

SLEEP QUALITY OF HIGH SCHOOL STUDENTS IN CENTRAL SLOVAKIA KVALITA SPÁNKU STREDOŠKOLÁKOV NA STREDNOM SLOVENSKU

ADAMČÁK Štefan¹, MARKO Michal², ADAMČÁKOVÁ KĽOCO VÁ Zora³,
AZOR Stanislav⁴, BARTÍK Pavol¹

¹ Faculty of Arts, Matej Bel University in Banská Bystrica, Slovakia

² Faculty of Performing Arts, Academy of Arts in Banská Bystrica, Slovakia

³ Regional Authority of Public Health in Banská Bystrica, Slovakia

⁴ Institute of Physical Education and Sports, Technical University in Zvolen, Slovakia

ABSTRACT

Theoretical background. Sleep quality and its importance in high school students is paramount because recognizing the sleep needs of high school students is important because of well-being (health) and academic performance (success); therefore, the aim of study was to examine the sleep quality of high school students in Slovakia.

Materials and Methods. Research instrument (Pittsburgh Sleep Quality Index) was carried out 6 months (January - June) because of examining (e.g., analyze, compare) the sleep quality of high school male (630; 45.65 %) and female (750; 54.35 %) students in Slovakia, attending the grammar (598; 43.34 %) and vocational (782; 56.66 %) high schools, and living in Zvolen (720; 52.18 %) and B. Bystrica (660; 47.82 %). Examining the sleep quality of high school students (1 380; 100 %) in Slovakia was by means of chi-square test, of which the significance level was 0.01 and 0.05 and Pearson's r (Ibm Spss Modeler).

Results. Significant difference (0.01; 0.05) between high school male (630; 45.65 %) and female (750; 54.35 %) students was in sleep quality (0.01), sleep latency (0.01), sleep duration (0.05), sleep disturbance (0.01), sleep medication (0.01), and daytime dysfunction (0.01). No difference (0.01; 0.05) between high school students (1 380; 100 %) was in sleep efficiency (> 0.05).

Conclusions. Supporting sleep habits (quality); in particular; consistent bedtimes, promoting and creating sleep environment (safe), improves the sleep quality in high school students. Sustaining communication (open) about sleep issues may facilitate the development of effective sleep strategy tailored to individual needs.

Key words: Adolescence. High school. Questionnaire. Sleep quality.

ABSTRAKT

Východiská. Spánok je mimoriadne dôležitým aspektom života žiakov stredných škôl. Napĺňanie tejto základnej potreby má vplyv nielen na zdravie ale i na výkonnosť vo vzdelávacom procese, preto sa táto štúdia zameriava na výskum kvality spánku študentov stredných škôl na Slovensku.

Súbor a metodika. Zber údajov prebiehal pomocou štandardizovaného dotazníka (Pittsburgh Sleep Quality Index) počas šiestich mesiacov (január – jún) na vzorke stredoškolských študentov slovenských stredných škôl (1 380; 100 %), rozdielnych pohlaví (muži 630; 45,65 %; ženy 750; 54,35 %), navštevujúcich odlišné typy stredných škôl (gymnázium 598; 43,34 %; stredná odborná škola 782; 56,66 %), žijúcich v rozdielnych mestách (Zvolen 720; 52,18 %; Banská Bystrica 660; 47,82 %). Skúmanie kvality spánku stredoškôľakov (1 380; 100 %) na Slovensku bolo realizované pomocou chi-kvadrát testu, pričom

hladina významnosti bola 0,01 a 0,05, a Pearsonovho korelačného koeficientu (Ibm Spss Modeler).

