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Prevalence of Alexithymia and the influencing factors among medical students at Umm Al-Qura University: A cross-sectional study

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ABSTRACT

Background: Alexithymia is inability of the person to describe his emotions, somatic sensations, and struggle to discuss feelings. *Objectives:* To determine the prevalence of the state of alexithymia among undergraduate medical students and to explore its potential risk factors. *Methods:* A cross-sectional study was done through online survey targeted to undergraduate medical students. The survey included the Toronto Alexithymia Scale (TAS-20), students' socio-demographics, and the potential risk factors for alexithymia. *Results:* A total of 317 students participated in the study. A 56.5% prevalence of alexithymia among participants was demonstrated. A binary logistic regression model revealed higher risk of alexithymia among students with female gender (OR: 2.32, 95% CI: 1.47-3.65; p <0.001), divorced parents (OR: 3.23, 95% CI: 1.43-7.32; p = 0.005), history of psychiatric illness (OR: 3.40, 955 CI: 1.51-7.67; p = 0.003), and history of childhood emotional, physical and/or sexual abuse (OR: 2.46, 95% CI: 1.42-4.29; p=0.001). A lower risk for alexithymia was demonstrated among students with higher grade point average (OR: 0.32, CI: 0.04-0.93; P = 0.035). There was no association between alexithymia and students' academic year of study. *Conclusions:* The current study revealed high alexithymia prevalence among undergraduate medical students. The condition is linked with female gender, divorced parents, history of psychiatric illness, and childhood abuse, and is associated with lower academic performance. Accordingly, for prevention and proper intervention of alexithymia among medical students, students' screening for the condition and ease of their access to psychiatric care is recommended.

Keywords: Alexithymia, medical students, prevalence, risk factors.

1. INTRODUCTION

Students transitioning from high school to college may confront a variety of issues, including loneliness, alexithymia, substance abuse, and anxiety

(Messedi et al., 2017). According to studies, alexithymia is one of the most common problems that students confront (McGillivary et al., 2017). Due to its non-clinical character, individuals are frequently unable to recognize they have a problem unless they have sufficient mental health awareness and education, and it often overshadows other academic and non-academic problems among student populations (McGillivary et al., 2017).

Alexithymia is a mental state where the person is not able to acknowledge or identify emotions (Messedi et al., 2017). It is distinguished by the inability of the individual to determine the difference between emotions, somatic sensations, and struggle to discuss feelings with other individuals (Chen et al., 2017). There are two types of alexithymia: trait alexithymia and state alexithymia. Trait alexithymia is regarded to be a personality trait, whereas state alexithymia has a specific etiology and is typically a brief condition. Although inborn features, such as trait alexithymia, are difficult to change, state components of alexithymia, a reaction to stressful situation, can be modified (Sánchez et al., 2003). Alexithymia is emphatically connected with certain mental disorders for instance depression, and anxiety, general psychological maladjustment, and it could lead to anorexia nervosa or bulimia(Lenzo et al., 2020). As a result, understanding the factors that influence state alexithymia could help prevent or mitigate its detrimental effects. There are no diagnostic criteria for alexithymia in the DSM-5 because it is a symptom rather than a disorder. This symptom, on the other hand, can worsen and lead to other mental disorders (Dubey & Pandey, 2013).

Medical students are more susceptible to emotional and mental health problems due to the focus of their studies on making a knowledgeable, skillful, and professional graduate. The way to guarantee that these criteria are met is by a curriculum developed to accomplish these goals. This curriculum has an unintended negative influence on the student's overall health with a probable effect on their performance on the academic level and professionalism (Dubey & Pandey, 2013). Medical students are more susceptible to alexithymia, due the environment of their studying field and training, especially among the students who suffer lack of family support, and those with poor academic performance (Popa-Velea et al., 2017). Students with alexithymia are more likely to feel loneliness and misalignment with university life, and engage in maladaptive behaviors such as poor self-care, poor academic achievement, smoking, substance misuse, and suicide (Abassi et al., 2014; Saravanan & Heidhy, 2014; Soliman, 2014). There is conflicting evidence of the association of alexithymia with student's gender, and level of academic years, however, there is supporting evidence of its association with psychiatric illnesses, and poor family support (Saravanan & Heidhy, 2014; Teixeira, 2017; Scimeca et al., 2017; Hamaideh, 2018; Zhu et al., 2017; Bratis et al., 2009). Also, the relation to other risk factors such as level of physical inactivity, and history of childhood abuse has been discussed (Alzahrani et al., 2020; Teixeira, 2017).

