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Test Period Stress: Factor on Eating and Physical Activity in College of Nayarit Mexico

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ABSTRACT

Background: Academic stress (AS) is a little studied topic and even less related to the eating habits (EH) and physical activity (PA) of college students when they are on exams. The university stage implies a greater degree of challenges that trigger a series of AS due to the overload of tasks or projects, which condition not only school performance, but also the quality of life and nutritional status of the university population.

Objective: To analyze the relationship between stress and food consumption and physical activity in college students exposed in an academic testing period.

Methods: The method was a descriptive, prospective, quantitative and observational study. 144 volunteer college students of bachelor degree of Physiotherapy, Nutrition, Psychology, Gastronomy, Business Administration, Educational Sciences and Architecture. The preference index (PI) was the method used to measure the frequency of EH, and Academic Stress Questionnaire by PA.

Results: Physiotherapy and Nutrition students presented high levels of stress. Students in Nutrition and Physiotherapy had great physical and/or mental exhaustion, and little motivation to turn in projects and assignments. Consumption of alcoholic beverages, soft drinks and junk food increases during testing periods. The fruit consumption PI is moderated by students during the examination period. Most students of all bachelor's degrees prefer to be resting, sleeping, watching TV or being on their cell phones.

Conclusions: The stress causes changes in eating habits and physical activities to college students to meet their academic needs.

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Academic stress, College students, Eating habits, Nayarit, Physical activity.

Introduction

The stress in the people has taken with great force at the present time, because it is associated to multiple alterations of the normal operation of the organism [1,2]. This problem usually manifests itself in various situations, such as nervousness, tension, fear, anguish, tiredness, oppression, restlessness, panic, love relationships, family and mourning, illness, pressure at work, school, and others [2,3]. It also occurs in situations of fulfillment of goals and purposes, existential void, inability to cope or inter-relational incompetence in socialization [4,5]. Therefore, stress generates physiological and behavioral changes and responses in people [6].

The university academic environment (UAE) is one of the environments where a high level of stress is commonly observed by students, due to a series of academic stressors such as the responsibility of fulfilling academic obligations (overload of homework and work), family and personal on their performance [3,5-7]. Today, there is an extensive study describing stress in college students during exam periods and the relationships with academic performance, student-teacher

behavior, physical activity, environmental psychological problems (student-university) and emotional exhaustion [8-10]. This academic stress presents multiple mental and physical symptoms among them are: depression, impulsivity, instability, lack of concentration, tension, tiredness, fatigue, anxiety, insomnia, back pain, among others [9]. Therefore, when students show a lack of interest in eating at set times to meet subject requirements, causing negative changes in their performance, physically, psychologically and, above all, academically [8]. In this sense, there are no studies on the choice of the type of eating (EH) and physical activity (PA) habits that students take when they have the stress of an exam period. Therefore, the present research aims to analyze the eating habits (EH) and physical activity (PA) that college students take when they are exposed during an academic testing period.

Methods

Type of study

The present research was a descriptive, prospective, quantitative and observational study in order to determine the

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relationship between academic stresses (AS), EH and PA in the CAE of the Universidad Vizcaya de las Americas (UVA) campus Tepic in the year 2018.

Participants and sample size

Students from each undergraduate degree program at the UVA campus Tepic were invited to a previous meeting to participate in a study of their EH and PA during the period May-August, 2018-II. Preliminary information was provided about the purpose, the protocol and the method of the study, including the guarantee of anonymity (according to Legislative Decree no. 196/2003 "Code concerning the protection of personal data"). Participation was voluntary and anonymous. The criteria for inclusion were students enrolled in the current term (morning and afternoon schooling) in which the study was conducted and those who signed the consent form. Participants read and signed the informed consent form stating their acceptance to participate in the study. A total of 144 volunteer college students were participated from Physiotherapy (PhyD), Nutrition (NutD), Psychology (PsyD), Gastronomy (GasD), Business Administration (BAD), Educational Sciences (EScD) and Architecture (AD). The sample was made up of students from PhyD (23, 15.98%), NutD (25, 17.36%), PsyD (14, 9.72%), GasD (19, 13.19%), BAD (23, 15.98%), EScD (23, 15.97%), and LA (18, 12.5%).

