MORBIDITY ASSESSMENT ACCORDING TO GENDER IN GEORGIAN STUDENTS

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Students belong to a high risk group due to a number of environmental factors which, in terms of modern life, negatively affect their physical, mental and reproductive health condition during their university years. Among these factors, a significant role is played by the permanent mental and psycho-emotional stress, informational stress, material problems and frequent violation of working, rest and nutrition regimes. Decrease in general level of culture, including sanitary and hygienic means, promotes the prevalence of self-destructive behavior such as: smoking, alcohol, narcotic and psychoactive substances [4,9]. The impact of health behavior and indicators over students' academic achievements is proved. For example, alcohol abuse, sleep deprivation and poor condition of psychical health is detrimental for academic achiements [6,18].

By Ruthig JC et al., significant gender differences were noted according to initial symptoms, stress perception, exercise and nutrition. If compared with previous achievements, increase in alcohol consumption negatively affected the female students' perception of their academic performance and success; Increase in tobacco consumption had negative impact on male students' performance. Male and female college students vary by how their healths change during the academic year and how such changes affect their further academic performance [8,17]. Female students experience more academic stress compared to male students [4].

The healthy behavior in Georgian students is not very stable [1]. The majority of respondents do not see the doctor for the purpose of prevention [20].

Females and males are significantly different in terms of assessments of general health conditions, frequency of alcohol consumption, amount of alcohol, consumed at session, the number of sexual partners and the daily intake of food. The physical exertion, frequency of annual check-ups by a doctor, screening of infective diseases and screening of hypertension are various. In general, males are characterized by more risky behavior than females [10].

Until now, students' physiologic status and negative impact of harmful habits on health, during the educational activities, are poorly studied. Analysis of scientific works on students' problems and their defining factors, confirms the inevitability of thorough investigation of students' health conditions. Taking all the above into consideration, it will be reasonable to perform research on studying health conditions of students - as a specific social group, integrated by certain age, working and living conditions. It causes interest, to study students' morbidity and academic performance according to gender differences [7].

Purpose: Distribution of the structure of students' morbidity and behavioral factors according to gender.

Material and methods. 766 Georgian students, aged 15 to 35 (20.7±2.4) have been interviewed from universities of Georgia, among them 347 men and 419 women. The cross-sectional study was performed, using the questionnaire form, created by us, the validity of which has been proved by previously performed studies, using Chronbach alpha.

The following groups of factors were studied: academic performance, additional work, sport activities, nutrition type and regime, sleep hygiene, skills, seeing doctors. Universities and students were randomly selected.

Inclusion criteria: A student of Georgian universities, a citizen of Georgia, Consent on participation in the trial. Exclusion criteria: pregnant women, refusal to the inclusion in the trial.

Students, whose average score was A or B were included in a good group, average level - C, D or E, and bad - those, who had Fx or F assessment in at least one subject. The study design was agreed with the ethics committee of David Aghmashenebeli University of Georgia. The form of informed consent was attached to the questionnaire. Full information about the study goals (purposes) and challenges (tasks) was provided to students. Data were collected only for research. The data are coded by numbers and are kept at investigator. They are available only for research purposes.

Instruments: We used structured interviews and self-assessment questionnaires as the main methodology instruments.

Continuous variables are expressed as mean ± SD, and categorical variables as frequencies and %. Categorical variables were compared with the use of the Fisher's Exact Test. Correlation analysis – by means of Spearman's ranking correlation, p value <0.05 was considered as statistically significant. All statistical analyses were performed using SPSS version 23.

Results and discussion. Students' distribution by gender and academic performance is demonstrated in Fig. 1.
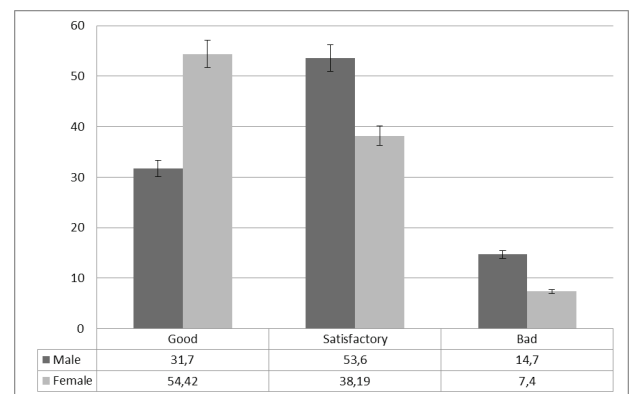

Fig. 1. Distribution by gender and academic performance

As it is seen from the diagram, academic performance is significantly higher in female students than in male students F=41.79, p<0.0001) and average and poor academic performance is significantly lower – respectively F=18.61, p<0.0001 and F=10.70, p=0.0011).

