

CORRELATION BETWEEN PASSIVE REST AND THE APPEARANCE OF FATIGUE IN A GROUP OF PUPILS FROM BOTOȘANI COUNTY

Adriana Albu¹, Alexandra Ioana Crăcană², & Florin Dima³

¹Grigore T. Popa University of Medicine and Pharmacy (Romania)

²Independent researcher (Romania)

³Vaslui Public Health Department (Romania)

Abstract

Introduction: fatigue is a physiological phenomenon that disappears when lowering effort levels and when sleeping. Young people need at least nine hours of sleep per day.

Material and methods: the study was carried out on a group of 246 high schoolers (9th and 11th grade) from three schools in Botoșani County. Pupils completed a questionnaire with questions about the daily time spent sleeping at night, the presence of fatigue, the time of day and the day of the week when it occurs and the presence of sleep during the day (naps). The results were processed using Pearson's chi-squared test.

Results and discussions: most pupils sleep for 6-7 hours (37.80%) or 7-8 hours (33.73%) per night, with statistically insignificant differences between the two classes ($p > 0.05$). Fatigue is often present in 46.34% of cases with insignificant differences between classes ($p > 0.05$). The correlation between night sleep and fatigue shows significant differences ($p < 0.05$). When waking up in the morning, 44.30% of young people feel tired, with statistically significant differences ($p < 0.01$). The correlation between the time allotted for nighttime sleep and the presence of morning fatigue shows statistically significant differences ($p < 0.01$). Most pupils in the 11th grade feel tired at the end of the week, while those in the 9th grade show signs of fatigue at the start of the week, the differences being statistically significant ($p < 0.05$). The correlation between nighttime sleep and the occurrence of fatigue during the week highlights statistically insignificant differences ($p > 0.05$). Napping is rarely present in most cases (46.74%), the calculated differences being insignificant between classes ($p > 0.05$).

Conclusions: insufficient sleep during the night is associated in most cases with the appearance of fatigue, an aspect that must be carefully studied and monitored from a medical point of view.

Keywords: Sleep, tired, napping, high school.

1. Introduction

Fatigue is a physiological phenomenon that occurs when the body exceeds effort capacity. Special attention should be paid to this phenomenon in students who are undergoing the processes of growth and development, but who must also adapt to school demands.

Fatigue disappears after passive rest through sleep or after active rest represented by recreational activities. Unfortunately, recreational activities can become a problem if the time allotted for them is too long – for example time spent on the computer can reach several hours a day. Obviously in this context active rest leads to a reduction in the number of hours of sleep and to the appearance of a chronic fatigue. Unfortunately, it can also lead to computer addiction which is dangerous (Baciu, 2020).

There is currently much discussion about addictive phenomenon, especially those related to overeating associated with reduced interest in physical activity and changes in sleep-related behavior. People who do not have a food addiction rarely experience moments of sudden sleepiness during the day (3.8 ± 5.0 days in the last month) while those with severe eating problems frequently have such moments (6.4 ± 7.7 days in the last month) (Tan Ee Li, Pursey, Duncan & Burrows, 2018).

Directly opposed situations where young people have eating problems manifested by insufficient intake. These imbalances are associated with slow growth, high stress, and impaired sleep. There are high school students who, due to an unbalanced diet, have problems with sleep quality (55.7% of students have such problems) (Rasouli et. al, 2021).

Parents should pay attention to these issues and intervene when needed. A study carried out on a group of teenagers from Iasi shows a modest level of parents' interest for students' leisure activities (rarely - 38.00%) or even an absence (never - 20.36%) so there is little chance that there is special concern for time given to sleep (Albu, Dima, Abdulan & Carausu, 2018).

Educational programs should also focus on understanding the importance of nighttime and daytime sleep in maintaining health and school performance. Programs that teach meditation exercises have increased the time allocated to sleep in students from 6.92 hours to 8.08 hours, which can be used in the therapy of patients with various addictions. (Soriano-Ayala, Amutio, Franco & Mañas, 2020).

There are aspects that need to be carefully monitored even for students who do not have addictions because as they get older, the time given to sleep decreases, which is concerning. This trend is clear in Ecuador's pupils. Children sleep an average of 8.96 hours per day, young adolescents an average of 7.96 hours and older adults an average of 7.08 hours with statistically significant differences (Villa-González, Huertas-Delgado, Chillón & Ramirez-Vélez, Barranco-Ruiz, 2019).

The objectives of the study:

- to evaluate of the time allotted for nighttime sleep and compare it with the norms;
- to assess levels of fatigue and the correlation with insufficient night sleep;
- to evaluate the time of the week and the day when fatigue occurs;
- to find out the frequency of daytime sleep;
- to evaluate the correlation between nighttime sleep and daytime sleep.

