LETTER TO THE EDITOR

Consumption of tryptophan-rich foods and quality of sleep in primary school students from a school in Lima, Peru

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To the Editor,

During the COVID-19 pandemic, many aspects of children's lives were significantly impacted, including their sleep habits (1). Recent studies have hypothesized and demonstrated the direct impact of confinement on sleep quality, resulting in immune system impairment and the development of psychological disturbances (2,3).

The sleep-wake cycle is regulated by circadian clocks, which govern circadian rhythms. In this process, the amino acid tryptophan plays a crucial role, as it is converted into serotonin, which in turn serves as the precursor to melatonin, the hormone that induces sleep (4). In young adults, lower tryptophan intake has been associated with a higher risk of short sleep duration, insomnia, and reduced sleep efficiency (5). Similarly, in infants, low tryptophan levels have been linked to longer sleep latency, difficulty initiating sleep, and frequent nocturnal awakenings (6), which corroborates the fundamental role of tryptophan in sleep regulation. However, few studies have explored the association between tryptophan intake and sleep quality in the pediatric population.

Given this background, we conducted a study to investigate the relationship between the consumption of tryptophan-rich foods and sleep quality in children aged 6 to 10 years at a school in Lima, Peru. To this end, we administered two questionnaires: a Food Consumption Frequency Questionnaire (CFCA), validated by experts in a similar population (mothers of children in the evaluated age range), and the Pittsburgh Sleep Quality Index (PSQI), validated in a Peruvian population (6) and adapted for schoolchildren in this age group (7). This index comprises seven components of sleep difficulty (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction). Each component is scored, and an overall score is calculated to determine sleep quality. Generally, a PSQI score >5 is considered indicative of significant disturbances ("poor sleep quality") in at least two components or severe difficulty in one component (8).

With informed consent from parents or guardians, we obtained anthropometric measurements for 440 children. From this group, a sample of 86 children was selected based on the following inclusion criteria: aged 6–10 years, enrolled in school, having fully completed both questionnaires (grades 1–5 of primary school) and have no medical condition that would prevent anthropometric measurement. Sixty-six percent of the children were older than 8 years, and 47 percent were female. We identified prevalences of overweight and obesity of 18.6 percent and 20.9 percent, respectively. The results revealed that 10.5% had poor sleep quality (PSQI score > 5). We observed insufficient intake of dairy and meat: 64.0% and 58.0% of the children, respectively, fell below the nutritional recommendations. For children and adolescents, the recommended intake of dairy products is 2–4 servings daily (9), while for meat, it is two servings daily of lean meat, eggs, or fish (10).

In this study, 10.5 percent of children had poor sleep quality, slightly higher than the 7.5 percent reported in Chinese elementary school children (11). Sleep problems in children and adolescents have been documented to impact physiological development and cognitive performance negatively (12). Experimental data indicate that consuming specific tryptophan- or melatonin-rich foods can improve sleep quality. For example, the effect of cereals enriched with tryptophan on sleep has been studied, observing that consuming a cereal high in tryptophan for one week increased sleep efficiency and duration, which were measured by

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actigraphy. Using the same method, another study found that fermented milk (100 g/day for 3 weeks) improved sleep efficiency and reduced awakenings, benefits attributed to dairy's tryptophan content (13).

Furthermore, administering tryptophan-enriched cereals to children aged 8–16 years improved sleep quality, as measured by increased total sleep time and reduced nighttime activity, compared with cereals containing a standard tryptophan concentration (14). In addition to enriched diets, supplements rich in tryptophan, vitamin B6, and melatonin have been shown to effectively induce sleep and reduce pain episodes and nocturnal awakenings in children undergoing clinical procedures and those with chronic headaches (15–17).

Previous studies have demonstrated the effectiveness of implementing food and nutrition education programs at the school level in significantly improving knowledge and consumption of healthy foods, thereby enhancing children's quality of life and promoting healthy habits (18,19). Therefore, further research is needed to evaluate the impact of dietary interventions on sleep quality in this population.

