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Quality of life and control of asthma and/or allergic rhinitis in children: Correlative study with CARAT Kids and ED-5D-Y. (QoLARy)

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Dedicatória

« Faites que le rêve dévore votre vie afin que la vie ne dévore pas votre rêve. »

Antoine de Saint-Exupéry

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Resumo

Introdução: A Qualidade de vida em crianças que sofrem de asma e/ou rinite alérgica parece ser menor do que nos saudáveis. No entanto, existem poucos estudos sobre o efeito da asma e rinite alérgica na qualidade de vida em crianças. Por isso, o objetivo deste estudo é descobrir a associação entre a qualidade de vida em crianças e o controle da asma ou rinite alérgica avaliada pelo CARATKids.

Métodos: Num estudo observacional, os instrumentos EQ-5D-Y e o CARATKids foram aplicados a uma amostra de crianças de 6 a 12 anos, com diagnóstico de asma ou rinite alérgica. Após a obtenção do consentimento informado, as crianças e seus pais completaram os dois questionários. Os resultados foram analisados com o Pacote de Software de Ciências Sociais (SPSS), versão 17.0. Uma análise descritiva foi utilizada para a caracterização da amostra. Testes paramétricos e não paramétricos foram realizados, incluindo o qui-quadrado, Mann-Whitney U e teste t de Student, depois de ser observada normalidade dos dados. Um valor-p inferior a 0,05 foi considerado para diferença significativa.

Resultados: Quarenta e sete crianças, com idade média de 9,34 anos foram estudadas. A amostra tinha 72.3% de crianças do sexo masculino. A maioria com diagnóstico de rinite alérgica, história familiar de atopia, vivia em área urbana e tinha animais de estimação em casa. A pontuação média do CARATKids foi 4,64 (num intervalo possível de 0 a 13). A qualidade de vida, usando o EQ-5D-Y, obteve uma média de pontuação de 0,33. Os resultados da qualidade de vida no primeiro quartil (“muito bons”) e no segundo quartil (“bons”) foram encontrados em 68,1% da amostra. A média do EQVAS foi de 85,30 ± 16,65, com mediana de 90,00. Muito boa qualidade de saúde foi relatada por 15 pacientes. Usando uma correlação de Pearson, para avaliar a correlação entre CARATKids e EQVAS, descobrimos que existe uma correlação negativa significativa (p=-0.37): Quanto mais respostas positivas pelas crianças, pelos pais ou ambos, no CARATKids, menor sua qualidade de vida na Escala Visual Analógica. A qualidade de vida foi relativamente elevada e foi influenciada pelo grau de controlo da asma ou da rinite alérgica.

Conclusão: O teste CARATKids tem boa correlação com o grau de qualidade de vida em crianças avaliadas pelo EQ-5D-Y. O CARATKids pode ser usado na prática clinica para controlar a asma e a rinite alérgica e para melhorar a qualidade de vida destas crianças.

Palavras-chave

Asma, Rinite Alérgica, Crianças, Qualidade de Vida, CARATKids.

Resumo Alargado

Introdução: A asma é uma das doenças crónicas mais prevalentes em todo o mundo. A rinite alérgica, apesar de ser sub-diagnosticada, também é um problema de saúde global com prevalência crescente. A rinite é frequentemente associada à asma e representa um fator de risco para esta. 60-80% das crianças asmáticas têm rinite alérgica e 40% dos pacientes com rinite alérgica têm asma concomitante. Ambas as patologias têm o poder de afetar a qualidade de vida das crianças. Assim, a qualidade de vida nas crianças diagnosticadas com estas doenças, parece ser inferior à das crianças saudáveis. No entanto, existem poucos estudos sobre o efeito da asma e da rinite alérgica sobre a qualidade de vida em crianças. Assim, o objetivo deste estudo é a associação entre a qualidade de vida em crianças e o controle da asma ou rinite alérgica avaliada pelo CARATKids. Ao diagnosticar e tratar a asma e a rinite alérgica nas crianças, podemos melhorar a sua qualidade de vida.

Métodos: A amostra incluiu crianças de 6 a 12 anos, com diagnóstico de asma ou rinite alérgica que atenderam à consulta externa de Imunoalergologia pediátrica do centro hospitalar Amato Lusitano em Castelo Branco. Após a obtenção do consentimento informado, as crianças e seus pais completaram os dois questionários selecionados: The Control of Allergic Rhinitis and Asthma Test – Kids version (CARATKids) and the The EuroQOL Five Dimensions questionnaire – Youth version (EQ-5D-Y). Os dados recolhidos foram analisados com o Pacote de Software de Ciências Sociais (SPSS), versão 17.0. Uma análise descritiva foi utilizada para caracterizar a amostra. Testes paramétricos e não paramétricos foram realizados, incluindo o qui-quadrado, Mann-Whitney U e teste t de Student, após ser observada normalidade dos dados. Um valor-p inferior a 0,05 foi considerado para diferença significativa em todos os testes utilizados.