2. Method

The study was carried out on a group of 246 students from three high schools in Botosani County. There are 123 pupils in the ninth grade and 123 in the eleventh grade. The young people completed a questionnaire about the time allotted for nighttime sleep, the presence of fatigue, the time of day / week when it occurs and the presence of sleep during the day.

Nighttime sleep was estimated based on the question:

- How many hours do you sleep on average per night: 6-7 hours; 7-8 hours, 8-9 hours; over 9 hours.

Fatigue was assessed with the help of four questions:

- Do you feel tired? - often, rarely, never;
- How do you feel when you wake up in the morning? - rested, tired, very tired;
- During the week, when do you feel tired? - at the start, in the middle, at the end;
- During the day, when do you feel tired? - in the morning, during the day, in the evening.

The presence of sleep during the day was also studied:

- Do you sleep in the afternoon? - every day, often, rarely, never.

The results were interpreted insisting on the correlations between nighttime sleep and the presence of fatigue. They were processed using the Pearson's chi-squared test.

3. Results

High school students need 9 hours of sleep per day. Unfortunately, this result is present in only less than 30% of young people (Table 1).

Table 1. Time spent sleeping at night.

	6-7 hours	7-8 hours	8-9 hours	Over 9 hours	Total
9 th grade	52	38	23	10	123
11 th grade	41	45	20	17	123
Total	93	83	43	27	246
%	37.80	33.73	17.47	10.97	

The calculated differences are statistically insignificant ($p > 0.05$, $f = 3$, $\chi^2 = 3.912$) so this is a habit that exists in most young people.

In this context, it is essential to assess the presence of fatigue. It is often recognized in 46.34% of cases. Out of the entire group we see that 6.50% of teenagers are never tired (Table 2).

Table 2. Frequency of fatigue.

	Often	Rarely	Never	Total
9 th grade	58	60	5	123
11 th grade	56	56	11	123
Total	114	116	16	246
%	46.34	47.15	6.50	
Correlation between nighttime sleep and fatigue				
6-7 hours	57	32	4	93
7-8 hours	32	44	7	83
8-9 hours	17	22	4	43
Over 9 hours	8	18	1	27

The calculated differences between the two school years are statistically insignificant ($p > 0.05$, $f = 2$, $\chi^2 = 2.420$). The correlation between the time allocated to night sleep and fatigue shows significant differences ($p < 0.05$, $f = 6$, $\chi^2 = 15.775$) which indicates the existence of a high percentage of students who sleep little and feel marked fatigue.

After a sleep adapted to the needs of the body in the morning on waking the student must feel rested. Unfortunately, this response occurs only in 44.30% of situations (Table 3).

Table 3. The presence of morning fatigue.

	Rested	Tired	Very tired	Total
9 th grade	41	66	16	123
11 th grade	68	43	12	123
Total	109	109	28	246
%	44.30	44.30	11.38	
Correlation between nighttime sleep and morning fatigue				
6-7 hours	24	53	16	93
7-8 hours	45	34	4	83
8-9 hours	21	16	6	43
Over 9 hours	19	6	2	27

The differences between school years are significant ($p < 0.01$, $f = 2$, $\chi^2 = 12.110$) and draw attention to young people in the ninth grade who often feel tired. The correlation between night sleep and morning fatigue shows statistically significant differences ($p < 0.01$, $f = 6$, $\chi^2 = 22.011$).

Fatigue should appear physiologically towards the end of the week. In the surveyed pupils, fatigue also occurs at the beginning and middle of the week (Table 4).

Table 4. The time of week when fatigue occurs.

	At the start	In the middle	At the end	Total
9 th grade	48	43	32	123
11 th grade	31	44	48	123
Total	79	87	80	246
%	32.11	35.36	32.52	
Correlation between nighttime sleep and fatigue during the time of the week				
6-7 hours	35	38	20	93
7-8 hours	24	28	31	83
8-9 hours	12	13	18	43
Over 9 hours	8	8	11	27

The differences between the two school years are statistically significant ($p < 0.05$, $f = 2$, $\chi^2 = 6.868$) and draw attention to students in the ninth grade who often feel tired. The correlation between sleep and the time of the week when fatigue appears shows statistically insignificant differences ($p > 0.05$, $f = 6$, $\chi^2 = 8.670$).

Physiological fatigue normally occurs in the evening. In the surveyed students, fatigue is also manifested in the morning and during the day (Table 5).

Table 5. The time of day when fatigue occurs.

