

Research Article

Correlation between Goitre Size and Quality of Life in Children and Adolescents with Hyperthyroidism in Dr. Hasan Sadikin General Hospital Bandung

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ABSTRACT

Introduction: Hyperthyroidism is a pathological disorder caused by excessive production of thyroid hormone. This pathological disorder is characterized by goitre. According to the previous research, it is said that hyperthyroidism is a global health problem that can affect the quality of life, especially in children. This study was carried out to determine whether there is a correlation between the size of goitre and the quality of life in children and adolescents with hyperthyroidism in Dr. Hasan Sadikin General Hospital Bandung (RSHS).

Method: The study was conducted for 2 months at the Pediatric Endocrinology Clinic of RSHS, Bandung. The data was taken after a physical examination done by the authors in form of inspection and palpation of the neck to determine the grading of goitre size based on the WHO grading system. The respondents and their parents then filling in the PedsQLTM 4.0 Generic Core Scales questionnaire which was translated into Indonesian language to determine the respondent's quality of life score. The correlation of goitre size and quality of life was calculated by the Spearman rank correlation test.

Result: There is no significant correlation between the size of goitre and the quality of life in children and adolescents with hyperthyroidism in RSHS. From 26 respondents, 22 of them were female and dominated by children and adolescents aged 13-18 years. Grade 2 goitre was found in half of the respondents. The PedsQLTM parent reports show that 31% of respondents have a poor quality of life and the child reports show that 48% of children have a poor quality of life. The respondents had the most severe impairment in their emotional functioning. Based on gender, the quality of life of women was worse than men. Spearman rank correlation test results showed no significant correlation between the size of goiter and the total score of quality of life both in child report ($r=-0.064$; $p>0.05$); and parent reports ($r=-0.175$; $p>0.05$).

Limitation: The limitation of this study is the measurement of quality of life that only uses generic instruments because PedsQLTM itself does not yet provide disease-specific questionnaires for children with thyroid disease.

Conclusion: There is no significant correlation between the size of goitre and all domains of quality of life both in PedsQLTM child reports and parent reports.

Keywords: Hyperthyroidism, PedsQLTM, Quality of life.

INTRODUCTION

Hyperthyroidism is a pathological disorder caused by excessive production of thyroid hormone. The function of thyroid hormone is to affect the metabolism of cells that make up different organs so that if the levels are too high, there will be a collection of symptoms involving many organ systems. Collection of symptoms that arise is called thyrotoxicosis.¹ In Indonesia, hyperthyroidism is one of the major thyroid defects that often occurs.² The prevalence of hyperthyroidism is higher in women compared to men and the number is highest in people aged ≥ 45 years. In 2013, of the total Indonesian population aged ≥ 15 years, which totaled 176,689,366 people, 700,000 of them were diagnosed with hyperthyroidism. Hyperthyroidism accounts for 15% of pediatric thyroid disorders and the cause is dominated by Graves' disease. Of all the provinces in Indonesia, West Java is ranked third as a province with a population of ≥ 15 years of age diagnosed with hyperthyroidism, which is 0.5% or 160,812 out

of 32,162,328 people in total.³ One clinical manifestation of hyperthyroidism is goitre. Goitre is a change in the size and shape of the thyroid gland which is a characteristic of hyperthyroidism.⁴

Thyroid hormone plays a role in bone turnover and osteoblast activity. Children and adolescents may experience accelerated development and premature epiphyseal maturation if thyrotoxicosis occurs.^{5, 6} This would result in accelerated bone age and having a stature higher than their age. Excessive bone resorption happens in serious hyperthyroidism, thus increasing the likelihood of fracture. Besides, due to elevated calorogenesis, weight loss will occur.⁶

The manifestations of hyperthyroidism include various organs ranging from the nervous system, eyes, thyroid gland, heart and lungs, gastrointestinal tract, reproductive system, blood-lymphatics, bones, muscles, and skin. Clinical manifestations including various organs can certainly affect the quality of life of a person, particularly children and adolescents, individuals who are undergoing physical, mental, and social changes.⁷