Resultados: O estudo contou com quarenta e sete participantes, com idade média de 9,34 anos (crianças dos 6 aos 12 anos). A amostra tinha 72.3% de crianças do sexo masculino. A maioria tinha diagnóstico de rinite alérgica, história familiar de atopia, vivia em área urbana e tinha animais de estimação em casa. A pontuação média do CARATKids foi 4,64 (num intervalo possível de 0 a 13). A qualidade de vida, usando o EQ-5D-Y, obteve uma média de pontuação de 0,33. Os resultados da qualidade de vida no primeiro quartil (“muito bons”) e no segundo quartil (“bons”) foram encontrados em 68,1% da amostra. A média do EQVAS foi de 85,30 ± 16,65, com mediana de 90,00. Muito boa qualidade de saúde foi relatada por 15 pacientes. Usando uma correlação de Pearson, para avaliar a correlação entre CARATKids e EQVAS, descobrimos que existe uma correlação negativa significativa (p=-0.37): Quanto mais respostas positivas dadas pelas crianças, pelos pais ou ambos, no CARATKids, menor sua qualidade de vida na Escala Visual Analógica. A qualidade de vida foi relativamente elevada e foi influenciada pelo grau de controlo da asma ou da rinite alérgica.

Conclusão: O teste CARATKids tem boa correlação com o grau de qualidade de vida em crianças avaliadas pelo EQ-5D-Y. O CARATKids pode ser usado na prática clinica para controlar a asma e a rinite alérgica e para melhorar a qualidade de vida destas crianças.

Abstract

Introduction: Quality of life in children suffering from asthma and/or allergic rhinitis seems to be lower than in healthy children. However, there are few studies of the effect of asthma and allergic rhinitis on the quality of life of children. The objective of this study is to find if quality of life in children correlates with the control of asthma and allergic rhinitis evaluated by the CARATKids test.

Methods: In an observational study the EQ-5D-Y and the CARATKids instruments were applied to a sample of children aged from 6 to 12 years old, diagnosed with asthma or allergic rhinitis. After obtaining written informed consent, the children and their parents completed both questionnaires. Results were analyzed with the Software Package for Social Sciences (SPSS), version 17.0. Descriptive analysis was used for the characterization of the sample. Parametric and non-parametric tests were performed, including chi-squared, Mann-Whitney U and Student t-tests, after data normality was observed. A p-value less than 0.05 was considered for significant difference.

Results: Forty-seven children, with a mean age of 9.34 years were studied. The sample had 72.3% male children. Most of them had a family history of atopic disease, were living in an urban area and had pets at home. The mean score of CARATKids was 4.64 (in a possible score range from 0 to 13). The mean quality of life score, using the EQ-5D-Y, was 0.33. QoL scores in the first quartile ("very good") or second quartile ("good") were found in 68.1% of the sample. The mean visual analogue scale (VAS) quality of life score was 85.30±16.65 with a Median of 90.00. "Very good" Quality of Health was reported by 15 patients. Using a Pearson correlation, to evaluate the correlation between CARATKids and EQVAS, we found that there is a significant negative correlation (p= -0.37). With more positive answers given by the children, the parents, or both, in the CARATKids instrument, the QoL in the Visual Analogue Scale was lower. Quality of Life was relatively high and was influenced by the degree of control of asthma or allergic rhinitis.

Conclusion: The CARATKids test has good correlation with quality of life in children measured by the EQ-5D-Y. CARATKids can be used in clinical practice, to control asthma and allergic rhinitis and to improve QoL in children.

Keywords

Asthma, Allergic Rhinitis, Children, Quality of Life, CARATKids.

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Lista de Acrónimos

AR	Allergic Rhinitis
ARPA	Avaliação da Prevalência e caracterização da rinite em utentes dos Cuidados de saúde primários de Portugal Continental
CARATKids	The Control of Allergic Rhinitis and Asthma Test – Kids Version
CEISUC	Centro de Estudos e Investigação em Saúde da Universidade de Coimbra
EQ-5D-Y	The EuroQOL Five Dimensions questionnaire – Youth version
EQVAS	The EuroQOL Visual Analogue Scale
FeNo	Determination of nitric oxide in exhaled breath
ISAAC	International Study of Allergy and Asthma in Childhood
SPSS	Software Package for Social Sciences
SPT	Skin prick tests
WHO	The World Health Organization

1. Introduction

Asthma is a chronic inflammatory disorder of the lower airways which causes variable and reversible obstruction. Patients have recurrent episodes of wheezing, dyspnoea, chest tightness and cough; symptoms tend to worsen at night or early in the morning (1).

Asthma is one of the most prevalent chronic illnesses worldwide, affecting around 300 million individuals. Its incidence has been increasing in developing countries (1). It has a major impact on quality of life (2). According to the "Programa Nacional para as Doenças Respiratórias", the prevalence of asthma in Portugal is greater than 11.0% of the population in the age group 6-7 years and 11.8% in the 13-14 years age groups in 2012 (3). Because of wide variation in severity of symptoms, asthma may interfere with everyday activities, may have an impact on family life and may lead to a decrease in the child's quality of life (4).