Questionnaire

Frequency of consumption

Food frequency (FF) was evaluated using multiple choice response tables, following the Thompson and Suban protocol [11]. The selected *items* were adapted in relation to the FF sold in and around the university and the EH during breakfast, afternoon, lunch and dinner. The preference index (PI) was calculated from the frequency of intake (FE, range 0-3) and the usual amount of intake (AI, range 1-3): $FE \times AI$ (PI, range 0-9). The rations of consumption were not established to find out the EH pattern using the data as estimates of the average frequency of consumption of different foods. Therefore, the study variables were: 1) AS, 3) manifestations produced by academic stress, 4) FF consumption during the examination period and, 5) EH during the examination period.

Level of PA

To measure the academic stress of students, a questionnaire was selected based on the Academic Stress Questionnaire (ASQ), originally developed by Cabanach, Valle, Piñeiro *et al.* [12] This questionnaire has a reliability of half of 0.87 and an alpha of Cronbach de 0.90, and it had a validation in a Spanish university population that is in turn composed of the following three subscales: academic stressors (S-ASQ), stress response (R-ASQ) and coping strategies (CS-ASQ). Responses to each of the items are made on a five-point scale from "Never" (1) to "Always" (5) which was rated on a percentage scale. The S-ASQ subscale consisted of measuring different CAE situations and/or circumstances that may put some pressure on the student so that they are assessed as a danger or a real threat to their health and/or nutrition. The R-ASQ was intended to measure symptoms related to the physical, behavioral and cognitive components linked to CAE. The CS-ASQ presents some situations and what students think and do when faced

with a problematic situation that causes stress. In each subscale, adjustments were made in order to find the factors that are related to EH and PH. To ensure that the objectives being measured were representative, some elements were taken from the questionnaires established by Institute of Epidemiology and Health Care [13-15].

Data Analysis

Firstly, and with the aim of checking the reliability of the items that make up the scales of the questionnaires used, Cronbach's alpha coefficient was used; this served to quantify the degree of partial correlation that existed between the items included, that is, the degree to which the items of the construct are related. Thus, the closer the value is to 1, the greater the reliability of what is to be studied. For the study of the descriptive parameters, percentages were used to describe all the variables of the study; likewise for the study of the comparative type between degrees, contingency tables, Pearson's chi-square and ANOVA with the statistical package Statistica v10 (Stat Soft. Inc., Tulsa, OK, USA).

Results

NutD and PhyD students had more stress when they were overloaded with assignments during the semester. The academic overload caused NutD students to feel apathetic about participating in presentations or turning in homework, assignments and research. As a result, NutD and PhyD students showed increased physical and/or mental exhaustion and negative thoughts about project submission, homework, study, and teacher attitude (Table 1). Figure 1 shows that 97% of EScD students eat breakfast when they are testing. NutD, PhyD, and GasD students prefer to eat sweets during their testing; while salty food and pastries are preferred for BAD and PhyD, respectively (Figure 2). The foods with the highest IP were apples (Psy, GasD, BAD, EScD, AD), bananas (NutD) and oranges (PhyD, NutD, PsyD, GasD), coffee (PsyD and GasD), lemonade (PhyD, PsyD, GasD), energy drinks (PhyD, NutD, BAD), beer (PhyD, NutD, BAD) and ready-to-drink (PhyD, NutD). In addition, junk food increased during the examination period (Table 2). However, seeds, sweets and dairy products are rarely consumed (Table 2). Consumption of alcoholic beverages increased during examination periods (Table 2). At breakfast, PsyD, NutD and PhyD tend to digest water (71%), milkshakes (73.6%) and coffee (65.2%), respectively. Soft drinks are consumed > 50% by PhyD, PsyD and GasD students at lunchtime (Figures 3A,3B). Energizers > teas > soft drinks > natural juices are the beverages consumed in smaller proportions; in contrast, water, smoothies and coffee are the beverages preferred at dinner by most students (Figure 3C). Cultural arts, sports and video games were not a priority for students. PsyD students preferred to be at rest (78.5%), sleeping (64%), watching TV (64%), or on a cell phone (100%). NutD and GasD preferred being on the cell phone, being in bed and sleeping (100%) (Table 3).