Quality of life itself is a prosperous concept involving feeling pleased and fulfilled with the whole of one's existence.⁸ According to previous study, hyperthyroidism patients including children and adolescents experience changes in various aspects of quality of life.⁹ One instance is the visual function disturbances that happens as a result of blurry vision and diplopia that can lead to problems for a person in performing daily activities such as reading and watching TV.¹⁰ Severe neuropsychological manifestations like sleep disturbance, anxiety, and unstable emotions can also be discovered in children. This can influence children's and adolescents' performances in their school.⁶ Besides, clinical manifestations of ophthalmopathy are considered to be able to change one's appearance. This will lead to a person's self-distrust which will worsen his psychosocial aspects in daily life.¹⁰

The goiter that occurs in individuals with hyperthyroidism can also have a direct impact on a person's quality of life. Goiter can suppress the structure of the adjacent organ such as trachea which can cause coughing and shortness of breath. Goiter can also suppress the esophagus so that it can interfere with the swallowing process.¹¹ This can disturb the daily activities such as breathing and swallowing in an individual.

From the description above, the authors believes that an individual's quality of life may be disrupted by hyperthyroidism that is defined by the presence of goiter. These could be physical aspects such as visual disturbances, mental aspects in the form of psychiatric symptoms, and social aspects in the form of loss of self-confidence induced by changes in appearance. According to previous research, it is said that hyperthyroidism is a global health problem that can influence the well-being of life, particularly in pregnant women and children.¹² Similar studies also have not been done in children and adolescents especially in Indonesia. This makes the authors interested to know whether there is a correlation between goiter size and the quality of life of hyperthyroid patients, particularly in children and adolescent patients with hyperthyroidism at Hasan Sadikin General Hospital (RSHS), Bandung, West Java, Indonesia.

METHOD

This is an analytical study with cross-sectional design. Sampling method used in this study is consecutive sampling. This study was conducted for 2 months from August to October 2019 at the Pediatric Endocrinology Clinic of RSHS, Bandung. The study population was children and adolescents with hyperthyroidism who came to the Pediatric Endocrinology Clinic of RSHS, Bandung. The subjects were patients who met the inclusion criteria, particularly patients with hyperthyroidism aged 2-18 years old. Some of them that fulfilled the exclusion criteria such as patients with chronic diseases affecting quality of life such as cancer, stroke, heart disease, diabetes, renal illness, intestinal illness, illnesses of the central nervous system and also patients or relatives who were not willing to be involved in the study after informed consent was done were ruled out from this study. The minimum sample size calculated using formula for analytical correlative study with ordinal and numeric variables. With 5% type I error, 90% power, and 0.55 minimum coefficient correlation obtained from the previous study, a minimum sample of 26 was attained.

Data on the size of the goitre and the quality of life were taken at the same time. After obtaining informed consent, the study subjects filled out their biodata. Goitre size is known by conducting a physical examination

done by the authors in form of inspection and palpation of the patient's neck and then classifying it based on the WHO's grading system while measuring the quality of life of patients by filling out the PedsQLTM 4.0 Generic Core Scales questionnaire which already translated into Indonesian language. The PedsQLTM questionnaire is filled out by the respondents and their parents.

The generic PedsQLTM instrument measures 4 domains, namely physical, emotional, social, and school function where the instrument has a total of 23 questions. A total result of less than 70 is considered poor.¹³ The PedsQLTM report itself consists of parent reports and child reports which are distinguished by the age of the child, including instruments for toddlers aged 2-4 years, young children aged 5-7 years, children aged 8-12 years, and teens aged 13-18 years whereas for toddlers age 2-4 years there are only questionnaires for parents.

Data were collected after obtaining ethics approval from the Ethics Committee of the Faculty of Medicine, Universitas Padjadjaran with the ethic number 729/UN6.KEP/EC/2019 and had permission from Research and Ethics Division of RSHS with number LB.02.01/X.2.2.1/10048/2019. The correlation between goitre size and quality of life calculated using the Spearman rank correlation test and will be shown in the table.

