

Evaluation of the Positive Impact of Tonsillectomy on Children Health Using Glasgow Benefit Inventory

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Abstract- The aim of this survey was to determine the level of health improvement reported by parents of children with a history of chronic tonsillitis who had undergone tonsillectomy in Baqubah City, Iraq. This retrospective cross-sectional study involved a sample of 100 pediatric patients aged 3 to 15 years with previous chronic tonsillitis who underwent tonsillectomy at Baqubah Teaching Hospital. Health improvement was assessed using a self-administered questionnaire known as the Glasgow Benefit Inventory (GBI). This standardized measure consists of 18 retrospective items, each rated on a 5-point Likert scale, and is designed to assess the degree of improvement attributable to surgical intervention. The scale provides a total score and three subscale scores: General Health, Social Support, and Physical Health. Scores are standardized on a scale from -100 to 100, where any positive score indicates improvement in the physical and emotional well-being of patients who have undergone tonsillectomy, whereas negative scores suggest deterioration. Analysis of the findings showed significant differences among the subscale scores, with the Social Support subscale having the lowest score, followed by the General Health subscale, while the Physical Health subscale had the lowest final rank. After tonsillectomy, improvements were observed in the overall GBI score as well as in the General Health, Social Support, and Physical Health subscales. These findings indicate that tonsillectomy has clinical benefits and may help address some claims made against the procedure. This study supports the appropriate use of healthcare budgets and highlights the importance of tonsillectomy in the management of chronic tonsillitis, particularly for otolaryngologists.

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Introduction

Tonsillitis refers to inflammation of the tonsils, which are located in the upper part of the throat. It may present as either an acute or a chronic condition (1-3). It usually has an abrupt onset. Symptoms associated with this condition include SSSS, sore throat, fever, tonsillar enlargement, and odynophagia (3-6). Tonsillitis may lead to various complications, including peritonsillar abscess (also known as “quinsy”), rheumatic fever, post-streptococcal arthritis, post-streptococcal glomerulonephritis, scarlet fever, toxic shock syndrome, ear infections and sinusitis, meningitis and brain

abscess, jugular vein thrombophlebitis (known as Lemierre’s syndrome), and necrotizing fasciitis (7).

Treatment aims to relieve symptoms and reduce complications (8). Paracetamol (acetaminophen) and ibuprofen can be used for pain relief (8,9). When streptococcal pharyngitis is diagnosed, oral penicillin is typically recommended. Cephalosporins or macrolides may be prescribed for patients with penicillin allergy. Tonsillectomy in children with recurrent tonsillitis modestly reduces the likelihood of subsequent episodes (8).

The tonsils play an important role in the primary and secondary immune response (10). Multiple studies

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suggest that inflammation and enlargement of the adenoids and tonsils result from impaired local and systemic immune function (11,12). There is speculation that tonsillectomy has a detrimental effect on children's immune systems. Conversely, numerous studies suggest that tonsillectomy does not appear to harm the immune system (13-15).

Tonsillectomy is recommended for specific infectious Tonsillectomy is also indicated for disorders affecting the tonsils or peritonsillar region and for cases of airway obstruction caused by tonsillar hyperplasia. In addition, it may be considered when malignancy is suspected. However, it is important to note that tonsillectomy is not usually performed solely for infectious diseases (16). Potential indications for tonsillectomy include sleep apnea, obstructive sleep-related breathing disorders, peritonsillar abscess, recurrent tonsillitis, periodic fever, aphthous stomatitis, pharyngitis, adenitis (PFAPA) syndrome, and other rare conditions (17).

Several studies have evaluated the effects of tonsillectomy on the health of children with a history of chronic tonsillitis. One study found that individuals who underwent tonsillectomy during childhood did not show increased susceptibility to infections before surgery and did not experience a higher incidence of infections 20 years later compared with age-matched individuals who had not undergone the procedure. However, the operated group showed a higher frequency of chronic immune-mediated diseases (18). Other studies have reported a significant prevalence (28%) of abnormal behavior among children undergoing tonsillectomy for chronic upper airway obstruction. Behavioral scores, as measured by a validated assessment tool, improved after tonsillectomy (19).