In response to these preliminary findings, we implemented the project "Cuidando tu futuro hoy", as part of the institutional culture "Modo USIL", at Universidad San Ignacio de Loyola. This project includes annual anthropometric evaluations and the distribution of informational materials to parents to promote healthy eating habits from childhood. Implementing educational and intervention programs, such as "Taking Care of Your Future Today," represents a step forward in promoting healthy habits. However, it is essential to continue investigating the relationship between nutrition and sleep in the pediatric population, including longitudinal studies with larger sample sizes to examine potential long-term effects on academic performance. It is also imperative to strengthen educational strategies aimed at parents regarding the importance of healthy nutrition and the risks associated with inadequate dietary patterns in order to promote optimal development and well-being in children.

Author contributions

The authors confirm their responsibility for the conceptualization and design, data collection, analysis, interpretation, and preparation of the final manuscript.

Conflicts of interest

The authors have no conflicts of interest associated with the material presented in this manuscript.

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Ethical aspects

Not applicable.

REFERENCES

1. Hashem MM, Yousof SM, Tesen HS, Ahmed AG, Fawzy F, Elsemelawy R, et al. Children sleep habits and their knowledge during COVID-19: the impact on quality of life. Egypt J Neurol Psychiatr Neurosurg. 2023;59(1). doi: 10.1186/s41983-023-00693-9
2. Navarro-Soria I, Costa-López B, Collado-Valero JA, de Mier RJ, Lavigne-Cervan R. Anxiety, sleep habits and executive function during the COVID-19 pandemic through parents' perception: a longitudinal study. Psicol Reflex Crit. 2023;36(1):8. doi: 10.1186/s41155-023-00251-5
3. Silva E de SM e, Ono BHVS, Souza JC. Sleep and immunity in times of COVID-19. Rev Assoc Med Bras [Internet]. 2020;66:143–7. Available from: https://doi.org/10.1590/1806-9282.66.S2.143
4. AEPap S. Uso de la Melatonina oral en edad pediátrica [Internet]. 2011 [cited May 31, 2023]. Available from: https://www.aeped.es/sites/default/files/melatonina_en_la_edad_pediatrica_informe.pdf
5. Morales-Suárez-Varela M, Amezcua-Prieto C, Peraita-Costa I, Mateos-Campos R, Ayán C, Ortiz-Moncada R, et al. Sleep Patterns and Tryptophan Consumption among Students at Spanish Universities: The Unihcos Project. Nutrients. 2024;16(14):2376. doi: 10.3390/nu16142376
6. Harada T, Hirotani M, Maeda M, Nomura H, Takeuchi H. Correlation between breakfast tryptophan content and morning-evening in Japanese infants and students aged 0-15 yrs. J Physiol Anthropol. 2007;26(2):201-7. doi: 10.2114/jpa2.26.201
7. Luna Y, Robles Y, Agüero Y. Validación del Índice de Calidad de Sueño de Pittsburgh en una muestra peruana. An salud ment [Internet]. 2015;31(2):23–30. Available from: https://www.academia.edu/34647099/VALIDACIÓN_DEL_ÍNDICE_DE_CALIDAD_DE_SUEÑO_DE_PITTSBURGH_EN_UNA_MUESTRA_PERUANA_VALIDATION_OF_THE_PITTSBURGH_SLEEP_QUALITY_INDEX_IN_A_PERUVIAN_SAMPLE
8. Scialpi A, Mignolli E, De Vito C, Berardi A, Tofani M, Valente D, Galeoto G. Italian Validation of the Pittsburgh Sleep Quality Index (PSQI) in a Population of Healthy Children: A Cross Sectional Study. Int J Environ Res Public Health. 2022;19(15):9132. doi: 10.3390/ijerph19159132
9. Sociedad Española de Pediatría Extrahospitalaria y Atención Primaria. Leche y lácteos en la alimentación de niños y adolescentes – SEPEAP [Internet]. [cited November 14, 2024]. Available from: https://sepeap.org/leche-y-lacteos-en-la-alimentacion-de-ninos-y-adolescentes/
10. Asociación Española de Pediatría. ¿Cuánta carne debe comer un niño? Asociación Española de Pediatría [Internet]. [cited November 14, 2024]. Available from: https://www.aeped.es/comite-nutricion-y-lactancia-materna/nutricion-infantil/documentos/cuanta-carne-debe-comer-un-nino
11. Liu B, Gao F, Zhang J, Zhou H, Sun N, Li L, et al. Sleep Quality of Students from Elementary School to University: A Cross-Sectional Study. Nat Sci Sleep. 2020;12:855-64. doi: 10.2147/NSS.S266493
12. Lima SBDS, Ferreira-Lima W, Lima FÉB, Lima FB, Santos A, Fernandes CAM, et al. Sleep Hours: Risk behavior in adolescents from different countries. Cien Saude Colet. 2020;25(3):957-65. doi: 10.1590/1413-81232020253.15722018
13. Zuraikat FM, Wood RA, Barragán R, St-Onge MP. Sleep and Diet: Mounting Evidence of a Cyclical Relationship. Annu Rev Nutr. 2021;41:309-32. doi: 10.1146/annurev-nutr-120420-021719
14. Cubero J, Chanclón B, Sánchez S, Rivero M, Rodríguez AB, Barriga C. Improving the quality of infant sleep through the inclusion at supper of cereals enriched with tryptophan, adenosine-5'-phosphate, and uridine-5'-phosphate. Nutr Neurosci. 2009;12(6):272-80. doi: 10.1179/147683009X42349