RESULTS

From the 26 respondents, it was found that the majority of the respondents were female with an age range dominated by children aged 13-18 years. Most respondents are currently studying at the junior secondary school. The parents' educational level data reveals that most of the respondents' fathers are senior high school graduates and their mothers' education is mostly elementary and senior high school graduates. On physical examination, grade 2 goitre was found in half of the respondents where the goitre was seen and felt when the chin was in a neutral position. (Table 1)

Characteristic	Frequency (n=26)
Gender	
Male	4
Female	22
Age (years old)	
2-4	1
5-7	0
8-12	7
13-18	18
Educational Level	
Uneducated	1
Primary school	5
Junior secondary school	12
Senior secondary school	8
Parents' Educational Level	
Father	
• Elementary school	6
• Junior secondary school	4
• Senior secondary school	12
• University	4
Mother	
• Elementary school	9
• Junior secondary school	5
• Senior secondary school	9
• University	3
Goiter size⁴	
0 (No visible or palpable goitre)	4
1 (Goitre is palpable but not visible in chin-neutral position)	9
2 (Goitre is visible and palpable in chin-neutral position)	13

The PedsQLTM parent reports show that 8 children have a poor quality of life and the child reports show that 12 children have a poor quality of life. Score calculation of different quality of life domains indicated that the respondents had the most severe impairment in their emotional functioning. The calculation of all domains of quality of life found that in physical and social domain more respondents had a good quality of life rather than poor. School function based on child reports and emotional function showed higher respondents with poor emotional function than the good one. The school domain score calculation on parent reports found that there was a similar proportion of respondents with poor and good school functions based on parent reports. Women's quality of life was worse than that men's, as reported by both the parent and child reports. Based on age, respondents with an age range of 8-12 years own the worst quality of life on parent reports and respondents with an age range of 13-18 years had the worst quality of life on child reports. (Table 2)

Table 2. Descriptive statistics of the respondents PedsQLTM Score

	Parent Reports (n=26)		Child Reports (n=25)	
	Median (min-max)	n (%)	Median (min-max)	n (%)
Physical Function	81.00(22-100)		78.00(25-100)	
Poor		8(31%)		11(44%)
Good		18(69%)		14(54%)
Emotional Function	60.00(10-100)		55.00(5-100)	
Poor		16(62%)		16(64%)
Good		10(38%)		9(36%)
Social Function	100.0(25-100)		90.00(33-100)	
Poor		3(12%)		7(28%)
Good		23(88%)		18(72%)
School Function	65.00(25-100)		60.00(30-90)	
Poor		13(50%)		17(68%)
Good		13(50%)		8(32%)
Total Function	78.00(35-96)		70.00(36-94)	
Poor		8(31%)		12(48%)
Good		18(69%)		13(52%)
Total Function based on gender				
Male	85.50(71-96)		93.00(64-94)	
Female	77.00(35-91)		67.00(36-89)	
Total Function based on age				
2-4	88.00(88-88)		-	
8-12	71.00(66-85)		72.00(50-87)	
13-18	78.00(35-96)		67.00(36-94)	

Table 3 shows the correlation between goitre size and the quality of life which consists of 4 domains, namely physical, emotional, social, and school functions that are accumulated in the form of a total score both viewed from the parent's report and the child's report. The correlation coefficient is calculated using the Spearman rank correlation test. The Spearman rank correlation test results showed no significant correlation between the goitre size and the quality of life in all domains both from child reports and parent reports. ($p > 0.05$)

Table 3. Correlation Between Goiter Size and Quality of Life

	Goiter Size	
	r_s	P value
Quality of Life based on Parent Reports		
Physical Domain	-0.25	0.11
Emotional Domain	-0.09	0.33
Social Domain	-0.24	0.12
School Domain	-0.01	0.48
Total Score	-0.18	0.20
Quality of Life based on Child Reports		
Physical Domain	-0.21	0.15
Emotional Domain	0.04	0.42
Social Domain	0.18	0.19
School Domain	-0.02	0.46
Total Score	-0.06	0.38

DISCUSSION

The characteristics of the respondents showed that more than 80% of the respondents were female. Hyperthyroidism itself is more frequent in women when compared with men where female sex is also referred to as one of the nongenetic risk factors of Graves' disease.¹ The majority of respondents in this study were 13-18 years old. Epidemiologically, the incidence of Graves' disease increases with age and the peak age is during adolescence.¹⁴ Physical examination results showed that 22 of the respondents had palpable goitre in a chin-neutral position where the goitre is indeed one of the main clinical features of Graves' disease in childhood.¹⁵