Allergic rhinitis is defined as a clinically symptomatic nasal disease induced by exposure to allergens, and characterized by an IgE-mediated inflammation of the mucous membranes of the nose. Symptoms include rhinorrhea, nasal obstruction, nasal itching, sneezing and postnasal drip that are reversible spontaneously or with medication. (5, 6)

Allergic rhinitis is also a global health problem. It is a common disease that affects 10 to 20% of the population with increasing prevalence. It is part of the "allergic march" during childhood and is most prevalent during school age (6). In 2002, the International Study of Asthma and Allergy in Childhood (ISAAC) identified 24.9% of children aged 6-7 years and 34.4% of adolescents aged 13-14 years with complaints consistent with the diagnosis of allergic rhinitis (7). In 2004, the Rhinitis prevalence and characterization survey in primary care centers of mainland Portugal (ARPA) study found a prevalence of 25.6% in patients under 25 years of age (8). While allergic rhinitis is not a life-threatening disease, it interferes with quality of life, sleep and daily functioning (9, 10).

Pathophysiological studies suggest that a strong relationship exists between rhinitis and asthma. The upper and lower airways are affected by a common inflammatory process that can be sustained and amplified by interconnected mechanisms. The allergic rhinitis is associated with asthma and is a risk factor for this illness. 60-80% of asthmatic children have rhinitis and nearly 40% of patients with rhinitis have concomitant asthma. (2, 11-13).

Quality of Life is a multidimensional concept defined by the WHO as the individual's perception of their position in life in the context of culture and value systems in which they live and in relation to their goals, expectations, standards and concerns. (WHOQOL Group, 1994). Quality of life includes at least the following dimensions: physical condition, psychological state (affective and cognitive), personal belief and social relationships. Quality of life also includes positive dimensions, such as mobility, and negative dimensions such as pain (14).

There are few studies of the effect of asthma and allergic rhinitis on the quality of life of children. The objective of this study was to assess the association between quality of life in children and the control of asthma and allergic rhinitis evaluated by the CARATKids test. By diagnosing and treating asthma and allergic rhinitis in children, we can improve their quality of life.

2. Material and Methods

2.1. Study design and sample selection

This was a cross-sectional study of youngsters aged 6 to 12 years with a confirmed diagnosis of asthma or/and AR, who were followed in a hospital asthma outpatient clinic. The ethics Committee of the Amato Lusitano Hospital, Castelo Branco, Portugal approved the research protocol.

2.2. Patient Recruitment

Patients were invited to participate in the study during a medical consultation, between October 2014 and January 2015. Parents or the legal guardian of the child were asked to give a written informed consent (Appendix 1) for participation in the study, in accordance with the Declaration of Helsinki, after the study was explained to them.

2.3. Questionnaires

All volunteers were interviewed by a trained interviewer who completed the questionnaires to ensure maximal homogeneity in data collection. Data on gender, age, date of the diagnosis, personal and family history of atopy and respiratory disease, place of residence, animals at home and medications used last trimester were obtained (Appendix 2). The Control of Allergic Rhinitis and Asthma Test – Kids (CARATKids) and the The EuroQOL Five Dimensions questionnaire – Youth version (EQ-5D-Y) validated for use in Portugal were applied (Appendix 3 and 4).

The CARATKids and the EQ-5D-Y questionnaires were administered in order to assess symptoms of asthma and AR in the children and its effects on their daily lives and their QoL.

CARATKids is the first questionnaire to assess simultaneously child's asthma and AR control (15, 16). This tool can be readily used in clinical practice and in primary care in particular (17). The 13-item questionnaire showed to have good discriminative properties. Of the 13 items, five are to be answered by parents and eight by children. Each 'Yes' answer scores one point and the total score of CARATKids can be interpreted as controlled (<4), insufficiently controlled (4 and 5), and uncontrolled (>5). Uncontrolled asthma or rhinitis can be ruled out with a score of three or less and ruled in with a score higher than five with good sensitivity and specificity.

Although EQ-5D-Y is generic questionnaire (and not a health-related one) for QoL, a study showed that EQ-5D-Y seems to be a feasible instrument that shows convergent validity when it comes to measuring Health Related-QoL in children and adolescents with asthma (18). We chose to use that instrument, because it is quick to apply, and the children would not be distracted from it. Five dimensions are evaluated – 'mobility', 'looking after myself', 'doing usual activities', 'having pain or discomfort' and 'feeling worried, sad or unhappy' – and are based on three levels of severity - 'no problems', 'some problems' and 'a lot of problems'-. In addition to the five dimensions of quality of life assessed in the EQ-5D-Y, the instrument consists of a visual analogue scale (VAS), in which the best possible health score is 100 and the worst imaginable health score is zero.

2.4. Statistical Analysis

Results were analyzed with the Software Package for Social Sciences (SPSS), version 17.0 software. Descriptive analysis was used for the characterization of the sample. A *p*-value less than 0.05 was considered for significant difference. Parametric and non-parametric tests were performed, including chi-squared, Mann-Whitney U and Student t-tests was performed after data normality was observed.

3. Results

3.1. Sample

The sample was composed of 47 children with asthma or AR who attended to the hospital asthma clinic for a specialized medical consultation. All the patients completed the necessary questionnaires. No refusal rate was encountered.