Given the lack of studies to examine alexithymia among medical students in Saudi Arabia, this study was purposed to determine the prevalence of the state of alexithymia among under graduated students of medicine in Saudi Arabia, and to explore the potential risk factors associated with this condition.

2. MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at the college of medicine, Umm Al-Qura University, Makkah Saudi Arabia, between August and October 2021. The study population was undergraduate medical students from the 2nd to the 6th year. The sample was recruited from among the 1200 medical students using the OpenEpi sample size calculator program. We estimated that the sample size required for analysis would be 292. To account for potential data loss, the total sample size was increased to 317.

Data were collected from completed self-administration survey distributed online through social media in English. Based on the study objectives, the survey was divided into three sections. First section included sociodemographic data including age, gender, academic year, GPA, marital status, parental marital status, living situation and physical activity. The second section included the potential risk factors of alexithymia involving medical history of chronic disease, body mass index (BMI), history of current or past psychiatric illness, history of current or past eating disorders, smoking, and whether they had ever been exposed to emotional, physical, or sexual abuse during childhood.

Third section included the Toronto Alexithymia Scale (TAS-20), one of the most used measures of alexithymia, to determine the prevalence of the condition among participants. The self-report TAS-20 scale includes 20 items valued with a five-point Likert scale (1=strongly disagree, and 5=strongly agree). It has three subscales; the Difficulty Describing Feelings subscale contains five items that measure difficulty describing emotions; the Difficulty Identifying Feelings subscale contains seven items that measure difficulty identifying emotions; and the Externally Oriented Thinking subscale contains eight items that measure an individual's tendency to concentrate their attention externally. The TAS-20 cutoff scores were 51 for the low end (indicating no alexithymia) and 61 for the high end (indicating alexithymia). Scores between 52 and 60 indicate possible alexithymia (Bagby et al., 1994).

The study was approved by the Institutional Research Board at Umm Al-Qura University (HAPO-02-K-012-2021-09-732). All study participants were informed of the objectives of the study and were assured that their responses will be kept confidential and will not be released.

Statistical analysis

This study employed descriptive statistics for reporting numerical and categorical variable; we reported means and standard deviation for numerical variables, and frequencies with proportion for categorical variable. The chi-squared test was used to examine the association between alexithymia and demographic data and risk factors. Univariate analysis was used to determine the prevalence of alexithymia among medical students. A P-value ≤0.05 was considered statically significant. The study data were entered into a 2020 excel spreadsheet (Microsoft Corp., Redmond, WA, USA) and SPSS software (version 21; IBM, NY, USA) was used for the statistical analysis of data.

3. RESULTS

A total of 317 medical students were involved in this study. Among them, 168 (53.0%) were females, mean age of 21.4±1.6 years, 79 (24.9%) were fourth year medical students, 73 (23.0%) were 6th year students, and only 4 (4.3%) of participants were married. Regarding GPA, 117 (36.9%) of participants had scores between 3.5 and 4, while 149 (47%) had scores between 2.75 and 3.49. Around 255 (80.4%) of them had married parents, and 38 (12.0%) had divorced parents. Regarding physical activity, 127 (40.1%) of participants engaged in physical activity once a week, and 94 (29.7%) do not practice regular physical activity. Only 23 (7.3%) of participants had chronic diseases, 49 (15.3%) of participants experienced psychiatric illness, and roughly 13 (4.1%) had eating disorders, while 79 (24.9%) had history of emotional, physical, or sexual abuse during childhood. Most participants, 290 (91.5%) were non-smokers, whereas more than half of them, 173 (54.6%), had normal body weight (Table 1).