Discussion

AS by UAE

AS is a big problem today, especially at the university level which requires a high level of knowledge due to factors known as intrinsic (personality, living environment, study

Table 1: Analysis of the three subscales of Academic Stress Questionnaire (ASQ) and level of AS from the college students.

ASQ	Bachelor Degree (%)						
	PhyD	NutD	PsyD	GasD	BAD	EScD	AD
<i>S-ASQ</i>							
Study habits							
Teaching method or strategies	96 ^a	92 ^a	31 ^c	28 ^c	47 ^b	29 ^c	14 ^d
Relationships with peers and teachers	72 ^b	85 ^a	62 ^c	40 ^d	36 ^d	28 ^e	18 ^f
Overload of work/homework prior to the examination period	87 ^a	83 ^a	61 ^b	42 ^c	39 ^c	37 ^c	22 ^d
Preparing an individual work	26.28 ^e	45.28 ^d	74.88 ^b	29.49 ^e	66.81 ^c	75.19 ^b	83.46 ^a
Preparing a teamwork	68.57 ^b	85.50 ^a	43.97 ^d	56.83 ^c	15.28 ^e	20.71 ^e	18.11 ^e
Limit time for delivery of work	82.47 ^b	96.17 ^a	86.27 ^b	64.29 ^c	41.84 ^e	58.22 ^d	36.50 ^f
Exposure to the group on an individual basis	25.90 ^b	20.75 ^b	33.04 ^a	11.80 ^c	10.70 ^c	22.10 ^b	18.90 ^b
Exhibition in front of the group in group form	14.19 ^b	15.20 ^b	20.10 ^a	10.39 ^b	12.76 ^b	16.60 ^b	18.45 ^b
The type of work requested by the teachers (consultation of topics, summary, monographs, mind maps, others)	82.48 ^a	74.09 ^b	88.24 ^a	65.51 ^c	48.29 ^e	52.20 ^d	45.05 ^e
Teacher's personality/character	62.85 ^b	75.90 ^a	50.45 ^c	52.80 ^c	60.40 ^b	56.70 ^c	50.40 ^c
Not understanding the topics discussed in class	13.90 ^a	17.50 ^a	20.10 ^a	14.90 ^a	15.80 ^a	10.00 ^a	14.59 ^a
Getting the academic scholarship	60.50 ^c	96.70 ^a	52.90 ^d	60.60 ^c	45.90 ^e	61.40 ^c	74.00 ^b
Lack of attention to academic performance	46 ^a	30 ^b	11 ^d	6 ^e	22 ^c	18 ^c	4 ^e
Low academic self-esteem	24 ^a	21 ^a	14 ^b	7 ^c	8 ^c	4 ^c	13 ^b
<i>Tests</i>							
Apathy	81 ^a	62 ^b	45 ^c	33 ^d	27 ^e	24 ^e	24 ^e
<i>R-ASQ</i>							
Physical/mental exhaustion	86 ^b	94 ^a	59 ^c	30 ^e	46 ^d	11 ^f	37 ^e
Difficulty sleeping	88 ^a	81 ^a	74 ^b	16 ^e	25 ^d	28 ^d	34 ^c
Negative thoughts	69 ^b	75 ^a	49 ^d	55 ^c	26 ^e	5 ^f	7 ^f
<i>CS-ASQ</i>							
Physical/mental exhaustion	77 ^b	93 ^a	38 ^c	28 ^d	36 ^c	9 ^e	18 ^e
Difficulty sleeping	19 ^a	21 ^b	1 ^c	5 ^c	1 ^c	1 ^c	20 ^b
Negative thoughts	89 ^a	81 ^a	41 ^b	6 ^c	7 ^c	2 ^c	5 ^c
<i>Levels of stress</i>							
Category of stress	High	High	Moderate	Low	Low	Low	Low

ASQ: Academic Stress Questionnaire; S-ASQ: academic stressors; R-ASQ: stress response; CS-ASQ: coping strategies; AS: academic stress; PhyD: Physiotherapy degree, NutD: Nutrition degree; PsyD: Psychology degree; GasD: Gastronomy degree; BAD: Business Administration degree; EScD: Educational Sciences degree; AD: Architecture degree. Values with different lowercases are significantly different ($p < 0.05$).

