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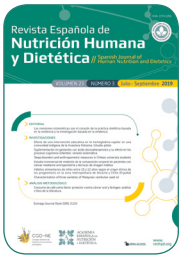

RESEARCH ARTICLE

Sleep disorders and anthropometric measures in Chilean university students

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KEYWORDS

Nutritional Status;

Sleep;

Sleep Initiation and Maintenance Disorders;

Obesity.

ABSTRACT

Introduction: To compare sleep habits, insomnia and daytime sleepiness in university students according to anthropometrics measures.

Material and Methods: A cross-sectional study was carried out on university students using the Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index and Insomnia Severity Index. In addition, anthropometric variables were determined; weight, height and waist circumference.

Results: We evaluated 1,275 university students (74% female). Students on average slept at midnight and slept on average 6.4 hours, 77.9% sleep less than recommended, 34.2% had daytime somnolence and 68.5% had insomnia. Regarding insomnia, it was observed that the low weight group presented the highest insomnia score that significantly contrasted with the normal weight group (p=0.04). In the case of daytime sleepiness when comparing by nutritional status, it was observed that obese students are the ones with the greatest daytime somnolence (p<0.05). Finally, there is an association between fewer sleep hours with higher BMI (OR:1.12 (95%CI:1.01–1.991)) and presence of insomnia (OR:2.734 (95%CI:1.324–5.645)).

Conclusions: University students sleep less than recommended, have a high prevalence of insomnia and excessive daytime sleepiness, in addition, it is obese women who present this alteration more frequently and the highest insomnia score is identified in underweight students. Both a high BMI and insomnia are associated with short-term sleep.

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Alteraciones del sueño y medidas antropométricas en estudiantes universitarios chilenos

PALABRAS CLAVE

Estado Nutricional;

Sueño;

Trastornos del Inicio y del Mantenimiento del Sueño;

Obesidad.

RESUMEN

Introducción: El objetivo del estudio es comparar los hábitos de sueño, el insomnio y la somnolencia diurna en estudiantes universitarios según las medidas antropométricas.

Material y Métodos: Diseño del estudio: un estudio transversal, se llevó a cabo en estudiantes universitarios utilizando la escala de somnolencia de Epworth, el índice de calidad del sueño de Pittsburgh y el índice de severidad del insomnio. Además, se determinaron las variables antropométricas; peso, altura y circunferencia de la cintura.

Resultados: Fueron evaluados 1.275 estudiantes universitarios (74% mujeres). Los estudiantes en promedio dormían a la medianoche y en promedio 6,4 horas, el 77,9% dormía menos de lo recomendado, el 34,2% tenía somnolencia diurna y el 68,5% tenía insomnio. Con respecto al insomnio, se observó que el grupo de bajo peso presentaba la puntuación más alta de insomnio que contrastaba significativamente con el grupo de peso normal (p=0,04). En el caso de la somnolencia diurna al comparar por IMC, se observa que los estudiantes con obesidad son los que presentan la mayor somnolencia (p<0.01). Hay una asociación entre menos horas de sueño con mayor IMC (OR:1,12 (IC95%:1,01–1,991)) y presencia de insomnio (OR:2,734 (IC95%:1,324–5,645)).

Conclusiones: Los estudiantes universitarios duermen menos de lo recomendado, tienen una alta prevalencia de insomnio y somnolencia diurna excesiva, además, son las mujeres con obesidad presentan esta alteración con mayor frecuencia y se identifica el puntaje más alto de insomnio en estudiantes con bajo peso. Tanto un IMC elevado como el insomnio se asocian a sueño de corta cantidad.

CITATION

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INTRODUCTION

Inadequate diet and low physical activity are factors associated with the development of obesity in different age groups[1].