Výsledky. Boli zistené významné rozdiely (0,01; 0,05) medzi študentmi mužského (630; 45,65 %) a ženského (750; 54,35 %) pohlavia v kvalite spánku (0,01), spánkovej latencii (0,01), dĺžke spánku (0,05), narušení spánku (0,01), medikácii (0,01) a narušení bdlosti (0,01). Neboli zistené rozdiely (0,01; 0,05) medzi študentami stredných škôl (1 380; 100 %) v efektívite spánku (> 0,05)

Záver. Podpora pozitívnych návykov pri spánkovej aktivite - hlavne pravidelnosť zaspávania, vytvorenie vhodného prostredia na spánok - zlepšuje kvalitu spánku študentov stredných škôl. Udržiavanie (otvorenej) komunikácie o problémoch spojených so spánkovou činnosťou môže uľahčiť vývoj efektívnej stratégie spánku prispôbenej individuálnym potrebám.

Kľúčové slová: Adolescencia. Stredná škola. Dotazník. Kvalita spánku.

INTRODUCTION

Sleep quality is of utmost importance in adolescence (i.e., high school student). Adolescents' development (e.g., physical, cognitive) depends on adequate sleep (Galan-Lopez et al., 2021). Sleep quality plays an important role in health; in particular, immune system (function), endocrine system (regulation), and ability of body to tissues' repair. Lack of sleep increases risk of obesity, diabetes (i.e., non-communicable diseases), susceptibility to illness, and lasting medical issues (Garbarino et al., 2021). Achieving adequate sleep quality affects attention and concentration, both of which are prerequisites for most learning.

Adequate sleep quality affects other aspects of cognition; in particular, memory, problem-solving, and processing and helps adolescents to remain attentive and retain information better, leading to improving academic performance. Inadequate sleep quality results in decreasing concentration, problem-solving ability, and lower academic performance (Jalali et al., 2020). Potential stress because of academic performance (success) contributes to

anxiety and issues unwinding before bedtime (Barbayannis et al., 2022).

Recognizing the sleep needs of adolescents is important in terms of their well-being and health. Adequate sleep quality helps to regulate mood, reduce stress, and enhance emotional resilience; however, inadequate sleep quality results in swings in mood, anxiety, and increasing risk of developing disorders in health (Vandekerckhove et al., 2017). Lack of sleep causes accidents because of reducing reaction times and weakening decision-making; however, sleep quality impacts stress, anxiety, and allows the brain to process emotions, reducing the chance of feeling anxious (Medic et al., 2017).

Sleep quality plays an important role in shaping well-being of adolescents; however, multitude of factors affect the sleep quality; therefore, understanding the factors is important in terms of promoting sleep patterns and optimizing well-being of adolescents. Circadian rhythm (biological clock) undergoes changes in adolescence, leading to later bedtimes, known as “sleep phase delay”, often resulting in conflict with early school start times, leading to inadequate sleep quality in school nights (Kwon et al., 2022).

Prevalence of electronic devices in adolescents is exceptional because of allure of smartphones, computers, and other devices, leading to excessive screen time; in particular before bedtime. Electronic devices release blue light, which causes the body's release of melatonin and changes the circadian rhythm, making it challenging in adolescents to sleep. Attractive content and social interaction cause excessive use, delaying bedtime, and reducing sleep quality (duration) (Hale et al., 2018).

Socializing, social media use, and late-night interaction, whether in person or digital platforms, extend into late hours, disrupting sleep quality. Influence of peers and desire of belonging lead to sacrifice of sleep quality (Yang et al., 2018). Associating

factors of inadequate sleep quality are diverse; therefore, recognizing the factors that adolescents confront and applying policy to manage the factors may result in adequate sleep quality, cognition, and well-being. Because of that and many gaps in literature, in terms of sleep quality of high school students in Slovakia (the best of authors' knowledge), the aim of study was to examine the sleep quality of high school students in Slovakia.

MATERIALS AND METHODS

Participants

In terms of study aim, the survey group (1 380; 100 %) (i.e., target population) consisted of high school male (629; 45.58 %) (16.90 ± 0.30 years) and female (751; 54.42 %) (16.50 ± 0.45 years) students in Slovakia, attending the grammar (598; 43.34 %) and vocational (782; 56.66 %) high schools, and living in Zvolen (720; 52.18 %) and B. Bystrica (660; 47.82 %) (Table 1).

