Health-Related Quality of Life in Thai Children with Allergic Respiratory Diseases

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Background: *Childhood asthma and allergic rhinitis (AR) are major chronic respiratory diseases affecting health-related quality of life (HRQOL). Few school-based studies have reported the HRQOL of individuals with asthma or AR.*
Objective: *The study measured HRQOL among primary school pupils with asthma, AR and both diseases combined in Thailand.*
Material and Method: *Two thousand and eight school pupils, aged 6-9 years, from six primary schools were randomly studied. The self-reported Pediatric Quality of Life Inventory Core Scales (PedsQL) questionnaires were used to evaluate pupils' HRQOL in their classrooms. The parent-reported PedsQL questionnaires and the parent-reported International Study of Asthma and Allergies in Childhood (ISAAC) written questionnaire were sent to their parents to evaluate pupils' HRQOL and identify asthma and AR respectively.*
Results: *One thousand nine hundred and twenty-four of 2,008 (95.8%) pupils completed the self-reported PedsQL questionnaire and 1,789/2,008 (89.1%) parent-reported questionnaires were returned for analysis. By child self-reports, asthmatic pupils with or without AR had significant impairment in all domains of PedsQL questionnaire ($p \leq 0.049$) compared to healthy pupils. Pupils with combined asthma and AR had significantly lower summary ($p = 0.015$) and emotional functioning mean scores ($p = 0.001$) than pupils with AR alone. By parent-reports, pupils with asthma alone, AR alone, and combined diseases had significant impairment in emotional functioning ($p \leq 0.047$), compared to healthy pupils.*
Conclusion: *Allergic respiratory diseases significantly reduced HRQOL in Thai school pupils, especially for emotional functioning. AR alone minimal impairs HRQOL while asthma with or without AR significantly reduce HRQOL in all domains.*

Keywords: *Asthma, Allergic rhinitis, Allergic respiratory disease, Pupils, Health-related quality of life, Pediatric Quality of Life Inventory Core Scales*

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Health-related quality of life (HRQOL) is increasingly recognized as an essential health outcome in patients with chronic diseases. It is defined as the patient's perception of physical, emotional and social well-being[1,2]. Asthma and allergic rhinitis (AR) are chronic respiratory diseases with global distributions[3,4]. The prevalence rates of childhood asthma and AR in Thailand, using the International Study of Asthma and Allergies in Childhood (ISAAC) written questionnaire, were from 5.5% to 11.7% and from 20.8% to 38.4%, respectively[5]. Asthma and AR are closely related and considered different manifestations of the same underlying atopic state[6]. They very often coexist in the same patient. 30% to 90% of asthmatic patients have AR, whereas 20% to 50% of patients with AR have asthma[7].

There is a growing awareness of the relationship between respiratory allergies and reduced HRQOL, work or school performance, and emotional well-being. Asthma symptoms lead to impairment in physical, emotional, and social aspects of a patient's life[8]. Patients with AR report annoyance from nasal symptoms (nasal congestion, sneezing, and rhinorrhea) and also experience non-nasal symptoms that are troublesome including headache, sleep disturbance, and learning difficulties[8,9]. The impact of AR on HRQOLas being related to asthma and asthma control has been reported[10,11].

In Thailand, there are validated Thai versions of specific instruments to assess the HRQOL in asthma or AR but not both diseases together[12,13]. The authors also use the Thai Pediatric Quality of Life Inventory Core Scales (PedsQL) questionnaire, the generic

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instrument, to measure HRQOL across a spectrum of different diseases[14,15]. No studies in Thailand have measured the HRQOL in asthma and AR in a single population. Thus, the objective of the present study was to assess HRQOL among primary school pupils with asthma, AR, and both diseases combined in Thailand.

