

## Original Article

## Comparison of Effects of Chronic illnesses and Obesity on Health-Related Quality of Life

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### Abstract

**Objective:** The purpose of this study is to compare the degree of impairment among obese and chronically ill children against healthy children in the setting of Mayo Hospital and two public sector schools in Lahore.

**Methods:** This cross-sectional study included 152 children comprising the age group of 8-12 years recruited via purposive sampling. HRQoL was assessed using PedsQL version 4.0, and a trained interviewer obtained the child's self-report. The ANOVA test was applied to compare subscales and total scores, while significant differences were determined by Bonferroni post hoc test.

**Results:** Mean self-reported total health scores were  $84.2 \pm 10.4$  and  $80.0 \pm 9.4$  in healthy boys and girls,  $73.7 \pm 23$  and  $65.5 \pm 21.4$  in chronically ill boys and girls,  $68.3 \pm 17$  and  $63.1 \pm 16.3$  in obese boys and girls, respectively. The current study's findings indicated least HRQoL scores among obese children as compared to their counterparts. Regarding the subscales, the lowest scores were reported in chronically ill children specifically in physical and school functioning, while obese children reported the lowest scores in emotional and social functioning.

**Conclusion:** Chronic illnesses mainly affect physical and school functioning, while obesity affects emotional and social functioning in children the most. It suggests that awareness be provided regarding childhood obesity to both children and parents and steps be taken to the prevention of childhood obesity and thus improving the standard of living. Moreover, disease processes in early childhood must be diagnosed with early intervention/investigation.

**Keywords:** Obesity, Chronic illness, Quality of Life, Health

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### Introduction

Health-related quality of Life (HRQoL) is defined by WHO as an individual's quality of life associated with his physical, mental and social well-being<sup>1</sup> Under the CDC (2013), HRQOL measurement can help to determine the burden of diseases, disabilities, and injuries and can provide information regarding relationships between HRQOL and disease risk factors; thus, the progress of achievement of the health objectives of a nation can be monitored. Moreover, identifying sub-groups believed to have poor health through the analysis of HRQOL surveillance data can help introduce new ways and means to fortify their living situations and prevent lethal consequences. Analysis of this data can assist in identifying health policies and ordinances requirements. Thus, it helps to allot resources for unmet

needs, propose strategic decisions, and scrutinize the effectiveness of interventions made at the broad community level.<sup>2</sup>

HRQoL is impaired in all the physical, mental, and social domains by several chronic diseases.<sup>3-7</sup> According to an estimate by the National Survey of Children's Health 2007, about 43%(32 million) of children in the USA are found to be having at least 1 of 20 chronic health conditions, and when overweight, obese, or being at risk for developmental delay are considered, this estimate spikes to about 54.1%.<sup>8</sup> The chronic illnesses which are most common in childhood include diabetes, asthma, obesity, cystic fibrosis, developmental disabilities, malnutrition, consequences of low birth weight, cerebral palsy, and mental illness. HRQOL is a significant factor to determine the standard of living and healthcare in

chronically ill pediatric populations. Many of these children are at a greater risk of getting disease-tracked into adulthood due to a lack of proper treatment.<sup>9</sup>

HRQoL is also impaired by obesity which has been a serious health concern prevailing among children in all regions of the world. A WHO-Collaborative Health Behavior in School-aged Children (HBSC) survey reported a prevalence of about more than 10% among school-age children in most countries, ranging from 7.6% in Latvia to 28.8% in the United States of America (USA).<sup>10</sup> In the Indian subcontinent, especially India, Bangladesh, and Pakistan, the prevalence of overweight has been reported to be as high as 35-40%.<sup>11</sup> This increased prevalence of obesity & overweight is found to be associated with genetic, environmental, socio-economic, and several other factors, including the lifestyle of children.<sup>12-14</sup> Childhood obesity has several morbidities, including Diabetes mellitus type 2 and cardiovascular abnormalities.<sup>15</sup> About 30% of obese children have been identified with Metabolic Syndrome (MS).<sup>16</sup> Moreover, studies have shown that childhood obesity also harms health-related quality of life, i.e., obese children show poorer health scores than their normal counterparts.<sup>17-19</sup>

A cross-sectional study conducted among children in the 8-12 age group compared health scores among healthy, obese, and chronically ill children and observed the lowest scores in obese as compared to their both healthy & chronically ill counterparts.<sup>20</sup> Similarly, studies in other countries have identified impaired HRQoL in obese.<sup>17-19</sup> and chronically ill children<sup>3-7</sup> compared to their healthy counterparts. Although some studies in Pakistan have investigated the prevalence of obesity among school-going children<sup>21,22</sup>, national literature provides limited evidence about HRQoL in obese and chronically ill children. Therefore, keeping in view the inadequacy of data on this issue in this setting, the current study focuses on the assessment of HRQoL in healthy, chronically ill & obese children in Pakistan and the acknowledgment of whether HRQoL impairment in children with chronic diseases is comparable with impaired HRQoL in obese children.

