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RESEARCH ARTICLE

ANXIETY AND DEPRESSION AMONG INTERNATIONAL STUDENTS STUDYING IN GEORGIA

Ann Rekhviashvili, Tamar Kandashvili, Tamar Giorgobiani and David Gordeladze

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Abstract

Background & objectives: Existence of anxiety and depression among students has growing tendency in the world. Purpose of the study was to determine the prevalence of anxiety and depression among international medical students studying in Georgia and their association with the body weight and blood pressure level.

Methods: 70 international medical students (mean age \pm SD; 22.67 \pm 2.65) were included in the study. All participants filled in anonymous questionnaires, which included socio-demographic data, blood pressure level, presence of diabetes mellitus, eating habits and body mass index (BMI). For an assessment of anxiety and depression was used Hospital Scale of Anxiety and Depression.

Results: In comparison with hypertensive or prehypertensive population, normotensive subjects had significantly lower depression and anxiety scores ($P < 0.001$ for both). Hypertensive students had higher anxiety score than prehypertensive individuals ($P = 0.03$). Therefore, depression score was not different between hypertensive and prehypertensive subjects. Study showed a positive correlation between blood pressure, BMI, depression and anxiety scores ($P < 0.005$).

Interpretation and conclusion: High prevalence of depression, anxiety, prehypertension, non-healthy eating habits and lifestyle among international medical students points out on the need to identify and treat mental health problems as early as possible to prevent possible serious sequelae.

Prevalence of Anxiety and Depression among International Students Studying in Georgia

Ann Rekhviashvili MD, PhD.¹, Tamar Kandashvili MD, PhD.², Tamar Giorgobiani³, David Gordeladze MD, PhD.⁴

1. Affiliation: Associate Professor and Chief of the Internal Medicine Department at the PetreShotadze Tbilisi Medical Academy. Chief of the Arterial Hypertension and Vascular Study Center at the Al. Aladashvili Clinical Hospital. Tbilisi, Georgia.
2. Affiliation: Associate Professor at the Tbilisi State Medical University. Tbilisi, Georgia
3. Affiliation: Assistant Professor at the Tbilisi State Medical University. Tbilisi, Georgia
4. Affiliation: Professor, Chief of the 3rd Department of Internal Medicine at the Tbilisi State Medical University. Tbilisi, Georgia

Introduction:-

Depression is a major social phenomenon and leading mental health problem in the world. It has been portrayed by the World Health Organization (WHO) as one of the leading causes of disability worldwide. American College Health Association as well as studies from different countries show a growing number of college students that face depression, anxiety, sleep disorders and other mental health problems (**American College Health Association, 2009**; Wahed et al., 2017; Abdallah and Gabr, 2014; Ibrahim and Abdelreheem, 2015; Alghamdi et al., 2017; Villatte et al., 2017). It was reported that more than 50% of students experience depression in a college and 10% have suicidal thoughts (Furr et al., 2011). In 60% of students' cases, depression, anxiety and maladjustment were the main causes of leaving universities without graduation (Wahed and Hassan, 2017). Studies revealed, that medical students in comparison with the general population and students from other fields, have higher level of anxiety prevalence (Dyrbye et al., 2005; Dyrbye et al., 2006; Willcock et al., 2004).

Depression is identified and classified by its symptoms, namely depressed mood, loss of interest, sleeping disturbances, excessive sadness, difficulties in thinking and concentration (Merrell, 2008). Anxiety is universal human emotion that occurs without an identifiable triggering stimulus, which involves psychological and physiological components, revealed as emotional, somatic, cognitive, and behavioral changes (Simpson et al., 2010). Depression and anxiety frequently coexist and revealed by symptoms, which include irritability, helplessness, hopelessness, worthlessness, restlessness, persistent sadness, feelings of guilt, anxious or "empty" feelings, loss of interest in activities or hobbies once pleasurable. Studies showed that medical students with elevated anxiety levels and depression have worse academic performance, professionalism and are inclined to the decreased empathy (Shanafelt et al., 2002; Barbosa et al., 2013).