High school male (629; 45.58 %) and female (751; 54.42 %) students consisted of convenience sample (i.e., 1 380 adolescent boys and girls), recruited through the EduPage (complete school system) and teachers of physical education. Selection process (i.e., recruitment) of survey group was carried out 6 months (January - June), in intervals of 3x (Mon, Tue, Thu)/ week (24 weeks), aiming for intentional sampling.

Examining the sleep quality of high school male (629; 45.58 %) and female (751; 54.42 %) students in Slovakia was carried out in accordance with ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments and/ or comparable ethical standards. All subjects (i.e., survey group) provided written informed consent (Harriss et al., 2022).

Table 1 Demographic data of survey group (n = 1 380)

Demographic data		
Age (2)	Male	16.90 ± 0.30 years
	Female	16.50 ± 0.45 years
Gender (2)	Male	629; 45.58 %
	Female	751; 54.42 %
Region (2)	Zvolen	720; 52.18 %
	B. Bystrica	660; 47.82 %
School (2)	Grammar	598; 43.34 %
	Vocational	782; 56.66 %

Research design. Research instrument (Pittsburgh Sleep Quality Index – PSQI) was carried out 6 months (January – June) because of examining the sleep quality of high school students (1 380; 100 %) in Slovakia. Adopting the research instrument made it easier to examine the data, consisting of 2 sections – Demographic data and Pittsburgh Sleep Quality Index – 19 items (individual), creating 7 components (Sleep quality (question 9), Sleep latency (questions 2 and 5a), Sleep duration (question 4), Sleep efficiency (questions 1, 3, and 4), Sleep disturbance (questions 5b – j), Sleep medication (question 6) and Daytime dysfunction (questions 7 and 8) (Buysse et al., 1989).

Self-measure questionnaire (pencil and paper) measures sleep quality over 1-month time interval and takes between 5 and 10 minutes to complete. Research instrument consists of combination of scale (Likert) and open-end questions. Scores of items (19) range of 0 – 3 (interval scales) and global scores (0 – 21) are results of 7 components, where lower scores indicate better sleep quality. Distinguishing good/ poor sleep quality (sleeper), global scores > 5 indicate the sensitivity of 89.6 % and specificity of 86.5 %.

Debriefing forms (online) did not include individual data, except demographic data of survey group. Incentive was not given (i.e., voluntary participation); however, the survey group received reports of individual data afterwards (Microsoft Forms, Office 365, Microsoft Corp., Redmond, WA, USA) (Andrade, 2020).

Statistical Analysis. Examining the sleep quality of high school students in Slovakia was by means of chi-square test, of which the significance level (α) was 0.01 and 0.05 (Ibm Spss Modeler) (Adamčák et al., 2023). Measuring the strength of relationship (linear) between 2 variables (7 components) was by means of Pearson's r ($0.3 > r$ – weak, $0.5 > r$ –

moderate., $0.5 < r$ – strong) (Turhan, 2020). Available data of survey group was tabulated in database design (single-measure, comparative study). Descriptive statistics; in particular, arithmetic mean, percentage frequency, described the data of survey group.

RESULTS

In terms of study aim, Table 2 shows the research instrument (distribution of 7 components) of survey group (1 380; 100%), including of global score. Adequate (good) sleep quality was in 86.95 % (1 200) of survey group (1 380; 100 %) with 7 % (56) difference in favor of high school male students ($4.40 \text{ E-}06$); therefore, inadequate (poor) sleep quality was in 13.05 % (180) of survey group (Table 2). No difference (0.01; 0.05) between high school students was in sleep efficiency (0.258) (Table 3).