3.2. Demographic characterization of the study population

Of the 47 subjects evaluated, 13 (27.7%) were female and 34 (72.3%) were male. Mean age was 9.34 years ±2.34. 27 youngsters (57.4%) lived in an urban area, 25 (53.2%) lived in a house and 23 (48.9%) had an animal at home.

3.3. Clinical characterization of the study sample

Of the 47 children evaluated, 31 (66%) were diagnosed with AR, 7 (14.9%) with asthma and 9 (19.1%) with both conditions. For 19 (40.4%) patients, no medication was used in the previous 3 months. Most of the patients (74.5%) had a family history of atopic disease. The results of the CARATKids questionnaire are shown in tables 1 and 2. The mean score was 4.64 (with a possible score range from 0 to 13). The common symptoms were “blocked nose” and “sneezing”. Only 12.8% missed school or other activities and consulted with the doctor because of their allergies.

Table 1. Results of the CARATKids (n=47)

CARATKids symptoms	Number (%) of children or parents answering "Yes"
Blocked nose	30 (63.8%)
Sneezing	30 (63.8%)
Runny nose	23 (48.9%)
Shortness of breath	10 (21.3%)
Wheezing	11 (23.4%)
Cough	20 (42.6%)
Cough, wheezing or chest tightness during physical activity or laugh	19 (40.4%)
Feeling tired or difficulties during activities	24 (51.1%)
Wakes up at night	9 (19.1%)
Symptoms on awaking	22 (46.8%)
Miss school or activities	6 (12.8%)
Took or used more medication than usual	7 (14.9%)
Went to the doctor	6 (12.8%)

Table 2. CARATKids Score

	N	Mean	Std. Deviation	Std. Error Mean	Min-maximum
Total of answers "YES" by the children	47	3,57	2,22	0,32	2,92 a 4,23
Total of answers "YES" by the parents	47	1,06	1,33	0,19	0,68 a 1,50
Total of answers "YES" by the children and the parents	47	4,64	3,26	0,48	3,69 a 5,60

3.4. Assessment of the Quality of Life

In the assessment of the patients' quality of life using the EQ-5D-Y, the mean score was 0.33 (Table 3). QoL results in the first ("very good") or second quartile ("good"), were found in 68.1% (Table 4).

Table 3. EQ-5D-Y Score calculated as for the Portuguese population (n=47)

N		47
Mean		0,33
Median		0,29
Std. Deviation		0,08
Minimum		0,13
Maximum		0,65
Percentiles	25	0,29
	50	0,29
	75	0,39

Table 4. EQ-5D-Y Score frequency (n=47)

		Frequency	Percent
EQ-5D-Y Score	≤0,29	32	68,1
	>029	15	31,9
	Total	47	100,0

The mean VAS quality of life score was of 85.30±16.65 with a Median of 90.00 (Table 5). In a percentile distribution n=15, 31.9% of the sample claims to be in a very good quality of health (Table 6).

Table 5. EQVAS analyses. Your health from 0 to 100.

Mean ± SD		85.30 ± 16.65
Median		90
Min-Max		40-100
Percentiles	25	75.00
	50	90.00
	75	99.00

Table 6. EQVAS analyses

		Frequency	Percent
EQVAS	≤75	12	27,7
	76-98	19	40,4
	≥99	15	31,9
	Total	47	100,0

3.5. CARATKids and EQ-5D-Y

There was a significant association found between the total of answers "YES" by the Children and by the Children and the Parents and the degree of the child's QoL ($p<0.001$ and $p=0.004$ respectively, using the Mann-Whitney U test) (Table 7 and 9). There was no association found between the total of answers "YES" by the parents and their child's QoL ($p=0.24$ using the Mann-Whitney U test) (Table 8).

Table 7. Difference between the total of answers "YES" by the Children and the degree of QoL

		Degree of Quality of life		Total
		Very good and good	Not Satisfactory	
Total answers "YES" by the children	0-1	9	1	10
	2-3	12	2	14
	4-5	7	6	13
	6-8	4	6	10
Total		32	15	47

P<0,001

Table 8. Difference between the total of answers "YES" by the Parents and the degree of QoL

		Degree of Quality of Life		Total
		Very good and good	Not Satisfactory	
Total of answers "YES" by the parents	0-1	25	10	35
	2-3	5	3	8
	4-5	2	2	4
Total		32	15	47

P=0,238

Table 9. Differences between the total of answers "YES" by the Children + Parents and the degree of QoL

		Degree of Quality of Life		Total
		Very good and good	Not Satisfactory	
Total of answers "YES" by the children and the parents	0-3	16	3	19
	4-5	10	4	14
	6-12	6	8	14
Total		32	15	47

P=0,004

Table 10 shows that there is a significant correlation between EQVAS and the number of positive answers given by the children (p=0.021). Using a Pearson correlation, to evaluate the correlation between CARATKids and EQVAS (Table 11), we found that there is a significant negative correlation (p=-0.37): The more answers "YES" given by the children, the parents or both, in the CARATKids, the lower their QoL will be in the Visual Analogue Scale.

