

CORRESPONDENCE

Research Letter

Weight Development in Children and Adolescents with Obesity During the COVID-19 Pandemic

The COVID-19 pandemic and the measures taken in accordance with the Infection Protection Act (such as contact restrictions, closure of schools and sports facilities, and reduced recreational opportunities) have influenced the everyday lives of children and adolescents. Additionally, the changed working situations of parents, for example due to short-time work, unemployment, or working from home, have also affected the everyday life of families and children. These changes can lead to negative health consequences, such as weight gain (1). The aim of this study was to describe the weight development of children and adolescents who receive care at obesity treatment centers as well as the use of medical care during the COVID-19 pandemic as compared to previous years.

Methods

Using the Adipositas-Patienten-Verlaufsdokumentation (APV; “Adiposity Patient History Documentation”) registry, data from children and adolescents with overweight or obesity from 69 obesity outpatient clinics and 13 rehabilitation clinics with a focus on obesity in Germany, Austria, and Switzerland were recorded. Included were children and adolescents (age < 20 years) with a body mass index (BMI) standard deviation score (SDS) of ≥ + 1.282 (≥ 90th percentile). Based on the AWMF-S3 guideline, the BMI-SDS was calculated using BMI reference data according to Kromeyer-Hauschild; comorbidities were also recorded (2). Clinical and laboratory parameters as well as therapeutic measures were collected for the periods from March to December

for each year from 2018 to 2020, and the cross-sectional data from these years were compared. The statistical evaluation was done using SAS9.4 based on frequency tables, Wilcoxon test for continuous variables, chi-square test for categorical parameters, Holm-correction for multiple testing, and a linear and logistic regression with the time range as a classification; gender, age, and migration background were used as covariates. The approval of the Ethics Committee of University of Ulm was obtained.

Results

Data from 12 516 children and adolescents with obesity were available. Table 1 shows the clinical characteristics of the children and adolescents as well as the number of examination appointments and consultations. Compared to boys, girls had a higher BMI-SDS (+2.61; 95% confidence interval [2.60; 2.62]) versus +2.52 [2.51; 2.54]; p < 0.001). After adjustment for gender, age, and migration background, the BMI-SDS in 2020 was +2.60 [2.58; 2.62], which was higher than the BMI-SDS of +2.56 [2.55; 2.58] for 2018 and 2019 (Table 2). For instance, for an 11.5-year-old boy with a height of 150 cm, a BMI-SDS of +2.60 versus +2.56 corresponds to a weight difference of 1 kg (69.8 kg vs. 68.8 kg body weight).

Discussion

From 2018 to 2020, the number of children and adolescents cared for in obesity treatment centers decreased. The reasons underlying this could be fewer requests as well as fewer offers (e.g., due

TABLE 1

Characteristics of children and adolescents with overweight or obesity from 1 March until 31 December of 2018, 2019, and 2020

	2018 (n = 6 094)	2019 (n = 5 357)	2020 (n = 3 927)	p-value*1
Proportion of first presentations (n)	11.7 % (711)	15.8 % (847)	15.9 % (623)	–
Proportion of inpatient rehabilitation (n)	27.1 % (1 651)	28.5 % (1 526)	24.6 % (966)	–
Gender (male/female)	50.6%/49.4 %	50.9%/49.1 %	51.5%/48.5 %	1.0 *2
Age (year). (mean [CI])	12.33 [12.25; 12.42]	12.15 [12.07; 12.24]	12.04 [11.93; 12.14]	0.055*3, 0.001 *4, 1.0*5
BMI-SDS (mean [CI])	+2.56 [+2.55; +2.58]	+2.55 [+2.54; +2.57]	+2.59 [+2.57; +2.61]	1.0*3, 0.15*4, 0.03 *5
Examinations after first presentation/patient (mean [CI])	2.62 [2.53; 2.71]	2.51 [2.42; 2.60]	2.23 [2.15; 2.32]	0.29*3, < 0.001 *4, < 0.001 *5
Medical consultation sessions/patient (mean [CI])	4.37 [4.19; 4.55]	4.60 [4.40; 4.81]	4.12 [3.90; 4.33]	1.0
Psychological counseling sessions/patient (mean [CI])	9.30 [8.94; 9.65]	9.58 [9.18; 9.98]	9.26 [8.77; 9.75]	1.0
Diet counseling sessions/patient (mean [CI])	14.59 [13.51; 15.66]	14.05 [13.32; 14.79]	13.46 [12.40; 14.52]	1.0*3, 0.19*4, 0.003 *5
Exercise sessions/patient (mean [CI])	53.07 [50.90; 55.24]	49.15 [47.02; 51.29]	42.12 [39.72; 44.52]	0.16*3, < 0.001 *4, 0.002 *5
Weeks of inpatient rehabilitation (mean [CI])	5.5 [5.3; 5.7]	5.0 [4.9; 5.1]	4.7 [4.5; 4.9]	0.01 *3, < 0.001 *4, < 0.001 *5

In the time ranges of 2018, 2019, and 2020, no differences were observed for the proportion of children and adolescents based on migration background (24.9% vs. 26.0% vs. 26.4%), elevated blood pressure values (54.3% vs. 55.9% vs. 57.7%), type 2 diabetes mellitus (0.9% vs. 1.2% vs. 1.3%), or elevated levels of transaminases (12.9% vs. 13.4% vs. 13.6%).*2