Previous research has extensively examined the effects of tonsillectomy in children. However, further information is needed regarding the impact of this procedure on children's health in Baqubah City. Therefore, this study aimed to assess the health benefits of tonsillectomy among children residing in Baqubah City.

Materials and Methods

This study was conducted at Baqubah Teaching Hospital in Diyala Governorate from January 2021 to May 2023. It was a retrospective cross-sectional study. Data were collected using a questionnaire.

Study population

Included criteria

A total of 100 pediatric patients aged 3 to 15 years who had recurrent episodes of chronic tonsillitis and underwent tonsillectomy, with or without adenoidectomy, under general anesthesia were included in the study.

Tonsillectomy was performed by an experienced specialist otolaryngologist at the teaching hospital. Formal consent was obtained from the patients before the surgical procedure.

- 1. Excluded criteria:** Patients younger than 3 years or older than 15 years, as well as those who underwent tonsillectomy to rule out the presence of a tumor or malignancy, were excluded from the study.
- 2. Study data:** A random selection of patient files was obtained from Baqubah Teaching Hospital. Relevant patient data, including name, age, sex, contact number, and the name of the operating surgeon, were documented. Information regarding the patient's health status before tonsillectomy was collected from either the patient or the parents. These data were then compared with the patient's condition after surgery using the GBI (Glasgow Benefit Inventory) questionnaire.
- 3. GBI (Glasgow-benefit-inventory):** In this retrospective evaluation, the questionnaire was used to quantify the long-term benefits experienced by patients after tonsillectomy. It provides a practical and relevant method for assessing pediatric health outcomes and is sufficiently sensitive to detect changes following procedures such as tonsillectomy. The Glasgow Benefit Inventory (GBI) consists of 18 items, each rated on a five-point Likert scale, and is designed to measure the multidimensional effects of surgery on patients' well-being. An example item is: "Since undergoing the procedure, do you feel better or worse?" with response options ranging from "a lot worse" to "much better."
- The instrument generates an overall score and three subscale scores. The General Health subscale includes items 1, 2, 3, 4, 5, 6, 9, 10, 14, 16, 17, and 18; the Social Support subscale includes items 7, 11, and 15; and the Physical Health subscale includes items 8, 12, and 13. GBI scores range from -100 to +100. Positive scores indicate an improvement in health-related quality of life following tonsillectomy, whereas negative scores indicate deterioration after surgery (Table 1) (20).
- 4. Calculation of questionnaire scoring:** Each item

in the questionnaire is assigned a value ranging from 1 to 5. A score of 1 indicates the most negative change in health status, whereas a score of 5 indicates the most positive change.

5. **Total score:** To calculate the average response score, all responses to questions 1-18 are summed and divided by 18. Then, 3 is subtracted from the mean response score, and the result is multiplied by 50.

General Health subscale score: The responses to questions 1, 2, 3, 4, 5, 6, 9, 10, 14, 16, 17, and 18 are summed and divided by 12. Then, 3 is subtracted from the mean response score, and the result is multiplied by 50.

Social Support subscale score: The responses to questions 7, 11, and 15 are summed and divided by 3. Then, 3 is subtracted from the mean response

score, and the result is multiplied by 50.

Physical Health subscale score: The responses to questions 8, 12, and 13 are summed and divided by 3. Then, 3 is subtracted from the mean response score, and the result is multiplied by 50 (21).

Ethical approval for the study was obtained from the College of Medicine, University of Diyala, Baqubah. Patients' medical information was collected after obtaining their consent.

Statistical analysis

Questionnaire scores were summarized using the mean and standard deviation. A paired two-sample t-test was used to analyze differences among the study variables. Statistical significance was set at $P < 0.001$. Data were analyzed using SPSS version 21 (SPSS Inc., Chicago, IL, USA) (22,23).

