



Body Mass Index in Children with Psoriasis

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Abstract

Psoriasis in children can be caused or even exacerbated by emotional stress, β -hemolytic streptococcal infection of the pharynx and perianal region, Kawasaki's disease, withdrawal of systemic corticosteroids, increase in body mass index (BMI). The World Health Organization defines overweight and obesity as a result of ectopic fat deposition that can lead to decline in health. Nowadays dermatologists focus more on the use of BMI to study progress in the treatment of psoriasis patients as obesity is considered to be an independent risk factor for psoriasis. In this article BMI in children with psoriasis aged 4-17 is analyzed. When assessing BMI, among 188 children 60% of them (113) were identified to have normal body mass index by their age. Increased BMI was reported in 66 children (35.11%), pre-obesity was reported in 51 children (27.13%) and extra 13 were observed to have class I obesity and 2 children – class II. The upward deviation of the average weight ranged between several and 25-30 kilograms in certain children. On average the exceedance of upper limits of the mean weight in children with increased BMI comprised $15.49 \pm 1.53\%$. The subnormal weight was observed in 6 children and 3 were underweight. The above-average weight and average height – the most typical combination for increased BMI – was reported in 24 children. The above-average weight and height and the above-average weight combined with the mean height were observed in 18 and 12 children respectively.

Keywords: Pediatric Psoriasis; Psoriasis Types; Body Mass Index

Abbreviations: BMI: Body Mass Index; PP: Plaque Psoriasis.

Introduction

Psoriasis is a chronic, multisystemic, inflammatory disease involving almost 1% of children. In psoriasis the interaction of multigenic predisposition and environmental factors along with the way of life provoke symptoms characterized by epidermal hyperproliferation and inflammation [1,2]. Psoriasis can develop at any age. The

prevalence rises linearly: from 0.2% among 1-year-olds to 1.2% among 18-year-olds [3-5]. Emotional stress [6-8], group A streptococcal infection of the pharynx and perianal region [4,9,10], Kawasaki disease [11-13], withdrawal of systemic corticosteroids, increase in body mass index (BMI) and, though it is paradoxical, TNF inhibitors [14-16] can cause or exacerbate pediatric psoriasis. Currently, dermatologists place greater focus on using BMI for studying treatment progress in patients with psoriasis, as obesity is considered to be an independent predictor of psoriasis [17].

The World Health Organization defines overweight and

obesity as a result of ectopic fat deposition that can lead to decline in health. In 2016 over 1.9 billion adults (39% of males and 40% of females) over 18 had overweight, and over 650 million (11% of males and 15% of females) among them were obese. Over the last 40 years the number of obese people worldwide has more than tripled. According to WHO in 2016 approximately 41 million children aged under 5 and 340 million children and adolescents aged from 5 to 19 had overweight or obesity. Overweight and obesity, previously supposed to be typical for high-income countries, are now becoming more widespread in low- and middle-income countries, especially in cities.

The prevalence of overweight and obesity among children and adolescents aged between 5 and 19 also increased dramatically over the last 40 years: from 4% in 1975 to over 18% in 2016. This increase is equally distributed among children and adolescents of both sexes: 18% of girls and 19% of boys suffered from overweight in 2016. In 1975 little less than 1% of children and adolescents aged from 5 to 19 suffered from obesity, while in 2016 their number reached 124 million (6% of girls and 8% of boys) [18].

Obese people are more likely to develop a variety of severe diseases: type 2 diabetes, cardiovascular diseases, osteoarthritis, gallbladder and kidney diseases, hypertension, dyslipidemia and cancer. Basically, more people die because of overweight and obesity consequences all over the world than underweight consequences. Obese people outnumber those with underweight; such a situation can be traced in all regions except for some African territories to the south of Sahara and Asia [19,20].

In order to diagnose obesity and overweight, body mass index (BMI) is used, which is weight-for-height and the most convenient criterion for assessing the rates of obesity and overweight in the population, since it is equal for both sexes and all age groups. BMI is calculated as the ratio of body weight in kilograms to squared height in meters (kg/m²). In accordance with WHO, overweight or obesity in adults are diagnosed in the following cases:

- BMI is higher or equals 25 – overweight.
- BMI is higher or equals 30 – obesity.

The age should be considered when calculating overweight and obesity in children. In children aged under 5 overweight and obesity are calculated as follows:

- Overweight – if weight-for-height exceeds the median value, specified in WHO Child Growth Standards by more than two standard deviations.
- Obesity – if weight-for-height exceeds the median value, specified in WHO Child Growth Standards by more than three standard deviations.

In children aged between 5 and 19 overweight and obesity are calculated as follows:

- Overweight – if BMI-for-age exceeds the median value, specified in WHO Child Growth Standards by more than one standard deviation.
- Obesity – if BMI-for-age exceeds the median value, specified in WHO Child Growth Standards by more than two standard deviations [18].

Objective

To examine BMI in children with psoriasis.

Materials and Methods

188 children with psoriasis aged from 4 to 17 who underwent inpatient treatment in Kyiv Municipal Dermatology-STI Clinic in 2017-2019. Children were divided into groups depending on the biological age grouping: group 1 or early childhood–4-7-year-olds–24 children (12.77%), group 2 or middle childhood–8-11-year-old girls, 8-12-year-old boys–56 children (29.79%), group 3 or adolescents–85 children (45.21%)– 12-15-year-old girls, 13 16 year old boys and group 4–17-year-old boys and 16-17-year-old girls–23 children (12.23%).

