



Comments

Mental health and sleep quality issues in adolescents with chronic conditions during and after COVID-19 quarantine



The COVID-19 pandemic was considered a catastrophic event for physical and mental health in adolescents.^{1,2} A systematic review showed an increased incidence of psychiatric issues for this population during this period,³ and the World Health Organization (WHO) also categorized adolescents with chronic conditions as a high-risk group during the pandemic.⁴

The authors demonstrated in a cross-sectional study that one-third of both chronic immunocompromised conditions and healthy teens had severe psychosocial dysfunction during COVID-19 quarantine. Female sex, fear of underlying disease activity or complication, and household members working outside of the home were relevant factors associated with adolescents with chronic immunocompromised conditions.⁵ The authors also showed poor sleep quality frequencies in both groups (38 % and 48 %) in another report.⁶ Another cross-sectional study of our group identified emotional, hyperactivity and inattention problems in up to one-third of immunocompromising chronic disease teens during this emergent period.⁷ All these researches were performed before the COVID-19 vaccination period for adolescents.⁵⁻⁷

A prospective study evaluated emotional issues during the COVID-19 pandemic in Brazil, and showed fluctuations in mental symptoms of non-vaccinated children and adolescents. Lowest socio-economic status, chronic condition demanding treatment and family members with COVID-19 have increased these mental issues over time.⁸

A recent meta-analysis study showed that the prevalence of mental health issues increased during the COVID-19 pandemic progression, even though recovery and stabilization of these were also evidenced. However, this report did not include subgroup analysis of immunocompromising chronic conditions, precluding a definitive conclusion of longitudinal mental health impact for this population.⁹ Therefore, the objective of this prospective study was to evaluate mental health and sleep quality issues in the teen population in two distinct moments: during the COVID-19 pandemic (non-vaccinated adolescents) and after the COVID-19 pandemic (vaccinated adolescents).

Between June and December 2022, a follow-up online survey was sent for the same subject's population ($n = 504$) of previous studies,⁵⁻⁷ using the validated instruments to assess prospectively: mental health (Strengths and Difficulties Questionnaire [SDQ]), Health-related quality

of life (HRQL) (Pediatric Quality of Life Inventory 4.0 [PedsQL4.0]) and sleep quality [Pittsburgh Sleep Quality Index (PSQI)]. The survey was sent using the REDCAP® platform at least six times to each subject, and contained a consent form signed by the guardians, an assent form signed by the adolescents, a semi-structured socioeconomic questionnaire, and the validated instruments.

During recruitment, $n = 38$ (35.2 %) of healthy adolescents and $n = 86$ (25.1 %) patients signed assent form. However, only $n = 27$ participants (6.0 %) ($n = 18$ patients and $n = 9$ healthy controls) finished the follow-up survey and had previously answered the questionnaires during the COVID-19 pandemic. According to diagnosis, rheumatologic conditions occurred in $n = 4$ (22.2 %), gastrointestinal conditions in $n = 8$ (44.4 %), and renal conditions in $n = 6$ (33.3 %).

Further comparison between adolescents during versus after COVID-19 quarantine showed that vaccinated against COVID-19 (≥ 2 shots; 0 vs. 96 %, $p = 0.0001$), vaccinated against COVID-19 (3 shots; 0 vs. 55 %, $p = 0.001$) and COVID-19 diagnosis confirmed by test (0 vs. 41 %, $p = 0.0003$) were significantly higher in the former group. Online school activities were significantly reduced after COVID-19 quarantine ($p < 0.0001$) (Table 1).

Importantly sleep quality of adolescents improved after the COVID-19 quarantine. The mean PSQI total score was significantly higher in adolescents during versus after COVID-19 quarantine (5.65 ± 2.6 vs. 3.48 ± 3.0 , $p = 0.038$), whereas the frequency of good sleep quality was significantly lower before COVID-19 quarantine (39.1 vs. 70.4, $p = 0.013$).

Abnormal SDQ score was high and similar in both groups (18.5% vs. 14.8 %, $p = 0.715$). No differences were observed before and after COVID-19 quarantine in all parameters of mental health score (SDQ) and HRQL (PedsQL) ($p > 0.05$).

