

A DESCRIPTIVE STUDY OF THE QUALITY OF LIFE IN A PAEDIATRIC AND ADOLESCENT POPULATION WITH ALLERGIC RHINITIS AT A TERTIARY HOSPITAL, KIGALI, RWANDA

Aurea Nyiraneza¹

Edgar Kalimba²

Peter Cartledge^{3,4,5}

¹ Department of Paediatrics, University of Rwanda, Rwanda

² Department of Paediatrics, King Faisal Hospital, Rwanda

³ Department of Emergency Medicine, Yale University, United States of America

⁴ Department of Paediatrics, University Teaching Hospital of Kigali (CHUK), Rwanda

⁵ Human Resources for Health (HRH) Program, Ministry of Health, Rwanda

Email | peterthomascartledge@gmail.com

ABSTRACT

Introduction: When allergic rhinitis (AR) symptoms are not controlled and treated, the recurrence and/or chronicity of its symptoms can lead to sleep disturbances, cognitive impairment, learning difficulties and school absenteeism.

Objectives: This study sought to describe the impact of allergic rhinitis on quality of life (QoL) in a cohort of Rwandan children with AR.

Methods: A cross-sectional study was undertaken at a public-private tertiary outpatient department in Kigali, Rwanda. The Score for Allergic Rhinitis (SFAR) was used to identify patients with AR suitable for inclusion. The Adolescent Rhino-conjunctivitis Quality of Life Questionnaire (AdoIRQLQ) for adolescents aged 12-17 years, and the Paediatric Rhino-conjunctivitis Quality of Life Questionnaire (PRQLQ) for young children aged 6-12 years were used to measure quality of life.

Results: A total of 115 subjects with an SFAR diagnosis of AR were eligible (PRQLQ, n = 80 and AdoIRQLQ, n = 35). The highest scoring item, in terms of impact on QoL, for adolescents was "How much were you bothered by having to rub your eyes and nose" (mean 3.57) and for young children was "How much were you bothered by sneezing" (mean 3.65).

Discussion: The symptoms of AR have a negative impact on the quality of life for young children and adolescents with AR in Rwanda. Awareness of this condition is paramount given that early recognition and treatment, as well as appropriate parent/patient education, may improve the well-being of the patients with AR.

Keywords: rhinitis, allergic; child; adolescent; Quality of Life; Africa; Rwanda

INTRODUCTION

Allergic rhinitis (AR) is an inflammatory condition of the nasal mucosa induced by IgE-mediated hypersensitivity reactions after exposure to specific allergens such as pollens, moulds, animal dander and house dust mites. It is characterised by rhinorrhoea, nasal obstruction, nasal itching and sneezing and may be accompanied by conjunctival inflammation.¹⁻⁵ The published data from Africa on the prevalence and severity of allergic rhinitis and other chronic atopic disorders are scant; however, there is a trend toward an increase in the prevalence and severity on the continent.⁶⁻⁸

Though AR may sometimes be perceived as being a trivial condition, the symptoms and their impact can be far-reaching.⁹ These chronic symptoms can have a significant burden on the quality of life (QoL) of paediatric patients with the condition. AR is often unrecognised by parents who misinterpret the symptoms as those of a "recurrent cold". Children with AR may present to healthcare facilities when they are being consulted for comorbidities such as asthma, eczema and otitis media. When AR symptoms are not well controlled, the recurrence and/or chronicity of symptoms can lead to sleep disturbances, cognitive

impairment, learning difficulties and school absenteeism.¹⁰ Therefore, measuring the symptoms of AR and its impact on QoL is an important aspect of care. Measuring health-related quality of life is not easy. Questionnaire-based instruments are often used. Two types of questionnaires are usually available: generic QoL instruments, designed to be applicable to patients in all disease states, and specific QoL instruments (specific to one condition).¹¹ Each have their own advantages and disadvantages.

Objective: The objective of this study was to describe the impact of allergic rhinitis on quality of life in a cohort of Rwandan children (aged 6-17 years of age) with AR.