Table 1. (Glasgow-Benefit-Inventory) questionnaire

No	This questionnaire assesses the extent to which you perceive improvement in your child's overall condition following surgery.
	: Has your child's surgery improved or worsened their overall quality of life?
	: Has your child's surgery impacted their activities?
	: Has the surgical procedure positively or negatively impacted your child's behaviour?
	: Has the surgical procedure your child underwent impacted his/her progress and development?
	: Has your child's surgery impacted their level of activity throughout the day?
	: Has the surgical procedure your child underwent impacted their nocturnal sleep quality?
	: Has your child's surgery impacted their pleasure in consuming food?
	: Has your child's surgery impacted their level of self-consciousness in social situations?
	: Has your child's surgery impacted their ability to interact harmoniously with the rest of the family?
	: Has your child's surgery impacted their capacity to socialize and enjoy leisure activities with friends?
	: Has your child's surgery impacted their level of self-consciousness around others?
	: Has your child's surgery impacted their level of distractibility?
	: Has the surgical procedure had by your child had an impact on his/her ability to acquire knowledge?
	: Has your child's surgery impacted their absence from nursery, playgroup, or school?
	: Has your child's surgery impacted their capacity to focus on a task?
	: Has your child's surgery impacted their level of frustration and irritability?
	: Has your child's surgery had an impact on their self-perception?
	: Has your child's surgery impacted their level of happiness and satisfaction?
•	The current questionnaire provides the following options for each question: significantly improved, slightly improved, no change, slightly worsened, and significantly worsened. Depicted general health subscale Depicted social support subscale Depicted physical health subscale

Results

The sociodemographic distribution of the study population revealed a gender distribution of 22 girls and 28 boys.

Total score

The results of our study indicate a significant increase in the total score (questions 1–18) following tonsillectomy compared to the pre-procedural scores

(Table 2, Figure 1).

General subscale score

The general subscale scores, derived from questions 1, 2, 3, 4, 5, 6, 9, 10, 14, 16, 17, and 18, demonstrated a significant increase after tonsillectomy compared to baseline scores before tonsillectomy (Table 3, Figure 2).

Social support score

The social support scores, derived from questions 7, 11, and 15, showed a significant increase after

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tonsillectomy compared with the preoperative scores (Table 4, Figure 3).

Physical score

The physical health scores, derived from questions 8,

12, and 13, also showed a significant increase after tonsillectomy compared with the preoperative scores (Table 5, Figure 4).

Table 2. Pre- and post-tonsillectomy GBI questionnaire total scores. A total of 50 children participated in this study, including 28 boys (56%) and 22 girls (44%). The total Glasgow Benefit Inventory (GBI) score improved after tonsillectomy. The mean score increased from -69.05 ± 18.17 before surgery to 79.52 after surgery. This difference was statistically significant ($t=6.546$, $P=0.0001$), showing that the patients had a better quality of life after the operation. These findings indicate that tonsillectomy had a positive effect on the patients' overall well-being.

Time	Specimens No	Total score (mean $\pm$ SD ^a)
Pre- tonsillectomy	50	-69.05 ± 18.17
Post- tonsillectomy	50	79.52 ± 15.78
t-value	-	6.546 **
P	-	0.0001