Furthermore, correlation analysis showed that female gender demonstrated convincing positive correlation with good academic performance r=0.228, p<0.0001.

The health self-assessment is given in the Fig. 2.

As we can see, the majority of respondents point out the good and very good health. Moreover, in terms of general health perception, **no** convincing difference by gender is observed.

The part of students describes new diseases, revealed during university years, the distribution of which by gender is shown in the table 1.
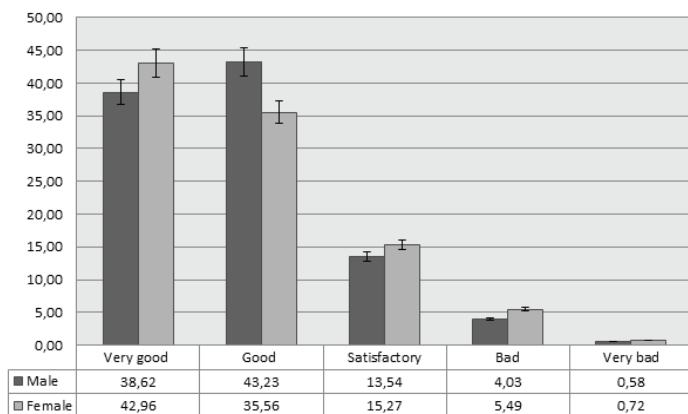
Fig. 2. Distribution by health self-assessment and gender

Table 1.   Distribution of diseases, revealed in students, by gender

Factors	Male (n=347)	Female (n=419)	P
	n(%)	n(%)	
Respiratory diseases, more than 4 a year	34(9.80)	100(23.87)	<0.00001
Diabetes	9(2.59)	6(1.43)	0.2486
Significant weight gain	71(20.46)	55(13.13)	0.0064
Significant weight loss	30(8.65)	83(19.81)	<0.00001
GI tract pathologies	47(13.54)	52(12.41)	0.6419
Cardiovascular diseases	20(5.76)	19(4.53)	0.4418
Nervous system disorders	53(15.27)	53(12.65)	0.2956
Vitamin deficiency	11(3.17)	21(5.01)	0.2052
Hypothyroidism	3(0.86)	2(0.48)	0.5083
Hyperthyroidism	1(0.29)	0(0.00)	0.2721
Hepatitis A	1(0.29)	0(0.00)	0.2721
Sexually transmitted diseases	8(2.31)	1(0.24)	0.0082
Impaired vision	7(2.02)	15(3.58)	0.1979

Table 2. Assessing the Odds Ratio of morbidity in male students compared to female

Factors	OR	95%CI(OR)	
Respiratory diseases, more than 4 a year	0.35	0.23	0.53
Diabetes	1.83	0.65	5.20
Significant weight gain	1.70	1.16	2.50
Significant weight loss	0.38	0.25	0.60
GI tract pathologies	1.11	0.72	1.69
Cardiovascular diseases	1.29	0.68	2.45
Nervous system disorders	1.24	0.83	1.88
Vitamin deficiency	0.62	0.29	1.31
Hypothyroidism	1.82	0.30	10.94
Sexually transmitted diseases	9.86	1.23	79.26
Impaired vision	0.55	0.22	1.38

Table 3. Distribution of exam-related complaints by gender

Factors	Male (n=347) n (%)	Female (n=419) n (%)	P
Headache	57 (16.43)	96 (22.91)	0.0254
Insomnia	97 (27.95)	128 (30.55)	0.4331
Appetite loss	62 (17.87)	103 (24.58)	0.0244
Appetite enhancement	34 (9.80)	47 (11.22)	0.5256
Violation of general regime	130 (37.46)	153 (36.52)	0.7869
Hair loss	2 (0.58)	1 (0.24)	0.4570
Depression	9 (2.59)	15 (3.58)	0.7242

Table 4.Distribution characteristics of health and behavior by gender and Risk assesment

