.70, 1.13)
	> 22 years	1.28 (0.87, 1.88)
Marital status	Single	---
	Married	1.00 (0.69, 1.45)
Depression status	No	---
	Yes	1.73 (1.18, 2.54)
Anxiety status	No	---
	Yes	1.42 (1.07, 1.89)
Stress status	No	---
	Yes	1.11 (0.69, 1.79)
Major	Public health	---
	Environmental health	1.00 (0.73, 1.36)
	Laboratory sciences	1.00 (0.74, 1.35)
	Nursing	1.62 (1.07, 2.45)
	Radiologic Technology	0.69 (0.47, 1.02)
	Anesthesia	1.47 (0.97, 2.24)
	Surgical technology	1.00 (0.77, 1.31)
	Midwifery	0.66 (0.43, 1.01)

probability of having alexithymia for each case was calculated using the proposed model and a receiver operating characteristic (ROC) analysis was performed to obtain the optimal cut-of point based on the Youden index. The obtained cut-of point was equal to 0.285 and the area under the ROC curve was 0.72 (95% CI: 0.66, 0.79) with sensitivity and specificity of 0.78 and 0.59, respectively (Figure 2).
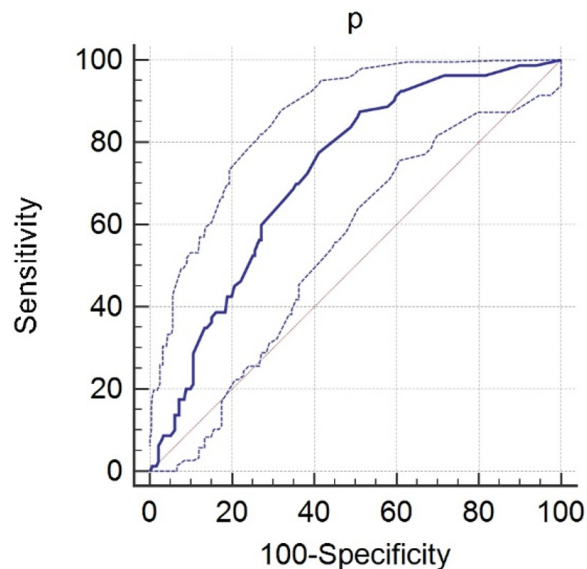
Figure 2. The area under the curve of LASSO logistic regression with %95 CI to predict alexithymia

Discussion

The aim of this study was to investigate the role of depression, anxiety, and stress variables in predicting alexithymia among undergraduate students. The rate of alexithymia was 26.9% in the current study which was close to the reported rate among Jordanian university students (24.6%), while higher than Finnish adolescents (8.5%).[2, 15] Moreover, the proportion of depression, anxiety, and stress were 15.8%, 45.0%, and 5.4%, respectively, which was slightly different from previous reports in Iran and other countries.[15, 16]

The results of this study showed that alexithymia is significantly higher among male students than female students. The results of this study are similar to the study of Salminen et al. and the study of Franz et al., two large-scale studies targeting the general populations of Finland and Germany, respectively. They showed men to be almost twice more alexithymic than women.[17, 18] This could be explained by

socialized (traditional) gender roles for males and females. It is more difficult for many men to cope with emotions as they have been taught not to show their feelings since childhood. Baron claims that because females have a more developed e-brain (emotional brain) and also better understand other people's emotions, alexithymia levels among females are lower in comparison to males.[13, 14]

Our results confirmed significant associations between depression and anxiety with alexithymia but no significant association between stress and alexithymia was detected, which was in line with the results of Luskin et al.,[19] Mazaheri et al.[20] and Karukivi et al.[15] These studies suggested that alexithymia is associated with mental health, anxiety, and depression. Alexithymia is believed to be a risk factor for many diseases because people with this condition have a hard time expressing their emotions. This failure hinders the regulation of emotions and makes successful adjustment difficult. In fact, people who can properly express their emotions are released from psychological stress.[21] Most studies on alexithymia have also shown its association with anxiety and especially depression.[22-25] Since these individuals are unable to properly identify their negative emotions, they also have difficulty evacuating and neutralizing these emotions and are exacerbated by the inability to manage and regulate negative emotions. Expressing emotions and participating in them is a skill and this inability manifests itself as symptoms of anxiety or depression.[23] These findings are consistent with previous studies, which showed that a high level of alexithymia was related to depression.[26] Depression leads to worse health conditions in a wide range of diseases[27, 28] and patients with depression

are typically engaged in emotional inhibition strategies to deal with their symptoms, and consequently, they have more difficulties in subjectively identifying and describing their emotions.[29] Patients with depression are typically unable to use functional ways to properly recognize emotions, and thus, they may be more prone to maladjustment.[26]

In 1999, Bertos et al. investigated alexithymia, anxiety, and depression among 125 female students. They showed that there was an inverse correlation between depression, anxiety (mood and trait), and alexithymia scores.[30] In our study, alexithymia was significantly more prevalent among nursing students while variables of age and marital status were not associated with alexithymia. Contrary to our research, the analysis performed in Rzepka's research did not show significant differences in total TAS-26 scores between selected university majors and alexithymia.[31] The schools of medicine, polytechnics, humanities, economics, and military were compared with each other and no considerable differences were observed.

This study showed that gender, the field of study, depression, and anxiety were able to predict the status of alexithymia. In line with our findings, Shaher et al. tried to predict alexithymia using demographic variables, depression, anxiety, and stress among Jordanian undergraduate students. They showed that gender, depression, stress, and life satisfaction were significantly associated and were capable of predicting alexithymia.[2]

In this study, the LASSO regression, as one of the modern statistical methods, was applied, and also some of the demographic variables which are potentially related to alexithymia have been investigated. Another strength of this study is that the four variables of gender,

the field of study, depression, and anxiety could well predict the state of alexithymia.

On the other hand, the present study has some limitations, too. The nature of this study is cross-sectional, so it needs further investigation and it is better to use larger prospective multicenter studies in the future. In addition, although this study represented the students of SKUMS in Iran, the findings may not be generalizable to all Iranian students. Future research using alternative methods, such as interviews, may provide a more complete picture of the relationship between depression, anxiety, and stress with alexithymia.

Conclusion

The results of this study indicate the importance of the role of anxiety and depression in predicting alexithymia. Therefore, in addition to considering anxiety and depression, one should be aware of the role of gender and the field of study in alexithymia. It is recommended to check the stress level in other studies and among other Iranian medical universities to better understand the relationship between the stress variable and alexithymia. Due to the high prevalence of alexithymia among college students, we suggest the routine evaluation of college students for alexithymia. In addition, comparative studies on populations in other countries are needed to determine the variation of risk factors of alexithymia among college students in different cultures.

Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

Conflicts of Interest

The author(s) declare(s) that there are no conflicts of interest regarding the publication of this article.

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