	In the morning	During the day	In the evening	Total
9 th grade	44	43	36	123
11 th grade	30	46	47	123
Total	74	89	83	246
%	30.08	36.17	33.73	
Correlation between nighttime sleep and fatigue during the time of day				
6-7 hours	33	41	19	93
7-8 hours	22	30	31	83
8-9 hours	15	11	17	43
Over 9 hours	4	7	16	27

Between school years the differences are insignificant ($p > 0.05$, $f = 2$, $\chi^2 = 4.204$) but the correlation between nighttime sleep and fatigue during the day shows statistically significant differences ($p < 0.01$, $f = 6$, $\chi^2 = 18.349$).

Theoretically, the problem of fatigue and insufficient nighttime sleep can be solved by sleeping during the day. This is present “often” or “every day” only in less than 20% of cases (Table 6).

Table 6. The presence of sleep during the day.

	Every day	Often	Rarely	Never	Total
9 th grade	3	14	66	40	123
11 th grade	7	16	49	51	123
Total	10	30	115	91	246
%	4.06	12.19	46.74	36.99	
Correlation between nighttime sleep and daytime sleep					
6-7 hours	4	9	43	37	93
7-8 hours	5	15	34	29	83
8-9 hours	1	6	22	14	43
Over 9 hours	0	0	16	11	27

Between school years the calculated differences are insignificant ($p > 0.05$, $f = 2$, $\chi^2 = 5.572$). When looking at the correlation between nighttime sleep and daytime sleep we see statistically significant differences ($p > 0.05$, $f = 6$, $\chi^2 = 10.740$).

4. Discussion

Specialists recommend 9-11 hours of sleep per day for teenagers under 14 years old, and 8-10 hours of sleep a day for those over 14 years old or 9-12 hours for those aged 9-12 years and 8-10 hours for 13-18-year-olds (Kracht et al., 2019; Hansen, Hanewinkel & Galimov, 2022). In a study carried out on adolescents in Iasi, similar results appear, which indicates the existence of a habit of young people related to an insufficient number of hours slept per night (Albu, Hodorcă, Onose, Negrea & Crăcană, 2016). In adolescents in the United States, insufficient sleep is present in only 25% of responses, being recognized by 24.98% of boys and 32.2% of girls (Jacobs, 2019). Urban adolescents in Mexico experience an average sleep time of 10 hours, a response that occurs in both sexes, in public and private schools and that is adapted to the age requirements (Galván et al., 2017).

Unhealthy living habits of young people often persist or worsen even after high school. In a group of young people aged 18-20 in Japan, there are situations in which the number of hours of sleep per night is 4 or less in 6.3% of cases or 5 hours in 22.4% of cases with the dominant response being 6 hours in 45.0 % of cases (Nakanishi et al., 2018). The situation is even more interesting for students who are preparing for a medical career and who often recognize a small number of hours of sleep per night (Saiyida, Afshan, Abdul & Syeda, 2019).

Marked fatigue is present in 46.34% of cases, with 55.68% of young people waking up tired and even very tired in the morning. The percentage is similar to that of the study conducted on adolescents in Iasi, which is a cause for concern (Albu, Hodorcă, Onose, Negrea & Crăcană, 2016). Physiological fatigue should occur in the evening or at the end of the week. In our group, fatigue occurs in the evening only in a third of cases and it appears at the end of the week with the same frequency.

Many problems arise because the lack of parental supervision leads adolescents in the studied group to an unhealthy lifestyle that can have serious repercussions on their health and their school results (Albu, Dima, Abdul & Carausu, 2018). Parents need to be actively involved in students' lives even if they are older and want to be independent. Parental involvement means, among other things, taking an interest in school performance and school activities, spending quality free time together, talking to teachers and the establishment of rules with clear consequences (Erdener & Knoepfel, 2018). The family environment is essential for the development of healthy living habits and this implies avoiding excessive alcohol consumption, smoking, unsafe sexual practices, drug abuse or engaging in antisocial behaviors (Harris et al., 2017; Richardson, McCarty, Radovic & Ballonoff Suleiman, 2017).

Unfortunately, when fatigue arises, adolescents turn to various stimulants that briefly remove the feeling of fatigue. Adolescents in rural and urban schools in Rhode Island sleep an average of 8.8 hours per night. Only a third of young people (38%) feel comfortable during the day. There are small problems of staying awake during the day in 49% of young people or even bigger problems of doing so in 10% of cases which they try to solve by drinking alcohol, smoking or even by taking drugs (Miller, Janssen, & Jackson, 2017).

5. Conclusion

The time allotted for nighttime sleep is, in most cases, insufficient; therefore, it is not possible to remove the fatigue that appeared during the day and the previous week. Fatigue is felt intensely by half of the teens in the group. They wake up tired and even very tired in the morning. Physiological fatigue occurs in the evening and at the end of the work week, but such answers appear in only a third of cases.