Table 1 Characteristics of participants (N=317)

Variable		N (%)
Age (years): (mean ± SD) [range]	21.4 (±1.6) [18-26]	
Gender	Male	149 (47.0%)
	Female	168 (53.0%)
Academic year	2nd year	53 (16.7%)
	3rd year	53 (16.7%)
	4th year	79 (24.9%)
	5th year	59 (18.6%)
	6th year	73 (23.0%)
Marital Status	Single	313 (98.7%)
	Married	4 (4.3%)
GPA	3.5 - 4	117 (36.9%)
	2.75 – 3.49	149 (47%)
	1.75 – 2.74	51 (16.1%)
Parental marital status	Married	255 (80.4%)
	Divorced	38 (12.0%)
	Widowed	24 (7.6%)
Physical activity	Never	94 (29.7%)
	Once a week	127 (40.1%)
	More than once a week	96 (30.3%)
Chronic disease	Yes	23 (7.3%)
	No	294 (92.7%)
History of psychiatric illness	Yes	49 (15.5%)
	No	268 (84.5%)

Eating disorder	Yes	13 (4.1%)
	No	304 (95.9%)
History of childhood emotional, physical, or sexual abuse	Yes	79 (24.9%)
	No	238 (75.1)
Smoker	No	290 (91.5%)
	Yes	20 (6.3%)
	Yes, I was	7 (2.2%)
BMI	Underweight	41 (12.9%)
	Normal	173 (54.6%)
	Overweight	69 (21.8%)
	Obese	20 (6.3%)
	Morbid obese	14 (4.4%)

Regarding the prevalence of alexithymia, a total of 179 (56.5%) of participants fulfilled the criteria of alexithymia, while 98 (30.9%) had suspected alexithymia, and 40 (12.6%) of them had no alexithymia (Figure 1).

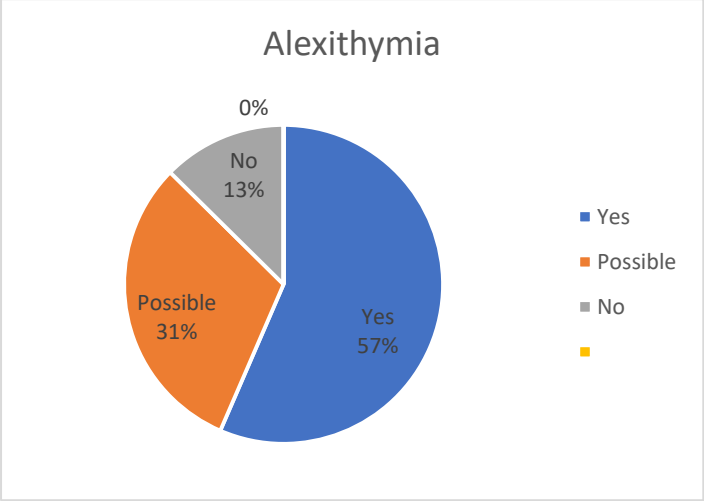

Figure 1 Prevalence of alexithymia among participants

Comparison of the students with alexithymia with those students without alexithymia revealed significant difference between both groups as regard gender (p = 0.00), and parental marital status (p = 0.011), GPA (p = 0.017), history of psychiatric illness (p = 0.002), and childhood emotional, physical, or sexual abuse (p = 0.002). There was no significant statistical difference as regard students' academic year of study, marital status, BMI, chronic disease, smoking, physical activity, and eating disorders (p= > 0.05) (Table 2).

Table 2 Comparison of participants with and without alexithymia (N=317)

Variable		Alexithymia		P VALUE
		YES 179 (56.5%)	NO 138 (43.5%)	
Gender	Male	68 (45.6%)	81 (54.4%)	0.000
	Female	111 (66.1%)	57 (33.9%)	
Academic year	2nd year	31 (58.5%)	22 (41.5%)	0.054
	3rd year	33 (62.3%)	20 (37.7%)	
	4th year	53 (67.1%)	26 (32.9%)	
	5th year	28 (47.5%)	31 (52.5%)	
	6th year	34 (46.6%)	39 (53.4%)	