## Methods

This simple cross-sectional study was conducted on children at three different setups in Lahore, i.e., Department of Pediatrics Mayo Hospital Lahore, Govt. Girls High School Napier Road Lahore and Govt. Model High School Circular Road, Lahore. The study lasted for 09 months (1<sup>st</sup> January 2019 to 30<sup>th</sup> September 2019). A total of 152 children were included in the study from the study as mentioned earlier settings. The inclusion criterion was 'children aged 8 to 12 years from our study settings' and 'consent of the child and the parents for voluntarily participating in the study. Children suffering

from mental illnesses or physical disabilities, non-cooperative children, and children below 8 years or above 12 years of age were excluded from the study.

**Data Collection:** Based on our inclusion and exclusion criteria, 152 children were included in the study. Sixty-three healthy children\* were recruited from the two schools. Fifty-eight chronically ill children\*\* were recruited in the study from the wards and outdoor blocks of the Department of Pediatrics, Mayo Hospital Lahore. A few of them were recruited from schools with illnesses like asthma and nasal obstruction. Thirty-one obese children\*\*\* were recruited from both schools and the hospital. In Mayo Hospital, obese cases were recruited from the outdoor department who came there for follow-up recommended by an endocrinologist.

Before advancing toward data collection, both the parents (those who were present at the time of data collection) and the child were informed about the study procedure, and a consent form was signed by the parent or the child. Then, assessments of children were accomplished, including anthropometric measurements and completion of the PedsQL™ 4.0 (Pediatric Quality of Life Inventory™ Version 4.0) questionnaire by a trained interviewer. HRQoL in children was assessed using the Pediatric Quality of Life Inventory version TM 4.0 (PedsQL). The PedsQL™ TM comprises 23 items belonging to four physical, emotional, social, and school functioning domains. Each item was responded to through one of the five choices ranging from zero (never have a problem) to four (almost always having a problem). Then, items were reverse scored, and for this purpose, 0 - 4 scale items were transformed to a 0 – 100 scale as follows: 0 = 100, 1 = 75, 2 = 50, 3 = 25, and 4 = 0, so that higher scores signify better HRQoL. The total score for each subscale was calculated by the summation of scores of all the items of that domain. Then, scores were converted to percentages, and these percentages were categorized into groups; Scores (< 25%) were interpreted as bad quality of life, (25% to < 50%) as the fair quality of life, (50 to < 75%) as good quality of life and (75–100%) as very good quality of life.

Anthropometric measurements were made using the 'China ZT-120 Body Weight and Height Scale' while the child stood barefoot, wearing light clothes with his shoulders in normal alignment. Measurements were not made in those chronically ill children who were unable to stand due to extreme weakness or the severity of the disease. BMI was calculated as the weight in kilograms (kg) divided by meters. Obesity was defined as BMI in the 95th percentile or higher for that specific age & sex.

## Data Analysis

Data were statistically analyzed using SPSS software

(version 20.0). Mean and standard deviation for continuous variables and frequencies/percentages for categorical variables were reported using charts and tables. ANOVA test was used to compare HRQoL scores and subscales among healthy, chronically ill & obese children. A pairwise comparison of HRQoL scores was made using the 'Bonferroni post hoc test' to determine significant differences between every two subgroups of health status.

**Results**

The study was carried out on children aged 8-12 years. A total of 152 children were included in this study; 63 of them (34 boys, 29 girls) were healthy, 58 (33 boys, 25 girls) were chronically ill, and 31 (15 boys, 16 girls) were obese.

ANOVA was used to compare HRQoL scores among different health status groups. On comparison, healthy boys showed the highest scores among boys while obese girls were found to have the lowest ones among all girls included in this study. As a final comparison among all the six groups i.e. healthy, chronically ill, and obese girls and healthy, chronically ill, and obese boys, the highest total scores were reported in healthy boys while the lowest total scores were reported in obese girls.

