Original Article

Effect of Adenotonsillectomy on Quality of Life in Children with Obstructive Sleep Apnoea

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Abstract

Background: Adenotonsillectomy is one of the most frequently performed surgical procedures in children with obstructive sleep apnoea due to chronic upper airway obstruction. There is paucity of data about the impact of adenotonsillectomy on children's quality of life in Nigeria**. Objective:** This study evaluated the quality of life of children pre and post adenotonsillectomy. **Methods:** Caregivers of children who had adenotonsillectomy completed the obstructive sleep apnoea OSA-18 quality of life (QOL) validated questionnaire before, and 6 months after adenotonsillectomy. The OSA-18 contains 18 questions and assessed the QOL in 5 domains. **Results:** A total of 80 (out of 105) caregivers completed and returned the questionnaires concerning 80 children (M = 38, F = 42). The age of the children ranged from 1 – 9 years with a mean ± SD of 3.67 ± 1.92 years. Caretaker preoccupation and sleep disorders were the domains with the greatest changes in their mean scores having 17.51 and 17.11 respectively. The mean ± SD of the total OSA-18 score was 89.89 ± 13.16 preoperatively, and 22.43 ± 4.31 post operatively. The changes in the scores for each domain, for each item of the OSA-18 survey, and the total score were highly significant ($p < 0.001$). The mean of the caretaker-perceived quality of life for the children showed improvement from 3.50 to 8.50 ($p < 0.001$). **Conclusion:** Adenotonsillectomy produced markedly significant improvements in the affected children's quality of life.

Keywords: Adenotonsillectomy, Adenotonsillar hypertrophy, Quality of life, Sleep disorders, Obstructive sleep apnoea

Introduction

Adenotonsillar hypertrophy is a prevalent childhood disorder that affects children as early as toddlerhood and up to age of 15 years.[1,2] The condition is the most common cause of chronic upper airway obstruction in children.[1] Various clinical manifestations of upper airway obstruction due to hypertrophic adenoids and tonsils include; mouth breathing, snoring, recurrent nasal discharge, daytime sleepiness, growth failure, cardiovascular dysfunction and neurocognitive and behavioral problems.[1-3] It is the major cause of obstructive sleep apnoea (OSA) or obstructive sleep disordered breathing (oSDB) in children.[4,5,6] Obstructive sleep apnoea is characterized by prolonged partial upper airway obstruction or intermittent complete obstruction that disrupts normal ventilation during sleep and normal sleep patterns.[5] Children with obstructive adenoid enlargement have an increased tendency for respiratory tract infections and hence have a higher rate of antibiotic usage, more hospital visits and an overall elevation of health care usage compared to their peers that have no such challenges. [6–10] Many children with OSA in the Low- and Middle-Income Countries have a higher tendency to experience failure to thrive than the unaffected children.[8,9] Evidence had shown that adenoid hypertrophy with its associated oSDB has a negative impact on the affected children's quality of life (QOL) including a negative effect on their behaviour and emotion. [3,6,7,10] It is responsible for several alterations on the children's development and behaviour; in fact, obstructive adenotonsillar hypertrophy and its associated problems induce worry in many parents of the affected children.[7,10] Adenotonsillectomy remains a commonly performed surgical procedure for the affected children.[1,2] Published studies have reported that effective treatment for moderate to severe OSA due to adenotonsillar hypertrophy in children is adenotonsillectomy.[3–7]

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It is the first line of treatment for adenotonsillar hypertrophy with OSA.[2,11] The surgery had proven to be safe and its therapeutic advantage far outweighs any little risk associated with the surgery.[2,7,11,12] Adenotonsillectomy can improve sleep quality, behaviour, and overall well-being of the affected children.[2–6,12] Studies also reported the effectiveness of adenotonsillectomy based on objective changes observed in health status of the affected children.[2,3,10,12]