There are scientific data regarding the positive association between migration status and mental health; namely, migrants who live in foreign countries for educational, social, economic or political reasons have higher risk of mental illnesses in comparison with non-migrants (Sumer et al., 2008; Bhugra and Jones, 2001). Absolute majority of studies published regarding depression in migrants have been mainly focused on investigations of depressive symptoms among migrant settlers, refugee populations and workers, while studies regarding prevalence of depressive symptoms among international students is scarce.

Data regarding prevalence of overweight and obesity among students are heterogeneous. Studies performed in Indian and Qatari local and international students' population revealed in average 40% prevalence of overweight and obesity, while other studies showed significantly lower prevalence (overweight and obesity in 9.3% and 18.4%, respectively) (Jayara et al., 2014; Al-Thani et al., 2018; Deotale et al., 2015).

Data regarding association between depression and obesity are not similar. Some authors showed statistically significant correlation between them, others confirmed their coincidence and no association. According to the World Health Organization report, the prevalence of obesity has tripled concurrently with the rate of depression in many countries of the European Region since 1980s, and continues to rise at an alarming rate. Meta-analyses, which involved data from over 33,000 subjects showed, that depressed compared with non-depressed people have significantly higher BMI and prevalence of obesity (Blaine, 2008).

Besides determination of body mass index, assessment of blood pressure values has immense meaning, especially in a population who impose stressful situations. Data on prehypertension in young adults are lacking, and little is known on the risk factors for prehypertension and their association with other CVD risk factors. Relationship between blood pressure level and existence, as well as severity of anxiety and depression still remain a mystery. Recently published scientific paper by Said et al. underlines relationship between severity of depression and prehypertension. According to their data, only severe and extremely severe depression is associated with prehypertension (Said et al., 2017). Other authors indicate that prehypertension is common among senior medical students and is related to being obese, having central obesity and low vegetable consumption (Alghamdi et al., 2017).

Majority of international students studying in Georgia come from India, Iraq and Nigeria. International students normally face many difficulties in a host country, namely language and financial problems, cultural shock, adapting

another type of weather and food, accommodation problems and feeling being lonely. All the factors listed above can be considered as potential cause of high prevalence of depression and anxiety among them. Hence, aim of our study was to assess prevalence of depression and anxiety in international students and its associations with higher than normal blood pressure, obesity, eating habits and physical activity level.

Material and Methods:-

Totally 70 international medical students from different countries were included in the study. 50 students were male and 20 female. Mean age of the students involved in a study was 22.67 ± 2.65 years.

We conducted a cross-sectional questionnaire based survey among the international students of PetreShotadze Tbilisi Medical Academy and Tbilisi State Medical University in spring, 2018 year. International students involved in the study were neither citizens nor permanent residents of Georgia and came to the country to complete a one-step educational program of medicine. The study was approved by the local Ethics Committee. Students were supplied with fully anonymous questionnaires by the investigators. For an assessment of anxiety and depression was used The Hospital Anxiety and Depression Scale (HADS) questionnaires (Snaith et al., 2003; Stern, 2014). Grading scores from 0 to 7 were considered as normal, from 8 to 10 – borderline, i.e. subclinical form and scores 11 and more as clinically manifested depression and/or anxiety.

HADS was developed by Zigmond and Snaith in 1983 to identify possibility and probability of anxiety disorders and depression among patients in nonpsychiatric hospital clinics. It is divided into an Anxiety subscale and a Depression subscale both containing seven intermingled items. To prevent ‘noise’ from somatic as well as mental disorders on the scores, all symptoms of anxiety or depression relating also to physical and psychiatric disorder, such as dizziness, headaches, insomnia, anergia and fatigue, were excluded by the authors.

A predesigned self-administered questionnaire have been used to assess demographic data, socioeconomic condition, and lifestyle; the factors examined included age, sex, nationality, blood pressure level, heart rate, presence of diabetes mellitus, frequency of fast food consumption, salt usage, amount of fruit and vegetable in a daily diet, calculated body mass index (BMI). According to the amount of salt consumption, subjects were divided into 3 groups: low salt consumption, when a person eats less salty products, avoids fast and canned food, eats row vegetables and fresh salads without adding some salt. Medium consumption of salt, when subjects eats food like others do without adding some extra amount of salt on it; high salt consumption, when a subjects adds salt without even trying the food’s taste and eats high amount of fast and/or restaurant food on daily basis.