**Table 1: Total HRQoL Score in Girls & Boys**

Subgroup	N	Scores
Healthy boys	34	84.2 ± 10.4
Healthy girls	29	80.0 ± 9.4
Chronically ill boys	33	73.7 ± 23
Chronically ill girls	25	65.5 ± 21.4
Obese boys	15	68.3 ± 17
Obese girls	16	63.1 ± 16.3

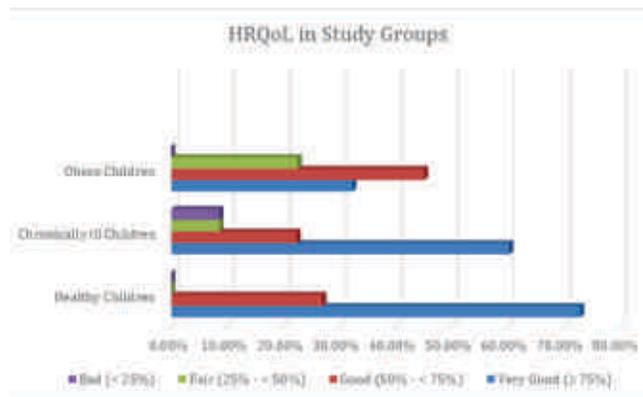
The total scores were grouped into classes as follows:

1. Scores < 25% were grouped as "bad quality of life."
2. 25% to < 50% were grouped as having a "fair quality of life."
3. Scores 50% to < 75% were grouped as "good quality of life."
4. 75% to 100% were grouped as having a "very good quality of life."

Among the healthy children, about 73.02% of the children were reported to have a very good quality of life (scores ≥75%), and about 26.98% were reported to have a good quality of life (scores 50 to 74%), as shown in the bar chart below. However, fair quality of life (scores 25 to 49%) and bad quality of life (scores <25%) were reported at 0.0%.

Among chronically ill children, about 60.34% of children were reported to have a very good quality of life (scores ≥ 75%), about 22.41% of children had a good quality of life (scores 50 to 74%), about 8.62% reported fair quality of life and about 8.62% reported bad quality of life (scores <25%), as shown in the bar chart below.

On the other hand, in the obese group of health status, a very good quality of life (scores ≥75%) was reported in 32.26%, while about 45.16% reported good quality of life (scores 50 to 74%) and about 22.58% reported fair quality of life (scores 25 to 49%), as shown in the bar chart below. However, bad quality of life (scores ≤ 25%) was reported at 0.0%.



**Figure 1: HRQoL in Study Groups**

Scores obtained through PedsQL scoring in all subscales are illustrated in table 2. In the physical functioning subscale, a very good quality of life was reported by about 88% of healthy boys and 79% of healthy girls, 57% of chronically ill boys and 36% of chronically ill girls, 60% of obese boys and 25% of obese girls. However, 0.0% of healthy children reported bad quality of life, 6% of chronically ill boys, and 8% of chronically ill girls. On the other hand, among the obese group, 0.0% of boys and 12.5% of girls reported bad quality of life.

In the emotional functioning subscale, very good quality of life was reported by about 67% of healthy boys and 48% of healthy girls, 63% of chronically ill boys and 44% of chronically ill girls, 46% of obese boys and 12.5% of obese girls. However, 0.0% of healthy children reported bad quality of life, 3% of chronically ill boys, and 0.0% of chronically ill girls. On the other hand, 0.0% of obese children reported bad quality of life.

In the social functioning subscale, very good quality of life was reported by about 97% of healthy boys and 89% of healthy girls, 84% of chronically ill boys and 68% of chronically ill girls, 53% of obese boys and 31% of obese girls. However, 0.0% of healthy children reported bad quality of life, 0.0% of chronically ill boys, and 4% of chronically ill girls. On the other hand, among the obese group, 6.6% of boys and 6.2% of girls reported

bad quality of life.

In the school functioning subscale, a very good quality of life was reported by about 61% of healthy boys and 69% of healthy girls, 60% of chronically ill boys and 20% of chronically ill girls, 60% of obese boys and 62% of obese girls. However, 0.0% of healthy children reported bad quality of life, 9% of chronically ill boys, and 16% of chronically ill girls. On the other hand, 0.0% of obese children reported bad quality of life.

Then, a pairwise comparison was made among every two groups, and significant differences were identified using the Bonferroni post hoc test with a significance level set at <0.05. When scores were compared among healthy

and chronically ill groups, the findings indicated that chronically ill children have lower scores in all domains than their healthy counterparts except for emotional functioning scores in girls, which were similar to the healthy ones. These differences were significant in the physical functioning domain in boys and the school functioning domain in girls.