Marital Status	Single	177 (56.5%)	136 (43.5%)	1.000
	Married	2 (50.0%)	2 (50.0%)	
GPA	3.5 - 4	53 (45.3%)	64 (54.7%)	0.017
	2.75 – 3.49	84 (56.4%)	65 (43.6%)	
	1.75 – 2.74	40 (78.4%)	11 (21.6%)	
Parent marital status	Married	137 (53.7%)	118 (46.3%)	0.011
	Divorced	30 (78.9%)	8 (21.1%)	
	Widowed	12 (50.0%)	12 (50.0%)	
Physical activity	More than once a week	49 (51.0%)	47 (49.0%)	0.190
	Once a week	70 (55.1%)	57 (44.9%)	
	Never	60 (63.8%)	34 (36.2%)	
Chronic disease	Yes	14 (60.9%)	9 (39.1%)	0.828
	Yes	14 (60.9%)	9 (39.1%)	0.828
History of psychiatric illness	Yes	39 (79.6%)	10 (20.4%)	0.002
	No	142 (53%)	126 (47%)	
Eating disorder	Yes	9 (69.2%)	4 (30.8%)	0.404
	No	170 (55.9%)	134 (44.1%)	
History of childhood emotional, physical, or sexual abuse	Yes	57 (70.2%)	22 (27.8%)	0.002
	No	122 (51.3%)	116 (48.7%)	
Smoking	Yes	13 (65.0%)	7 (35.0%)	0.569
	No	163 (56.2%)	127 (43.8%)	
	I was	3 (42.9%)	4 (57.1%)	
BMI	Underweight	26 (63.4%)	15 (36.6%)	0.699
	Normal	98 (56.6%)	75 (43.4%)	
	Overweight	39 (56.5%)	30 (43.5%)	
	Obese	10 (50.0%)	10 (50.0%)	
	Morbid obesity	6 (42.9%)	8 (57.1%)	

A binary logistic regression model of the predictors of alexithymia revealed higher risk for alexithymia among students with female gender (OR: 2.32, 95% CI: 1.47-3.65; p <0.001), divorced parents (OR: 3.23, 95% CI: 1.43-7.32; p = 0.005), history of psychiatric illness (OR:3.40, 955 CI: 1.51-7.67; p = 0.003), and history of childhood emotional, physical and/or sexual abuse (OR: 2.46, 955 CI: 1.42-4.29; p=0.001). A lower risk for alexithymia was demonstrated among students with higher Grade Point Average (OR: 0.32, CI: 0.04-0.93; P = 0.035). There was no association between alexithymia and students' level of academic study, marital status, physical activity, smoking, chronic disease, and BMI (p > 0.05) (Table 3).

Table 3 Binary multivariate logistic regression of factors associated with alexithymia (N=317).

Variable	OR (95% Cl)	P value
Gender		
Male	R	<0.001
Female	2.32 (1.47-3.65)	
Academic year		
Preclinical: 2nd year	R	
Preclinical: 3rd year	1.17 (0.54-2.55)	0.691

Clinical: 4th year	1.45 (0.70-2.97)	0.315
Clinical: 5th year	0.64 (0.30-1.35)	0.244
Clinical: 6th year	0.62(0.30-1.26)	0.188
Marital status		
Single	R	0.793
Married	0.77 (0.11-5.52)	
GPA		
1.75-2.74	R	
2.75-3.49	0.31 (0.03-1.89)	0.301
3.50-4	0.32 (0.04-0.93)	0.035
Parental marital status		
Married	R	
Divorced	3.23 (1.43-7.32)	0.005
widowed	0.86 (0.37-2.00)	0.727
Physical activity		
Never	R	
Once a week	0.70 (0.40-1.20)	0.194
More than once a week	0.59 (0.33-1.06)	0.067
Chronic disease		
No	R	0.659
Yes	1.21 (0.51-2.89)	
History of psychiatric illness		
No	R	0.003
Yes	3.40 (1.51-7.67)	
Eating disorder		
No	R	0.349
Yes	1.77 (0.54-5.89)	
History of childhood emotional, physical, or sexual abuse		
No	R	0.001
Yes	2.46 (1.42-4.29)	
Smoker		
Yes, I was	R	
No	1.71 (0.38-7.78)	0.487
Yes	2.48 (0.43-14.34)	0.312
BMI		
Underweight	R	
Normal	0.75 (0.37-1.52)	0.431
Overweight	0.75 (0.34-1.66)	0.478
Obese	0.58 (0.20-1.70)	0.319
Morbid obese	0.43 (0.13-1.49)	0.184

4. DISCUSSION

The current study assessed the prevalence of alexithymia in a fair sample of undergraduate medical students and identified the risk factors for alexithymia, and its effect on academic performance. A 56.5% prevalence of alexithymia was demonstrated among current study participants. This prevalence is comparable to that identified by a study among medical students in King Abdul-Aziz University in Jeddah, Saudi Arabia (49%) (Alzahrani et al., 2020), and considerably higher in comparison to studies in other communities such as a study in Iran (21.8%) (Faramarzi & Khafri, 2017), Jordan (24.6%) (Hamaideh, 2018), China (37.7%) (Zhu et al.,

2017). Social and cultural factors in the study setting might contribute to the higher prevalence in our study compared to other settings.