However, other factors are emerging that could be involved in the development of obesity, including sleep[1], which is important for growth, human development, metabolism, weight regulation, immune function, learning, memory and emotional health, so, studies in children and adolescents reveal that up to 70% of students sleep less than recommended for their age[2], despite the recommendation of the National Sleep Foundation to maintain between 7 and 9 hours of sleep per day in young adults and adults[3].

In relation to the deficit in the quantity and quality of sleep, a highly vulnerable group is identified which corresponds to university students[4]. It should be noted that they have extensive academic conferences, concentration of the studies in the night, reduction of free time allocated to non-academic activities, high levels of stress. On the other hand, students at times have foods that are not recommended, particularly at night and high consumption of caffeine and energy drinks.

A reduction in sleep hours in university students has been associated with a decrease in academic performance, depression and can be detrimental to health[5]. Due to the academic demand and high intensity produced by the University, it is generally not possible to cover the recommended hours of sleep, therefore, students are expected to maintain habits, behaviors and a vulnerable and irregular meal schedule[6].

Authors have suggested that through an unclear mechanism, lack of sleep, would affect cognitive processes,

it has been suggested that certain stress-associated hormones that are secreted in conditions of sleep restriction can affect the physiology of neurons and contribute to the cognitive impairment[7]. These reflections might suggest that the consequences of exposure to poor sleep quality could be long-term.

Previous studies have reported concerning results in relation to the poor quality of sleep of university students, that is how in a group of medical students more than 30% presented poor and unsatisfactory sleep quality[5]. In another study conducted in nursing students, the prevalence of insomnia was also close to 30%[8].

Other research in university students indicated that more than 92% of students reported poor sleep quality, while 77% of them reported a very irregular sleep schedule[9].

It is important to point out that important researches have also related in university students the poor quality of sleep with an increase in overweight and obesity[10], in addition, diverse studies have shown differences in the amount of sleep, insomnia and daytime somnolence while comparing sexes[11,12].

Due to the aforementioned, it is essential and relevant to continue investigating associations or consequences that involve deficits in the quantity and quality of sleep.

The objective of the present study is to compare sleep habits, insomnia and daytime sleepiness in university students according to anthropometrics measures.

MATERIAL AND METHODS

Cross-sectional study, all university students who were present at the time of the evaluation were included; and who expressed their informed consent through written documentation, excluded students who presented medical leave and did not sign the requested document.

For the sample calculation, the total number of Campus students (6,800), heterogeneity 50%, margin of error 3%, and confidence level of 95% were used, resulting in a total of 923 students as a minimum sample of the study. The questionnaires were self-administered at the time and later an anthropometric evaluation was carried out by a professional Nutritionist. Finally, there were 1,275 students from different careers at the San Sebastian University (Chile), who formed the study voluntarily, during the 2017 and 2018 academic years. Sleep quality was determined through the questionnaires: Epworth Sleepiness Scale, Pittsburgh Sleep Quality Index and Insomnia Severity Index.

The study was developed according to the Declaration of Helsinki regarding work with human beings and previously approved by the Ethics Committee by Universidad San Sebastián.

Epworth Sleepiness Scale

Likert short questionnaire that determines Daytime Sleepiness, by predicting the risk of the interviewee to fall asleep on a scale of 0 to 3 for eight different everyday situations. A score of 0 to 24 points is obtained, which is categorized as normal daytime somnolence (0 to 10 points), mild daytime somnolence (11 to 12 points), moderate daytime somnolence (13 to 15 points), and somnolence severe diurnal (16 to 24 points)[13].

Insomnia or Insomnia Severity Index (ISI) Questionnaire

It is a self-report questionnaire that aims to evaluate the nature, severity and impact of insomnia; are 5 questions ranging from 0 to 4 points, with a final score between 0 to 28 points and is composed of 5 self- minimum score of 0 and maximum of 4 per question. The results obtained are classified according to the numerical value of the sum of the responses performed by the subjects, so that the registers are divided into 4 categories, distributed as follows: absence of clinical insomnia (0 to 7 points), subclinical insomnia (8 to 14 points), moderate clinical insomnia (15 to 21 points), and clinical or severe insomnia (22 to 28 points)[14].