When the scores were compared among healthy and obese children, obese children reported lower scores in all domains compared to their healthy peers in both genders. When a comparison was made among obese and chronically ill children, the findings indicated that physical and school scores were higher in obese than in

**Table 2:** PedsQL Scoring of Subscales in both the Genders

	Healthy <sup>¥</sup>				Chronically ill <sup>€</sup>				Obese <sup>†</sup>			
	Boys		Girls		Boys		Girls		Boys		Girls	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<b>Physical score <sup>§</sup></b>												
Below 25%	0	0.0	0	0.0	2	6.0	2	8.0	0	0.0	2	12.5
25-49%	0	0.0	0	0.0	5	15.1	9	36.0	2	13.3	1	6.2
50-74%	4	13.0	6	20.6	7	21.2	5	20.0	4	26.6	9	56.2
≥75%	30	88.0	23	79.3	19	57.7	9	36.0	9	60	4	25.0
<b>Emotional Score <sup>ϕ</sup></b>												
Below 25%	0	0.0	0	0.0	1	3.0	0	0.0	0	0.0	0	0.0
25-49%	0	0.0	5	17.2	1	3.0	4	16.0	4	13.3	3	18.7
50-74%	11	32.3	10	34.4	10	30.3	10	40.0	4	26.6	11	68.7
≥75%	23	67.6	14	48.2	21	63.6	11	44.0	7	46.6	2	12.5
<b>Social score <sup>ϕ</sup></b>												
Below 25%	0	0.0	0	0.0	0	0.0	1	4.0	1	6.6	1	6.2
25-49%	0	0.0	0	0.0	3	9.0	3	12.0	2	13.3	5	31.2
50-74%	1	2.9	3	10.3	2	6.0	4	16.0	4	26.6	5	31.2
≥75%	33	97.0	26	89.6	28	84.8	17	68.0	8	53.3	5	31.2
<b>School Score <sup>ƒ</sup></b>												
Below 25%	0	0.0	0	0.0	3	9.0	4	16.0	0	0.0	0	0.0
25-49%	0	0.0	0	0.0	5	15.1	0	0.0	0	0.0	1	6.2
50-74%	13	38.2	9	31.0	3	9.0	15	60.0	6	40.0	4	25.0
≥75%	21	61.7	20	68.9	20	60.6	5	20.0	9	60.0	10	62.5

<sup>§</sup> Measured by the ability to run, walk long distances, do sports and heavy exercises, take a bath and do household chores.

<sup>ϕ</sup> Measured by:

- The number of times a child has feelings of sadness, anger, fear, and anxiety
- The ability of a child to get along with other children, i.e., the number of friends a child has.

<sup>ƒ</sup> Measured by:

- Duration of attention of the child in the classroom
- The span of memory of a lesson
- Number of absences from school due to illness

<sup>¥</sup> The children who are not a part of any course of therapy at the time of the study.

<sup>€</sup> Children who have been seeking any treatment, i.e., medication, radiotherapy, dialysis. For the last 6 weeks or more.

<sup>†</sup> Children have BMI in the 95th percentile or higher for age and sex.

their chronically ill counterparts. However, emotional and social scores were poorer in obese children than chronically ill children.

The Bonferroni post hoc test results are shown in Tables 3 & 4. The findings indicate that healthy children in

both genders reported significantly higher HRQoL scores in different subscales than their counterparts with obesity and other chronic diseases. In addition, obese girls reported significantly lower scores than their healthy and chronically ill counterparts. However, in the emotional functioning subscale, no significant diffe-

**Table 3:** HRQoL Total Scores & Sub-scales in Boys

	Healthy <sup>a</sup>	Chronically ill <sup>b</sup>	Obese <sup>c</sup>	Significant Difference
Physical Functioning	87.94 ± 10.6	71.09 ± 24.9	74.33 ± 20.0	a-b
Emotional Functioning	80.47 ± 16.4	74.36 ± 17.7	67.00 ± 20.6	No significant difference
Social Functioning	88.67 ± 10.0	85.06 ± 21.4	72.00 ± 25.8	a-c
School Functioning	79.05 ± 14.0	70.16 ± 31.3	76.00 ± 9.6	No significant difference
Total scores	84.2 ± 10.4	73.7 ± 23	68.3 ± 17	a-c

