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Association of quality of life with physical activity, depression, and demographic characteristics and its predictors among medical students

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Abstract:

BACKGROUND: Medical students face a variety of challenges during their years of medical education that can affect their quality of life (QOL). This study aimed to investigate the association of QOL with physical activity (PA), depression, and demographic characteristics, as well as to determine its predictors among medical students in different stages of education.

METHODS: A cross-sectional descriptive-correlational study was conducted on 186 medical students of Tabriz University of Medical Sciences in different educational stages including basic sciences, physiopathology, externship, and internship using stratified random sampling method. Data were collected using demographic questionnaire, International PA Questionnaire, World Health Organization QOL Questionnaire, and Beck depression inventory-2. Data analysis was performed using SPSS/Ver 23 through descriptive and analytic statistics including one-way analysis of variance, independent *t*-test, Pearson and Spearman correlation coefficient, and multivariate linear regression model.

RESULTS: There were significant differences in total score of QOL among students in different stages ($P < 0.05$). There were indirect significant correlations between total score of QOL (β [confidence interval 95%]: -0.85 [-1.11—-0.59]) and its all subdomains with Beck depression score but direct significant correlations with total PA ($P < 0.05$) except for social relationship. Educational stage, employment status, family income, inhabitant, moderate PA, and depression were the predictors of QOL and altogether explained 63% of its variance.

CONCLUSIONS: To pay attention to the predictors of QOL, life among medical students seems necessary for increasing their QOL to provide high-quality care for people with disabilities as well as for the whole community.

Keywords:

Demographic characteristics, depression, physical activity, predictors, quality of life

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Introduction

Medical colleges are responsible for training skilled, professional, and knowledgeable medical students to provide the health of individuals and the community. However, to achieve this goal, some aspects of the medical education process cause some mental and emotional distresses on medical students that can have undesirable

consequences. Medical students face a variety of challenges during their years of medical education.^[1,2] Prolonged medical education, encountering with suffering and death of patients, lack of time, and sense of competition can affect the quality of life (QOL) of medical students.^[3,4] QOL is a multifaceted concept that considers the level of well-being in different aspects of life, such as psychological, physical, and social

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aspects, and is generally defined as one's satisfaction with life.^[5] QOL is especially important among students because the university is the place of professionalism and independence of every student. Numerous factors affect the QOL of medical students which cause lower QOL of them in comparison to the general population.^[6]

One study in Brazil on the impact of sociodemographic factors on QOL of medical students revealed that body mass index (BMI), gender, and having at least one parent who was a doctor were correlated with students' QOL score.^[7] The academic year is one of the most important indicators of QOL of medical students.^[8]

A considerable proportion of medical students suffer from anxiety and depression.^[9] Depression and anxiety among Brazilian medical students have been linked to poor mental health and QOL.^[10]

Physical activity (PA) reduces the risk of several diseases such as depression.^[11] Some studies have shown that there is a difference in the level of PA between medical students and the general population.^[12] PA also differs between different levels of medical training.^[13] PA in students has been beneficial in improving mental health and enhancing their QOL through increasing physical self-esteem.^[14] Students who experience an aerobic exercise and/or strength training habits have a higher QOL than other students.^[15]

Several studies have examined the QOL of medical students.^[3,4,7] However, there are limited studies which investigated the relationship between QOL with PA, depression score, and other possible related factors. Hence, this study aimed to investigate the QOL in medical students among four stages of medical education (basic sciences stage, physiopathology stage, and the two clinical stages: externship stage and internship stage) and to determine the predictors of QOL among medical students. In the current study, we tested the hypothesis that there may be relationship between QOL and some demographic characteristics, PA, and depression score.

Methods

A cross-sectional descriptive-correlational study was conducted on the students of Tabriz University of Medical Sciences after obtaining the ethics approval 2018 (Code: IR.TBZMED, REC, 1396.77). Students who were currently studying at Tabriz University of Medical Sciences and were willing to participate in the study were included. Exclusion criteria included any movement limitations such as musculoskeletal disorders, contraindications for PA such as some physical ailments, significant mental disorders requiring medical treatment, participation in a particular hero sport activity, pregnancy

or breastfeeding for female students, and quest students. Sample size was calculated based on the study of Tofighi *et al.*^[16] Considering $m_1 = 29.81$, standard deviation (SD) = 18.31, $\alpha = 0.05$, confidence interval = 95%, $d = 0.08$, around mean, the estimated sample size was 180.