Material and Method

A total of 2,008 school pupils, aged 6-7 years, from 6 primary schools, located in Bangkok (n = 1,422) and Buriram (n = 586) were randomly recruited to the study. Data collection was performed by two methods. Firstly, the self-reported PedsQL questionnaires and assent forms were distributed to pupils in their classrooms. The PedsQL items were read slowly and loudly, sentence by sentence, by a research team member and the pupils themselves completed the questionnaires. Secondly, the parent-reported PedsQL questionnaire, the ISAAC written questionnaire, written informed consent forms, and a letter explaining the purpose of the study were sent to their parents at home. Once completed, the parents were asked to send back the questionnaires to the research team using a stamped envelope provided by the research team. The study was approved by the Ethics Committee of the Thammasat University.

Measures

The Thai version of ISAAC written questionnaire was used as the questionnaire-based screening tool to identify asthma and AR among school pupils by proxy-reports. Asthma or non-asthma was classified, based on the answers to the following questions: "Has your child had been wheezing or whistling in the chest in the past 12 months?" and "Has a doctor ever diagnosed your child as asthmatic?". Similarly, AR or non-AR was classified, based on the answers to the following questions: "Has your child had a problem with sneezing or a runny or blocked nose when he/she did not have a cold or the flu in the past 12 months?" and "Has a doctor ever diagnosed your child as AR?[3]".

The Thai version of PedsQL questionnaire has been validated[14]. Parallel child-self-reports (ages 5-7) and parent proxy-reports (ages 5-7) were used in this study. The 23-item PedsQL encompasses the following subscales: physical functioning, emotional functioning, social functioning, and school functioning. The instructions ask how much of a problem each item has been during the past one month. A 5-point response scale is used for child self-reports and parent proxy-reports (0 = never a problem; 1 = almost never a problem; 2 = sometimes a problem; 3 = often a problem; 4 = almost always a problem). Items are reverse-scored and linearly transformed to a 0-100 scale (0 = 100, 1 = 75, 2-3 = 50, 4 = 0), so that higher scores indicated better HRQOL[14].

Statistical analysis

Statistical analysis was performed using the STATA statistical package, version 9.0 (Stata Corporation, Texas, USA). Descriptive statistics were used to describe the pupils and their family characteristics and describe the PedsQL mean scores of each respiratory allergy group (pupils with asthma alone, AR alone, and combined asthma and AR) and the healthy group (non-asthma and non-AR pupils). Prevalence estimation of respiratory allergic diseases was presented with 95% confidence intervals. One-way analysis of variance (ANOVA) was used to compare the PedsQL mean scores among the four groups with F statistic tests. Then, a series of pair-wise 't' tests with Bonferroni correction was computed.

Results

Of 2,008 pupils, 1,789 (89.1%) parent-reported questionnaires were returned for analysis (Table 1). According to the proxy-reported ISAAC written questionnaires, the prevalence rates of asthma and AR were 218/1,789 (12.2%, 95% confidence

Table 1. Pupils and family characteristics

	Frequency (%) n = 1,789
Gender	
Boys	879 (49.1)
Girls	910 (51.9)
Paternal age	43.5 (6.4)
Maternal age	40.7 (5.7)
Parental highest education	
Primary school or lower	129 (7.2)
Secondary school	875 (48.9)
Bachelor degree or higher	785 (43.9)
Informants (proxy-reports)	
Mother	1,100 (61.5)
Father	443 (24.8)
Other relatives	246 (13.8)
Allergic rhinitis alone	370 (20.7)
Asthma alone	76 (4.2)
Asthma plus allergic rhinitis	142 (7.9)

interval: 10.7-13.8%) and 512/1,789 (28.6%, 95% confidence interval: 26.5-30.8%), respectively. Of 512 pupils with AR, 27.7 percent (142 pupils) had asthma (95% confidence interval: 23.9-31.8%). Of 218 pupils with asthma, 65.1 percent (142 pupils) had AR (95% confidence interval: 58.4-71.4%).