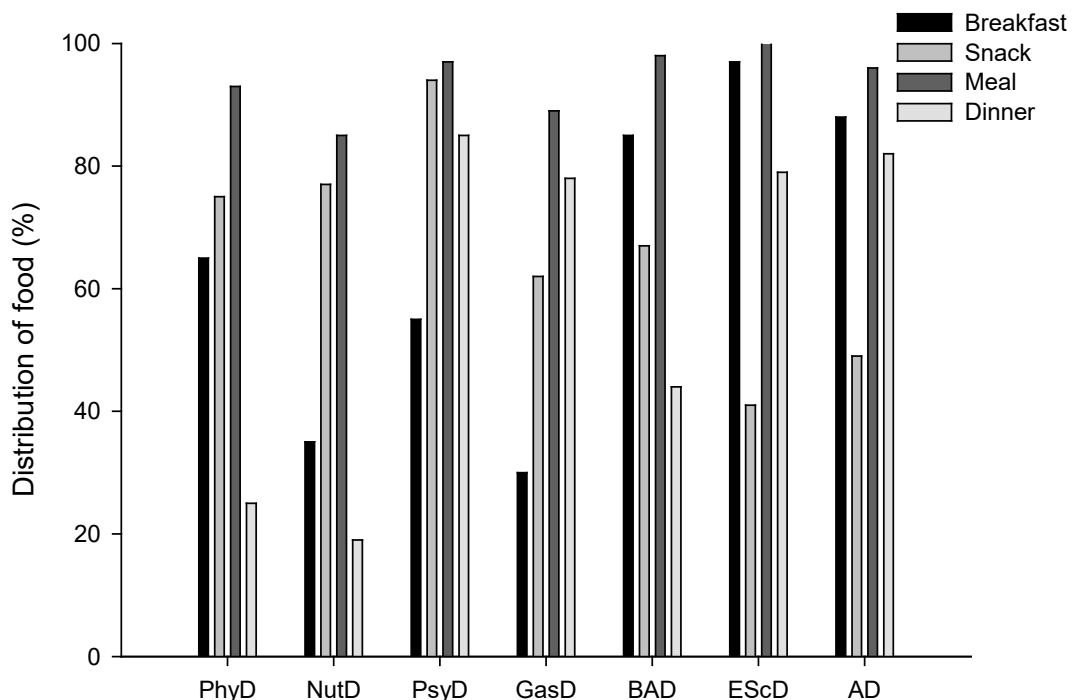


Figure 1: Distribution of meals by university students during testing periods.

Table 2: Preference index (PI) of kind of food consumed by students under AS by testing period.