Home blood pressure measurement on 3 different occasions via previously validated fully automated blood pressure measurement devices (Omron M3 Comfort and Microlife BP A2 Classic) were performed by the participants themselves and recorded in a questionnaire paper. Because of discrepancies between ESH/ESC 2018, AHA/ACC 2017 and JNC8 guidelines, for definition of arterial hypertension and prehypertension, superiority has been given to JNC8 classification.

Data were analyzed using Statistical Package for SocialScience version 16.0 software, SPSS, Inc., Chicago, IL. Data were summarized using mean and standard deviation values, as well as median scores and percentage for qualitative variables. Comparisons between groups were performed by using chi-square test for qualitative variables and Mann-Whitney test for scores. A p value less than or equal to 0.05 was considered statistically significant.

Results:-

From the 70 international students studying in Georgia, 34% were from India ($n=24$), 54% ($n=38$) from Iraq and 12% ($n=8$) from Nigeria. Mean BMI of the study population was 25.72 ± 5.97 kg/m^2 ; hence, 17% of the study population were obese, with mean BMI 33.70 ± 4.35 kg/m^2 , 28.5% were overweight and 54.5% had normal weight with BMI of 27.34 ± 1.99 kg/m^2 and 20.56 ± 2.48 kg/m^2 , respectively.

Mean systolic blood pressure of the study population was 125.93 ± 17.35 mmHg and mean diastolic blood pressure was 76.41 ± 10.52 mmHg. 9% of the study population were hypertensive ($n=6$) with mean systolic and diastolic blood pressures 157.33 ± 17.11 mmHg and 97.0 ± 7.56 mmHg; respectively. Prehypertension was revealed in 47% ($n=33$) of investigated subjects with mean systolic and diastolic blood pressures 127.85 ± 7.53 mmHg and 78.6 ± 8.42 mmHg. Rest of the population ($n=31$; i.e. 44%) had normal blood pressure with mean systolic BP level of

107.22±8.46 mmHg and diastolic blood pressure 70.1±6.17 mmHg. 3 students had confirmed diabetes mellitus; from them 2 were on insulin therapy and 1 was on *per os* medication (Table 1).

Fast food consumption on daily basis was revealed in majority of investigated subjects (n=50). Vegetables in daily diet had 80% (n=56) and fruit – 53% (n=37) from them. Only 37% (n=26) of the investigated subjects were physically active more than 4 days per week. According to the amount of salt in every day diet, students who used to take low salt diet were minority (13%; n=9). 26% of subjects (n=18) used to take very high amount of salt. Medium salt consumption was recorded by 43 students (61%).

From the investigated medical students, 10 had clinically manifested depression, 17 – subclinical form of depression and 43 had no depression at all. Herein, 12 students had clinical form of anxiety, 18 – subclinical form and 40 no anxiety at all. Mean score of depression and anxiety according to the HADS among study participants was 6.81±3.59 and 6.74±4.31, respectively (Table 2).

Clinically manifested anxiety and depression simultaneously had 4 students (5.7%). 31 (44.28%) students had not anxiety nor depression. Totally, clinically manifested and subclinical forms of depression were found in 27 students (38.6%) and anxiety in 30 students (42.8%), respectively. Detailed data are given in Table 3.

Normotensive subjects in comparison with hypertensive or prehypertensive population had statistically significant lower level of depression (4.97±2.33 vs 10.83±3.25; P=0.00044 and 4.97±2.33 vs 10.47±2.55; P<0.00001, respectively) and anxiety scores (5.40±3.80 vs 12.83±3.60; and 5.40±3.80 vs 8.29±3.58; P<0.001 for both). Therefore, there was not found significant difference of depression score between subjects with hypertension and prehypertension (10.83±3.25 vs 10.47±2.55; P=NS). However, subjects with hypertension had significantly higher score of anxiety in comparison with prehypertensive subjects (12.83±3.60 vs 8.29±3.58; P=0.03).