** : significant at ($P \leq 0.01$), a: standard deviation

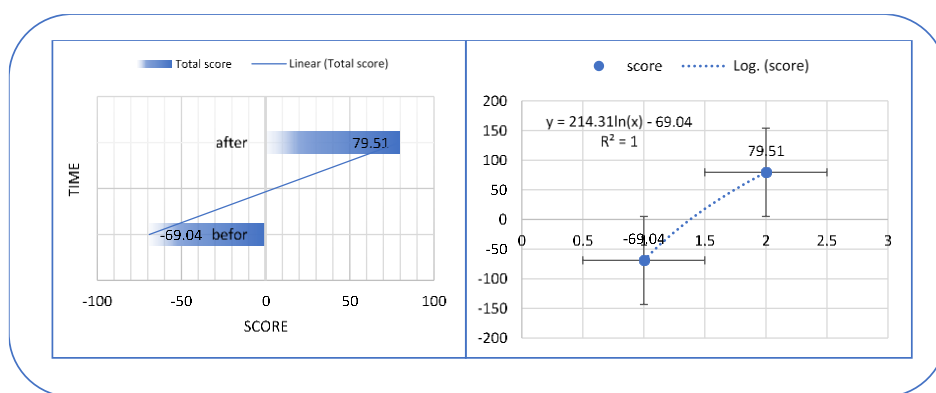


Figure 1. Total scores for the pre-and post-tonsillectomy GBI questionnaire

Table 3. Pre- and post-tonsillectomy GBI questionnaire general subscale scores. The general subscale score showed a clear improvement after tonsillectomy. The mean score increased from -64.79 ± 17.22 before surgery to 74.66 ± 15.64 after surgery. This difference was statistically significant ($t=6.527$, $P=0.0001$), showing an improvement in the patients' general health and daily activities.

Time	Specimens No	Total score (mean $\pm$ SD ^a)
Pre- tonsillectomy	50	-64.79 ± 17.22
Post- tonsillectomy	50	74.66 ± 15.64
t-value	-	6.527 **
P	-	0.0001

** : significant at ($P \leq 0.01$), a: standard deviation

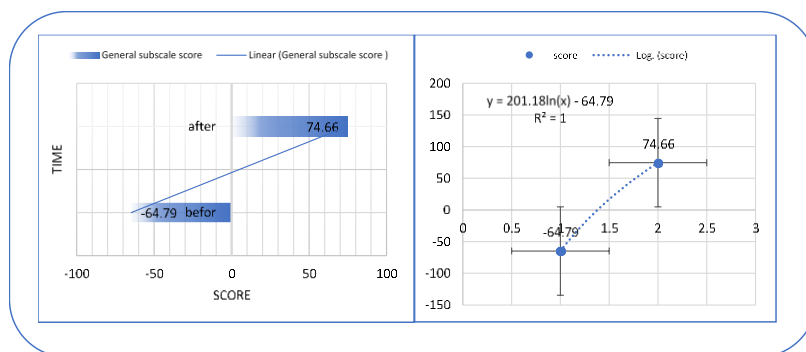


Figure 2. Pre- and post-tonsillectomy GBI questionnaire general subscale scores

Table 4. Pre- and post-tonsillectomy GBI questionnaire social support subscale scores The social support subscale showed a clear improvement after tonsillectomy. The mean score increased from -78.49 ± 18.45 before surgery to 90.63 ± 17.26 after surgery. This change was statistically significant ($t=7.089$, $p = 0.0001$), showing better social support after the procedure

Time	Specimens No	Total score (mean $\pm$ SD ^a)
Pre- tonsillectomy	50	-78.49 ± 18.45
Post- tonsillectomy	50	90.63 ± 17.26
t-value	-	7.089 **
P	-	0.0001