Food group	Bachelor Degree (%)						
	PhyD	NutD	PsyD	GasD	BAD	EScD	AD
<i>Fruits</i>							
Apple	6 ^b	6 ^b	9 ^a	9 ^a	9 ^a	9 ^a	9 ^a
Banana	6 ^b	9 ^a	6 ^b	3 ^c	3 ^c	3 ^c	6 ^b
Watermelon	3 ^b	6 ^a	3 ^b	3 ^b	6 ^a	6 ^a	3 ^b
Cantaloupe	6 ^a	6 ^a	3 ^b	3 ^b	6 ^a	3 ^a	3 ^a
Orange	9 ^a	9 ^a	9 ^a	9 ^a	6 ^b	3 ^c	3 ^c
Prunes	0 ^b	0 ^b	0 ^b	3 ^a	0 ^b	3 ^a	0 ^b
Pineapple	3 ^a	3 ^a	3 ^a	0 ^b	0 ^b	0 ^b	3 ^a
Jicama	0 ^b	0 ^b	3 ^a	3 ^a	3 ^a	0 ^b	0 ^b
<i>Seeds</i>							
Almond	0 ^b	0 ^b	3 ^a	3 ^a	0 ^b	0 ^b	0 ^b
Walnuts	3 ^a	0 ^b	3 ^a	3 ^a	0 ^b	0 ^b	0 ^b
Peanut	3 ^b	6 ^a	3 ^b	6 ^a	6 ^a	3 ^b	3 ^b
Pistachio	0 ^c	0 ^c	0 ^c	6 ^a	3 ^b	0 ^c	0 ^c
<i>Drinks</i>							
Tea	6 ^a	6 ^a	6 ^a	3 ^b	0 ^c	0 ^c	0 ^c
Fruit wáter	3 ^c	9 ^a	6 ^b	3 ^c	0 ^d	3 ^c	0 ^d
Coffee	9 ^a	6 ^b	9 ^a	9 ^a	6 ^b	6 ^b	9 ^a
Soft drinks	3 ^a	0 ^b	0 ^b	3 ^a	3 ^a	0 ^b	0 ^b
Limonade	9 ^a	6 ^b	9 ^a	9 ^a	3 ^c	0 ^d	0 ^d
Water	6 ^b	9 ^a	6 ^b	6 ^b	6 ^b	9 ^a	3 ^c
Energized drinks	9 ^a	9 ^a	6 ^b	6 ^b	9 ^a	6 ^b	3 ^c
Processed juice	6 ^a	3 ^b	6 ^a	6 ^a	3 ^b	3 ^b	0 ^c
Beer	9 ^a	9 ^a	3 ^c	9 ^a	6 ^b	9 ^a	6 ^b
Prepared drinks (piña colada, clamato)	9 ^a	9 ^a	6 ^b	3 ^c	3 ^c	0 ^d	9 ^a
<i>Dairy</i>							
Yogurth	3 ^c	6 ^b	0 ^d	0 ^d	9 ^a	9 ^a	6 ^b
Cheese	0 ^b	0 ^b	0 ^b	3 ^a	3 ^a	0 ^b	0 ^b
<i>Junk food</i>							
Chips	9 ^a	9 ^a	6 ^b	9 ^a	9 ^a	6 ^b	0 ^c
Sweet bread or pastries	9 ^a	9 ^a	6 ^b	9 ^a	9 ^a	9 ^a	9 ^a
Cookies	9 ^a	9 ^a	9 ^a	9 ^a	9 ^a	9 ^a	9 ^a
Bubble gum or candies	0 ^b	0 ^b	3 ^a	0 ^b	0 ^b	0 ^b	3 ^a

PI: preference index, was calculated by multiplying frequency of eating (range 0-3) and the usual amount of intake (range 1-3); AS: academic stress; PhyD: Physiotherapy degree, NutD: Nutrition degree; PsyD: Psychology degree; GasD: Gastronomy degree; BAD: Business Administration degree; EScD: Educational Sciences degree; AD: Architecture degree. Values with different lowercases are significantly different ($p < 0.05$).