The main limitation of the present study was low adherence to questionnaire responses. This finding may be related to tiredness, possibly due to fatigue by the information overload of the COVID-19 quarantine. Low response rates in research also have been described during SARS-CoV-2¹⁰ and may be related to subjects feeling undervalued and media overexposed of adolescents during and after this emergency crisis.

In conclusion, the present study showed psychosocial dysfunction in approximately 15 % of adolescents with chronic immunocompromised conditions and healthy teens after the COVID-19 pandemic, with longitudinal improvement in sleep quality. This report highlights the necessary implementation of future programs to protect the mental health of teens from other public health disasters or emergencies.

Table 1

Demographic data, Strengths and Difficulties Questionnaire (SDQ), Pittsburgh Sleep Quality Index (PSQI) and Pediatric Quality of Life Inventory 4.0 (PedsQL4.0) scores reported by adolescents during COVID-19 quarantine and after COVID-19 quarantine.

Domains	Adolescents during COVID-19 quarantine (n = 27)	Adolescents after COVID-19 quarantine (n = 27)	p
Semistructured socioeconomic questionnaire			
Demographic data			
Current age	14 (10–17)	16 (12–19)	0.001
Female sex	13 (48)	13 (48)	1.000
Use of daily medication	17 (63)	13 (50)	0.500
Psychological or psychiatric care	2 (7)	7 (26)	0.142
COVID-19 diagnosis and vaccination			
Vaccinated against influenza	16 (59)	19 (70)	0.393
Vaccinated against COVID-19 (≥ 2 shots)	0 (0)	26 (96)	0.0001
Vaccinated against COVID-19 (3 shots)	0 (0)	15 (55)	0.0001
COVID-19 diagnosis confirmed by test	0 (0)	11 (41)	0.0003
Hospitalization due to COVID-19	0 (0)	3 (11)	0.236
Sleep time			
Sleep after midnight	19 (70)	14 (52)	0.163
Sleep before midnight	8 (30)	13 (48)	
Sleeping disorder	9 (33)	7 (26)	0.551
Online school activities			
Without	0 (0)	17 (63)	<0.0001
≥ 3 h/day	14 (52)	5 (19)	
< 3 h/day	13 (48)	5 (18)	
Housework			
None	7 (26)	7 (26)	0.788
≤1 hour/day	5 (18)	7 (26)	
>1 hour/day	15 (56)	13 (48)	
Screen time			
≤ 2 h/day	0 (0)	3 (11)	0.134
3–6 h/day	16 (59)	11 (41)	
> 6 h/day	11 (41)	13 (48)	
Family financial status			
Did not change	19 (70)	17 (63)	0.820
Worsen	7 (26)	8 (30)	
Improved	1 (4)	2 (7)	
SDQ			
SDQ score			
SDQ total score (0–40)	12.7 ± 6.3	11.6 ± 5.8	0.350
Abnormal SDQ, (total score 20–40)	5 (18.5)	4 (14.8)	0.715
SDQ domains scores			
Prosocial (0–10)	7.04 ± 2.3	7.37 ± 2.0	0.431
Hyperactivity (0–10)	4.41 ± 3.0	4.04 ± 2.7	0.464
Emotional (0–10)	3.48 ± 2.5	3.48 ± 2.5	1.000
Conduct (0–10)	2.52 ± 2.0	1.85 ± 2.0	0.077
Peers (0–10)	2.30 ± 1.8	1.85 ± 2.0	0.389
Internalizing (0–20)	5.78 ± 3.6	5.97 ± 3.6	0.877
Externalizing (0–20)	6.93 ± 4.4	5.89 ± 3.9	0.148
SDQ domains abnormal scores			
Prosocial disorders, (score 0–4)	11 (40.7)	8 (29.6)	0.393
Hyperactivity disorder, (score 7–10)	8 (29.6)	5 (18.5)	0.340
Emotional disorder, (score 7–10)	5 (18.5)	5 (18.5)	1.000
Conduct disorder, (score 5–10)	5 (18.5)	4 (14.8)	1.000
Peers problems, (score 6–10)	5 (18.5)	4 (14.8)	1.000
Internalizing disorder, (score 11–20)	5 (18.5)	5 (18.5)	1.000
Externalizing disorder, (score 13–20)	6 (22.2)	4 (14.8)	0.484
PSQI score			
PSQI score			
PSQI total score (0–21)	5.65 ± 2.6	3.48 ± 3.0	0.038
Good sleep quality, total score ≤5	9 (39.1)	20 (70.4)	0.013
PSQI domains scores			
Overall sleep quality (0–3)	0.69 ± 0.88	0.74 ± 0.62	0.285
Sleep latency (0–3)	1.13 ± 0.97	0.91 ± 0.90	0.347
Sleep duration (0–3)	0.13 ± 0.63	0.26 ± 0.54	0.479
Sleep efficiency (0–3)	0.50 ± 0.89	0.88 ± 1.26	0.304
Sleep disturbances (0–3)	1.26 ± 0.45	1.17 ± 0.39	0.328
Sleep medication use (0–3)	0.78 ± 1.24	0.61 ± 1.20	0.590
Day dysfunction due to sleepiness (0–3)	0.96 ± 0.93	0.83 ± 1.15	0.613
PedsQL4.0 score			
Total score (0–100)	77 (35–95)	77 (44.5–100)	0.440
Physical health summary score (0–100)	84 (31–100)	81 (38–100)	0.792
Psychosocial health summary score (0–100)	73 (20–92)	78 (45–100)	0.203
Emotional functioning (0–100)	65 (30–95)	75 (25–100)	0.114
Social functioning (0–100)	93 (20–100)	90 (65–100)	0.715
School functioning (0–100)	65 (0–100)	75 (15–100)	0.189