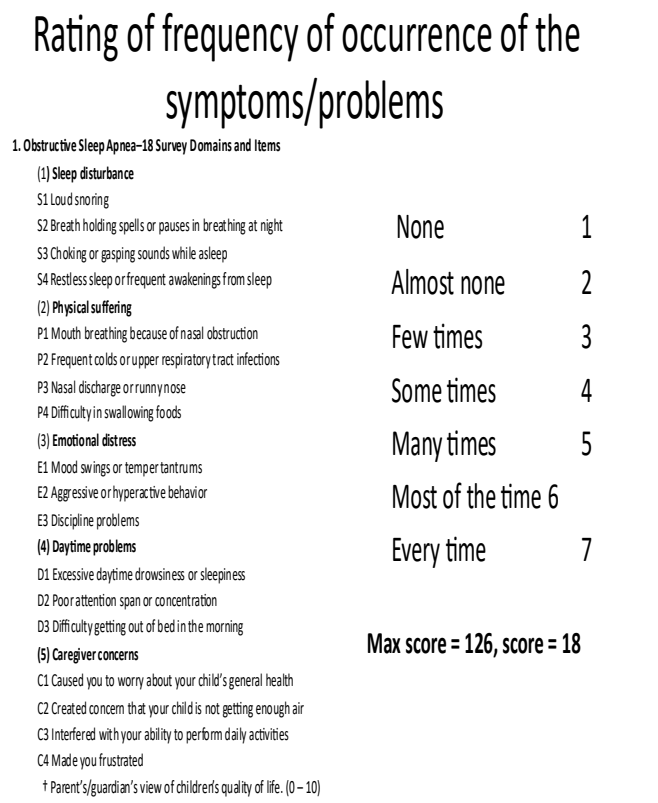
Various methods and parameters have been employed to assess the benefit of adenotonsillectomy on the quality of life of the affected children. These include post-operative measurements of weight, height and mid upper arm circumference, the paediatric quality of life inventory (pedsQL), the tonsil and adenoid health status instrument (TAHSI), health-related quality of life (HRQL), the Glasgow children's benefit inventory (GCBI) and obstructive sleep apnea-18 (OSA-18) questionnaire.[2,3,5,7,8] Most of these seek to determine the extent to which a child's usual or expected physical, emotional, and social well-being is affected by a medical condition or its treatment. They also help to determine the benefit of the procedure as well as the satisfaction of both the children and their parents after adenotonsillectomy.[2–8] Satisfaction is an important measure of the outcome because it is related to the improvement in health status.

The present study employs the obstructive sleep apnea questionnaire (OSA-18). It is one of the most frequently used questionnaires worldwide and it has been validated in a variety of languages.[2,3,5,7] The OSA-18 questionnaire is a disease-specific, self-administered tool that is relatively quick to complete. It helps to quantify the impact of SDB or OSA on various aspects of a child's life. There is a paucity of data on the impact of adenotonsillectomy on children's quality of life in published studies in Nigeria that are accessible online. We conducted this study to provide a baseline data on the subject matter in our environment. This study therefore aims to assess children's quality of life (QOL) post-adenotonsillectomy in order to determine the benefit of the procedure.

Patients and Method

This was an observational, cross-sectional, comparative study conducted with the parents/guardians of children who had adenotonsillectomy. The study was conducted at Otorhinolaryngology department of University of Osun (UNIOSUN) Teaching Hospital, Osogbo, South-West Nigeria, from April 2022 to March 2024. The study assessed the impact of surgery on children aged 1 to 9 years, who had surgery for obstructive adenotonsillar enlargement.

Informed consent was obtained from consecutive eligible participants after review and approval by the Osun State Health Research Ethical committee (OSHREC), reference number OSHREC/PRS/569T/1055. An investigator administered a structured questionnaire to parents/caregivers of each participant to collect patient's demographic and clinical data. Parents/caregivers completed the OSA-18 quality of life questionnaire before and 6 months after surgery. The OSA-18 (Table I) is a validated questionnaire that contains 18 questions divided into 5 domains: sleep disorders (4 items), physical distress (4 items), emotional distress (3 items), daytime problems (3 items), parent/guardian concern (4 items). Each domain was scored from 1 to 7, with 1 representing none of the time, and 7 representing all of the time. Another single quality of life item was also included in the survey. This item allowed caregivers to grade their child's quality of life using a visual analog scale ranging from 0 (worst possible quality of life) to 10 (best possible quality of life).