Significant differences (0.01; 0.05) between high school male (629; 45.58 %) and female (751; 54.42 %) students were in 6 out of 7 components; in particular, in sleep quality ($4.10 \text{ E-}06$), sleep latency ($4.10 \text{ E-}06$), sleep duration ($7.66 \text{ E-}05$), sleep disturbance ($8.88 \text{ E-}10$), sleep medication ($3.22 \text{ E-}08$) and daytime dysfunction ($2.28 \text{ E-}06$) (Table 4).

Pearson's r of 629 (45.58 %) high school male students was moderate (positive) between sleep quality and sleep duration ($r = 0.38$), and sleep quality and sleep disturbance ($r = 0.32$).

Pearson's r of 751 (54.42 %) high school female students was moderate (positive) between sleep quality and sleep duration ($r = 0.46$), sleep quality and daytime dysfunction ($r = 0.44$), sleep duration and sleep efficiency ($r = 0.40$) and sleep duration and daytime dysfunction ($r = 0.40$). Remaining (i.e., correlation) was weak (positive; $0.30 > r$), in terms of high school male and female students.

Table 2 Research instrument (Global Score) of survey group (n = 1 380)

Components	Items	Male	Female	Chi-square T
Global Score	> 5	9.25 %	16.25 %	4.40 E-06 (p)
	≤ 5	90.75 %	83.75 %	20.10 ($\chi^2_{(2)}$)

Table 3 Research instrument (Component 4) of survey group (n = 1 380)

Components	Items	Male	Female	Chi-square T
Sleep Efficiency	≥ 85 % (0)	84.72 %	88.46 %	0.2580 (p) 4.02 ($\chi^2_{(3)}$)
	85% – 75 % (1)	8.12 %	6.86 %	
	75% – 65 % (2)	3.18 %	2.02 %	
	≤ 65 % (3)	3.98 %	2.66 %	

Table 4 Research instrument (Components 1 – 3, 4 – 7) of survey group (n = 1 380)

Components	Items	Male	Female	Chi-square T
Sleep Quality	Very good (0)	9.70 %	11.72 %	4.10E-06 (p) 27.75 ($\chi^2_{(3)}$)
	Fairly good (1)	56.12 %	47.28 %	
	Fairly bad (2)	30.38 %	30.36 %	
	Very bad (3)	3.80 %	10.64 %	
Sleep Latency	0 Σ (0)	56.08 %	48.60 %	4.10E-04 (p) 18.42 ($\chi^2_{(3)}$)
	1 – 2 Σ (1)	16.64 %	13.98 %	
	3 – 4 Σ (2)	22.68 %	32.90 %	
	5 – 6 Σ (3)	4.60 %	4.52 %	
Sleep Duration	\geq 7 hours (0)	40.02 %	32.66 %	7.66E-05 (p) 26.34 ($\chi^2_{(3)}$)
	6 – 7 hours (1)	42.12 %	42.68 %	
	5 – 6 hours (2)	12.24 %	17.04 %	
	\leq 5 hours (3)	5.62 %	7.62 %	
Sleep Disturbance	0 Σ (0)	4.12 %	1.60 %	8.88E-10 (p) 40.38 ($\chi^2_{(3)}$)
	1 – 9 Σ (1)	80.60 %	72.12 %	
	10 – 18 Σ (2)	12.52 %	20.78 %	
	19 – 27 Σ (3)	2.76 %	5.50 %	
Sleep Medication	0/ month (0)	94.76 %	92.08 %	3.22E-08 (p) 36.62 ($\chi^2_{(3)}$)
	< 1/ week (1)	2.38 %	2.92 %	
	1 – 2 / week (2)	0.00 %	3.94 %	
	> 3/ week (3)	2.86 %	1.06 %	
Daytime Dysfunction	0 Σ (0)	11.32 %	4.92 %	2.28E-06 (p) 32.62 ($\chi^2_{(3)}$)
	1 – 2 Σ (1)	38.46 %	39.68 %	
	3 – 4 Σ (2)	38.80 %	36.34 %	
	5 – 6 Σ (3)	11.12 %	19.06 %	

DISCUSSION

Sleep quality (subjective) of high school students (i.e., in adolescence) refers to how students (male, female) perceive and evaluate the quality of sleep, involving the individual evaluation of factors (e.g., sleep latency, sleep duration) and impact of sleep. Sleep quality plays an important role in shaping well-being of high school students; however, multitude of factors (e.g., biological change, academic demand) affect the sleep quality; therefore, understanding the factors is important, in terms of promoting sleep patterns and optimizing well-being (Kwon et al., 2022). Measuring the sleep quality of high school students involves using sensitive and age-appropriate instruments; in particular, questionnaires and surveys, to capture their experiences.