Results are presented in median (minimum–maximum values), mean \pm standard deviation and n (%).

Declaration of competing interest

The authors declare no conflicts of interest.

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References

1. Safadi MAP, Silva CAAD. The challenging and unpredictable spectrum of COVID-19 in children and adolescents. *Rev Paul Pediatr* 2020;39:e2020192.
2. United Nations Children's Fund. The State of the World's Children 2021: On My Mind – Promoting, Protecting and Caring For Children's Mental Health. New York: UNICEF; October 2021. Available in: <https://www.unicef.org/reports/state-worlds-children-2021> Last accessed in 2023, August 8th.
3. Jones EAK, Mitra AK, Bhuiyan AR. Impact of COVID-19 on mental health in adolescents: a systematic review. *Int J Environ Res Public Health* 2021;18(5):2470.
4. Washington D.C. Mitigating the direct and indirect consequences of COVID-19 on the health and well-being of young people in the Americas. (2021). Available in: <https://iris.paho.org/handle/10665.2/54815>. Last accessed in 2023, August 8th
5. Lindoso L, Astley C, Queiroz LB, Gualano B, Pereira RMR, Tannuri U, et al. Physical and mental health impacts during COVID-19 quarantine in adolescents with preexisting chronic immunocompromised conditions. *J Pediatr (Rio J)* 2022;98(4):350–61.
6. Helito AC, Lindoso L, Sieczkowska SM, Astley C, Queiroz LB, Rose N, et al. Poor Sleep quality and health-related quality of life impact in adolescents with and without chronic immunosuppressive conditions during COVID-19 quarantine. *Clinics* 2021;76:e3501.
7. Campos RT, Lindoso L, de Sousa RA, Helito AC, Ihara BP, Strabelli CAA, et al. Emotional, hyperactivity and inattention problems in adolescents with immunocompromising chronic diseases during the COVID-19 pandemic. *Clinics* 2023;78:100167.
8. Zuccolo PF, Casella CB, Fatori D, Shephard E, Sugaya L, Gurgel W, et al. Children and adolescents' emotional problems during the COVID-19 pandemic in Brazil. *Eur Child Adolesc Psychiatry* 2023;32:1083–95.
9. Deng J, Zhou F, Hou W, Heybati K, Lohit S, Abbas U, et al. Prevalence of mental health symptoms in children and adolescents during the COVID-19 pandemic: a meta-analysis. *Ann N Y Acad Sci* 2023;1520(1):53–73.
10. Patel SS, Webster RK, Greenberg N, Weston D, Brooks SK. Research fatigue in COVID-19 pandemic and post-disaster research: causes, consequences and recommendations. *Disaster Prev Manag* 2020;29(4):445–55.

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