Child self-reported HRQOL

Of the total of 2,008 pupils, 1,924 (95.8%) pupils completed the child self-reported PedsQL questionnaire. The summary and individual domains of the PedsQL mean scores were significantly ($p \leq 0.004$ by F tests) associated with respiratory allergy (Table 2). Pupils with combined asthma and AR had the lowest summary mean score (68.1), following by those with asthma alone (71.2) and AR alone (77.0), respectively. This pattern of the mean scores was also observed for physical, emotional, and social functioning domains. The lowest mean score (53.0) was for emotional disturbance in children with asthma plus AR.

Compared to healthy pupils, asthmatic pupils with or without AR had significant impairment in all domains of PedsQL questionnaire ($p \leq 0.049$). Pupils with combined asthma and AR had significantly lower summary ($p = 0.015$) and emotional functioning mean scores ($p = 0.001$) than pupils with AR alone.

Parent proxy-reported HRQOL

The emotional functioning ($p<0.001$) and school functioning ($p = 0.045$) mean scores were significantly associated with allergic respiratory diseases. Pupils with asthma alone, AR alone, and combined diseases had significant impairment in emotional functioning, compared to healthy pupils ($p \leq 0.047$).

Discussion

In this population-based study of Thai primary school pupils, burdens of asthma and AR were documented. In terms of HRQOL, kids gave significant results with respiratory allergic diseases. Emotional function affected the most and consistent with kids and parents. The validity of the present study is supported by using standard tools in the study. The HRQOL tool, the Thai version of the PedsQL, has been validated in terms of internal consistency, reliability (test-retest), and discriminatory property, the ability to distinguish patients and healthy children[14]. The PedsQL is a widely used generic tool for determining the relative burden of different diseases[16]. The asthma and AR definitions were based on the ISAAC questionnaire and had been widely used in epidemiological studies[3,4]. These definitions have been shown to be robust and distinguish healthy children from those with asthma and AR[17,18]. The asthma definition also showed high agreement with respiratory physician diagnosis[17].

The prevalence rates of asthma (12.2%) and AR (28.6%) in present study are consistent with the epidemiological results of ISAAC studies in Thailand reviewed by Trakultivakorn et al[5]. Also consistent with other studies[7,19], were the high co-morbidity rates between AR and asthma; approximately 28% of AR pupils had asthma and just over 65% of asthmatics had AR.

Both self-reported and parent-reported PedsQL questionnaires were answered at the same time in the present study. The most affected domain in the self and parent-reported PedsQL questionnaire was emotional functioning. In the self-reported PedsQL, most of the mean scores in all domains were significantly lower than in healthy children whereas only the emotional domain was significantly associated with asthma/AR in the parent-reported PedsQL. This discordance has been observed before. Rosemarie et al[20] reported that discordant (low to medium agreement) was observed between self-reported and parent-reported PedsQL scores in schoolchildren. Thus, self-reported PedsQL questionnaires may be more sensitive at detecting the effects of allergic respiratory diseases on pupils' HRQOL. Indeed, Varni et al[21] recommended not to use the parent-reports as a substitute for child self-reports when children were willing and able to provide their perspectives.

Children with AR alone had minimal impairment of HRQOL, consistent with the findings from previous studies[8,22,23]. Asthmatic pupils with or without AR had significant impairment in all domains of HRQOL. Nevertheless, the mean HRQOL scores between the asthma and asthma/AR group were not significantly different. Emotional disturbance was greatest in pupils with combined disease and this was significantly greater compared to the AR alone children. Vandenplas et al[24] reported the impact of rhinitis on HRQOL as being related to asthma and asthma control. However, a hospital-based study in Turkey by Kalpaklioglu el al[22] found that mental health scores in patients with isolated AR were lower than those of asthmatic subjects whereas all asthmatic patients (with or without AR) had significantly greater impairment in physical functioning. Diagnostic

Table 2. Self-reported and parent-reported Pediatric Quality of Life Inventory Core Scales (PedsQL) mean scores in healthy pupils and pupils with asthma, allergic rhinitis or both diseases combined