Factors		Male (n=347) n (%)	Female (n=419) n (%)	P
Sport	Professional	83 (23.92)	64 (15.27)	0.0025
	Amateur	140 (40.35)	149 (35.56)	0.1743
	Hypodynamia	26 (7.49)	38 (9.07)	0.4332
Intake of harmful substances	Marijuana	17 (4.90)	14 (3.34)	0.2767
	Other heavy narcotics	9 (2.59)	4 (0.95)	0.0806
	Alcohol	50 (14.41)	27 (6.44)	0.0003
	Tobacco	151 (43.52)	102 (24.34)	<0.00001
Work	Additional paid job	129 (37.18)	97 (23.15)	<0.00001
	Working without pay	28 (8.07)	53 (12.65)	0.0402
Sleep disturbance	Drowsiness	88 (25.36)	99 (23.63)	0.5790
	Insomnia	73 (21.04)	120 (28.64)	0.0158
	Intermittent sleep	85 (24.50)	125 (29.83)	0.0995
Learning	In the morning	52 (14.99)	57 (13.60)	0.5864
	During the day	93 (26.80)	150 (35.80)	0.0077
	At night	174 (50.14)	203 (48.45)	0.6409
Living	With the family (parents)	198 (57.06)	301 (71.84)	<0.00001
	With relatives or friends	72 (20.75)	49 (11.69)	0.0367
	Alone	76 (21.90)	68 (16.23)	0.0580
Seeing a doctor	Prophylaxis	58 (16.71)	92 (21.96)	0.0689
	If required	247 (71.18)	289 (68.97)	0.5076
	No	42 (12.10)	38 (9.07)	0.1721
Type and content of nutrition	Mostly fatty	70 (20.17)	40 (9.55)	<0.00001
	Mostly proteins	67 (19.31)	79 (18.85)	0.8737
	Mostly carbohydrates	57 (16.43)	88 (21.00)	0.1078
	Fast food	103 (29.68)	152 (36.28)	0.0540
	Balanced nutrition	153 (44.09)	212 (50.60)	0.0729
	Overeating	26 (7.49)	24 (5.73)	0.3256
	Fruit and vegetable intake	294 (84.73)	358 (85.44)	0.9116

Respiratory diseases more than 4 per year significantly often found in men.The part of students describes notable weight gain during studentship. Besides, male students convincingly more frequently describe weight gain while female students describe weight loss.

In both groups, the gastrointestinal tract pathologies and nervous system disorders were the most frequent among diseases. However, no difference was found between genders.

Sexually transmitted diseases were significantly higher in men. Only one case was described in women.

We assessed the relative chance of morbidity in male students compared to female (Table 2).

Males increase the odds ratio of weight gain and sexually transmitted diseases and decrease the relative chance of weight loss and respiratory disease

A part of students links the health problems with the stress

associated with exams. Complaints, associated with exams are shown in the table 3.

During the period of exams, more than 1/3 of the intervewed describe the violation of general regime, but no gender differences were found by this factor. Significantly higher frequency of headache and appetite loss was found in women.

Health problems are linked with characteristics of behavior.

Characteristics of health and distribution by behavior are given in table 4.

The majority of students go in for sport - 436(56.9%) students. Among professional sportsmen, males make up significant majority. However, among amateur sportsmen no difference was observed between genders. Among harmful habits, tobacco and alcohol consumption showed high rate, the prevalence of which is significantly higher in males. Some part of students work as well. Besides this, significantly more men are paid for their work than women and more women don't get paid for their work, than men. Much more women report insomnia, than men while there is no difference by gender in terms of drowsiness and insufficient sleep. Almost half of students prefer learning at night. However, among those who learn at day time, girls make up a significant majority. Seeing a doctor is mainly associated with the need of medical assistance. Preventive visits are insignificantly more frequent in women.

10.4% of students never see a doctor. Frequent intake of fruits and vegetables was reported by the majority of both genders. Intake of mostly fatty food is described by significantly more males, but balanced nutrition and fast food were reported by insignificantly more women.

This can be linked with the fact that much more girls live with their parents, than boys, but much more males live with their friends, relatives or alone.

According to the literature, university students lead unhealthy lifestyle and have risky behavior, which can affect their future health [2]. Female population has significantly better values of self-assessed health, then male population [13]. Besides this, statistically significant differences by gender were found in terms of general health as well as infections of GI tract and upper respiratory ways[11]. With our data, in terms of general health perception, no significant difference by gender was found. Majority of students report good and very good health. As regards the diseases, revealed in university years, in both groups the GI tract pathologies showed the highest prevalence, nervous system disorders, but difference by gender was not found significant.

Sexually transmitted diseases were significantly prevalent in males. Only one case was described in a female.

The investigation revealed gender differences in lifestyle [21]. The research, performed in university students, showed that although damaging for health behaviors were very prevalent both in men and in women, risky for health behavior is more characteristic for males than for females[12].