15. Della Volpe A, Dipietro L, Ricci G, Pastore V, Paccone M, Pirozzi C, et al. Pre-treatment with Melamil Tripto® induces sleep in children undergoing Auditory Brain Response (ABR) testing. Int J Pediatr Otorhinolaryngol. 2018;115:171-4. doi: 10.1016/j.ijporl.2018.10.006
16. Picone S, Ariganello P, Mondì V, Di Palma F, Martini L, Marziali S, Fariello G, Paolillo P. A solution based on melatonin, tryptophan, and vitamin B6 (Melamil Tripto©) for sedation in newborns during brain MRI. Ital J Pediatr. 2019;45(1):122. doi: 10.1186/s13052-019-0714-y
17. Bravaccio C, Terrone G, Rizzo R, Gulisano M, Tosi M, Curatolo P, et al. Use of nutritional supplements based on melatonin, tryptophan and vitamin B6 (Melamil Tripto®) in children with primary chronic headache, with or without sleep disorders: a pilot study. Minerva Pediatr. 2020;72(1):30-6. doi: 10.23736/S0026-4946.19.05533-6
18. Pérez Villasante L, Raigada Mares J, Collins Estrada A, Mauricio Alza S, Felices Parodi A, Jiménez Castro S, et al. Efectividad de un programa educativo en estilos de vida saludables sobre la reducción de sobrepeso y obesidad en el Colegio Robert M. Smith; Huaraz, Ancash, Perú. Acta médica Perú [Internet]. 2008 [cited April 2, 2025];25(4):204–9. Available from: http://www.scielo.org.pe/scielo.php?script=sci_arttext&pid=S1728-59172008000400004
19. Martínez-García A, Trescastro-López EM. Actividades de educación alimentaria y nutricional en escolares de 3o de primaria en el Colegio Público "La Serranica" de Aspe (Alicante): Experiencia piloto. Rev Esp Nutr Humana Diet [Internet]. 2016 [cited April 2, 2025];20(2):97–103. Available from: https://scielo.isciii.es/scielo.php?pid=S2174-51452016000200004&script=sci_arttext