Using Pearson's Correlation Coefficient analyses, we found that in the total population there is a positive correlation between systolic and diastolic blood pressure values and depression score (R=0.6763 and R=0.6676, respectively; P<0.00001). Hence, as high is blood pressure, as higher depression score is expected. Relationship between systolic as well as diastolic blood pressures and anxiety also showed strong positive correlation (P<0.005).

BMI was positively correlated with the SBP, DBP and depression score (P<0.001 for all the parameters); hence, there was not revealed correlation between BMI and anxiety level in our study population (P=NS).

Females in comparison with males had lower score of depression (4.55±2.41 vs 7.72±3.60; P<0.001). Anxiety did not show statistically significant difference between male and female groups (P=0.19). Systolic, as well as diastolic blood pressure was significantly higher among males (126.52±16.84 vs 108.05±10.27 and 79.22±10.36 vs 69.40±7.24; respectively. P<0.00001).

Discussion:-

In our study, prevalence of depression and anxiety among medical students were reported in 38% and 42.8%, respectively, which is quite different from the data received by other scientists, who revealed significantly lower or higher prevalence data (Wahed et al., 2017; Abdallah and Gabr et al., 2014; Ibrahim and Abdelreheem et al., 2015; Mook et al., 2016). Such discrepancies between the data from different countries underlines a necessity for further large scale studies in multiethnic study groups.

The data regarding the prevalence of pre-hypertension among students is quite divergent. Similar to the data from Malaysian government university (prevalence of prehypertension - 42.9%) and different from other Malaysian and African studies (34%, 30.1% and 26.1% prevalence of prehypertension), our study showed a 47% prevalence of prehypertension (Said and Saliluddin, 2017; Lee et al., 2010; Balami et al., 2014; Gyamfi et al., 2018). Moreover, the prevalence of pre-hypertension among university students in Columbia, Kuwait, Palestine and Slovakia were reported as 40.0%, 39.5%, 27.1% and 22.1%, respectively (Torres and Alberto, 2011; Al-Majed and Sadek, 2012; Tayem et al., 2012; Hujová, 2013). In 2017, researchers found a high prevalence of prehypertension in a large sample of university students across seven ASEAN countries and significant association of prehypertension with some psychosocial risk factors, including male gender, obesity, soft drinks consumption, heavy drinking and depression symptoms (Peltzer et al., 2017). Respectively, different study designs, ethnicity, life style, obesity, socio-

economical status and some other factors may be explain the discrepancy between the data received from different studies.

In contrast to our study, where hypertension was recorded in 9% of the participants, other scientists recorded higher prevalence of hypertension among medical students of Uganda and India, namely 14%, and 13.88%, respectively (Chattopadhyay et al., 2014; Nyombi et al., 2016). Opposite to these findings, some authors did not record any case of hypertension while studying 222 medical students (Namita and Ranjan, 2017). This discrepancy between quite homogenic study groups is quite confusing and future multiethnic studies are needed to find out the real prevalence of hypertension among students.

In our study hypertension as well as prehypertension was associated with the higher scores of depression. In comparison with students with anxiety, students with clinically manifested depression had higher SBP (129.8±21.5 mmHg vs 141.4±16.6 mmHg; $P<0.05$). Students without depression and anxiety had the lowest blood pressure (112.2±10.1 mmHg). Moreover, hypertensive and prehypertensive subjects had higher depression score than those with normal blood pressure (10.83±3.25 vs 10.47±2.55 vs 4.98±2.33; respectively); hence, statistically significant difference between depression severity was not found between hypertensive and prehypertensive subjects. Pearson's Correlation Coefficient analyses also confirmed strong positive correlation between systolic and diastolic blood pressure values and depression scores, which can be a good indicator for the bidirectional relationship between depression and increased blood pressure level. Hence, early manifestation of hypertension and prehypertension, may be helpful to avoid development of clinical forms of anxiety and depression and associated with them undesirable and sometimes life-threatening complications.

Similar to other studies, the prevalence of obesity and overweight in our study was 17% and 28.5% respectively (Katuka et al., 2016). Similar to Scott et al., who conducted a cross sectional survey across 13 countries and revealed a statistically significant association between obesity and depressive disorders, we found out a positive correlation between BMI level and the depression score (Scott et al., 2008). Moreover, bi-directional association between obesity and depression was confirmed by a meta-analysis (Mannan et al., 2016). Hence, obese people of both sexes are at higher risk of depression. However, the association is stronger for females.