Pittsburgh Sleep Quality Index

It evaluates sleep quality through seven components: subjective quality of sleep, latency (amount of time taken to sleep), duration, habitual efficiency, alterations, use of hypnotic medication and diurnal dysfunction. It consists of 7 questions ranging from 0 (no difficulty) and 3 points (severe difficulty), with an overall score between 0 (no difficulty) and 21 points (difficulty in all areas), with a cut-off point in the Score 5 to differentiate well from bad sleepers[15].

Anthropometric variables were determined; weight, height and waist circumference. The determination of weight (kg) was carried out with a mechanical scale (SECA, maximum capacity of 220kg precision in 50g) with the minimum of clothes possible. The height (cm) was determined with a built-in height rod, and the waist circumference was obtained by measuring with a tape measure. Body mass index (BMI) was calculated by dividing the weight by the squared size-IMC=weight(kg)/size^2(meters). BMI was categorized

according to WHO classification BMI, using the following values: low weight (<18.5), normal (18.5-24.9), overweight (≥25-29.9) and Obesity (≥30).

Statistics

To evaluate the normality of the data, the Kolmogorov Smirnov test was performed, as the data was normal, mean and SD were used. To compare between groups the ANOVA test and a Bonferroni *post hoc* were used, a $p<0.05$ was considered significant. To determine the association of BMI with sleep and insomnia, a multivariate logistic regression analyses is performed. In the raw model associated with fewer hours of sleep (<7 hours), present a BMI≥25. Presence of Insomnia and excessive daytime somnolence were included in model 2. Model 3 doing physical activity were added, in addition models 2 and 3 were adjusted by sex and tobacco consumption. The statistical program used was SPSS 22.0.

RESULTS

The sample was represented by 1,275 university students (74% female); age, height, weight, and BMI were 21.7±2.4 years, 63.1±11.5kg, 163.4±8.3cm., 23.5±3.2kg/m^2 respectively (Table 1). 77.9% of university students sleep less than the recommended hours, without differences due to gender and nutritional status. The average daytime sleepiness score was slightly drowsy, a similar situation occurred with the average insomnia score (subclinical insomnia); students on average slept at midnight and sleep was 6.4 hours.

Table 2 shows the percentage of daytime sleepiness and insomnia according to sex, a high prevalence of daytime sleepiness (34.2%) and insomnia (68.5%) in college students, when comparing daytime sleepiness by sex higher in females ($p=0.04$). When comparing diurnal somnolence according to nutritional status, there are no significant differences; however, in insomnia, underweight and obese students are the ones with the highest levels of insomnia ($p<0.001$).

We performed the anthropometric comparison and sleep habits according to BMI classification (Table 3), there were differences in weight, BMI and waist among the 4 groups, with respect to insomnia it was observed that the low weight group presented the highest insomnia score that significantly contrasted with the normal weight group ($p<0.05$).

Figure 1 shows that obese women present significantly higher scores in daytime sleepiness than those with low weight and normal weight ($p<0.01$). Obesity in men presented significantly higher scores in daytime sleepiness than men with normal weight ($p<0.05$).

Table 1. General characteristics of the sample (n=1,275).

	Mean	SD	Minimum	Maximum
Age (y)	21.7	2.4	18.0	39.0
Weight (kg)	63.1	11.5	40.0	121.0
Height (cm)	163.4	8.3	144.0	195.0
BMI (k/m^2)	23.5	3.2	16.7	42.0
Waist circumference (cm)	77.5	9.9	60	145
Epworth (score)	8.7	3.8	0	23
Insomnia (score)	10.1	4.8	0.0	27.0
Bedtime (h)	12:10 pm	1:20	8:00 pm	7:00 am
Sleep Latency (min)	27.6	31.6	0.0	360.0
Time to wake up	7:36 am	1:26	1:00 am	2:00 pm
Sleep Duration (h)	6.4	1.5	2	14
Score Pittsburgh	9.1	6.5	0.0	40.0

Table 2. Percentage of daytime sleepiness and insomnia according to sex and BMI (n=1,275).