**Table 4:** HRQoL Total Scores & Sub-scales in Girls

	Healthy <sup>a</sup>	Chronically ill <sup>b</sup>	Obese <sup>c</sup>	Significant Difference
Physical Functioning	84.75 ± 10.8	58.92 ± 25.7	61.93 ± 23.6	a-b, a-c
Emotional Functioning	68.41 ± 17.8	69.92 ± 19.8	58.12 ± 11.2	no significant difference
Social Functioning	90.34 ± 10.9	78.20 ± 27.1	60.18 ± 23.1	a-c, b-c
School Functioning	78.79 ± 9.7	58.54 ± 23.6	74.66 ± 16.1	a-b, b-c
Total scores	80.06 ± 9.4	65.55 ± 21.4	63.19 ± 16.3	a-b, a-c

rences were observed between the two groups.

In the subscales of physical, emotional, social, and school functioning, when all six groups of healthy, chronically ill, and obese girls and boys were compared, the highest scores in the physical functioning domain were reported by healthy boys. In contrast, the lowest scores were reported in chronically ill girls. In the emotional functioning subscale, the highest scores were observed in healthy boys, and the lowest scores were reported in obese girls. However, in social functioning, the highest scores were reported by healthy girls and the lowest scores were reported by obese girls. In the school functioning subscale, the highest scores were reported in healthy boys, and chronically ill girls reported the lowest.

Findings indicated that emotional and social functioning was worst in obese children, while physical and school functioning was worst in chronically ill children.

## Discussion

The current study measured Health-Related Quality of Life (HRQoL) scores using The Pediatric Quality of Life Inventory (PedsQL) version 4.0. When these scores were compared among healthy and obese children, obese children reported poorer physical, emotional, social, and school functioning domains and total quality of life than healthy children. It suggests that obesity harms HRQoL. These results are consistent with the study by Riazi et al. in the United Kingdom where all domains were found to be impaired in the obese group.<sup>27</sup>

However, the findings are inconsistent with the Israel study, which stated that obese children had emotional and school scores similar to their normal weight counterparts; scores differed significantly only in the physical domain.<sup>23</sup> The poor emotional scores of the obese group in the current study might be because our society has great regard for a slim and smart appearance.

When the scores were compared between healthy and chronically ill children, poorer quality of life was reported by chronically ill children in almost all domains as compared to their healthy counterparts except for the emotional scores, which were similar in both the healthy and chronically ill groups in girls. These findings are consistent with the study by Diana H. Arabiat in Jordan, who stated that healthy children reported better quality of life in regards to the physical, emotional, social, and school functioning domains and total quality of life than chronically ill children,<sup>4</sup> However, our findings were inconsistent with another study, which found that chronic illnesses were linked to more emotional disturbances and self-inflicting behavior in females than males.<sup>28</sup> This difference might be due to the difference in conduct with ill children in various societies. In our society, ill children, especially girls, are offered great moral support by their families.

When scores were compared among chronically ill and obese children, obese children reported poorer quality of life regarding emotional and social functioning than chronically ill children. However, physical and school

scores were better in obese children. It indicates that obesity mainly harms the social relations and emotions of children. Our findings were consistent with the study of Farahani et al. in Iran, which suggested decreased social functioning in obese children than in their chronically ill peers.<sup>20</sup> However, contrary to our findings, the same study suggested reduced physical functioning in obese children compared to the chronically ill population included in their study.<sup>20</sup>

### Conclusion

As a conclusion, HRQoL was recorded to be the least in obese children as compared to healthy and chronically ill population in this study. In the subscales, social and emotional functioning were affected the most in obese children, while physical and school functioning was impaired in chronically ill children. These statistics highlight the importance of various awareness campaigns addressing the problems of the pediatric age group, including childhood obesity and chronic illnesses which impact their physical, mental, and social functioning.

### Limitations

As far as the limitations of this study are concerned, the study comprises observations made on a relatively smaller group of children. Additionally, our study includes a heterogeneous sample for chronic conditions, i.e., stages and severity of each illness would have been variable. Hence, the power of the study to detect some differences might be sub-optimal. Effective database access with better availability of resources can help us expand our study with better results. Moreover, the proxy report still needs to be obtained. Thus, future studies should relate a child's self-assessment to the proxy report obtained from parents to validate these findings further.

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### Ethical Considerations

The study was approved by Research Committee, King Edward Medical University Lahore. Participants and their parents were informed of the purpose of this study in detail and consent was obtained through a duly signed consent form.

### Conflict of Interest

*None*

### Funding Source

*None*

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