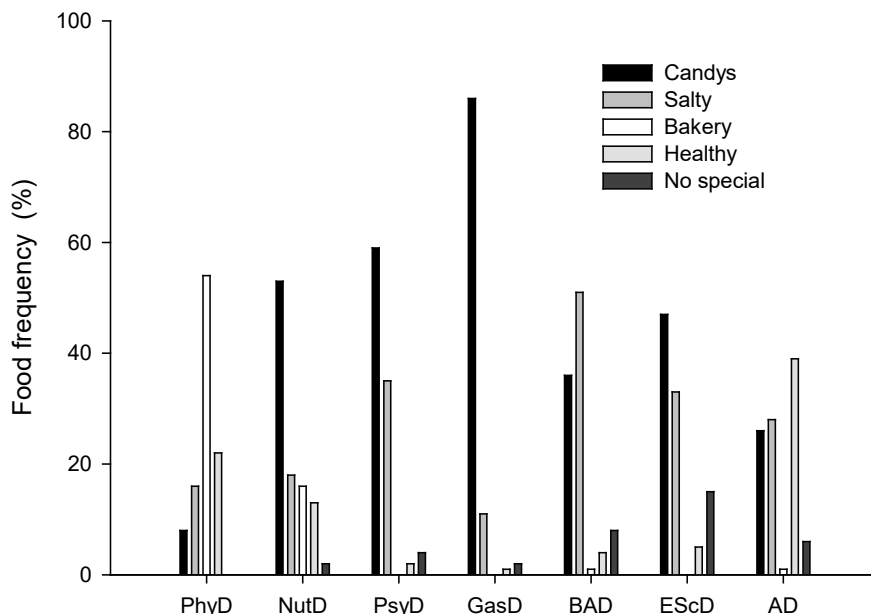


Figure 2: Preference of food by college students during application for tests.

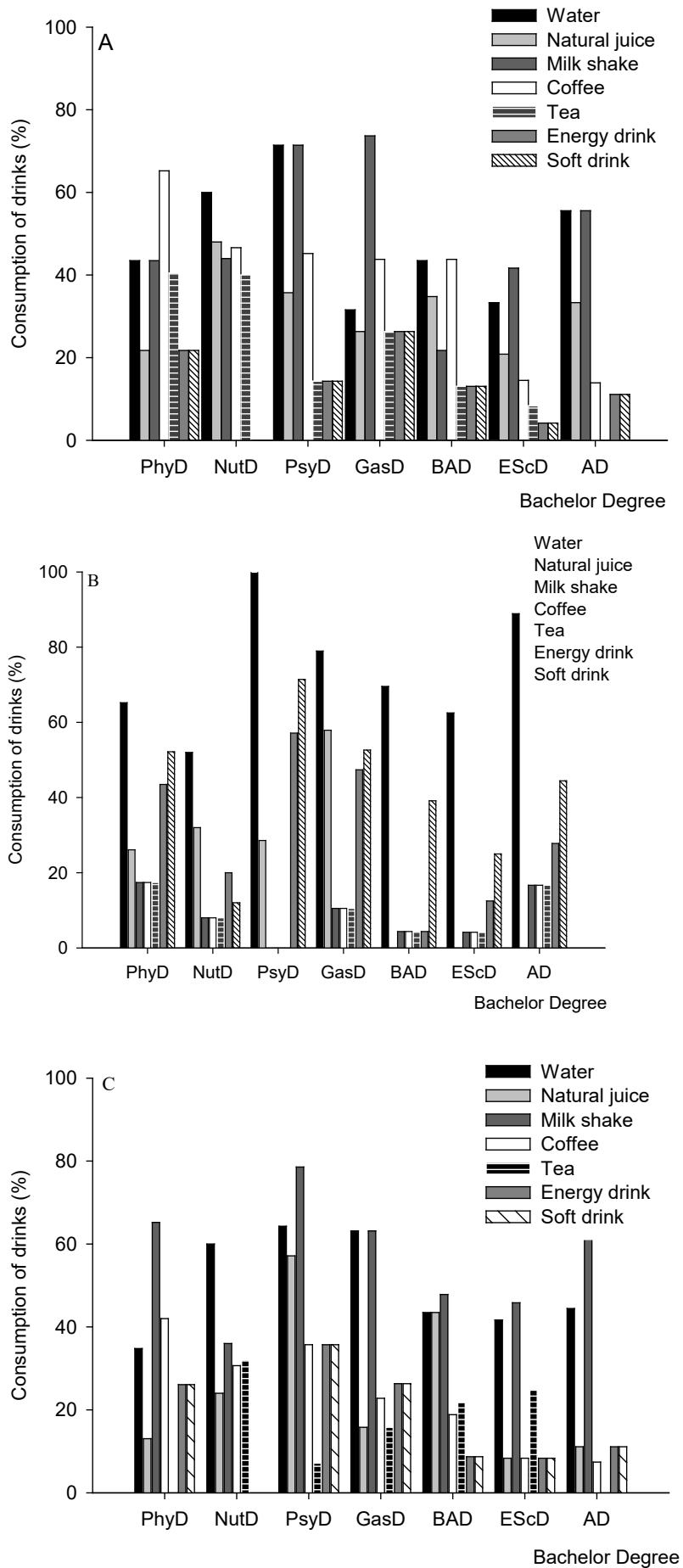


Figure 3: Consumption of drinks at breakfast (A), lunch (B) and dinner (C) by university students during testing periods.