The difference between the results of parent reports and child reports of PedsQLTM may be due to lack of parental knowledge of their children's experience, differences in perspective between parents and children, as well as differences in awareness, sensitivity, and tolerance of parents towards health problems experienced by their children.⁸ PedsQLTM total score of parent reports indicate that nearly half of the respondents have a poor quality of life. Research that has been done by Riguetto et al. found that patients with hyperthyroidism have a more severe quality of life impairment when compared to people who are euthyroidism.¹⁶ In physical and social domain, more respondents had a good quality of life rather than poor probably because of the respondents were from the outpatient clinic who have received treatment with antithyroid drugs to improve their clinical condition and improvement of lab results.

From the various quality of life domains, the school domain scores indicate that more respondents had poor scores than the good one according to child reports. This result is similar to one of clinical presentation in patients with Graves' disease which shows a worsening of academic performance and attention.¹⁴ The lowest score lies in the emotional function of the respondents. Besides, it also found that more respondents have a poor score than a good one in this domain both in parent reports and child reports. Graves' disease patients themselves often experience symptoms such as memory problems, emotional lability, irritability, depression, and anxiety which adversely affect the quality of life of patients.¹⁷ A study in adult in Denmark also found that one of the most disturbed domains in nontoxic goiter patients was the anxiety domain where the patients felt concerned about being seriously ill, feeling uneasy, and feeling nervous.¹⁸ A study on patients with Graves' disease also found impairment in quality of life, especially in the physical and emotional domains. Poor quality of life in patients with Graves' disease is often associated with psychiatric symptoms such as generalized anxiety and mood disorders that are higher than in the normal population.¹⁶

The results from interviews with the patients and their parents found that patients often experiencing emotional disturbances in the form of irritability. This matter contributes to the lowest emotional domain score compared to other domains. Patients also complained that they were easily tired during exercise, teased by their friends because of exophthalmos and excessive sweating appearance, and often did not go to school because they had to go to the hospital. These things lead to a decline in the physical, emotional, social, and school domains of

PedsQLTM scores both in parent and child reports. Men's quality of life is usually higher than women's.¹⁶ This is confirmed by the results of data analysis showing that the calculation of the total PedsQLTM scores shows higher results in male than female patients in both parent and child reports.

The results of this study found that there is no significant correlation between goiter size and quality of life in all domains from both the child reports and the parent reports. This result is different from the previous study conducted in Philippines where this study found that goiter grade was moderately correlated with goiter symptoms that would later impair quality of life.¹⁷ The absence of this correlation is likely to occur because of respondents were from the outpatient clinic and undergoing treatment with antithyroid drugs in a different range of time. Treatment of hyperthyroidism can improve the quality of life and also reduce the mortality and morbidity of hyperthyroidism itself.¹⁹

A study by Klaver et al found that there was no significant difference in the quality of life of subjects who experienced an increase or decrease in TSH or T4 values with the subjects who had a normal thyroid function. It was also found that several other things became quality of life predictors such as smoking status, co-morbidity, and BMI. Impaired quality of life in patients with thyroid disease can occur due to awareness of the disease state they are experiencing where a person feels unwell rather than their endocrinological disturbances.⁹

The results of the study indicate the need to conduct quality of life assessments in clinical settings in children and adolescents with hyperthyroidism which has a manifestation of goiter especially to find out whether there are emotional disturbances and difficulty in activities at school. The strength of this study is a similar study in children and adolescents has never been done before. This study is the first time conducted in Indonesia. The limitation of this study is the measurement of quality of life that only uses generic instruments because PedsQLTM itself does not yet provide disease-specific questionnaires for children with thyroid disease. The suggestion that can be given is that in assessing patients, the psychological aspect and how the health complaints experienced by patients interfere with their daily lives need to be considered so that early intervention in the form of psychological consultations can be carried out to prevent the worsening quality of life. Suggestions for future research are to conduct research in a larger population to increase the power of the study, measure both general and disease-specific quality of life of the subjects, and paying attention to confounding variables such as age and gender. Research comparing the quality of life of patients before and after treatment can also be conducted to find out the effects of the treatment.

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