Results of students' investigation of 27 universities and from 26 countries showed that in general, male students of universities reported significantly high risk behavior in comparison with female students [15].

Unhealthy diet is known as the risk factor of extra weight and obesity[16]. The study, performed in India, among students, showed that risky for health factors mainly consisted of: incorrect nutrition, extra weight, insufficient oral care and bad habits of sleeping. Habits of nutrition and physical activity significantly determine the academic performance. According to literature, female students have better habits for health than males. Preventive habits for heart and coronary diseases proved to be better

for female students than for male students[14]. Women, compared to men, show a higher risk of nightmares related to sleep disorders. Women need more time to reach a state of alertness after getting up, women show worse quality of sleep and more frequency and propensity to suffer nightmares [19].

By our data, the balanced nutrition is reported by more than the half of female students while significantly more males receive extra fat. In university years, mostly male students report weight gain. During the day, more women study than men. Hence, sleep disturbances are reported by significantly more men.

Thus, studying of the gender predictors will promote to perform the arrangement of students' health improvement.

Conclusions.

• The female gender shows convincing positive correlation with good academic performance.

• The gender difference is reported in habits, associated with students' health and health characteristics.

• Better habits, associated with health, are reported in female students than in male students.

Limitations. Despite this strength, there are a number of limitations that must be considered when interpreting the results of this study. The study was performed among Georgian students. Hence, its generalization on other populations is not recommended. The study was performed on the basis of questionnaires. Hence, mistakes or bias in self-assessment cannot be excluded.

Ethics statement. Research was conducted in accordance with the Declaration of Helsinki and informed.Ethical approval was obtained from the Human Research Ethics Committee at the SDASU for all aspects of the current research.

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SUMMARY

MORBIDITY ASSESSMENT ACCORDING TO GENDER IN GEORGIAN STUDENTS

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Significant gender differences were noted according to initial symptoms, stress perception, exercise and nutrition.

Purpose - distribution of the structure of students' morbidity and behavioral risk factors for health according to gender.

766 Georgian students, aged 15 to 35 (20.7±2.4) have been interviewed from universities of Georgia, among them 347 men and 419 women. The cross-sectional study was performed.

Female gender demonstrated convincing positive correlation with good academic performance - $r=0.228$, $p<0.0001$.

Male gender increase the odds ratio of weight gain- OR=1.70(95%CI: 1.16-2.50) and sexually transmitted diseases OR=9.86(95%CI:1.23-79.26) and decrease the relative chance of weight loss - OR=0.38(95%CI:0.25-0.60) and respiratory disease OR=0.35(95%CI:0.23-0.53) in students.

During the period of exams, significantly higher frequency was found in women then man of headache - 57 (16.43%) and 96 (22.91%) Respectively ($p=0.0254$) and appetite loss - 62 (17.87) and 103 (24.58) Respectively - $p=0.0244$.

The gender difference is reported in habits, associated with students' health and health characteristics. Better habits, associated with health, are reported in female students than in male students.

Keywords: gender, students' morbidity, behavioral factors.

РЕЗЮМЕ

ОЦЕНКА ЗАБОЛЕВАЕМОСТИ ПО ГЕНДЕРНОМУ ПРИЗНАКУ СРЕДИ ГРУЗИНСКИХ СТУДЕНТОВ

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Цель исследования - распределение структуры заболеваемости и поведенческих факторов риска для здоровья среди студентов с учетом пола.

Опрошены 766 грузинских студентов в возрасте от 15 до 35 лет (средний возраст 20,7±2,4 лет), среди них 347 мужчин и 419 женщин. Проведено поперечное исследование.

Установлено, что мужской пол повышает отношение шансов увеличения веса - OR=1,70 (95% ДИ: 1,16–2,50) и заболеваний, передающихся половым путем - OR=9,86 (95% OR: 1,23-79,26), снижает относительную вероятность потери веса - OR=0,38 (95%OR: 0,25–0,60) и респираторных заболеваний OR=0,35 (95% OR: 0,23–0,53) у студентов. В период экзаменов у женщин выявлена значительно более высокая частота головных болей, чем у мужчин - 96 (22,91%) и 57 (16,43%), соответственно, (p=0,0254) и потеря аппетита - 103 (24,58) и 62 (17,87), соответственно, (p=0,0244).

Гендерные различия проявляются также в привычках, связанных с риском для здоровья. Сообщается о лучших привычках, связанных со здоровьем, у студенток, в сравнении со студентами.