Total scores varied from 18 to 126 and were classified in relation to their impact. The OSA-18 total scores less than 60 indicated a mild negative impact, scores of between 60 and 80 indicated a moderate negative impact and scores greater than 80 indicated a high/severe negative impact on quality of life.[5–7] Statistical analysis was performed using Statistical Product and Service Solution (SPSS) version 20. Frequencies, means and standard deviations were used to describe patient clinical, socio-demographic, and scale characteristics. A paired samples t-test was used to compare the quality of life pre, and post adenotonsillectomy. A chi-square test was performed to compare the significant association between categorical variables and a p value < 0.05 was taken as statistically significant.

Results

A total of 80 parents / caregivers (out of 105 (76.2%)) completed and returned the questionnaires for 28 male and 42 female children. The age of the children ranged from 1 to 9 years, with a mean±SD of 3.670±1.918 years and modal age group of 4-5 years (Figure 1).

Table 1: Pre- and post-operative values of different domains and the paired sample t-test

DOMAINS	PRE-OPERATIVE VALUES (mean)	POST-OPERATIVE VALUES (mean)	DIFFERENCE (in Means) improvement (+) worsening (-)	T - Test	*P* – Value
Sleep Disorder	22.36	5.25	+ 17.11	37.391	0.000
Physical Distress	21.28	5.62	+ 15.66	29.033	0.000
Emotional Disorder	12.81	3.60	+ 9.21	17.457	0.000
Diurnal Problems	11.51	3.42	+ 8.09	20.432	0.000
Caretaker Pre-occupation	22.04	4.59	+ 17.51	32.233	0.000
Total mean +- SD	89.89 ± 13.16	22.43 ±4.31	+ 67.45±8.64	37.391	0.000

The mean ± SD of the total OSA-18 score was 89.89±13.16 preoperatively and 22.43±4.31 postoperatively. The total mean score difference was 67.45±8.64. Caregiver preoccupation and sleep disorders were the domains with the greatest changes in their mean scores having 17.51 and 17.11, respectively and the least was diurnal problems from 11.51 to 3.42 = 8.09 (Table 1). The changes in the scores for each domain, for each item of the OSA-18 survey, and in the total score were highly significant ($p < 0.001$).

Chi-square test analysis showed significant association between sleep disorder and physical distress $\chi2=2.40$, $p=0.000$ preoperatively and $\chi2=62.93$, $p = 0.000$ postoperatively and sleep disorder & parental concern $\chi2=2.44$, $p = 0.000$ pre-operatively and $\chi2=45.22$, $p = 0.000$ post-operatively. None of the patients had increased values of OSA-18 scores after surgery, neither in the total scores nor in each domain separately.

The mean of the perceived children's quality of life by the caretaker showed improvement from 3.50 to 8.50 ($p < 0.001$). Paired sample t-test showed highly significant values for all the domains including that of quality-of-life assessment by the parents/caregiver ($p < 0.001$) (Table 1 and Figure 2).