MATERIALS AND METHODS

STUDY DESIGN

A cross-sectional study was performed between May and November 2017. The reporting of the current study has been verified in accordance with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) checklist.¹²

SOURCE POPULATION (STUDY SETTING AND LOCATION)

The study was performed in the outpatient department (OPD) at King Faisal Hospital (KFH) in Kigali, Rwanda. Patients were attending general paediatric and Ear, Nose and Throat (ENT) clinics. KFH is a public-private tertiary-level hospital in Kigali. Patients using the National Health Insurance system ("Mutuelle de Sante") are referred from District Hospitals and Health Centres and cannot self-refer to tertiary hospitals. Self-paying patients and those with private health insurances can self-refer to KFH.

PARTICIPANTS/SUBJECTS

Inclusion criteria were paediatric patients aged 6-17 years of age with AR, as diagnosed by using the Score for Allergic Rhinitis (SFAR), whose parents consented to their participation. For the purposes of the study, those participants who scored ≥ 7 on SFAR were given a diagnosis of AR and were eligible for inclusion.

Exclusion criteria were acutely unwell children, fever $>39^{\circ}\text{C}$, respiratory distress, pain, diarrhoea, vomiting, seizures, altered level of consciousness, poisoning history, and other severity signs according to World Health Organization (WHO) triage guidelines.¹³ Children with significant disabilities (hearing impairment, developmental/educational delay, language disorders etc. and those who were unable to respond to the questionnaires were also excluded. As this was a descriptive study, with no analytical component, no sample size calculation was undertaken.

RECRUITMENT/ENROLMENT OF PARTICIPANTS

Participants were recruited after standard/routine OPD triage. After the consent from parents and assent from children were completed, the participants completed the relevant questionnaires.

VARIABLES AND OUTCOMES

Variables and outcomes were limitation of activities, symptoms (nasal, eye, emotional and other non-AR symptoms), and the

feasibility of the Paediatric Rhino-conjunctivitis Quality of Life Questionnaire (PRQLQ) and the Adolescent Rhino-conjunctivitis Quality of Life Questionnaire (AdoIRQLQ) in our setting. Outcomes were, thereby, measured using previously validated scoring questionnaires.¹⁵⁻¹⁷

DATA COLLECTION TOOLS EMPLOYED

The study data collection tool employed four components:

1. *Demographic questionnaire:* included address, age, gender, parents' education level, insurance type and preferred language.
2. *The Score for Allergic Rhinitis (SFAR):*¹⁴ SFAR was used to identify patients with AR suitable for inclusion. Diagnosis was not confirmed by skin-prick testing or clinical history.
3. *PRQLQ and AdoIRQLQ questionnaires:* PRQLQ was used for those aged 6-11 years. AdoIRQLQ was employed for participants aged 12-17 years.¹⁵⁻¹⁷ These tools were developed and validated in Southern Ontario, Canada, in 1993 and 1997 respectively, and are used to assess the QoL of in paediatric patients (aged 6-17 years) with AR by measuring symptoms during the preceding seven days. They have not previously been validated in the African continent. PRQLQ and AdoIRQLQ are composed of 23 and 25 questions, respectively. Both include the same five domains, namely: i) activity limitation; ii) practical problems, iii) eyes symptoms, iv) nasal symptoms, and v) non-AR/other symptoms. AdoIRQLQ also includes a sixth domain of emotional problems. Responses to each question are given on a seven-point Likert scale (0-6) e.g. "not troubled/bothered at all" to "extremely troubled/bothered". The AdoIRQLQ and PRQLQ measure activity limitation in different ways. In the AdoIRQLQ, adolescents (aged 12 to 17) self-identify three activities impacted by AR and then score the limitations for each. The activities are self-selected from a list of 29 predefined activities presented in the questionnaire. In the PRQLQ, the activity questions are fixed. Participants respond independently, with no intervention from their caregiver or parents. Paper versions of the questionnaires were obtained, along with permission for use, from the copyright holder, Professor Elizabeth Juniper.
4. *Feasibility questionnaire:* a questionnaire of yes/no responses was designed specifically for this study to assess the feasibility of PRQLQ and AdoIRQLQ questionnaire use in this cohort.