At first, the list of students studying at all stages of medicine in Tabriz University of Medical Sciences was obtained from the Department of Education, and then, the names of students at each stage were listed with consecutive row numbers. At that time, 710, 289, 468, and 480 students were studying, respectively, in basic science, physiopathology, externship, and internship stages. Among those students, a total of 186 students were selected using stratified random sampling method by online software (www.random.org, 45 students from each stage and 51 for internship stage with equal sex ratio). The researcher identified the selected students and recorded their contact numbers. After coordinating at the appropriate time and place for gathering information with the students and the Department of Education, the objectives of the study were explained to them. If the students were eligible, the informed consent form was signed by them. Then, the questionnaires were completed by the students. The students' names were not mentioned in the questionnaire to ensure confidentiality of the information. Subjects with severe depression based on the Beck 2 questionnaire were referred to a psychiatrist.

Data were collected using demographic and anthropometric questionnaire, International PA Questionnaire, World Health Organization QOL Questionnaire (WHOQOL), and Beck depression inventory-2.

In this study, a short questionnaire form in which ones recall their activity over the last 7 days was used (2 questions on vigorous PA, 2 questions on moderate PA, 2 questions on mild PA, and 1 question on sitting). The level of PA is presented in the corresponding metabolic equivalent (MET). Reliability of this questionnaire was reported in the study by Bashiri Moosavi *et al.*,^[17] with correlation coefficient of 0.86. Validity and reliability of this tool were confirmed by Craig *et al.*^[18] in 12 countries.

WHOQOL-short form (WHOQOL-BREF) containing 26 items is a standard tool for measuring QOL. It has four subscales and a total score that measures four broad domains: Physical health (7 questions), psychological health (6 questions), social relationships (3 questions), and environment (8 questions). The sum of the total scores and the scores for each domain are reported by the formula based on 100 to facilitate comparisons with another questionnaire used to address QOL (the WHOQOL-100). A higher score indicates better QOL.^[19] Validity and reliability of this questionnaire have been confirmed by Nejat *et al.* in Iranian population.^[20]

Beck depression inventory-2 is a 21-item self-report questionnaire for assessing the severity of depressive symptoms. Each question consists of four statements of 0–3 that the higher score indicates more intense symptom severity.^[21] Taheri Tanjani *et al.*'s study on Iranian elderly showed that the Beck 2 questionnaire has desirable validity and reliability in the Iranian population.^[22]

Statistical analysis

Data analysis was performed using SPSS/Ver 23 (IBM SPSS Statistics, IBM Corporation, Chicago, IL) at the significant level of 0.05. The normality of the quantitative data distribution was investigated using Kolmogorov–Smirnov test. Pearson correlation test was used to determine the relationship between QOL with depression while Spearman test was used if data distribution was abnormal (PA). Pearson correlation coefficient, independent *t*-test, and one-way analysis of variance were used to determine the relationship of QOL with sociodemographic variables. To predict the effect of each of the independent variables on the QOL, all variable with $P < 0.2$ in the two-tailed were entered to multivariate linear regression model with backward strategy.

Results

The mean SD age of the medical students was 22.6 (2.8) years. The majority of them (88.0%) were single. The mean (SD) weight and BMI were 67.4 (12.6) kg and 23.7 (10.4) kg/m², respectively. BMI in 71.9% of medical students was normal. Half of them inhabited parents' home. Only 3.8% had a history of depression and mood disorders. Three-quarters of fathers and two-thirds of mothers had university education. Occupation of nearly half of the fathers was employee, while 54.7% of mothers were housekeepers. Majority (63.1%) of them mentioned that family income is insufficient. Thirty-eight percent were in the examination course. Presence of serious illnesses, stressful events, and death of loved ones were reported by 8.2%, 18.6%, and 2.7%, respectively [Table 1].

The mean (SD) scores of total QOL (based on 100) of medical students in different educational stages including basic sciences, physiopathology, clinical externship, internship were 69.6 (12.3), 57.6 (12.5), 60.0 (14.0), and 65.0 (18.1), respectively ($P = 0.001$). The mean (SD) scores of physical health domain in aforementioned stages were 75.6 (11.1), 64.1 (15.0), 65.5 (12.6), and 71.6 (18.3), respectively ($P = 0.001$). It was 69.9 (14.9), 53.5 (14.2), 56.1 (17.6), and 62.2 (20.1) for environmental domain ($P < 0.001$). The mean differences in psychological and social relationships domains were not significant between groups ($P > 0.005$); however, similar to total QOL, the mean scores of physical health, and environmental domain among students in

physiopathology and internship courses were better than others [Table 2].