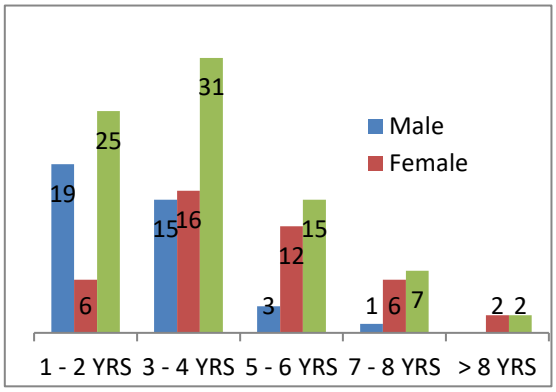


Figure 1: Age and gender distribution of the children

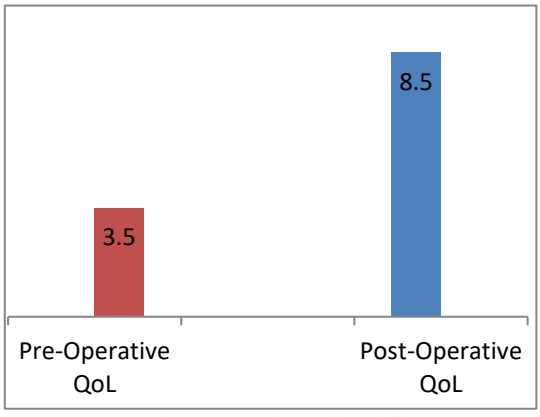


Figure 2: Pre- and post-operative quality of life assessment by the parents/caregivers ($p = 0.000$)

Discussion

Quality of life assessment post adenotonsillectomy has become in important subject in patients with adenotonsillar hypertrophy.[2,4,5,10,12] The disease has a serious negative effect on quality of life of the affected children and it is a major concern for their caregivers.[2–5,10–15] Reports from published studies point out that eighty to one hundred percent of parents or guardians reported the effectiveness of adenotonsillectomy on the aspects of satisfaction and general health status post-surgical intervention.[7,12] Moreover, beyond satisfaction and health status, adenotonsillectomy has been reported and objectively demonstrated to yield a positive effect on children's quality of life with majority of the parents rating their child's well-being far above average.[2,3,5,12]

Consistent with reports from other studies, over eighty-eight percent (88.7%) of our patients were 6 years and below.[12–14] Adenotonsillar disease severity tends to be greater in that age group. Coincidentally this is the age group that appears to benefit most from adenotonsillectomy with greater improvement in quality of life. Kanmaz *et al*.,[7] demonstrated the relationship between improvements in health-related quality of life and age among children who had adenotonsillectomy. Their study showed that, the increase in health-related quality of life in patients younger than age 6 years, was significantly higher than in the older age groups. [7] In consonance with reports from previous authors, our findings showed that adenotonsillectomy led to a reduction in the mean score for all domains as well as the overall survey score.

When compared to pre-adenotonsillectomy, there were higher scores across the entire domain, including overall survey score. The lower score obtained post-adenotonsillectomy signifies better quality of life. Our findings corroborated the report of other researchers. Naiboğlu et al.,[5] reported that adenotonsillectomy improves the quality of life in children with obstructive sleep apnea (OSA) as evidenced by reductions in OSA-18 scores across all domains. Al-Iede and his co-researchers in their study among the Middle Eastern population utilizing a validated Arabic version of the OSA-18 questionnaire opined that adenotonsillectomy brought great improvement to quality of life in cases of pediatric OSA.[16]

Most of the improvements in the quality of life were more pronounced in severe cases as was the case in our study giving credence to the procedure's efficacy in addressing more critical presentations of paediatric obstructive sleep apnoea. Lee *et al.,* in Taiwan reported similar findings that children with sleep disordered breathing (SDB) had improvement in QOL after adenotonsillectomy as documented by OSA-18 score changes and that the QOL improvement after adenotonsillectomy increased as disease severity increased.[17]

Similar findings on quality-of-life improvement have been reported using other validated means of assessing quality of life post adenotonsillectomy. Kanmaz *et al*.,[7] used health related quality of life (HRQL) and their finding was that of a positive effect of adenotonsillectomy on children's quality of life. Over 96% of the parents in their study confirmed that the intervention was successful and gives a significant amelioration in all domain scores. They therefore concluded that adenotonsillectomy improved not only physical health but also other aspects of daily life. Ramya *et al*.,[18] in India used the Tonsil and Adenoid Health-Specific Index (TAHSI) with 6 distinct subscales. They concluded that adenotonsillectomy had a positive impact on the quality of life of children including a reduction in episodes of sore throat, difficulty in swallowing and sleep disturbances. This improvement in QOL following adenotonsillectomy was also corroborated by Goldstein *et al*.,[6] where disease-specific and global quality of life of children who underwent adenotonsillectomy were studied with six- month and one-year follow-ups, and reported that all parameters studied showed statistically significant improvement. Wood *et al.,*[19] in their study "Qualities of life following surgery for sleep-disordered breathing: subtotal reduction adenotonsillectomy versus adenotonsillectomy in Australian children" reported that even subtotal reduction adenotonsillectomy gave improvement in quality of life as comparable to those patients undergoing total adenotonsillectomy.