The correlation between hours slept and the presence of fatigue often indicates significant differences that underline the risk of progression towards chronic fatigue or overwork.

Such studies are essential for adolescents' health and for the formation of a healthy lifestyle that can be maintained throughout life.

References

- Albu, A., Hodorcă, R. M., Onose, I., Negrea, M. & Crăcană, I. (2016). The evaluation of the scholar fatigue phenomenon and some causative factors in a group of teenagers from Iasi. *Global Journal of Sociology: Current Issues*, 6(2), 44-49.
- Albu, A., Dima, F., Abdulan, I. & Carausu, M. (2018). Evaluation of school fatigue and social relationships in a group of students from general knowledge high schools in Iasy country. *Education Journal*, 7(1):1-4.
- Baciu, A., 2020. Medical and social consequences of digital addiction. *Medical Anthropology*, The Publishing House of the Romanian Academy, 22(3), 141-147.
- Erdener, M. A. & Knoepfel, R. (2018). Parent perceptions of their involvement in schooling. *International Journal of research in Education and Science*, 4(1).
- Galván, M., Monroy-Campos, A., López-Rodríguez, G., Unzaga, M. G., Olivio, D. Jhazmín, H. C., Teodoro, S. D., Trinidad, F. C., Rebeca, G. S. & Hugo, A. (2017). Physical activity in Mexican urban school children: difference by nutritional status and school type. *Global Advanced Research Journal of Medicine and Medical Sciences*, 6(12), 362-368.
- Hansen, J., Hanewinkel, R. & Galimov, A. (2022). Physical activity, screen time and sleep: do German children and adolescents meet the movement guidelines?. *European Journal of Pediatrics*. doi: <https://doi.org/10.1007/s00431-022-04401-2>
- Harris, S., Aalsma, M., Weitzman, E., Garcia-Huidobro, D., Wong, C., Hadland, S. E., Santelli, J., Park, M. J. & Ozer, E. M. (2017). Research on clinical preventive service for adolescents and young adults: wherw are we and were do we need to go?. *Journal of Adolescent Health*, 60, 249-260.
- Jacobs, M. (2019). Latent class analysis of adolescent health behaviors. *Journal of Community and Preventive Medicine*, 2(1).
- Kracht, C., Chaput, J. P., Martin, C., Champagne, C., Katzmarzyk, P. & Staiano A. (2019). Associations of sleep with food cravings, diet, and obesity in adolescence, *Nutrients MDPI*, 11, 2899.
- Miller, M. B., Janssen, T. & Jackson, K. (2017). The prospective association between sleep and initiation of substance use in young adolescents. *Journal of Adolescent Health*, 60, 154-160.
- Nakanishi, J., Suematsu, Y., Arimura, T., Kuwano, T., Shiga, Y., Kitajima, K., Morito, N., Nii, T., Saku, K., & Miura, S. I. (2018). Recomendations of lifestyle modification according to a survey of first-year university students. *J.Clin.Med. Res.* 10(10), 772-780. doi: 10.14740/jocmr3574w
- Rasouli, A., Mohiti, S., Javadi, M., Panjeshahin, A., Karemi, M. & Shiri-Shahsavari, M. R. (2021). The effect of daily fast-food consumption, family size, weight-caused stress and sleep quality on eating disorder risk in teenagers. *Sleep Breathing Physiology and Disorders*. doi: 10.1007/s11325-020-02189-9
- Richardson, L., McCarty, C., Radovic, A. & Ballonoff Suleiman, A. (2017). Research in the integration of behavioral health for adolescents and young adults in primary care settings: a systematic review. *Journal of Adolescent Health*, 60, 261-269.
- Saiyida, K. F., Afshan, A., Abdul, R. K. & Syeda, F. (2019). Distribution and determinant of sedentary lifestyle among health care professionals. *Pakistan Journal of Medicine and Dentistry*, 8(2), 80-86.
- Soriano-Ayala, E., Amutio, A., Franco, C. & Mañas, I. (2020). Promoting a healthy lifestyle through mindfulness in university students: a randomized controlled trial. *Nutrients MDPI*, 12, 2450.
- Tan Ee Li, J., Pursey, K., Duncan, M. & Burrows, T. (2018). Addictive eating and its relation to physical activity and sleep behavior. *Nutrients MDPI*, 10, 1428.
- Villa-González, E., Huertas-Delgado, F., Chillón, P., Ramirez-Vélez, R. & Barranco-Ruiz, Y. (2019). Associations between active commuting to school, sleep duration and breakfast consumption in Ecuadorian young people, *BMC Public Health*, 19(85).