BMI-SDS, Body Mass Index–Standard Deviation Score; CI, 95% confidence interval

*1 Wilcoxon test for continuous variables, with Holm correction for multiple testing; statistically significant p-values are indicated in bold;

*2 chi-square test at percentage frequencies with Holm correction for multiple testing; *3 time range 2018 vs. 2019; *4 time range 2018 vs. 2020; *5 time range 2019 vs. 2020

TABLE 2

Results of the regression analysis using time ranges of 1 March to 31 December of 2018, 2019, and 2020 as classification variables, and gender, age, and migration background as covariates

2018	2019	2020	p-values* ¹
Number of examinations after initial presentation per patient*²			
2.62 [2.54; 2.71] (0.04)	2.50 [2.41; 2.59] (0.05)	2.23 [2.13; 2.34] (0.05)	0.05* ³ < 0.001* ⁴ < 0.001* ⁵
BMI-SDS*²			
+ 2.56 [+ 2.55; + 2.58] (0.008)	+ 2.56 [+ 2.55; + 2.58] (0.008)	+ 2.60 [+ 2.58; + 2.62] (0.01)	0.89* ³ 0.001* ⁴ 0.003* ⁵
Percentage with type 2 diabetes mellitus			
0.9%	1.2%	1.3%	0.65* ³ 0.25* ⁴ 0.47* ⁵
Percentage with increased levels of transaminases			
12.9%	13.4%	13.6%	0.33* ³ 0.25* ⁴ 0.81* ⁵

*¹ p-values adjusted for multiple comparisons using the Tukey-Kramer method
*² adjusted mean [95% CI] (SEM)
*³ time range 2018 vs. 2019; *⁴ time range 2018 vs. 2020; *⁵ time range 2019 vs. 2020
BMI-SDS, Body Mass Index–Standard Deviation Score; SEM, standard error of the mean; 95% CI, 95% confidence interval

to insufficient financing) with regard to specialized obesity treatments. The trend that existed already in 2019 may have been amplified in 2020 by the COVID-19 pandemic.

During the pandemic, the BMI-SDS of all children and adolescents treated in obesity outpatient clinics and rehabilitation clinics was slightly higher than in the previous two years. It is conceivable that more children with a higher BMI-SDS and a higher disease burden presented to the centers. Data from a pediatric cohort (largely from the eastern German states) also show an increase in BMI-SDS during the COVID-19 pandemic: the BMI-SDS of the mostly normal-weight children and adolescents increased by 0.06 over a period of three months (which would correspond to an increase in BMI-SDS of 0.24 over 12 months) (3). In the present cross-sectional analysis, we observed that the BMI-SDS was 0.04 higher on average in the children and adolescents treated in obesity treatment centers in 2020 as compared to the two previous years. A survey from an obesity outpatient clinic in Italy also shows an increase in the BMI-SDS in adolescents (4). It seems that it was difficult for children and adolescents with obesity to avoid gaining weight, or to achieve weight loss, during the COVID-19 pandemic because there were fewer opportunities for physical activity, probably due to restrictions. Changes in eating habits, such as more frequent snacking at home, may also have contributed to weight gain. Furthermore, less medical care was offered to the children and their families during the COVID-19 pandemic. Our evaluation shows that, above all, fewer exercise sessions and less inpatient rehabilitation took place. In contrast, the number of medical and psychological consultations in 2020 was not lower. Due to contact restrictions, group exercise sessions could not take place. The medical and psychological consultations, on the other hand, were mostly indi-

vidual appointments and were therefore probably still offered and attended. Surveys from Germany also show that the psychological well-being of children and adolescents was impaired during the COVID-19 pandemic, and that psychosomatic and psychological symptoms (such as anxiety symptoms and depressive symptoms) occurred more frequently (5). It is possible that the effects of the COVID-19 pandemic on the mental health of children and adolescents with obesity led to medical and psychological counseling being offered and used. The limitation of this observational study is that no statements on causal relationships are possible.

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Acknowledgment

We thank the children, adolescents, and families, as well as the adiposity centers, for their participation. We also thank Anna Wagner for the first version of the statistical analyses.

Funding

Financial support for the analyses was received by the EU project SOPHIA (no. 875534) as well as from the DFG projekt Kick COVID.

Conflict of interest statement

Ines Gellhaus is a Board Member of the Deutschen Adipositas-Gesellschaft (German Obesity Society) and primary Chairperson of the Konsensusgruppe Adipositas-schulung für Kinder und Jugendliche e. V. (Consensus Group Obesity Training for Children and Adolescents).

The remaining authors declare that no conflict of interest exists.

Manuscript received on 10 December 2021, revised version accepted on 24 February 2022.

Translated from the original German by Veronica A. Raker, PhD.

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Cite this as:

Galler A, Röbl M, Prinz N, Dannemann A, Gellhaus I, Kapellen T, Linke S, Schauerte G, Stein R, Weghuber D, Wehrauch-Blüher S, Wiegand S, Holl R: Weight development in children and adolescents with obesity during the COVID-19 pandemic. *Dtsch Arztebl Int* 2022; 119: 302–3. DOI: 10.3238/arztebl.m2022.0155