This study revealed that female students were at higher risk for alexithymia than males. This finding is consistent with that of several studies (Alzahrani et al., 2020; Hamaideh, 2018), although a study by Scimeca et al., (2017) found no significant differences in the prevalence of alexithymia by gender. Higher prevalence of emotional problems among females is well established (Holden, 2005; Kajantie & Phillips, 2006). Students' psychiatric illness including depression, and anxiety was recognized as a significant predictors of alexithymia in the current study, in line with previous studies (Alzahrani et al., 2020; Bob et al., 2013; Dalbudak et al., 2013; Obeid et al., 2019). This finding could be explained by either the primary alexithymia theory or the theory of secondary alexithymia. Alexithymia was originally assumed to be a cognitive process deficiency in the ability to process or control emotions, according to primary alexithymia hypothesis. This deficiency puts a person at risk for a variety of illnesses associated with poor affect control, including anxiety and mood disorders. However, secondary alexithymia hypothesis viewed alexithymia as a condition of a response to distress, which included a variety of negative feelings and mood disorders.

In certain ways, our result is in line with primary alexithymia theory and secondary alexithymia theory as well (Chen et al., 2017). It is known that medical students suffer from high rates of mental health difficulties. In recent years, there has been a greater emphasis on the need to strengthen support and treatment programs for those students in difficulty (King et al., 2017). Moreover, the present study revealed that alexithymia is linked with students' emotional, physical, or sexual abuse during childhood. Zhu et al., (2017) have demonstrated higher score for total TAS-20 among students with history of childhood abuse. There is mounting evidence that trauma during childhood is a well-known risk factor for a variety of psychiatric diseases, including alexithymia (Wingenfeld et al., 2011; Kaplan et al., 2013). Early childhood trauma may impair the ability to effectively self-regulate affective states, resulting in alexithymia (Zhu et al., 2017). Trauma in childhood can hinder the formation of the hippocampus, a portion of the brain tangled in emotions. Martin Teicher, for example, discovered that people subjected to multiple instances of parents' physical or verbal abuse in their early childhood, had their volumes of the hippocampus reduced by up to 6.5 percent (Teicher et al., 2012). As a result, abused children may experience difficulties with emotion perception, expression, and comprehension, which are basic aspects of alexithymia. Although, Faramarzi et al., (2017) stated that alexithymia was not a considerable predictor of poor academic achievement among university students.

Our study, consistent with previous findings, demonstrated significant inverse relation between alexithymia and academic performance. Students who have alexithymia mostly have negative feelings about their environment and studies, which consequently negatively affect their academic overall performance (Alzahrani et al., 2020; Saravanan & Heidhy, 2014; Parker et al., 2005). Consistent with Morice-Ramat et al., (2018) there was no association between alexithymia and students' academic year in the current study. Conversely, other studies have shown that year one and five students experience more alexithymia than students in years two, three, or four (Saravanan & Heidhy, 2014; Zhu et al., 2017). Al Zahrani et al., (2020) described lower risk for alexithymia among students of clerkship years year (5th and 6th). Similar findings were described by other researches (Holden, 2005; Faramarzi & Khafri, 2017). Difficulties adjusting to the new environment at the beginning of students' college life might explain higher alexithymia among early year's students demonstrated by other studies.

According to some researchers, alexithymia is state-dependent and vanishes after a stressful scenario or a change in experience (Fukunishi et al., 1997). Although the odds of having alexithymia among participants of the current study was high for the early 3rd year (OR: 1.17), compared to the advanced 6th year (OR 0.62), however, the odds were non-significant statistically ($p > 0.05$). Participants of the current study were included from the 2nd to 6th year. They must go through a preparatory 1st year in the college before they engage in the study of medicine. This preparatory year probably gives a chance for students for adaptation to the new college environment and explains the non-significant difference of alexithymia between students' academic years.

This study revealed that almost one eighth of the participants were at the possible alexithymia score. It is important to keep reassessing these students to explore if their scores are increasing or decreasing over time, noted that some of the students may be able to convalesce by employing self-help coping mechanisms, such as spiritual coping mechanisms (Zhang et al., 2017).