	Daytime sleepiness			Insomnia			
	Normal	Mild	Moderade	Normal	Subthreshold insomnia	Clinical insomnia (moderate severity)	Clinical insomnia (severe)
Women	63.2	27.2	9.5	32.1	50.1	16.3	1.4
Men	72.7	22.1	5.2	29.3	49.6	19.9	1.0
Chi scuare, p value	0.018			0.669			
Underweight	69.7	9.1	21.2	25.0	50.0	18.8	6.2
Normal weight	72.6	12.1	15.3	33.1	49.5	17.0	0.4
Overweight	72.4	14.3	13.3	29.8	49.2	18.3	2.7
Obesity	63.4	17.3	19.3	19.5	60.8	13.0	6.7
Chi scuare, p value	0.547			0.001			

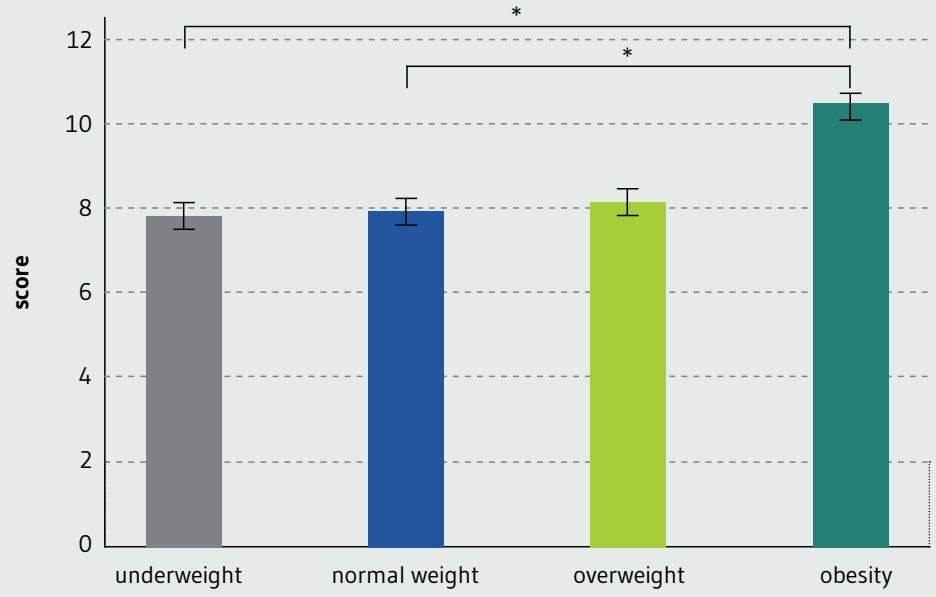
Table 3. Anthropometric comparison and sleep habits according to classification of body mass index.