Table 3: Activities performed by university students in AS by testing period during the morning, afternoon and evening shift.

Activities	Consumption of fruits (%)						
	PhyD	NutD	PsyD	GasD	BAD	EScD	AD
<i>Morning shift</i>							
Gym/Crossfit	34.78 ^d	60.00 ^c	78.57 ^a	36.84 ^d	73.91 ^b	41.66 ^d	11.11 ^e
Watch Tv	43.47 ^b	32.00 ^c	64.28 ^a	42.10 ^b	43.47 ^b	12.50 ^d	0.00 ^e
Chating	86.96 ^b	72.00 ^c	100.00 ^a	78.94 ^c	21.74 ^e	41.66 ^d	27.77 ^e
Read	65.21 ^a	44.00 ^b	35.71 ^c	63.15 ^a	43.47 ^b	4.16 ^e	11.11 ^d
Resting	47.82 ^b	44.00 ^b	78.57 ^a	26.31 ^c	43.47 ^b	4.16 ^d	0.00 ^e
Culture arts	43.47 ^a	0.00 ^c	0.00 ^c	26.31 ^b	0.00 ^c	0.00 ^c	0.00 ^c
Sport (soccer, basketball, baseball, others)	39.13 ^a	20.00 ^b	35.71 ^a	26.31 ^b	21.74 ^b	20.83 ^b	22.22 ^b
Sleep	43.47 ^c	36.00 ^d	64.28 ^a	63.15 ^a	52.18 ^b	0.00 ^e	0.00 ^e
What to do	39.13 ^a	44.00 ^a	35.71 ^b	26.35 ^c	43.47 ^a	4.16 ^e	16.66 ^d
<i>Afternoon shift</i>							
Chating	86.95 ^a	72.00 ^b	85.71 ^a	52.63 ^c	52.17 ^c	29.16 ^e	38.88 ^d
Read	0.00 ^c	20.00 ^b	71.42 ^a	26.31 ^b	0.00 ^c	0.00 ^c	0.00 ^c
<i>Evening shift</i>							
Gym/Crossfit	56.52 ^b	20.00 ^c	71.43 ^a	52.63 ^b	17.39 ^c	20.83 ^c	16.66 ^c
Watch Tv	52.17 ^b	48.00 ^c	71.42 ^a	57.89 ^b	21.74 ^d	20.83 ^d	16.66 ^e
Chating	86.96 ^b	80.00 ^b	100.00 ^a	100.00 ^a	86.95 ^b	0.00 ^d	44.44 ^c
Read	52.18 ^a	60.00 ^a	57.14 ^a	52.63 ^a	8.69 ^b	8.33 ^b	0.00 ^c
Resting	91.30 ^a	48.00 ^b	100.00 ^a	100.00 ^a	52.17 ^b	33.33 ^c	16.66 ^d
Sport (soccer, basketball, baseball, others)	52.17 ^a	12.00 ^c	42.85 ^b	10.52 ^c	43.47 ^b	4.16 ^d	5.55 ^d
Sleep	95.65 ^a	80.00 ^b	100.00 ^a	100.00 ^a	65.21 ^c	33.33 ^e	44.44 ^d
What to do	47.82 ^c	24.00 ^d	42.85 ^c	57.89 ^b	65.21 ^a	0.00 ^e	0.00 ^e

AS: academic stress; PhyD: Physiotherapy degree, NutD: Nutrition degree; PsyD: Psychology degree; GasD: Gastronomy degree; BAD: Business Administration degree; EScD: Educational Sciences degree; AD: Architecture degree. Values with different lowercases are significantly different (p < 0.05).

habits, type of intelligence, others) and extrinsic (degree of study, university environment, teaching strategies, classroom interventions (Student-Peer-Teacher), academic overload (projects, homework, research, oral presentation of work in class, taking an test), lack of incentives (scholarships) and lack of time to complete academic activities) [16,17]. Thus, when the student has not studied, he or she will be under immense stress, especially when he or she knows that his or her grade depends only on the particular exam [17]. The student may also become unmotivated to participate in class (apathy) for fear of making a mistake in answering a teacher's question or for the grade he or she may receive for the answer given.