** : significant at ($P \leq 0.01$), a: standard deviation

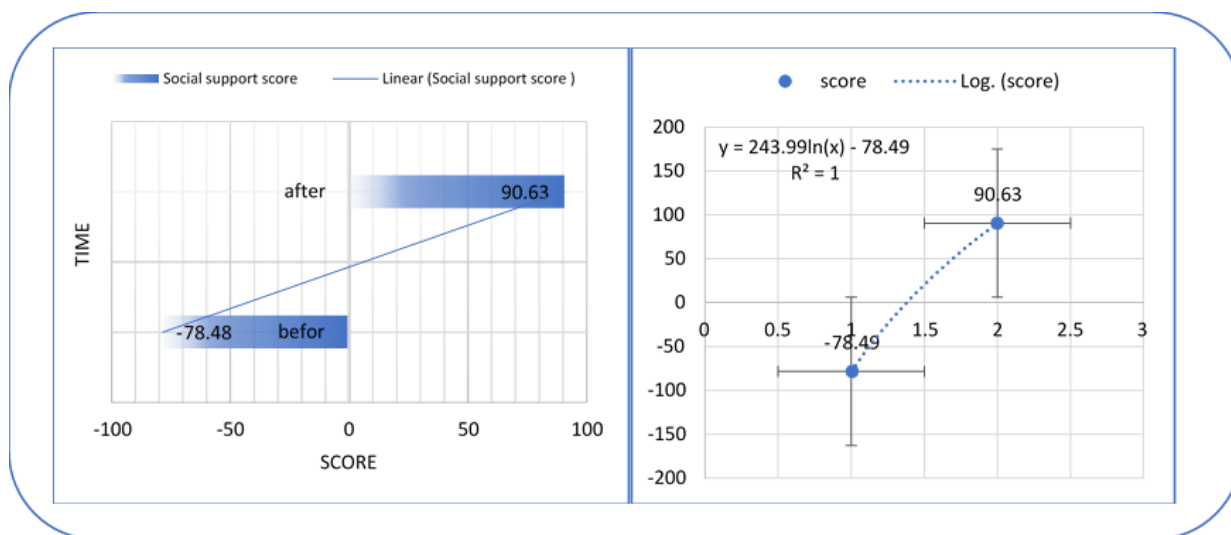


Figure 3. Pre- and post-tonsillectomy GBI questionnaire social support subscale scores

Table 5. Pre- and post-tonsillectomy GBI questionnaire physical subscale scores. The physical health subscale showed a clear improvement after tonsillectomy. The mean score increased from -79.41 ± 20.87 before surgery to 88.65 ± 19.19 after surgery. This difference was statistically significant ($t=7.957$, $P=0.0001$), indicating that the patients had better physical health after the operation. The results suggest that many of the physical symptoms were reduced and that the patients felt better following surgery

Time	Specimens No	Total score (mean $\pm$ SD ^a)
Pre- tonsillectomy	50	-79.41 ± 20.87
Post- tonsillectomy	50	88.65 ± 19.19
t-value	-	7.957 **
P	-	0.0001

** : significant at ($P \leq 0.01$), a: standard deviation

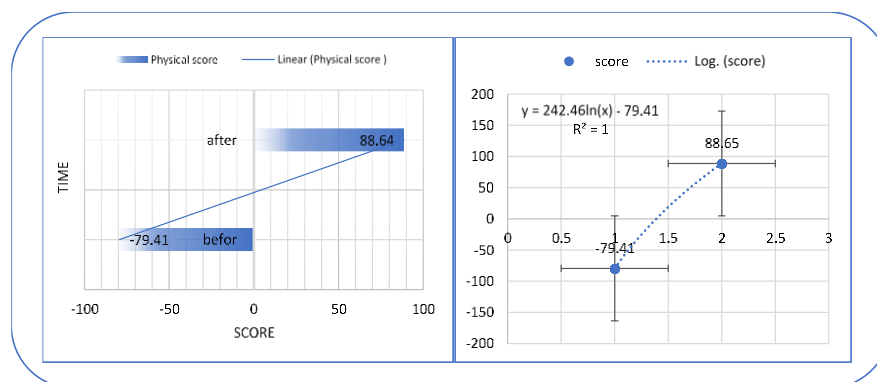
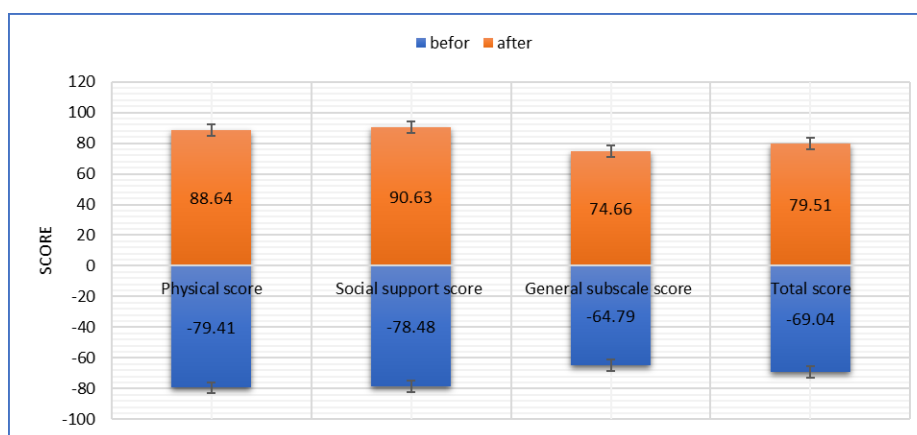