Adequate (good) sleep quality was in 86.95 % (1 200) of survey group (1 380; 100%), with 7 % (56) difference in favor of high school male (572, 90.75 %) students (4.40 E-06); therefore, inadequate (poor) sleep quality was in 13.05 % (180) of survey group. Inadequate (poor) sleep quality and its prevalence in adolescence differs because of different regions, populations; however, significant

numbers (25 – 40 %) of adolescents experience inadequate sleep quality. Inadequate sleep quality was in 7.3 % of adolescents in India (10 – 19 years), lower during vacation (6.5 %) than school days (9.3 %) (Dubey et al., 2019). Inadequate sleep quality in adolescence was 2.5 % (14.2 \pm 2.4 years) (95 %, Ci: 1.6% - 3.9 %) (Sarveswaran et al., 2021). Inadequate sleep quality was in 32 % of high school students (1 080; 100 %); lower in male (29 %) than in female (34.5 %) students in Thailand (Hounnaklang et al., 2016). Inadequate sleep quality was in 49 % of adolescents (44 % of boys and 53 % of girls) (Galan-Lopez et al., 2021). Adolescent girls report more issues in terms of sleep; in particular, longer sleep latency, worse sleep quality, and shorter sleep duration than adolescent boys (Forest et al., 2022). Inadequate (poor) sleep quality was in 56 % of adolescents. Higher incidence was in adolescent girls (63.2%) in contrast to boys (44.4%) (Galland et al., 2017). Higher incidence of issues and shorter sleep duration in adolescent girls is constant in literature (Madrid-Valero et al., 2017).

\leq 15 minutes (or less) was necessary in terms of sleep (fall) in 56.08 % (355) of high school male and

48.60% (365) of female students (4.10 E-04). Average time in adolescents (Norway, 10 220, 16 – 18 years, 54 % girls) in terms of sleep (fall) was 48 minutes, with 24.2 % reporting time of ≤ 15 minutes and 60 % reporting time of ≥ 30 minutes. Average time in terms of sleep was longer (significant) in adolescent girls than boys (0.01) (Hysing et al., 2013). Sleep latency of ≤ 15 minutes and ≤ 30 minutes indicates adequate sleep quality; however, ≥ 45 minutes indicates inadequate (poor) sleep quality (Ohayon et al., 2016).

Sleep duration decreases in adolescence from ± 8.5 hours of sleep/ day at age 13 to ± 7.3 hours/ day at age 18; therefore, differs because of age and individual needs. 6 – 7 hours/ day of sleep was in 42.12 % (266) of high school male and 42.68 % (320) female students (7.66 E-05); however, adolescents (14 – 18 years) need 8 - 10 hours/ day of sleep, yet, most of adolescents exhibit ± 7 hours/ day of sleep, even $<$ (less). Besides that sleep duration decreases of ± 10 minutes/ year and sleep duration of week-night decreases of $\pm 10 - 12$ minutes/ year in adolescence (Campbell et al., 2023). > 7 hours/ day of sleep was in 72.6 % of adolescents in India (10 – 19 years) (Dubey et al., 2019) and 7.8 hours / day of sleep was in another study in India (Gupta et al., 2008). < 8 hours/ day of sleep was in 67 % of adolescents in Seville (615), 67 % in Reykjavik (258), and 73 % in Tartu (300) (Galan-Lopez et al., 2021). Adolescent girls sleep longer; however, others report that adolescent boys sleep longer, and others report similar duration of sleep (Dalmases et al., 2018). No difference (0.01; 0.05) between high school students (1 380; 100 %) was in sleep efficiency (0.258). Sleep efficiency of ≥ 85 % was in 84.72 % (534) of high school male and 88.46 % (664) of female students.