	Underweight (n=33)	Normal weight (n=860)	Overweight (n=309)	Obesity (n=53)
Aged (y)	21.8 (2.8)	21.6 (2.3)	21.9 (2.8)	21.6 (2.4)
Weight (kg)	46.9 (3.7) [a,b,c]	59.0 (7.7) [a,d,e]	72.0 (9.4) [b,d,f]	88.4 (12.4) [b,d,f]
Height (cm)	161.4 (6.5)	163.3 (7.9)	163.7 (9.4)	165.1 (8.7)
BMI (k/m²)	17.9 (0.4) [a,b,c]	22.0 (1.7) [a,d,e]	26.7 (1.3) [b,d,f]	32.2 (2.7) [b,d,f]
Waist circunference (cm)	64.1 (4.7) [a,b,c]	74.3 (6.9) [a,d,e]	84.5 (8.8) [b,d,f]	97.7 (11.9) [c,e,f]
Epworth (score)	9.4 (3.6)	8.7 (3.8)	8.7 (3.9)	9.4 (3.9)
Insomnia (score)	12.0 (5.5) [a]	9.8 (4.6) [a]	10.5 (5.1)	11.3 (5.0)
Sleep Latency (min)	29.6 (36.7)	26.4 (27.4)	30.1 (37.2)	31.4 (50.6)
Bedtime	24:3 (1:33)	24:11 (1:0)	24:21 (1:3)	24:13 (1:2)
Time to wake up	7:6 (1:7)	7:6 (1:4)	7:6 (1:5)	7:30 (1:4)
Sleep Duration (h)	6.4 (1.5)	6.3 (1.4)	6.2 (1.4)	6.1 (1.5)
Score Pittsburg	8.3 (4.0)	9.0 (6.4)	9.3 (6.9)	9.6 (6.4)

Values expressed as mean (SD); ANOVA test; *post hoc* Bonferroni; equal letters (a,b,c,d,e,f) indicate significant differences (p<0.05).

Table 4 shows the results of the analysis between sleeping less than 7 hours of sleep and nutritional status, an association was found between a few hours of sleep with a higher BMI≥25 both in the crude and adjusted models (OR:1.36 (95%CI:1.059–1.751)), (OR:1.47 (95%CI:1.124–1.947)), (OR:1,12 (95%CI:1,01–1,991). There was also association with insomnia in models 2 and 3, no associations were observed with daytime sleepiness and physical activity, models 2 and 3 were adjusted for sex and tobacco consumption, performing an analysis with the BMI

Figure 1. Comparison of daytime sleepiness according to body mass index in women.



*ANOVA test, *post hoc* Bonferroni; p value <0.01.

Table 4. Association between fewer hours of sleep (<7 hours).

	OR Crude Model	OR Model 2	OR Model 3
BMI ≥ 25	1.36 (1.059-1.751)	1.47 (1.124-1.947)	1.120 (1.011-1.991)
BMI ≥ 30	1.469 (1.033-1.897)	1.557 (1.021-2.823)	1.305 (0.988-1.756)
Present Insomnia		2.716 (1.840-4.009)	2.734 (1.324-5.645)
Present excessive daytime sleepiness		1.289 (0.892-1.889)	0.955 (0.475-1.921)
Do physical activity			0.922 (0.509-1.670)

ANOVA test and *post hoc* Bonferroni, adjusted for sex, consume tobacco;
Odds Ratio.

greater than 30 raw model (OR:1.469 (95%CI:1.033–1.897)) and model 2 (OR:1.557 (95%CI:1.021–2.823)) presented associations with less hours of sleep, this did not occur in model 3 where only a tendency was observed. (OR:1.305 (95%CI:0.988–1.756)).

DISCUSSION

The main result is that there is an association between fewer hours of sleep with a higher BMI and presence of insomnia in students. It also observed poor sleep quality of university students, translated into a high prevalence of insomnia in both sexes of university students and daytime sleepiness in women. In addition, when comparing nutritional status, obese women are those that present greater daytime sleepiness and the highest insomnia score was presented in underweight students.

Insomnia has numerous associated complications such as; poor sleep quality, anxiety, depression[16,17], and even affect memory and performance during the day, thus modifying student performance in university life[18].

There are several factors that could influence these results, such as the large number of hours used in Internet use during the day, a strong correlation between Internet use and insomnia has been reported in the literature, affecting mainly men[19].

In addition, a high caffeine intake has been significantly correlated with mild to severe symptoms of depression and insomnia, however in the present study no caffeine intake analysis was performed[20], because it was beyond the scope of the study.

Also, with the indiscriminate increase of the use of technology, even late at night, mainly cellular devices, a study in university students revealed a use of 60% of these during night time, with a significant relationship with insomnia, and consequent lack of energy, fatigue and headache[21].