DATA COLLECTION

Data were collected exclusively using paper questionnaires. The official languages of Rwanda are Kinyarwanda, English and French. The data collector completed the demographic and SFAR questionnaires by verbal questioning of the participants. The demographic questionnaire was completed in Kinyarwanda. The SFAR questionnaire was only available in English; however, verbal explanations were given if required. PRQLQ and AdoIRQLQ were available in English or French and were completed by the participant without help from an adult or caregiver, in the language of their choice. The feasibility

TABLE I: BASELINE DATA

	SFAR ≥ 7 (n = 115, 31.1%)		Total (n = 115)
	Ado RQLQ (n = 35, 30%)	Paed RQLQ (n = 80, 70%)	
SEX			
Male	12/35 (34.3%)	51/80 (63.8%)	63/115 (54.8%)
Female	23/35 (65.7%)	29/80 (36.3%)	52/115 (45.2%)
PARENT EDUCATION			
Low (None/primary)	0/32* (0%)	10/74* (13.5%)	10/106* (9.4%)
High (secondary or tertiary)	32/32* (100%)	64/74* (86.5%)	96/106* (90.6%)
INSURANCE TYPE			
Private	28/35 (80.0%)	56/80 (70.0%)	84/115 (73.0%)
Public	7/35 (20.0%)	24/80 (30.0%)	31/115 (27.0%)
TRIGGERS IN PATIENT			
Yes	32/35 (91.4%)	70/80 (87.5%)	102/115 (88.7%)
No	3/35 (8.6%)	10/80 (12.5%)	13/115 (11.3%)
REPORTED ALLERGY TEST RESULTS			
No testing	32/35 (91.4%)	79/80 (98.8%)	111/115 (96.5%)
Positive	3/35 (8.6%)	1/80 (1.3%)	3/115 (2.6%)
Negative	0/35 (0%)	0/80 (0%)	0/115 (0%)

* Missing data – Not all patients had all variables available and therefore the denominator is lower than the total number of participants in this group. Ado – Adolescent (aged 12 to 17); Paed – Paediatric (aged 6 to 11)

questionnaire was available in English and Kinyarwanda and was completed by the patient without help from an adult or caregiver.

DATA STORAGE AND STATISTICAL ANALYSIS

Responses were electronically entered and stored in a password protected Excel spreadsheet. Data was cleaned and coded in Excel. Missing data is represented in the tables by the relevant denominators. Statistical Package for the Social Sciences (SPSS) version 24 was used to perform the analysis: Likert items were described using means [18]. Multiple items from each domain (e.g. four items in eye-symptoms domain) were combined to give a “weighted domain score” out of 100. The weighted domain scores were created by adding the total scores from the individual Likert scales and then factoring to 100 (e.g. multiplying by 5 for 4 Likert questions) to aid comparison between the domain scores.

RESULTS

PARTICIPANTS

A total of 370 young children (6 to 11 years) and adolescents (aged 12 to 17 years) were screened for eligibility using the SFAR tool. 115 young children and adolescents with an SFAR diagnosis (≥ 7) of AR were eligible (PRQLQ, n = 80 and AdoRQLQ, n = 35) (Figure 1). No record was kept of patients who declined to participate. The majority (73.0%) of patients were private paying patients. Parents were well educated, with 91% having completed secondary or university education.

QUALITY OF LIFE OF CHILDREN AND ADOLESCENTS

For adolescents, the highest scoring item was “How much were you bothered by having to rub your eyes and nose” (mean 3.57). For young children, “How much were you bothered by sneezing” (mean 3.65) scored highest.

Activity limitation: The AdoRQLQ and PRQLQ measure activity limitation using different approaches. Adolescents choose three activities, from a list of 29 activities, that AR impacts in their lives and then score the limitations on these activities. The three activities that were most commonly chosen were “studying”, “watching TV”, and “swimming”. For the PRQLQ the activity questions are fixed; young children rated being woken at night (mean 3.40) as the activity impacted the most by AR (Table II).

Practical problems: Adolescents reported “rubbing their eyes and nose” (mean 3.80), and the paediatric population reported “having to blow the nose” as the most significant practical problems of AR.

Non-AR symptoms: Both adolescents (mean 3.71) and paediatric (mean 3.09) patients reported “headache” as the most significant non-AR symptom (Table III). Adolescents (mean 54.5) had a higher “weighted non-hayfever symptom score” compared to paediatric patients (mean 43.8).