Our findings also showed that, the severity of sleep-disordered breathing is directly associated with the degree of both physical suffering and caretaker concern ($p < 0.001$). These were the domains where the greatest improvement was observed in the present study. Our observation is in agreement with the findings of Al-Iede *et al*.,[16] where they concluded that caregiver concerns and physical sufferings were the domains of greatest improvement. Kang *et al*.,[20] reported changes in QOL recorded by means of the OSA-18 questionnaire with marked improvement in the items related to sleep disturbances with a positive correlation between OSA-18 scores and the number of apnoeic episodes in children with severe adenotonsillar hypertrophy. Most parents/caregivers reported serious concern about their children's health. In fact, most parents of children who had OSA were unable to sleep or perform daily activities or were frustrated when their children were having either loud snoring, apnoeic attacks or gasping for breath while sleeping. All of them had great relief following adenotonsillectomy with the disappearance of those symptoms.

As seen in other previous studies, snoring and sleep disturbances are the major hallmarks for paediatric OSA and only a small portion of paediatric OSA presented with emotional and diurnal disorders.[12,21,22] This may account for the lowest score seen in the domain of diurnal and emotional disorders in the present study. In our study, majority of the affected children were referred on account of snoring, physical suffering and sleep disordered-breathing. Preoperatively, only a small percentage of patients presented with symptoms related to emotional, behavior, and diurnal complaints.[1]

The effectiveness of adenotonsillectomy in improving the quality of life of children with OSAS in the present study was validated by the Paired sample t-test which showed highly significant values for all the domains including quality of life assessment by the parents and the caregivers ($p < 0.001$). The OSA-18 total scores greater than 80 indicated severe negative impact on quality of life. Preoperative value in this study of 89.89±13.16 was reduced to 22.43±4.31 (indicating a significant improvement on quality of life postoperatively. Hence, our findings of paired t-test with highly significant values buttressed the significance of the improvement in the quality of life of the affected children post-adenotonsillectomy. This finding also corroborated the assertion that adenotonsillectomy has more beneficial effects on the clinical outcome and quality of life in comparison with a watchful waiting group.[23,24]

Our choice of a six-month assessment post-surgery in the present study was due to the fact that, after six months the changes observed had been demonstrated to remain stable.[24] Also after six months, following improvement in the quality of life, most patients are usually lost to follow-up.

There are some limitations to this study, the assessment was based on the perception of the parents/caregivers and not the children who actually had the diseases; however, most of the children are very young and may not be able to express themselves effectively, also a tendency to recall bias by the parents /caregivers is identified as a limitation. We suggest a further study that will employ objective assessment tools involving the affected children like weight, height, and other anthropometric parameters.

Conclusion

Adenotonsillectomy provides an effective way to improve the quality of life of children with adenotonsillar hypertrophy. A validated instrument like the OSA-18 questionnaire has been found

to be a useful tool for post-adenotonsillectomy quality of life evaluation of the affected children. It showed parental and caregiver satisfaction with marked improvement in the items related to sleep disturbances, caregiver concern and physical sufferings.

We therefore recommend that surgery should not be postponed in children with chronic adenotonsillar disease as both the children and their parents are generally satisfied with the results when the surgery is performed at the earliest possible time.

Human Ethics and Consent to Participate Declaration

Ethics: The procedures in this study were in accordance with the ethical standards of the institutional committee on human experimentation, and with the Helsinki Declaration of 1975, as revised in 2000.

Funding/ Sponsorship: Nil

Conflict of Interest: The authors declare that they have no conflict of interest.

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