Another important result of the present study corresponds to the high prevalence of daytime sleepiness; in women, 36.7% were detected, while in men, 27.3% were observed, both mild and moderate drowsiness, thus revealing a significant difference according to sex. In addition, an association between female gender and BMI was found.

In a study of medical students, it was found that approximately 40% of them presented excessive daytime sleepiness, in addition the authors describe that the sleep quality of university students was deficient[22].

That women with obesity presented a higher score on the daytime sleepiness scales is indicating that their quantity and quality sleep is not adequate; obesity may be accompanied by disorders ranging from snoring to apnea-hypopnea syndrome[23]. Sleep disorders have increased over the last few years. University students, because they are constantly confronted with a condition of maintained stress, affect the quality of sleep in general, thus increasing anxiety which in turn is significantly associated with daytime sleepiness and insomnia[17].

Interestingly, in the present study, low-weight students who present a higher prevalence of insomnia, possibly due to an overestimation as the group was very small (33 subjects), studies generally show that obesity is associated with insomnia[24], the obese university students were in second place in insomnia score.

Insomnia is a frequent condition in adolescents and young adults, especially in university students[8]. Frequently, insomnia is associated with the poor quality of sleep in college students, promoted by extensive days of night study, and irregular sleep hours. An interesting study in students of the Psychology Degree detected a close relationship between insomnia and academic performance, concluding that even failing was higher in students with insomnia[25].

Interestingly, in the present study, underweight students have a higher prevalence of insomnia, possibly due to an overestimation in the results, probably due to the low number of students who presented underweight (33 subjects). Studies generally show that obesity is associated with insomnia[24]. Obese students ranked second in insomnia scores.

Although there are no significant differences, it is interesting to note that in daytime somnolence there was a trend in U-curve, although it did not reach a significant difference, and the students of greater weight slept less than normal weight students, but also did not reach a significant difference.

One study indicated that daytime somnolence is associated with a 3.5-fold increased likelihood of presenting common mental disorders (CMD), including anxiety, mood disorders and eating disorders, behaviors related to the aforementioned[26].

In addition, an investigation of 2,538 students found that 33.4% of them had MCT, and female students were more likely to develop MCT (39.2%) than males (24.4%)[27].

A recent university study provided evidence that the presence of more severe insomnia symptoms was associated with higher levels of suicidal ideation[28].

Although this study did not evaluate the association between sleep and obesity, several studies in children and adults have established an association between less sleep and increased risk of obesity, such as that performed in students of Nutrition and older Chilean subjects[29,30]. Sleep exerts a wide range of physiological functions, a short duration of sleep is associated with a higher total caloric intake, greater fat intake, and lower protein intake, in addition there is limited evidence that associates short-term sleep with a lower intake of Fruits and vegetables, and lower quality diets[31].

Among the strengths of the present study, it was emphasized that internationally validated surveys were used and these data can be compared with other studies. Regarding limitations, mention should be made of those of the study design (cross-section), so that causality can not be established and the data are not representative of all university students in the country.

CONCLUSIONS

Among the results of the study, there is an association between fewer hours of sleep with a higher BMI and presence of insomnia in students. The large number of university students who presented insomnia (in their different categories) in both sexes and excessive daytime sleepiness, revealed that it is the women who present this alteration more frequently and that the insomnia score is higher in underweight students. It is necessary that in Higher Education Institutions establish strategies to reduce sleep disorders, insomnia and daytime sleepiness, carrying out education on adequate sleep habits, since the alterations of these have consequences that affect the capacity of concentration and learning, academic performance, in addition to promoting alterations in nutritional status and unhealthy lifestyles, increasing the indirect risk of developing other chronic pathologies in university students.

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COMPETING INTERESTS

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REFERENCES

(1) Chaput JP, Dutil C. Lack of sleep as a contributor to obesity in adolescents: impacts on eating and activity behaviors. Int J Behav Nutr Phys Act. 2016; 13(1): 103.