There were indirect significant correlations between total score of QOL and its all subdomains with Beck depression score adjusted for covariates ($P < 0.001$). Direct significant correlations were found between total score of QOL and its all subdomains with total PA ($P < 0.05$), except for social relationship domain [Table 3].

Median (minimum, maximum) of total, vigorous, moderate, and mild PA was 1611 (346.5, 312,25.5), 0 (0, 28,800), 0 (0, 14,400), and 742.5 (346.5, 5890.5) MET-min/week, respectively.

To determine the predictors of QOL in medical students, multivariate linear regression model was used. All variables with $P < 0.2$ in bivariate analysis were entered into this model with backward method. The results showed that educational stage, employment, family income, inhabitant, moderate PA, and depression were the predictors of QOL and altogether explained 63% of its variance. Medical students in basic science stage had significantly more QOL compared to internship, but their QOL was less in physiopathology and clinical externship stages in comparison to internship stage; it was not significant [Table 4]. Employment along with studying significantly decreased the QOL. Sufficient family income, inhabitant personal home compared to dormitory, and moderate PA had significantly decliner effect on QOL, whereas depression and inhabitant rental home compared to dormitory had increasing effect [Table 4].

Discussion

Predictors of medical students' QOL in this study included educational stage, employment, family income, moderate PA, and depression. In addition, BMI, serious illness, and being in the examinations period were a number of sociodemographic characteristics that showed a significant statistical relationship with students' QOL. In the study by Serinolli and Novaretti,^[7] religious beliefs, BMI, longer daily traveling time, having at least one parent who was a doctor, and gender were effectiveness on the QOL of medical students. Zhang *et al.*^[8] reported that different academic years, different specialties, gender, interest in the area of study, confidence in career development, hometown location, and physical exercise were significantly associated with the QOL.

The results of the present study showed that the scores of total QOL and its physical health and environment domains at different stages of medical education were significantly different, which is consistent with the results of previous studies.^[4,7,8] The basic science stage is one of the strong

Table 1: Socio-demographic characteristic of medical students and its relationship with quality of life (n=186)

Sociodemographic characteristics	n (%)	QOL mean (SD)	P	Sociodemographic characteristics	n (%)	QOL mean (SD)	P
Age, mean (SD)	22.6 (2.8)		0.831*	Father's education			
Gender				Primary-secondary	8 (4.3)	62.5 (16.0)	0.194‡
Male	93 (50.0)	63.8 (17.3)	0.576†	Diploma	31 (16.8)	62.5 (16.0)	
Female	93 (50.0)	62.6 (13.1)		University	145 (78.8)	62.5 (16.0)	
Marital status				Mother's education			
Single	162 (88)	63.0 (14.8)	0.733†	Primary-secondary	17 (9.2)	63.7 (13.4)	0.815‡
Married	22 (12)	64.2 (18.3)		High school-diploma	48 (26)	62.2 (17.0)	
Educational grade				University	119 (64.7)	63.9 (14.4)	
Basic sciences	45 (24.2)	69.6 (12.3)	0.001‡	Father's occupation			
Physiopathology	45 (24.2)	57.6 (12.5)		Unemployed	2 (1.1)	70.6 (0)	0.328‡
Clinical externship	45 (24.2)	60.0 (14.0)		Employee	88 (47.8)	64.1 (15.0)	
Internship	51 (27.4)	65.0 (18.1)		Self-employment	54 (29.3)	60.4 (16.6)	
Weight (kg), mean (SD)	67.4 (12.6)		0.968*	Others	40 (21.7)	65.4 (12.2)	
BMI (kg/m ²), mean (SD)	23.7 (10.4)		0.015*	Mother's occupation			
Underweight (<18.5)	17 (9.9)	70.5 (11.2)	0.015‡	Housekeeper	99 (54.7)	64.0 (15.6)	0.613†
Normal (18.5-24.9)	123 (71.9)	63.4 (14.9)		Occupied	82 (45.3)	62.8 (14.1)	
Overweight (25-29.9)	28 (16.4)	62.3 (14.2)		Income			
Obese (≥30)	3 (1.8)	86.0 (15.1)		Insufficient	113 (63.1)	68.0 (14.1)	<0.001†
Employment				Sufficient and somehow sufficient	66 (36.9)	56.0 (13.6)	
Yes	9 (5.4)	50.2 (7.7)	0.003†	Death of loved ones			
No	159 (94.6)	65.4 (14.9)		Yes	5 (2.7)	52.0 (9.2)	0.090†
Inhabitant				No	179 (97.3)	63.7 (15.2)	
Dormitory	48 (26.1)	61.3 (11.4)	0.026‡	Serious illness			
Parent's home	93 (50.5)	64.1 (15.0)		Yes	15 (8.2)	53.2 (8.1)	0.006†
Personal	22 (12.0)	70.9 (18.1)		No	167 (91.8)	64.5 (5.3)	
Rental	20 (10.9)	56.5 (16.1)		Stressful events			
Depression history				Yes	34 (18.6)	61.4 (15.9)	0.398†
Yes	7 (3.8)	47.3 (12.4)	0.220†	No	149 (81.4)	63.9 (14.8)	
No	178 (96.2)	63.9 (15.0)		Examination period			
Family history of depression				Yes	69 (38.3)	67.9 (14.2)	0.002†
Yes	15 (8.2)	58.5 (15.5)	0.220†	No	111 (61.7)	60.9 (15.3)	
No	169 (91.8)	63.6 (15.2)		History of mood disorders			
				Yes	7 (3.8)	52.1 (9.8)	0.051†
				No	177 (96.2)	63.6 (15.3)	