Disorders of initiating and maintaining sleep (i.e., sleep disturbance; 1 – 9 Σ) was in 80.60 % (508) of high school male and 72.12 % (540) of female students (8.88 E-10). Sleep disturbance (i.e., issue, problem) increases in adolescence worldwide. Significant difference (0.01) between adolescent boys and girls was in sleep disturbance, in favor of adolescent boys (0.002) and 13 (6.5 %) adolescents used sleep medication (Thorsén et al., 2020). Sleep disturbance was in 22.6 % of children and 20 % of adolescents (Lewien et al., 2021). 17 % (370) of adolescents used sleep medication; in particular, melatonin 10 %, alimemazine 7 % (Oerbeck et al., 2020); however, no adolescents (0 %) reporting

sleep medication in Indian study (Dubey et al., 2019). No use of sleep medication was in 94.76 % (596) of high school male and 92.08 % (690) of female students (3.22 E-08). Daytime dysfunction (e.g., social, educational; 1 – 2 Σ) was in 38.46 % (242) of high school male and 39.68 % (298) of female students (2.28 E-06).

CONCLUSIONS

Examining the sleep quality of high school students in Slovakia uncovers multitude of significant insights and underscores the importance of addressing sleep quality in terms of well-being in adolescence. Multitude of factors influencing sleep quality, emphasizes the need of comprehensive strategy aimed at promoting sleep environment (safe). Available data provide evidence (rare) necessary because of implementing of target interventions and educational programs in adolescents, parents, and educators. Understanding the challenges faced by adolescents and tailoring initiatives of addressing the challenges, we have the potential to enhance sleep quality, aspects of cognition, and well-being. Multitude of insights underscore the urgency of considering influences that contribute to sleep quality. Collaborative efforts; in particular, schools, policymakers, work in creating sleep environment conducive to adequate (good) sleep quality in adolescence. This, in turn, may have far-reaching impacts on well-being and academic performance.

Acknowledgement

The research received no specific grant from any funding agency in the public, commercial, and/or not-for-profit sectors.

REFERENCES

- ADAMČÁK Š., MARKO M., IZÁKOVÁ A. et al. Curriculum preferences of physical education teachers in primary schools: differences in length of pedagogical practice. *Health, Sport, Rehabil.* 2023; 9 (3): 40-50.
- ANDRADE C. Limitations of online surveys. *Indian J Psychol Med.* 2020; 42 (6): 575-576.
- BARBAYANNIS G., BANDARI M., ZHENG X. et al. Academic stress and mental well-being in college students. *Front Psychol.* 2022; 13 (1): 886344.
- BUYSSE D., REYNOLDS C., MONK T. et al. Pittsburgh sleep quality index. *Psychiatry Res.* 1989; 28 (2): 193-213.