Effect of AS on EH

Students are often vulnerable to their EH because their diet depends on their break times when they are in school, leading to long fasts, not eating at scheduled times, snacking between meals, eating fast food, soft drinks, waiting until after school [18]. EH is alarming because students make unconscious decisions when they are stressed by tests. Our results match those reported by Herrera-Cussó [19] observed that 84.2% of NutD students in Argentina do not eat healthy foods when stressed during exam periods. Thus, stress causes loss of appetite due to metabolic factors [15,20]. However, students who consume certain types of fruit can reduce neuronal stress due to the activity of phenolic compounds [21]. Evidence suggests that eating 400 g of fruits and vegetables per day has a lower risk of chronic degenerative diseases [22]. Therefore, consuming vegetables can enhance physical and intellectual performance, mood and body weight. Therefore, it is important for students to consider consuming one serving 4 or 5 times

per week (40g) to reduce approximately 40% of the risk of experiencing coronary heart disease [23,24].

The UAE demands that the student make efforts to obtain a quality preparation to perform professionally in an increasingly competitive market. This requires students to resort to the consumption of certain psychoactive beverages such as coffee, soft drinks, energy drinks and alcohol to cope with stress [25]. Studies reveal that 5 cups of coffee a day causes cardiovascular and hypercholesterolemic risk because caffeine induces the release of catecholamines that cause blood pressure [26,27]. The results show alarming figures (Table 2), as students seek alcohol to reduce effective coping before testing. Perales [28], in his study of students from two Peruvian universities, found high prevalence of alcohol consumption at both universities (95.6% and 86.8%). The United Arab Emirates, 65% of the university students had frequent consumption of alcohol and soft drinks [29], coinciding with these results it can be observed that alcohol and soft drinks are a pattern linked to a reason of happiness or sadness after an exam. In Germany, the students who took the tests had more stress and more tendencies to consume soft drinks and alcoholic beverages in order to distract themselves from stress [30]. It has been seen that elevations in glucocorticoid secretion, induced by stress, promotes the pleasurable consumption of this type of beverage [31,32]. Alcohol consumption under stress can produce high concentrations of acetaldehyde in the brain and central nervous system causing headaches, gastritis and nausea.38 The results suggest that college students are a high risk group for developing overweight, obesity, type 2 diabetes mellitus and cardiovascular disease [33,34]. Although the students chose to drink fruit water, tea, lemonade or water during the tests, their diet is very critical, as it affects not only their academic

performance and abilities, but also the development of good EH that will impact their future health.

Relationship between AS and PA

The AS caused by the tests cause PH, so 100% of the students mentioned that they prefer to rest, sleep or rest with their cell phones (Table 3). These results are related to previous studies where it has been seen that people who suffer from stress do not practice PH or are not able to achieve adequate rest to recover the energy to relax [35]. Stress causes people to release pro-inflammatory and prothrombotic substances causing increases in cholesterol, overweight, arrhythmias, heart attacks and strokes [36,37]. Since the university becomes the student's second home and with the information generated by this research it can lead to motivate students to participate in PA to promote the production of endorphins, which are responsible for relaxing muscles, helping to maintain joint flexibility and promoting the oxygenation of cells [37,38]. In addition to promoting programs aimed at the health of students, involving actions that help preserve EH and PH to prevent risks to their health.

Conclusion

The AS is an alarming factor that exposes the nutritional integrity of college students. Stress has influenced the EH and PA of students during exam periods. Considering this problem, it is necessary to propose actions to students to over-exercise and reduce stress during the exam period. It is also recommended to develop strategies to increase the consumption of fruits, vegetables, nuts and cereals to promote the health of students.

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