Table 10. Correlation between EQVAS percentile and the total of answers "YES" by the children

		N	Mean	Std. Deviation	P
Total of answers "Yes" by the kid	EQVAS <P75	31	4,13	2,22	
	EQVAS ≥P75	15	2,53	1,92	0,02

Table 11. Correlation CARATKids and EQVAS

VAS health rating	Total of answers "Yes" by the children	-0,35 [a]
		0,02 [b]
	Total of answers "YES" by the parents	-0,31 [a]
		0,03 [b]
	Total of answers "YES" by the children and the parents	-0,37 [a]
		0,01 [b]

[a] Pearson Correlation
[b] Sig. (2-tailed)

3.6. Complementary analysis

Table 12. Correlations of QoL and children's gender, age, diagnosis, family history of atopy, residence and presence of pets at home.

Degree of QoL measured by EQ-5D-Y.	Gender	0.20[a]
	Age	0.70[c]
	Diagnosis	0.79[b]
	Family history of atopy	0.19[a]
	Residence	0.41[b]
	Pets at home	0.68[a]

[a] Pearson's Chi-square
[b] p-value
[c] Student's t-test

4. Discussion

Before the elaboration of this theses, we worked in the translation and cross-cultural adaptation of CARATKids in French. We followed a protocol, based on international recommendations and best practices, who has three main steps: forward translation, back translation, and patient testing (17). Actually, we are in the patient testing phase, once we finished, CARATKids can be disseminated and adopted in primary and specialized care in France. Our project, also help the CEISUC (Centro de Estudos e Investigação em Saúde da Universidade de Coimbra) to apply the other tool used on this study, the EQ-5D-Y.

The present study, assesses the correlation between asthma and/or AR control and the QoL in children. There are few studies of AR impact on asthma in the pediatric age range (11). Some studies showed that an uncontrolled asthma or AR, will lead to a poor QoL in children (13, 19), which has implications for sleep, school functioning and limitation of activities (10, 12). It can also have a negative impact in emotional, intellectual and physical development (20, 21).

One of the main limitations of our study was recruitment of patients. We were only able to recruit 47 children with asthma and/or AR. Our sample is not large enough to allow us to extrapolate the data to the general population.

Another limitation is that the performance of CARATKids in children with isolated asthma or AR remains unknown (16) and only 19.1% of our sample were diagnosed with both conditions.

This cross-sectional design of our study is another limitation of our study. Asthma and AR have fluctuation symptoms and show seasonal variation. A longitudinal study would be preferred.

CARATKids assesses the degree of asthma and AR control in the previous two weeks whereas EQ-5D-Y focuses on limitations felt “today”. This discrepancy may be associated with a potential bias.

Our study showed that most patients were males with a mean age of 9.34 years, diagnosed with AR, living in a house located in an urban area, had a pet (with fur) at home and most of them had a family history of allergic illness. We found no correlation between QoL and children’s gender, age, diagnosis, place of residence, family history of atopy and presence of pets at home.

Some studies are in accordance with our results for the relation between QoL and child's gender and age. One of them was performed in our university and another one in the United States of America, they both showed that global QoL score was not associated with child's gender and age (12, 19). A study performed in Portugal, revealed that QoL in asthma patient is related to gender and that the correlation between age and QoL was low; but the participants of this study are at least 18 years old, which may be the cause of the discrepancy (22). Egyptians and Nigerians investigators showed that QoL is lower in males and in older patients (20, 21). However other studies from Sweden (23) and Germany –as shown in the Egyptian study- (20) showed a lower QoL in girls. We have two explanations in mind for those results, but further exploration is required. On one hand, males have smaller airways and higher airway resistance and are more physically active (jumping, running) when compared to females (playing with dolls, read books), so less symptoms can lead to a higher limitation and consequently a lower QoL. On the other hand, girls are more anxious about their health and are more likely to overt-report their symptoms and to show their deficiencies than boys (19, 20). The results observed in our study can also be due to the fact that only 27.7 % of our sample, were girls. The lower QoL in older children can be explained by the fact that the younger children adapt more easily to the disease by choosing less everyday limiting activities and because they rely more on their parents for their health needs (20, 21).

The place residence of the patients did not significantly affect the QoL score ($p>0.05$), as found in other studies. QoL in asthmatic patients might be lower in rural area than urban ones because of the decreased access to medical care services (20). Rural residence was not a barrier to receiving care in this population.

No significate association was found between the QoL and the presence of pets at home, as in the Egyptian study (20). The lack of significant effect of fur can be due to the lack of follow up of this patients which may uncover the actual effect of environmental factors, Fur and other allergens may worsen asthma or AR. The "immune-tolerance theory" affirms that the early exposition to allergens reduces the risk by potentiating the capacity of regulation of the immune system (24, 25). The ISAAC study also found that most children with allergic illness had no contact with animals in their first year of life (7).