	Self-reported PedsQL scores					Parent-reported PedsQL scores				
	Healthy pupils n = 1,187	Allergic rhinitis alone n = 356	Asthma alone n = 69	Both diseases n = 132	*p*-value[#]	Healthy pupils n = 1,191	Allergic rhinitis alone n = 358	Asthma alone n = 71	Both diseases n = 135	*p*-value[#]
Physical functioning, mean (SD)	86.2 (8.1)	79.4 (14.9) *p* = 0.028*	79.1 (11.3) *p* = 0.049*	74.0 (12.6) *p* = 0.001*	<0.001	65.9 (21.5)	64.8 (21.4)	64.6 (22.8)	62.2 (21.5)	0.268
Emotional functioning, mean (SD)	76.0 (15.6)	70.1 (15.4) *p* = 0.001**	60.0 (10.3) *p* = 0.016*	53.0 (9.1) *p*<0.001*	<0.001	74.9 (15.5)	70.2 (16.6) *p* = 0.047*	69.5 (16.3) *p*<0.001*	69.0 (17.5) *p* = 0.005*	<0.001
Social functioning, mean (SD)	86.4 (12.0)	81.3 (12.7) *p* = 0.034*	76.1 (11.4) *p* = 0.009*	75.0 (13.9)	0.004	70.4 (19.4)	70.3 (19.9)	73.9 (20.6)	68.1 (19.8)	0.378
School functioning, mean (SD)	79.1 (13.5)	75.7 (15.5)	65.0 (8.7) *p* = 0.023*	66.8 (7.9) *p* = 0.009*	0.001	62.3 (17.6)	60.6 (17.4)	64.5 (16.9)	57.8 (17.7)	0.045
Total summary score, mean (SD)	82.5 (9.5)	77.0 (11.2) *p* = 0.045* *p* = 0.015**	71.2 (6.1) *p* = 0.009*	68.1 (7.1) *p*<0.001*	<0.001	66.6 (15.0)	66.3 (14.9)	67.7 (15.5)	64.0 (15.3)	0.403

[#] The Peds QL mean scores of all groups were compared by F statistic tests in analysis of variance (ANOVA)

* The Peds QL mean scores of pupils with each respiratory allergy group were significantly lower than the mean scores of the healthy pupils (*p*-value <0.05), by Bonferroni adjustment of a series of pairwise t-tests

** The PedsQL mean scores of pupils with allergic rhinitis alone was significantly lower than the mean scores of the both disease group (*p*-value <0.05), by Bonferroni adjustment of a series of pairwise t-tests

accuracy, severity distribution of asthma and AR, and appropriate treatment in school-based and hospital-based settings may differ and result in different conclusions.

There are some potential limitations of the present study. The use of the generic PedsQL questionnaire could have reduced the sensitivity for detecting impaired HRQOL. In Thailand, there is not currently a specific tool to measure HRQOL for use in concomitant asthma and AR. Selection bias was another concern for the study's external validity. Although our sample was large, only six schools from two provinces were randomly chosen for the study. The authors did not assess disease severity nor ask about treatment. Future studies should include such data as well as a validated specific questionnaire for concomitant asthma and AR. Further studies in primary schools and hospital-based settings in Thailand could be done to compare and contrast the findings and see how they might impact better holistic management of asthma and AR.

In conclusion, allergic respiratory diseases significantly reduced HRQOL in school pupils, especially in emotional functioning. AR alone minimally impairs HRQOL while asthma with or without AR significantly reduces HRQOL in all domains.

What is known on this topic?

Allergic rhinitis and asthma coexist very often in the same patient and both impair HRQOL. Disease-specific HRQOL questionnaires have been developed and validated for asthma and rhinitis separately.

What this study adds?

Allergic respiratory diseases significantly reduced HRQOL in school pupils, especially in emotional functioning. Allergic rhinitis alone minimal impairs HRQOL while coexisting of allergic rhinitis and asthma significantly reduces HRQOL in all domains.

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Potential conflicts of interest

None.