Nasal symptoms: Both adolescents (mean 3.57) and paediatric (mean 3.65) patients reported “sneezing” as the most significant nasal symptom.

Eye symptoms: Adolescents were most affected by “watery eyes”, whereas paediatric patients were more affected by “itchy eyes”. Adolescents (mean 40.4) had a higher “weighted eye-symptom score” compared to paediatric patients (mean 25.8).

Emotional problems: Only adolescents completed the emotional score and being “irritable” was the most reported problem.

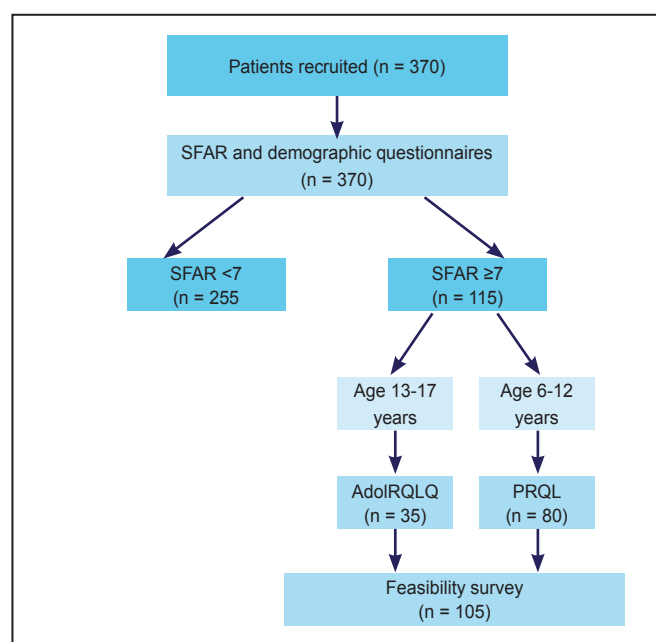


Figure 1: Consort diagram of participant recruitment and questionnaires administered

FEASIBILITY OF AdoIRQLQ AND PRQLQ

105 participants completed the feasibility questionnaire. No exploration was undertaken as to why 10 participants did not complete the feasibility section. 94% of participants reported that they understood all the questions in the AdoIRQLQ and PRQLQ questionnaires (Table IV). The majority of patients who filled out

the feasibility survey felt that AdoIRQLQ or PRQLQ was easy to complete (85%). However, 24% of patients felt they would have benefited from parental assistance while filling out the survey and 23% felt they would have benefited from a Kinyarwanda version instead of the English or French versions offered.

DISCUSSION

This study sought to assess the impact on quality of life using the PRQLQ and AdoIRQLQ questionnaires and the feasibility of these questionnaires at a public-private tertiary hospital in Kigali, Rwanda.

PARTICIPANTS

The study was based at a public-private hospital. Therefore, a large number were privately paying patients (73%). Nearly all (97%) participants had not had any previous allergy testing. Allergy testing is frequently unavailable in resource-limited settings. The lack of availability of allergy testing supports the need for well validated AR scores to assist in diagnosing AR and identifying the range of symptoms in this setting. The AdoIRQLQ and PRQLQ questionnaires were available only in English and French, thus excluding paediatric patients who do not know either of the languages. As our population was generally from more affluent and well-educated families, this did not have a large impact on the ability to use the tools in this study. If the questionnaires were to be used in the broader Rwandan population then translation of the tool, or creation of a locally relevant tool, into the local language Kinyarwanda would be a priority. The tools could not be translated for this study as it was not possible under the current copyright agreement.