5. CONCLUSION

The current study revealed high alexithymia prevalence among medical students with female predominance. Some students' characteristics were significantly associated with the condition including students' parental divorce, psychiatric illness, and childhood abuse. A significant association with lower academic performance was demonstrated. As a result, the findings of our research can be used to prevent and treat alexithymia among medical students. Screening students for alexithymia and ease of psychiatric care is encouraged.

Limitation

This study has some limitations. First, the cross-sectional design of the current study, which impairs possibility to obtain a valid cause-and-effect relationship between alexithymia and characteristics of students. To explore the causality, longitudinal study for further research is needed. Secondly, the current study is restricted to participants' self-report, in which heterogeneity by individual biases is not known. Third, the study was limited to only medical students from a single medical college which affects its generalizability. Conducting a longitudinal multicenter study with a representative sample size will improve the generalizability of the findings. Fourth, certain significant prospective elements for alexithymia study, such as participant's adult trauma, were left out. The exploration of these influences may be important research directions in the future.

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Author's contribution

Abdullah Meshal Alharthi: Manuscript editing and review – literature search –Result writing.
Manal Abdalelah Almsoudi: Manuscript editing and review – literature search – Methods writing.
Mohammed Bander Alotaibi: Manuscript editing and review – literature search – Introduction writing.
Mohamed Sami Jalalalddin: Manuscript editing and review – literature search – Abstract writing.
Mokhtar Mahfouz Shatla: Manuscript editing and review – literature search – General supervision.

Ethical approval

The study was approved by the Ethics and Research Review Committee of Umm Al-Qura University, Faculty of Medicine (Approval number: HAPO-02-K-012-2021-09-732), Date of approval was 07/09/2021.

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Conflict of interests

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

REFERENCES AND NOTES

1. Abbasi M, Bagyan MJ, Dehghan H. Cognitive failure and alexithymia and predicting high–risk behaviors of students with learning disabilities. Int J High Risk Behav Addict 2014; 3(2):e16948.
2. Alzahrani SH, Coumaravelou S, Mahmoud I, Beshawri J, Algethami M. Prevalence of alexithymia and associated factors among medical students at King Abdulaziz University: a cross-sectional study. Ann Saudi Med 2020; 40(1):55-62.
3. Bagby RM, Parker JDA, Taylor GJ. The twenty-item Toronto Alexithymia Scale—I. Item selection and cross-validation of the factor structure. J Psychosom Res 1994; 38(1):23-32.
4. Bob P, Selesova P, Raboch J, Kukla L. 'Pseudoneurological'symptoms, dissociation and stress-related psychopathology in healthy young adults. BMC psychiatry 2013; 13(1):1-5.
5. Bratis D, Tselebis A, Sikaras C, Moulou A, Giotakis K, Zoumakis E, Ilias I. Alexithymia and its association with burnout, depression and family support among Greek nursing staff. Hum Resour Health 2009; 7(1):1-6.
6. Chen L, Xu L, You W, Zhang X, Ling N. Prevalence and associated factors of alexithymia among adult prisoners in China: a cross-sectional study. BMC Psychiatry 2017; 17(1):1-13.
7. Dalbudak E, Evren C, Aldemir S, Coskun KS, Yıldırım FG, Ugurlu H. Alexithymia and personality in relation to social anxiety among university students. Psychiatry Res 2013; 209(2):167-72.
8. Dubey A, Pandey R. Mental health problems in alexithymia: Role of positive and negative emotional experiences. Journal of Projective Psychology & Mental Health 2013; 20(2): 128-36.