From the mechanisms linking depression and obesity most important are behavioral, lifestyle, biological and genetic factors. Depressed adolescents mostly change their appetite and dietary patterns, which mostly leads to weight change (Privitera et al., 2013). Depressed people prefer carbohydrate rich food, which provides pleasure or comfort. Moreover, frequently they have sedentary lifestyle and insomnia as well. Obese people of all ages, especially adolescents may experience stigmatization, inferiority, poor body image and low self-esteem, which increase their vulnerability to depression. There are also a number of shared biological mechanisms including inflammation, impaired glycaemic control, dysregulation of the hypothalamic–pituitary–adrenocortical axis, and neuroendocrine mechanisms via leptin melanocortinergic-BDNF signaling that have been implicated in the etiology of both depression and obesity (Mannan et al., 2016).

In contrast to some published data and similar to others, we could not reveal any association between obesity and anxiety (Wahed et al., 2017; Chukwunonso, 2013; Garipey et al., 2013). This discrepancy between the studies may be explained via non-homogeneity of the study populations.

Similar to the results obtained by Nyombi and Kabir, majority of students involved in our study were regular consumers of fast food (Nyombi et al., 2016; Kabir et al., 2016). Eating habits of 80% of investigated subjects were characterized with daily vegetable consumption. Physical activity 4 days per week and more was prevalent only in 37% of cases. Low salt diet was recorded by significant minority of the students (13%), and nearly one forth of a total examined population recorded being on a very high salt diet. Hence, we can suggest that international students mostly are not well adopted, prefer fast food with high salt consistency and low physical activity, which needs additional attention and measures from the university authorities and healthcare professionals to improve their lifestyle and avoid future complications.

Table I:- Socio-demographic characteristics of the study participants.

Continous Variables	Mean	S.D.
AGE	22.65	2.65
BMI kg/m ²	25.72	5.97

Mean SBP	125.93	17.35	
Mean DBP	76.41	10.52	
Categorical Variables	Frequency	Percentage	
Gender			
Male	50	71.40%	
Female	20	28.60%	
Country of origin			
India	24	34%	
Nigeria	8	12%	
Iraq	38	54%	
Blood pressure			
Arterial hypertension	6	9%	
Prehypertension	33	47%	
Normotension	31	44%	
Diabetes Mellitus			
No	67	95.70%	
Yes	3	4.30%	

SBP – Systolic blood pressure. DBP – Diastolic blood pressure.

Table II:- Depression and Anxiety prevalence according to the HADS.

	Depression Score	Anxiety Score	
Clinically manifested	13.2±1.6	13.66±2.10	
Subclinical form	8.88±0.78	9.16±0.78	
Normal	4.51±1.88	3.65±2.09	

Table III:- Prevalence of Anxiety and Depression among study population.

	Clinical Anxiety	Subclinical Anxiety	No Anxiety	
Clinical Depression	N =4	N =3	N =3	
Subclinical Depression	N =6	N =5	N =6	
No Depression	N =2	N =10	N =31	

N – Number of students.

Conclusion:-

Similar to many other studies, we showed high prevalence of depression, anxiety, prehypertension, non-healthy eating habits and low physical activity in international medical students studying in Georgia. Individuals with high blood pressure, especially in association with depression and anxiety have significant decline in the cognitive functions, motivation, academic performances, professionalism and mostly are inclined to the decreased empathy.

Because of rarity of routine screenings in university healthcare clinics, depression and anxiety mostly remain underdiagnosed and are often missed by the health care professionals. Hence, University authorities should pay more attention for development of special healthcare programs, which will give a unique opportunity to identify and treat mental health problems as early as possible, which will be a real hallmark for prevention of the serious sequelae of untreated depression and anxiety. High prevalence of obesity, non-healthy diet, high salt abuse and physical inactivity among the University students points out the immense meaning of the development of special educational programs for improvement their habits and accordingly prognosis.

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