(2) Gruber R, Carrey N, Weiss SK, Frappier JY, Rourke L, Brouillette RT, et al. Position statement on pediatric sleep for psychiatrists. J Can Acad Child Adolesc Psychiatry. 2014; 23(3): 174-95.

(3) National Sleep Foundation Recommends New Sleep Times. https://sleepfoundation.org/press-release/national-sleep-foundation-recommends-new-sleep-times.

(4) Veldi M, Aluoja A, Vasar V. Sleep quality and more common sleep-related problems in medical students. Sleep Med. 2005; 6: 269-75.

(5) Dietrich SK, Francis-Jimenez CM, Knibbs MD, Umali IL, Truglio-Londrigan M. Effectiveness of sleep education programs to improve sleep hygiene and/or sleep quality in college students: a systematic review. JBI Database System Rev Implement Rep. 2016; 14(9): 108-34.

(6) Abdulghani HM, Alrowais NA, Bin-Saad NS, Al-Subaie NM, Haji AM, Alhaqwi AI. Sleep disorder among medical students: relationship to their academic performance. Medical Teach. 2012; 34(Suppl 1): S37-41.

(7) Meerlo P, Mistlberger RE, Jacobs BL, Heller HC, McGinty D. New Neurons in the adult brain. The role os sleep and the consequences of sleep loss. Sleep Med Rev. 2009; 13: 187-94.

(8) Angelone AM, Mattei A, Sbarbati M, Di Orio F. Prevalence and correlates for self-reported sleep problems among nursing students. J Prev Med Hyg. 2011; 52: 201-8.

(9) Taher YA, Samud AM, Ratimy AH, Seabe AM. Sleep complaints and daytime sleepiness among pharmaceutical students in Tripoli. Libyan J Med. 2012; 7. doi: 10.3402/ljm.v7i0.18930.

(10) Lombardo-Aburto E, Velázquez-Moctezuma J, Flores-Rojas G, Casillas-Vaillard GA, Galván-López A, García-Valdés P, et al. Relación entre trastornos del sueño, rendimiento académico y obesidad en estudiantes de preparatoria. Acta Pediatr Mex. 2011 ;32(3): 163-8.

(11) Meyer C, Ferrari Junior GJ, Andrade RD, Barbosa DG, da Silva RC, Pelegrini A, Gomes Felden ÉP. Factors associated with excessive daytime sleepiness among Brazilian adolescents. Chronobiol Int. 2019 (in press).

(12) Durán Agüero S, Rosales Soto G, Moya Cantillana C, García Milla P. Insomnio, latencia al sueño y cantidad de sueño en estudiantes universitarios chilenos durante el periodo de clases y exámenes. Salud Uninorte. Barranquilla (Col.) 2017; 33 (2): 75-85

(13) The Epworth Sleepiness Scale (ESS). http://epworthsleepinessscale.com/about-the-ess/.

(14) Bastien CH, Vallieres A, Morin CM. Validation of the Insomnia Severity Index as an outcome measure for insomnia research. Sleep Med. 2001; 2(4): 297-307.

(15) Buysse DJ, Reynolds CF, 3rd, Monk TH, Hoch CC, Yeager AL, Kupfer DJ. Quantification of subjective sleep quality in healthy elderly men and women using the Pittsburgh Sleep Quality Index (PSQI). Sleep. 1991; 14(4): 331-8.

(16) Kato T. Impact of psychological inflexibility on depressive symptoms and sleep difficulty in a Japanese sample. SpringerPlus. 2016; 5(1): 712.

(17) Choueiry N, Salamoun T, Jabbour H, El Osta N, Hajj A, Rabbaa Khabbaz L. Insomnia and Relationship with Anxiety in University Students: A Cross-Sectional Designed Study. PloS ONE. 2016; 11(2): e0149643.