Children with asthma or AR can experience poor control of their disease, resulting in a decreased QoL, recurrent asthma exacerbations and hospital visits (26, 27). A survey of asthma patients indicated that concomitant rhinitis was the most important risk factor associated with emergency room visits due to asthma exacerbations (13). 12.8% of our sample had school absenteeism and clinical consultation in the previous two weeks because of their allergic illness, which is relatively low. The Egyptian study showed that 80% of their

sample had to miss school and 60% had hospital admission (20). This difference in hospital admission, may be due to differences in the response of primary caregivers to exacerbation. Seasonal variation may also contribute to these differences.

By applying the EQ-5D-Y questionnaire, we showed that 68.1% of our sample had a good or very good QoL, and that 31.9% had a very good quality of health. We found a significant association between the total of positive answers by the children and the parents in the CARATKids and the degree of the child's QoL. We also found a significant a significant negative correlation between the CARATKids and EQVAS, so we can affirm that the more positive answers given in the CARATKids, the lower their QoL will be in the Visual Analogue Scale and that the degree of asthma and AR control have an influence on the child's QoL. In accordance with those results, the American study referred earlier, found a relation between a lower QoL and poor asthma and/or AR control (12). This conclusion, is also reported by other studies (20, 28). An Iranian study, with the same age and gender distribution as ours, showed a moderate to low QoL (10), but they only assessed children with isolated asthma.

5. Future prospects

In order to overcome limitations of the present study and to further analyze some of the results detected, we need to improve some aspects and propose some future approach.

This study of the association between asthma and AR control and quality of life was underpowered. It could benefit from a larger sample size. The effects of seasonal variation could be overcome by a longitudinal design or a longer data collection period. Selection bias could be overcome by performing the study in primary care clinics or on a population sample.

Secondly, although we asked if the families had pets at home, it would be interesting to ask the parents if their children had contact with domestic or farm animals during the first's years of their lives. It would allow us to study the influence of the early exposition of allergens in those pathologies.

Thirdly, our study is based on parent's reports and self-reported symptoms. It would be important to associate an assessment of airways using spirometry and determination of nitric oxide in exhaled breath (FeNO), and an assessment of allergic atopic sensitization using skin prick tests (SPT) with aeroallergens.

Finally, QoL by EQ-5D-Y must be considered as a whole therefore no results can be shown by one of its measuring items and since other studies showed which QoL factors were most affected by allergic illnesses, it would be important to study that aspect (19, 29).

Primary caregivers have an important role in overseeing their child's allergies management (19), but only the physicals aspects of QoL can be recognize by them. QoL is a variable concept which depends on the individual expectations and perception of the disease, who can change with time and disease evolution (13). Consequently, QoL's assessment on asthma and/or AR patients is very important in clinical practice (22). In primary care, the use of simple questionnaires, like CARATKids and EQ-5D-Y, could help to recognize the children with poor disease control and a negative impact on their QoL. The introduction of QoL questionnaires may further help identify unique needs in individual patients and help direct interventions (25). We have to be aware that some children have a low QoL and they must not be forgotten. Usually caring tends on focusing on the patients limitations, but it is also very important to discover the aspects in a child's daily life which contribute to a high QoL, in order to improve and maintain the child's well-being (20).

Since AR is often unrecognized and undiagnosed, we have to be able to identify (8, 11) patients with both conditions and offer a holistic approach to treatment and management (30). In primary care we have the opportunity to improve morbidity by managing both AR and asthma proactively.

6. Conclusion

The CARAT Kids test is easy to apply to children to assess their control of asthma and allergic rhinitis and has good correlation with the degree of Quality of life in Children measured by the EQ-5D-Y. Consequently, we can apply CARATKids in primary care and even in specialized care, to control asthma and AR, and to improve QoL in those children.

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8. Appendix

8.1. Appendix 1: Informed consent

Consentimento Livre e Informado

Carla Santos Resende, aluna da Faculdade de Ciências da Saúde da Universidade da Beira Interior a realizar um trabalho de investigação subordinado ao tema "Qualidade de vida e controlo de asma e rinite alérgica em crianças. Estudo correlacional com CARAT Kids e EQ-5D-Y" vem solicitar a sua colaboração neste estudo.

Informo que a sua participação é voluntária, podendo desistir a qualquer momento sem que por isso venha a ser prejudicado nos cuidados de saúde prestados pelo Hospital Amato Lusitano; informo ainda que a sua privacidade será respeitada, todos os dados recolhidos serão confidenciais e não serão fornecidas quaisquer compensações.

Objetivo do trabalho de investigação: Verificar se a qualidade de vida se correlaciona com o controlo de asma e/ou rinite em crianças avaliadas pelo CARAT Kids.

Critérios de inclusão: Crianças dos 6 aos 12 anos inclusive com diagnóstico de asma e/ou rinite alérgica.
Critérios de exclusão: Crianças com menos de 6 anos ou mais de 12 anos, sem diagnóstico de asma ou rinite alérgica.

Procedimentos necessários: Entrevista às crianças e aos pais com recolha de dados (medicação nos últimos 3 meses e antecedentes familiares) e aplicação dos questionários CARAT Kids e EQ-5D-Y. A investigadora irá encontrar-se apenas uma vez com o participante e o seu tutor legal num gabinete do HAL durante 30 minutos. A tese é orientada pelo Professor Doutor Luiz Miguel Santiago.