Descriptive statistics was analyzed by patients' demographic characteristics (age, sex) and psoriasis features (extent of disease, clinical forms). The control group comprised 20 children without chronic somatic, skin and sexually transmitted diseases.

Results and Discussion

The mean age of children with psoriasis was 11.89 ± 0.25 with the disease duration ranging between 1 month and 15 years. The girls and boys were divided equally. The average duration of the last exacerbation or manifestations was 11.45 ± 1.05 months. The extensive process was observed in 150 children, among whom plaque psoriasis (PP) prevailed–110 children. Guttate psoriasis was found in 34 (18.28%) children. The localized process, affecting only the scalp, was found in 26 (13.83%) of 188 children, in 3 children palms and feet (PPP) were affected by the psoriatic process. Nail pitting, deformity or thinning of the nail plate was observed in one quarter of children (25.71%).

When assessing body mass index (BMI), 60% of children (113) were identified to have normal body mass index. Increased BMI was reported in 66 children (35.11%). Among children having normal body mass index, in accordance with the age 107 children were of the mean weight and extra 7–less than the average. The weight greater than the average for the corresponding age was observed in 71 children and extreme overweight in 3. Pre-obesity was reported in 51

children (27.13%) and extra 13 were observed to have class I obesity and 2 children – class II. The upward deviation of the average weight ranged between several and 25-30 kilograms in certain children. On average the exceedance of upper limits of the mean weight in children with increased BMI comprised $15.49 \pm 1.53\%$. The subnormal weight was observed in 6 children and 3 were underweight. Three-quarters of children

with psoriasis from group 1 were of normal BMI, only 6 had increased BMI. Group 2 comprised the highest number of children with increased BMI – 41.06%, then up to group 4 the gradual decrease in the number of children with increased BMI takes place, from 37.65% in group 3 to 21.73% in group 4 (Table 1).

BMI	Group 1 (n=24)		Group 2 (n=56)		Group 3 (n=85)		Group 4 (n=23)	
	abs.	%	abs.	%	abs.	%	abs.	%
Standard	18	75	31	55.36	46	54.17	18	78.26
Pre-obesity	3	12.5	18	32.14	25	29.41	5	21.74
Class I obesity	2	8.33	4	7.14	7	8.24	--	--
Class II obesity	1	4.17	1	1.78	--	--	--	--
Subnormal weight	--	--	1	1.78	5	5.88	--	--
Underweight	--	--	1	1.78	2	2.35	--	--

Table 1: BMI in children with psoriasis.

Comparing the values exceeding the upper weight limits in children with psoriasis depending on the age, it was identified that the greatest increase in weight ($27.62 \pm 4.95\%$) was observed in 4-7-year-old children (group 1), that was apparently different from the values of weight exceedance in children of group 2 and 4 (by $12.73 \pm 2.52\%$ and $10.67 \pm 2.83\%$ respectively, $p \leq 0.05$).

The height of 96 children with psoriasis was age-appropriate, 59 (31.38%) children were of above-average

height, 24 (12.77%) children were tall and 2–extremely tall. The combination of height and weight turned out to be very curious in children with increased BMI. The above-average weight and average height—the most typical combination for increased BMI – was reported in 24 children. The above-average weight and height and the above-average weight combined with the mean height were observed in 18 and 12 children respectively. And even with the weight above average and extreme height 2 children had increased BMI (Table 2).

Height Weight	Average	Above-average	Extremely high	Sub average
Average	2 / 62 / 3	-- / 1 / 25	--	3 / -- / --
Above-average	1 / 29 / --	-- / 7 / 18	-- / -- / 1	-- / 1 / --
High	2 / 3 / --	-- / 5 / 13	-- / -- / 2	1 / -- / --
Extremely high	--	-- / -- / 2	--	--
Sub average	-- / 5 / --	--	--	--
Low	-- / -- / 1			-- / -- / 1

Table 2: Combination of weight and height in calculating BMI in children with psoriasis. (BMI deficiency/ normal BMI/ increased BMI).

When assessing BMI in children of the control group (31) the following was identified: 61.29% of children (19) were identified to have normal body mass index, increased BMI was reported in 9 children (29.04%) and 3 children were identified to have decreased BMI. Among the children with increased BMI pre-obesity was reported in 5 children, 3 were observed to have class I obesity and 1 child–class II. On average the exceedance of upper limits of the mean weight in

children with increased BMI comprised $15.50 \pm 3.35\%$ which has no significant difference between this group and group of children with psoriasis.

Conclusion

The research shows that among 188 children with psoriasis 35.11% of them were reported to have increased

BMI comparing to 29.04% of children of control group (OR, 1.23; 95% confidence interval, 0.61-1.84). The largest number of children with increased BM—children aged 8-11/12 (41.06%). Up to group 4 the gradual decrease in the number of children with increased BMI takes place, from 37.65% in group 3 to 21.73% in group 4. The greatest increase in weight was observed in 4-7-year-old children with psoriasis: $27.62 \pm 4.95\%$.

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