(18) Gerber M, Lang C, Lemola S, Colledge F, Kalak N, Holsboer-Trachsler E, et al. Validation of the German version of the insomnia severity index in adolescents, young adults and

adult workers: results from three cross-sectional studies. BMC Psychiatry. 2016; 6: 174.

(19) Younes F, Halawi G, Jabbour H, El Osta N, Karam L, Hajj A, et al. Internet Addiction and Relationships with Insomnia, Anxiety, Depression, Stress and Self-Esteem in University Students: A Cross-Sectional Designed Study. PloS ONE. 2016; 11(9): e0161126.

(20) Jin MJ, Yoon CH, Ko HJ, Kim HM, Kim AS, Moon HN, et al. The Relationship of Caffeine Intake with Depression, Anxiety, Stress, and Sleep in Korean Adolescents. Korean J Fam Med. 2016; 37(2): 111-6.

(21) Zarghami M, Khalilian A, Setareh J, Salehpour G. The Impact of Using Cell Phones After Light-Out on Sleep Quality, Headache, Tiredness, and Distractibility Among Students of a University in North of Iran. Iran J Psychiatry Behav Sci. 2015; 9(4): e2010.

(22) Alsaggaf MA, Wali SO, Merdad RA, Merdad LA. Sleep quantity, quality, and insomnia symptoms of medical students during clinical years. Relationship with stress and academic performance. Saudi Med J. 2016; 37(2): 173-82.

(23) Sivertsen B, Pallesen S, Sand L, Hysing M. Sleep and body mass index in adolescence: results from a large population-based study of Norwegian adolescents aged 16 to 19 years. BMC Pediatr. 2014; 14: 204.

(24) Sánchez-Cárdenas AG, Navarro-Gerrard C, Nellen-Hummel H, Halabe-Cherem J. Insomnia. A severe health care problema. Rev Med Inst Mex Seguro Soc. 2016; 54(6): 760-9.

(25) León Guerrero G, Kautzman Dimas V, López Parra V y Coronel Pérez F. El impacto del insomnio en el rendimiento académico. Revista de Psicología y Ciencias del Comportamiento. 2014; 5(2): 46-59.

(26) Concepcion T, Barbosa C, Velez JC, Pepper M, Andrade A, Gelaye B, et al. Daytime sleepiness, poor sleep quality, eveningness chronotype, and common mental disorders among Chilean college students. J Am Coll Health. 2014; 62(7): 441-8.

(27) Rose D, Gelaye B, Sanchez S, Castaneda B, Sanchez E, Yanez ND, et al. Morningness/eveningness chronotype, poor sleep quality, and daytime sleepiness in relation to common mental disorders among Peruvian college students. Psychol Health Med. 2015; 20(3): 345-52.

(28) Chu C, Hom MA, Rogers ML, Ringer FB, Hames JL, Suh S, et al. Is Insomnia Lonely? Exploring Thwarted Belongingness as an Explanatory Link between Insomnia and Suicidal Ideation in a Sample of South Korean University Students. J Clin Sleep Med. 2016; 12(5): 47-52.

(29) Durán-Agüero S, Fernández-Godoy E, Fehrmann-Rosas P, Delgado-Sánchez C, Quintana-Munoz C, Yunge-Hidalgo W, et al. Fewer hours of sleep associated with increased body weight in chilean university nutrition students. Rev Perú Med Exp Salud Publica. 2016; 33(2): 264-8.

(30) Durán-Agüero S, Sánchez Reyes H. Relationship between amount of nocturnal sleep and obesity in Chilean elderly. ALAN. 2016; 66(2): 142-7.

(31) Dashti HS, Scheer FA, Jacques PF, Lamon-Fava S, Ordovas JM. Short sleep duration and dietary intake: epidemiologic evidence, mechanisms, and health implications. Adv Nutr. 2015; 6(6): 648-59.