Risco / Benefício da sua participação: Não existem riscos. Não existe garantia de que venha a retirar qualquer benefício no imediato, mas o conhecimento adquirido com este estudo pode ajudar ao seu filho(a) e/ou outras crianças com asma e/ou rinite alérgica no futuro.

Duração da participação no estudo: Setembro a Dezembro 2014

Nº aproximado de participantes: 50

Consentimento Informado – Aluno / Investigador

Ao assinar esta página está a confirmar o seguinte:

* Entregou esta informação;
* Explicou o propósito deste trabalho;
* Explicou e respondeu a todas as questões e dúvidas apresentadas pelo participante ou representante legal.

_____

Nome do Aluno / Investigador (Legível)

_____

Assinatura do Aluno / Investigador

Data

____ / ____ / ____

Consentimento Informado – Participante

Ao assinar esta página está a confirmar o seguinte:

* O Sr. (a) leu e compreendeu todas as informações desta informação, e teve tempo para as ponderar;
* Todas as suas questões foram respondidas satisfatoriamente;
* Se não percebeu qualquer das palavras, solicitou ao aluno/investigador uma explicação, tendo este esclarecido todas as dúvidas;
* O Sr. (a) recebeu uma cópia desta informação, para a manter consigo.

_____

Nome do Participante (Legível) ou Representante Legal

_____

(Assinatura do Participante ou Representante Legal)

Data

____ / ____ / ____

8.2. Appendix 2: Data Collection

Nome:

Idade: 6-8 anos □ 8-10 anos □ 10-12 anos □

Sexo: Feminino □ Masculino □

Diagnóstico: Asma □ Rinite □ □ Outro:

Freguesia:

Lugar onde vive: Aldeia □ Cidade □ Vila □

Apartamento □ Casa □

Animais domésticos: Sim□ Não□

Se sim, quais?