9. Dyrbye LN, Thomas MR, Shanafelt TD. Medical student distress: causes, consequences, and proposed solutions. Mayo Clin Proc 2005; 80(12):1613-22.
10. Faramarzi M, Khafri S. Role of alexithymia, anxiety, and depression in predicting self-efficacy in academic students. Sci World J 2017.
11. Fukunishi I, Kikuchi M, Wogan J, Takubo M. Secondary alexithymia as a state reaction in panic disorder and social phobia. Compr Psychiatry 1997; 38(3):166-70.
12. Hamaideh SH. Alexithymia among Jordanian university students: Its prevalence and correlates with depression, anxiety, stress, and demographics. Perspect Psychiatr Care 2018; 54(2):274-80.
13. Holden C. Sex and the suffering brain. Science 2005; 308(5728):1574.
14. Kajantie E, Phillips DI. The effects of sex and hormonal status on the physiological response to acute psychosocial stress. Psychoneuroendocrinology 2006; 31(2):151-78.
15. Kaplan MJ, Dwivedi AK, Privitera MD, lsaacs K, Hughes C, Bowman M. Comparisons of childhood trauma, alexithymia, and defensive styles in patients with psychogenic nonepileptic seizures vs. epilepsy: implications for the etiology of conversion disorder. J Psychosom Res 2013; 75(2):142-6.
16. King E, Steenson C, Shannon C, Mulholland C. Prevalence rates of childhood trauma in medical students: a systematic review. BMC Med Educ 2017; 17(1):1-5.
17. Lenzo V, Barberis N, Cannavò M, Filastro A, Verrastro V, Quattropani MC. The relationship between alexithymia, defense mechanisms, eating disorders, anxiety and depression. Riv Psichiatr 2020; 55(1):24-30.
18. McGillivray L, Becerra R, Harms C. Prevalence and demographic correlates of alexithymia: A comparison between Australian psychiatric and community samples. J Clin Psychol 2017; 73(1):76-87.
19. Messedi N, Feki I, Saguem BN, Masmoudi R, Masmoudi J. Alexithymia and coping strategies among medical students. Eur Psychiatry 2017; 41(S1):S695.
20. Morice-Ramat A, Goronflot L, Guihard G. Are alexithymia and empathy predicting factors of the resilience of medical residents in France?. Int J Med Educ 2018; 9:122-28.
21. Obeid S, Akel M, Haddad C, Fares K, Sacre H, Salameh P, Hallit S. Factors associated with alexithymia among the Lebanese population: results of a cross-sectional study. BMC Psychol 2019; 7(1):1-10.
22. Parker JDA, Austin EJ, Hogan MJ, Wood LM, Bond BJ. Alexithymia and academic success: Examining the transition from high school to university. Pers Individ Dif 2005; 38(6):1257-67.
23. Popa-Velea O, Diaconescu L, Mihăilescu A, Popescu MJ, Macarie G. Burnout and Its Relationships with Alexithymia, Stress, and Social Support among Romanian Medical Students: A Cross-Sectional Study. Int. J. Environ. Res. Public Health 2017; 14(6):560.
24. Sánchez F, Ato-García M, OrtizSoria B. Alexithymia—state or trait?. Span J Psychol 2003; 6(1):51-9.
25. Saravanan C, Heidhy I. Psychological problems and psychosocial predictors of cigarette smoking behavior among undergraduate students in Malaysia. Asian Pac J Cancer Prev 2014; 15(18):7629-34.
26. Scimeca G, Bruno A, Crucitti M, Conti C, Quattrone D, Pandolfo G, Zoccali RA, Muscatello MRA. Abnormal illness behavior and Internet addiction severity: The role of disease conviction, irritability, and alexithymia. J Behav Addict 2017; 6(1):92-7.
27. Soliman M. Perception of stress and coping strategies by medical students at King Saud University, Riyadh, Saudi Arabia. J Taibah Univ Med Sci 2014; 9(1):30-5.
28. Teicher MH, Anderson CM, Polcari A. Childhood maltreatment is associated with reduced volume in the hippocampal subfields CA3, dentate gyrus, and subiculum. Proc Natl Acad Sci 2012; 109(9):E563-72.
29. Teixeira RJ. Alexithymia and drug addiction: Is there a missing link?. MOJ Addict Med Ther 2017; 3(3):71-3.
30. Wingenfeld K, Riedesel K, Petrovic Z, Philippsen C, Meyer B, Rose M, Grabe HJ, Barnow S, Löwe B, Spitzer C. Impact of childhood trauma, alexithymia, dissociation, and emotion suppression on emotional Stroop task. J Psychosom Res 2011; 70(1):53-8.
31. Zhang H, Fan Q, Sun Y, Qiu J, Song L. A study of the characteristics of alexithymia and emotion regulation in patients with depression. Shanghai Arch psychiatry 2017; 29(2):95-103.
32. Zhu Y, Luo T, Liu J, Qu B. Influencing factors of alexithymia in Chinese medical students: A cross-sectional study. BMC Med Educ 2017; 17(1):1-7.