*Pearson correlation coefficient, †Independent t-test, ‡One-way ANOVA Fisher's exact test. ANOVA=Analysis of variance, QOL=Quality of life, SD=Standard deviation, BMI=Body mass index

Table 2: Mean (standard deviation) score of quality of life and its dimensions in medical students by educational course (n=186)

WHOQOL-BREF (0-100)	Basic sciences (n=45)	Physiopathology (n=45)	Clinical externship (n=45)	Internship (n=51)	Total (n=186)	P*
Total QOL	69.6 (12.3)	57.6 (12.5)	60.0 (14.0)	65.0 (18.1)	63.2 (15.2)	0.001
Physical health	75.6 (11.1)	64.1 (15.0)	65.5 (12.6)	71.6 (18.3)	69.3 (15.2)	0.001
Psychological	63.8 (14.5)	56.5 (12.2)	59.0 (16.2)	62.9 (21.0)	60.7 (16.6)	0.133
Social relationships	65.6 (21.7)	55.2 (15.9)	58.9 (18.6)	60.4 (23.2)	60.0 (20.4)	0.125
Environment	69.9 (14.9)	53.5 (14.2)	56.1 (17.6)	62.2 (20.1)	60.6 (18.0)	<0.001

*One-way ANOVA. WHOQOL=World Health Organization Quality of Life Questionnaire, ANOVA=Analysis of variance

predictors of high QOL that is consistent with the results of Jamali *et al.*^[4] Physiopathology and externship stages were inversely related to QOL. Our study showed that the QOL was high in basic science but declined dramatically upon entering the physiopathology stage. At the externship stage, the QOL did not change much but gradually began to increase as the internship stage progressed. According

to Kjeldstadli *et al.*^[23] medical students in the 1st year of medical school have the same level of life satisfaction as other students, but the life satisfaction decreased from 1st to 3rd year in the medical school and remained low until graduation. Paro *et al.*^[24] showed that the highest impairment of QOL was observed among 3rd-year medical students. In our study, the physiopathology stage showed the lowest

Table 3: Relationship between depression and total physical activity with quality of life and its dimensions among medical students (n=186)

Variable	r	Beck depression (0-63)		Total physical activity (MET-min/week)	
		β (95% CI)*	P*	r	P*
Total QOL (0-100)	-0.557	-0.85 (-1.11--0.59)	<0.001	0.191	0.016
Physical health	-0.573	-0.89 (-1.17--0.61)	<0.001	0.217	0.006
Psychological health	-0.525	-0.94 (-1.24--0.64)	<0.001	0.172	0.030
Social relationship	-0.422	-0.99 (-1.42--0.58)	<0.001	0.131	0.100
Environment	-0.455	-0.69 (-1.01--0.37)	<0.001	0.170	0.032

*Pearson correlation coefficient and multivariate linear regression adjusted for educational grade, family income, employment, examinations period, history of mood disorders, serious illness, death of loved ones, †Spearman rho correlation coefficient. CI=Confidence interval, MET=Metabolic equivalent

Table 4: Predictors of quality of life among medical students (n=186)