რეზიუმე

ავადობის შეფასება ქართველ სტუდენტებში გენდერული ნიშნის გათვალისწინებით

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სტუდენტებში აღინიშნება მნიშვნელოვანი გენდერული განსხვავებები ავადობის, სტრესის აღქმის, ფიზიკური აქტივობისა და კვების მიხედვით.

კვლევის მიზანს წარმოადგენდა სტუდენტების ავა-დობისა და ჯანმთელობისათვის სარისკო ქცევითი ფაქტორების სტრუქტურის განაწილება სქესის გათვალისწინებით.

გამოიკითხა 15-დან 35 წლამდე (საშუალო ასაკი 20,7±2,4 წ.) 766 ქართველი სტუდენტი, მათ შორის 347 მამაკაცი და 419 ქალი. ჩატარდა ჯვარედინი კვლევა.

კვლევამ აჩვენა, რომ მამრობითი სქესის სტუდენ-ტებს აქვთ წონის მომატების და სქესობრივი გზით გადამდები დაავადებების უფრო მაღალი ფარდობითი შანსი, ვიდრე გოგონებს - OR=1.70 (95%CI: 1.16-2.50) და OR=9.86(95%CI:1.23-79.26), ასევე რესპირატო-რული ავადობის და წონის მნიშვნელოვანი კლების ფარ-დობითი შანსი - OR=0.35(95%CI:0.23-0.53) და OR=0.38 (95%CI:0.25-0.60), შესაბამისად. გამოცდების პერი-ოდში ქალებში სარწმუნოდ უფრო მაღალი იყო თავის ტკივილი, ვიდრე მამაკაცებში - 96 (22.91%) და 57 (16.43%), (p=0.0254) და მადის დაქვეითება - 103 (24.58%) და 62 (17.87%), შესაბამისად, (p=0.0244).

ქართველ სტუდენტთა შორის აღინიშნება გენ-დერული განსხვავება ავადობასა და ჯანმრთელობას-თან დაკავშირებულ სარისკო ქცევაში. ვაჟ სტუდენ-ტებთან შედარებით, ჯანმრთელობასთან დაკავშირე-ბული უკეთესი ჩვევები დაფიქსირდა გოგონებში.

THE ROLE OF BURSTS IN SENSORY DISCRIMINATION AND RETENTION OF FAVORED INPUTS IN THE CULTURED NEURAL NETWORKS

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The ability of neural tissue to distinguish sensory impulses dictates how we identify world diversity. Burst responses are widely accepted as an additional synaptic tool in the brain tissue for successful information coding mechanisms. Different nature, origin and functions are descovered in burst discharges. In spite of the variety of views reserchers of the computational neuroscience agree that single spikes and bursts create the parallel mechanisms for synaptic transmission, but bursts have even more effectiveness to strengthen weak synapsis compared to single action potentials [10,16]. One of the most significant goals of neuroscience nowadays is to determine the mechanisms underpinning information coding in brain tissues on the one hand, and to decode information encoded in neural circuits on the other [9]. In humans and higher vertebrates, sophisticated nervous system functions like memory, sensory processing and perception necessitate the engagement of the high order brain structures. However, whether sensory processing and memory, characteristic feature of high order nervous system functions are present and interrelated at the level of local neural circuits and how bursting mechanisms help to realize these complicated processes is a fascinating question in neuroscience.

Dissociated cortical culture (DCC) homed in a multielectrode array (MEA60) allows mimicking neural networks of the brain and use it for investigation of neural computation processes [7].

This system becomes an effective scientific tool for modeling brain to body feedback systems [12,14] and even prototyping neuro-prosthetic or brain to machine cyborg systems using complicated algorithms, advancing a topic of great medical significance [3,13]. As a result, they're frequently referred to as *in vivo like in vitro* system [1,6,15,]. Suitable arrangement of multiple electrodes capable of both stimulation and recording allows to simulate a variety of sensory inputs and to investigate the processing of sensory information in the developing neural circuits of DCC.

In this work we were interested in whether the neural networks of DCC was capable of sensory discrimination and especially, to determine the particular role of bursts in the information processing needed for that. By this reason, we attempted to register newly established bursts in DCCs and investigate its role in the "sensory acquisition" processes when preferred stimuli were perceived. Our previous work helped us in approaching the topic and provided a more conducive environment for research. Over time, the population of about 100000 neuronal and glial cells in our experimental setting formed a simplified but realistic brain structure and could live on MEA for two months. This allowed us to track and assess the structural and functional refinement of freshly formed neural circuits, as well as their capacity for information collection, processing and coding.