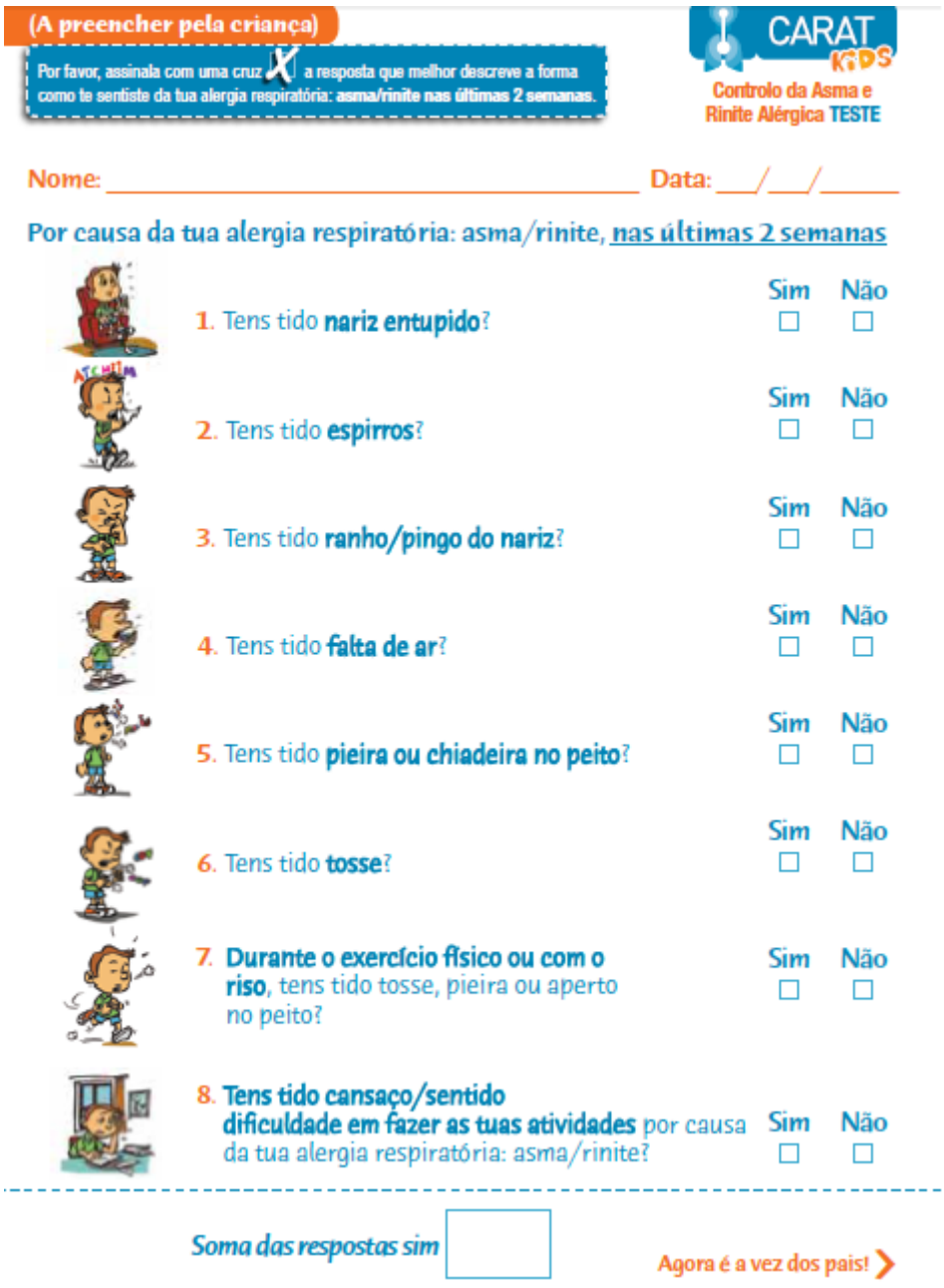
Antecedentes familiares: Sim□ Não□

Se Sim, quais?

Fundamental medicação nos últimos 3 meses: Sim□ Não□

Se Sim, qual?

8.3. Appendix 3: CARATKids



(A preencher pela criança)

Por favor, assinala com uma cruz X a resposta que melhor descreve a forma como te sentiste da tua alergia respiratória: asma/rinite nas últimas 2 semanas.

CARAT KIDS
Controlo da Asma e Rinite Alérgica TESTE

Nome: _____ Data: ___/___/_____

Por causa da tua alergia respiratória: asma/rinite, nas últimas 2 semanas

		Sim	Não
1.	Tens tido **nariz entupido**?	☐	☐
2.	Tens tido **espirros**?	☐	☐
3.	Tens tido **ranho/pingo do nariz**?	☐	☐
4.	Tens tido **falta de ar**?	☐	☐
5.	Tens tido **pieira ou chiadeira no peito**?	☐	☐
6.	Tens tido **tosse**?	☐	☐
7.	**Durante o exercício físico ou com o riso**, tens tido tosse, pieira ou aperto no peito?	☐	☐
8.	**Tens tido cansaço/sentido dificuldade em fazer as tuas atividades** por causa da tua alergia respiratória: asma/rinite?	☐	☐

Soma das respostas sim ☐

Agora é a vez dos pais!

(A preencher pelos pais ou tutor)

Por favor, assinale com uma cruz X a resposta que melhor descreve a forma como o seu filho / a sua filha se sentiu da alergia respiratória: asma/rinite, nas últimas 2 semanas.

CARAT KIDS
Controlo da Asma e Rinite Alérgica TESTE

Nome (filho/filha): _____ Idade ____ Sexo ____

Data: ___/___/_____

Nas últimas 2 semanas, o seu filho / a sua filha

1. **Tem acordado durante a noite** por causa da alergia respiratória: asma/rinite? Sim ☐ Não ☐

2. **Tem tido queixas/sintomas de manhã ao acordar** por causa da alergia respiratória: asma/rinite? Sim ☐ Não ☐

3. **Teve de faltar à escola ou a atividades** por causa da alergia respiratória: asma/rinite? Sim ☐ Não ☐

4. **Teve de tomar/usar mais medicamentos por estar pior** da alergia respiratória: asma/rinite? Sim ☐ Não ☐

5. **Teve de ir ao médico** por estar pior da alergia respiratória: asma/rinite? Sim ☐ Não ☐

Soma das respostas sim (pais/tutor) ☐ *Total (criança+pais)* ☐

8.4. Appendix 4: EQ-5D-Y

EQ-5D-Y

Como está a tua saúde HOJE

Em cada grupo, põe uma cruz (X) no quadrado que melhor representa a tua saúde HOJE.

Mobilidade (andar)

- Não tenho dificuldade em andar ☐
- Tenho alguma dificuldade em andar ☐
- Tenho muita dificuldade em andar ☐

Cuidar de mim

- Não tenho dificuldade a lavar-me ou a vestir-me ☐
- Tenho alguma dificuldade a lavar-me ou a vestir-me ☐
- Tenho muita dificuldade a lavar-me ou a vestir-me ☐

Fazer coisas normais (por exemplo: ir à escola, passatempos, fazer desporto, brincar, estar com a família ou com amigos/as)

- Não tenho dificuldade em fazer as coisas normais ☐
- Tenho alguma dificuldade em fazer as coisas normais ☐
- Tenho muita dificuldade em fazer as coisas normais ☐

Ter dor ou mal-estar

- Não tenho dor ou mal-estar ☐
- Tenho alguma dor ou mal-estar ☐
- Tenho muita dor ou mal-estar ☐

Sentir-se preocupado/a, triste ou infeliz

- Não estou preocupado/a, triste ou infeliz ☐
- Estou um pouco preocupado/a, triste ou infeliz ☐
- Estou muito preocupado/a, triste ou infeliz ☐

Como está a tua saúde HOJE?

Gostaríamos de saber como está a tua saúde HOJE, boa ou má.

- Esta linha está numerada de 0 a 100.
- 100 significa a melhor saúde que possas imaginar.
  0 significa a pior saúde que possas imaginar.
- Por favor, põe um X na linha para mostrar como a tua saúde se encontra HOJE.