Variable	QOL	
	β (95% CI)*	P*
Educational grade (Reference group: Internship)	-	-
Basic sciences	7.9 (3.5-12.1)	<0.001
Physiopathology	-1.9 (-7.5-3.6)	0.493
Clinical externship	-2.9 (-8.7-2.9)	0.329
Employment (Reference: Yes)	-	-
No	12.3 (4.8-19.8)	0.001
Family income (Reference group: Sufficient)	-	-
Insufficient and somewhat sufficient	-6.0 (-10.2--1.7)	0.006
Inhabitant (Reference group: Dormitory)	-	-
Parent's home	2.9 (-1.8-7.6)	0.219
Personal	8.2 (1.9-14.3)	0.010
Rental	-6.4 (-11.9--0.8)	0.025
Moderate physical activity (MET-min/week)	0.001 (0.0-0.002)	0.016
Depression	-0.8 (-1.0--0.5)	<0.001
Adjusted R ²		0.63

*Multivariate linear regression model. All variable with P<0.2 were entered to model with Backward strategy. CI 95%. CI=Confidence interval, QOL=Quality of life, MET=Metabolic equivalent

QOL compared to other stages, which is approximately equivalent to the 3rd year of medicine. Perhaps, one of the reasons for the high QOL of medical students in the 1st year of medical school is the happiness resulted from being admitted to the medical school; but their QOL has remarkably decreased with increasing academic overload and encountering with preclinical and clinical education as a new and stressful experience as well as with the pressure of examinations and competition. In the internship stage, the QOL of the students began to increase with increasing adaptability to the clinical environment as well as independence in the clinical environment, but still the QOL was lower than the basic science stage. Unemployment while studying is one of the powerful predictors of high QOL. Student employment affects students' mental and physical health. Increasing hours of work has a negative impact on students' academic performance.^[25] It seems that being employed while studying puts additional strain on the student and leads to lower QOL.

Inadequate family income is another predictor of poor QOL of medical students. The relationship between family income and students' QOL has been reported differently in previous studies. In the study by Aboalshamat *et al.*,^[26] medical students with high family income showed higher life

satisfaction. On the contrary, according to Angkurawaranon *et al.*,^[27] family income did not significantly correlate with the QOL of medical students, which is inconsistent with the results of our study. However, the impact of living in low-income families on the increased risk of depression and anxiety^[28] cannot be ignored. According to Pekmezovic *et al.*,^[29] living in a rented home was associated with lower QOL among students. In the present study, rental home was relatively strongly related to low QOL, which may be affected by family income.

Several previous studies have reported that increased PA improves individuals' QOL.^[15,30,31] The present study also showed a direct correlation between QOL and PA in medical students. In our study, moderate PA was a predictor of QOL in medical students. In the study by Peleias *et al.*,^[3] there was a significant relationship between severe and moderate PA and better QOL, which is in agreement with the results of our study. In addition, Zhang *et al.*,^[8] reported that physical exercise was significantly related to QOL.

In the present study, there was a significant indirect correlation between overall QOL score and all of its subdomains with depression score. Many studies

showed that by reducing depression and increasing mental health, people's QOL increases,^[31-34] which is consistent with the results of our study. Paro *et al.*^[24] reported that depression was associated with the highest impairment of QOL among medical students. In addition, Arslan *et al.*^[35] showed that depression negatively affects all domains of QOL.

In several previous publications that reported factors affecting the QOL of medical students, females had lower QOL than male students.^[6,7,36] In our study, the QOL of male students was not significantly different from that of female students, which is inconsistent with the results of previous studies. Paradoxically, in the study by Angkurawaranon *et al.*,^[27] female students had a higher QOL than male students. Kjeldstadli *et al.*^[23] did not find any gender difference in the QOL of students, which is consistent with our study. It may indicate the same educational conditions for both genders in Tabriz University of Medical Sciences. In addition, this study specially focused on medical students that may have different condition with other students

Limitations

One of the potential limitations of the present study is the type of cross-sectional study. This type of study is not able to discover the causal relationship between variables. Our study was limited to one medical school, which eliminates the possibility of comparing results with other college students. The relatively small sample size was also one of the limitations of our study that could affect some of the characteristics with low prevalence, including being married and having children. Future research with longitudinal design can be conducted to trace changes in the medical students QOL over time. Multi-institution study with larger sample size is needed. In addition, it is suggested to investigate the QOL in the residency stage.

Conclusions

There was a significant indirect correlation between overall QOL score and all of its subdomains with depression score. There was a direct correlation between QOL and PA in the medical students. Predictors of medical students' QOL in this study included educational course, employment, family income, moderate PA, and depression. To pay attention to the predictors of QOL, life among medical students seems necessary for increasing their QOL to provide high-quality care for people with disabilities as well as for the whole community.

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Conflicts of interest

There are no conflicts of interest.

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