- CAMPBELL I., CRUZ-BASILIO A., FIGUEROA J. et al. Earlier bedtime and its effect on adolescent sleep duration. *Pediatrics*. 2023; 152 (1): 2022060607.
- DALMASES M., BENÍTEZ I., MAS A. et al. Assessing sleep health in European population. *Plos One*. 2018; 13 (4): 0194495.
- DUBEY M., NONGKYNRIH B., KALAIVANI M. et al. Sleep quality assessment of adolescents residing in urban resettlement colony, New Delhi, India. *Indian J. Community Med*. 2019; 44 (3): 271-276.
- FOREST G., GAUDREAU P., MICHAUD F. et al. Gender differences in interference of sleep difficulties and daytime sleepiness on school and social activities in adolescents. *Sleep Med*. 2022; 100 (1): 79-84.
- GALAN-LOPEZ P., DOMÍNGUEZ R., GÍSLADÓTIR T. et al. Sleep quality and duration in European adolescents. *Children*. 2021; 8 (3): 188.
- GALLAND B., GRAY A., PENNO J. et al. Gender differences in sleep hygiene practices and sleep quality in New Zealand adolescents aged 15 to 17 years. *Sleep Health*. 2017; 3 (2): 77-83.
- GARBARINO S., LANTERI P., BRAGAZZI N. et al. Role of sleep deprivation in immune-related disease risk and outcomes. *Commun Biol*. 2021; 4 (1): 1304.
- GUPTA R., BHATIA M., CHHABRA V. et al. Sleep patterns of urban school-going adolescents. *Indian Pediatr*. 2008; 45 (3): 193-189.
- HALE L., KIRSCHEN G., LEBOURGEOIS M. et al. Youth screen media habits and sleep. *Child Adolesc Psychiatr Clin N Am*. 2018; 27 (2): 229-245.
- HARRISS D., JONES C., MACSWEE A. Ethical standards in sport and exercise science research. *Int J Sports Med*. 2022; 43 (13): 1065-1072.
- HOUNNAKLANG N., LERTMAHARIT S., LOHSOONTHORN V. et al. Prevalence of poor sleep quality and its correlates among high school students in Bangkok, Thailand. *J Health Res*. 2016; 30 (2): 91-98.
- HYSING M., PALLESEN S., STORMARK K. et al. Sleep patterns and insomnia among adolescents: Population-based study. *J Sleep Res*. 2013; 22 (5): 549-556.
- JALALI R., KHAZAEI H., PAVEH B. et al. Effect of sleep quality on students' academic achievement. *Adv Medical Educ Pract*. 2020; 11 (1): 497-502.
- KWON A., CHOI Y., KIM S. et al. Characteristic sleep patterns and associated obesity in adolescents. *Life*. 2022; 12 (9): 1316.
- LEWIEN C., GENUNEIT J., MEIGEN C. et al. Sleep-related difficulties in healthy children and adolescents. *Bmc Pediatr*. 2021; 21 (1): 82.
- MADRID-VALERO J., MARTÍNEZ-SELVA J., DO COUTO B. et al. Age and gender effects on prevalence of poor sleep quality in adult population. *Gac Sanit*. 2017; 31 (1): 18-22.
- MEDIC F., WILLE M., HEMELS M. Short- and long-term health consequences of sleep disruption. *Nat Sci Sleep*. 2017; 9 (1): 151-161.
- OERBECK B., OVERGAARD K., HJELLVIK V. et al. Use of sleep medication in youth residential care. *J Child Adolesc Psychopharmacol*. 2020; 30 (5): 335-341.
- OHAYON M., WICKWIRE E., HIRSHKOWITZ M. et al. National sleep foundation's sleep quality recommendations. *Sleep Health*. 2017; 3 (1): 6-19.
- SARVESWARAN G., ARIKRISHNAN K., KRISHNAMOORTHY Y. et al. Prevalence and determinants of poor quality of sleep among adolescents in rural Puducherry, South India. *Int J Adolesc Med Health*. 2021; 33 (2): 20180101.
- THORSÉN F., ANTONSO C., SUNDQUIST J. et al. Sleep in relation to psychiatric symptoms and perceived stress in Swedish adolescents aged 15 to 19 years. *Scan J Child Adolesc Psychiatr Psychol*. 2020; 8 (1): 10-17.
- TURHAN S. Karl Pearson's chi-square tests. *Educ Res Rev*. 2020; 15 (9): 575-580.
- VANDEKERCKHOVE M., WAND Y. Emotion, emotion regulation and sleep. *Aims Neurosci*. 2017; 5 (1): 1-17.
- YANG J., GUO Y., DU X. et al. Association between problematic internet use and sleep disturbance among adolescents. *Int J Environ Res Public Health*. 2018; 15 (12): 2682.