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คุณภาพชีวิตด้านสุขภาพของเด็กไทยที่มีโรคภูมิแพ้ระบบทางเดินหายใจ

ภาสกร ศรีทิพย์สุโข, อรภัทร วิริยอุดมศิริ

ภูมิหลัง: *โรคหืดและจมูกอักเสบจากภูมิแพ้ในเด็กเป็นโรคระบบทางเดินหายใจเรื้อรังที่สำคัญที่มีผลกระทบต่อคุณภาพชีวิตด้านสุขภาพ รายงานการศึกษาเกี่ยวกับคุณภาพชีวิตในเด็กที่ป่วยเป็นโรคหืดและจมูกอักเสบจากภูมิแพ้ในโรงเรียนยังมีน้อย*

วัตถุประสงค์: *เพื่อศึกษาวัดระดับคุณภาพชีวิตด้านสุขภาพในเด็กนักเรียนไทยชั้นประถมศึกษาตอนต้นที่เป็นโรคหืดอย่างเดียว จมูกอักเสบจากภูมิแพ้อย่างเดียว และเป็นทั้ง 2 โรคร่วมกัน*

วัสดุและวิธีการ: *ศึกษาในเด็กนักเรียนอายุ 6-9 ปี จำนวน 2,008 ราย โดยสุ่มจาก 6 โรงเรียน โดยให้แบบสอบถาม The Pediatric Quality of Life Inventory (PedsQL) ฉบับให้เด็กตอบเองในห้องเรียนเพื่อวัดระดับคุณภาพชีวิตของตนเอง และส่งแบบสอบถาม PedsQL ฉบับผู้ปกครองเป็นผู้ประเมินเด็ก และแบบสอบถาม International Study of Asthma and Allergies in Childhood (ISAAC) ฉบับผู้ปกครองเป็นผู้ประเมินเด็กเกี่ยวกับภาวะโรคหืดหรือจมูกอักเสบจากภูมิแพ้ของเด็ก*

ผลการศึกษา: *มีแบบสอบถามคุณภาพชีวิตฉบับเด็กตอบ 1,924 ฉบับ (ร้อยละ 95.8) และแบบสอบถามฉบับผู้ปกครองตอบ 1,789 ฉบับ (ร้อยละ 89.1) ที่สามารถนำวิเคราะห์ข้อมูลได้ จากผลการศึกษาโดยนักเรียนประเมินคุณภาพชีวิตตนเองนั้น พบว่าเด็กนักเรียนที่เป็นโรคหืดและมีหรือไม่มีจมูกอักเสบจากภูมิแพ้ร่วมด้วยนั้น มีระดับคุณภาพชีวิตในทุกด้านน้อยกว่าเด็กนักเรียนปกติอย่างมีนัยสำคัญ ($p \leq 0.049$) เด็กที่มีทั้งโรคหืดและจมูกอักเสบจากภูมิแพ้มีระดับคะแนนคุณภาพชีวิตโดยรวม ($p = 0.005$) และคุณภาพชีวิตด้านอารมณ์ ($p = 0.001$) น้อยกว่าเด็กที่มีจมูกอักเสบจากภูมิแพ้อย่างเดียว สำหรับผลการศึกษาคุณภาพชีวิตเด็กโดยผู้ปกครองเป็นผู้ตอบนั้นพบว่า เด็กที่มีโรคหืดอย่างเดียวจมูกอักเสบจากภูมิแพ้อย่างเดียวหรือมีทั้งสองโรคนั้น จะมีระดับคะแนนด้านอารมณ์น้อยกว่าเด็กปกติอย่างมีนัยสำคัญ ($p \leq 0.047$)*

สรุป: *โรคภูมิแพ้ของระบบทางเดินหายใจทำให้คุณภาพชีวิตของเด็กนักเรียนลดลงอย่างมีนัยสำคัญ โดยเฉพาะด้านอารมณ์ โรคจมูกอักเสบจากภูมิแพ้อย่างเดียวมีผลกระทบกับคุณภาพชีวิตเพียงเล็กน้อย ในขณะที่โรคหืดและจมูกอักเสบจากภูมิแพ้จะลดคุณภาพชีวิตเด็กในทุกด้านอย่างมีนัยสำคัญ*