Figure 4. Pre- and post-tonsillectomy GBI questionnaire physical subscale scores

Table 6. comparison of all the scores before and after tonsillectomy

Score	score (mean $\pm$ SD ^a) Before	score (mean $\pm$ SD ^a) After
Total score	-69.04 $\pm$ 17.18	79.51 $\pm$ 15.76
General subscale score	-64.79 $\pm$ 17.21	74.66 $\pm$ 15.63
Social support score	-78.48 $\pm$ 18.44	90.63 $\pm$ 17.25
Physical score	-79.41 $\pm$ 20.88	88.64 $\pm$ 19.18
(mean $\pm$ SD ^a)	-73.02 $\pm$ 3.63	83.36 $\pm$ 3.77
t-value	20.106**	22.067**
P	0.0001	0.0001

** : significant at ($P \leq 0.01$), a: standard deviation, n= 50

**Figure 5.** Comparison of all the scores before and after tonsillectomy

Discussion

Our GBI questionnaire results showed substantial differences in the total score, physical health score, general subscale score, and social support score before and after tonsillectomy in patients with chronic tonsillitis. Multiple studies conducted using similar approaches have reported comparable findings. One study provided clear evidence that tonsillectomy results in considerable improvement in patient-reported outcome measures (PROMs) compared with watchful waiting and concluded that tonsillectomy offers significant clinical benefit (24). Another study assessed the effectiveness of the T14 questionnaire in patients who underwent tonsillectomy, and its findings demonstrated significant benefits throughout 3 to 24 months of follow-up (24,25). A 2015 study of 54 pediatric patients from the UK revealed that tonsillectomy significantly improved T14 scores over a 2-year period (25). In February 2014, another study also reported significant improvement in children's health status six months after tonsillectomy (25).

The available evidence supports our findings that recurrent tonsillitis imposes a significant burden on affected individuals, manifesting as fever, pain, lethargy, impaired eating and sleeping, emotional consequences,

reduced academic performance, and increased school absenteeism (24). Strong evidence from multiple studies also indicates that when the number of tonsillectomies decreases below a certain threshold, patients may experience acute tonsillitis requiring hospitalization, along with a concerning increase in life-threatening suppurative complications (26). Consequently, there is a clear and significant risk that more children may require hospital admission because of painful, prolonged, and disabling tonsillar illnesses, with substantial adverse effects on the overall well-being of both the child and the family (27).

Similar findings were reported in another study addressing the same topic as our investigation. During the postoperative follow-up period, although some patients experienced sore throat, no visits to primary care services or school absences related to these symptoms were recorded. Although these outcomes were not quantified, they support the need for further research in this area, particularly when evaluating the economic benefits of tonsillectomy (24).

Based on the questionnaire scores, the greatest improvement was observed in the general health domain, while the physical health and social support domains also showed positive changes. These findings support the view that tonsillectomy provides benefits not

only for the physical health of children with chronic tonsillitis but also for their psychological and social well-being. Together, these improvements contribute to a meaningful positive effect on the overall health status of the patient. The use of validated and carefully selected assessment measures strengthens the reliability of these findings. Overall, the available evidence suggests that children suffering from recurrent throat infections may experience improvements in both health and well-being following tonsillectomy (28).

This study has some limitations. First, the economic implications of tonsillectomy were not evaluated. Second, the sample size was relatively small because of difficulties encountered during follow-up.

The findings of this study demonstrated a positive effect of tonsillectomy on GBI questionnaire scores among pediatric patients, indicating improvements in overall health, social support, and physical well-being after the procedure. A significant positive association was observed between tonsillectomy and improved health status in children with chronic tonsillitis. Although some reports have suggested that tonsillectomy offers only limited clinical benefit, our findings support the view that the procedure can provide meaningful health benefits and may therefore represent an appropriate use of healthcare resources. These results highlight the importance of a clear understanding of the role of tonsillectomy in the management of chronic tonsillitis among otolaryngologists.

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