TABLE II: ACTIVITY LIMITATION AND PRACTICAL PROBLEMS

	Item	AdoIRQLQ Mean (±SD)	PRQLQ Mean (±SD)
Activity limitation	Activity 1	2.70 (±1.9) ^a	-
	Activity 2	2.90 (±1.7) ^a	-
	Activity 3	3.30 (±1.6) ^a	-
	How often did your allergies wake you up during the night	-	3.40 (±1.70) ^b
	How often did your allergies make it hard to get to sleep	-	3.25 (±1.87) ^b
	How often did your allergies make it hard to pay attention	-	2.45 (±1.86) ^b
	How much were you bothered by your allergies playing outdoors	-	2.39 (±1.97) ^c
	Weighted Activity Limitation Score (out of 100)	45.2 (±31.2)	51.8 (±21.1)
Practical problems	How much were you bothered by having to blow your nose	3.57 (±2.06) ^a	3.63 (±1.6) ^c
	How much were you bothered by having to Take medication for your allergies	-	3.24 (±1.98) ^b
	How much were you bothered by having to carry the Kleenex	3.30 (±2.1) ^a	3.00 (±2.2) ^c
	How much were you bothered by having to rub your eyes and nose	3.80 (±1.54) ^a	2.99 (±2.07) ^c
	How often did your allergies make you feel embarrassed	-	1.80 (±1.88) ^c
	Unable to do your work (schoolwork) as well as usual	2.89 (±1.92) ^a	-
	Lack of good night's sleep	3.00 (±2.21) ^a	-
	Weighted Practical Problems Score	55.1 (±20.0)	48.6 (±17.2)

Items have not been presented in the order given in the questionnaire, rather ranked according to the scores given by patients.

^a Likert scales – Ado bothered (yellow card): 0=Not troubled, 1=hardly troubled at all, 2=Somewhat troubled, 3=Moderately troubled, 4=Quite a bit troubled, 5=Very troubled, 6=Extremely troubled

^b Likert scales - Paed timing (green card): 0=none of the time, 1=Hardly any of the time, 2=Once in a while, 3=some of the time, 4=Quite often, 5=Most of the time, 6=All of the time
^c Likert scales - Paed bothered (blue card): 0=Not bothered, 1=hardly bothered at all, 2=Bothered a bit, 3=Somewhat bothered, 4=Quite bothered, 5=Very bothered, 6=Extremely bothered

TABLE III: NON-HAYFEVER SYMPTOMS, NASAL AND EYE SYMPTOMS

	Item	AdolRQLQ Mean (±SD)	PRQLQ Mean (±SD)
Non-hayfever symptoms	How much were you bothered by having a Headache	3.71 (±1.99) ^a	3.09 (±2.03) ^c
	How often did your allergies make you feel not well	3.49 (±1.93) ^b	2.85 (±1.92) ^d
	How often did your allergies make you feel tired	3.43 (±1.92) ^b	2.76 (±2.89) ^d
	How much were you bothered by thirst	3.14 (±2.30) ^a	2.66 (±2.05) ^c
	How much were you bothered by a Scratchy /Itchy throat	-	2.36 (±2.10) ^c
	How often did your allergies make you feel irritable	-	2.08 (±1.98) ^d
	How troubled have you been by not able to concentrate	2.60 (±1.88) ^a	-
	Weighted non-hayfever symptoms score (out of 100)	54.5 (±19.7)	43.8 (±20.3)
Nasal symptoms	How much were you bothered by sneezing	3.57 (±1.82) ^a	3.65 (±2.11) ^c
	How much were you bothered by a stuffy blocked nose	3.43 (±1.90) ^a	3.37 (±2.36) ^c
	How much were you bothered by a runny nose	3.23 (±1.91) ^a	3.26 (±1.81) ^c
	How much were you bothered by an itchy nose	03.00 (±1.98) ^a	2.90 (±2.12) ^c
	Weighted nasal symptoms score (out of 100)	54.8 (±23.8)	55.0 (±18.9)
Eye symptoms	How much were you bothered by Itchy eyes	2.83 (±2.32) ^a	2.13 (±2.15) ^c
	How much were you bothered by watery eyes	3.43 (±2.20) ^a	1.78 (±2.11) ^c
	How much were you bothered by red/sore eyes	2.11 (±2.2) ^a	1.31 (±2.16) ^c
	How much were you bothered by swollen /puffy eyes	1.31 (±1.92) ^a	1.00 (±1.79) ^c
	Weighted eye symptoms score (out of 100)	40.4 (±26.6)	25.8 (±27.5)
Emotional problems	How often were you troubled by being irritable	3.03 (±1.72) ^b	-
	How often were you troubled by being frustrated	2.94 (±2.12) ^b	-
	How often were you troubled by being restless	2.71 (±1.96) ^b	-
	How often were you troubled by being upset embarrassed by other people's response	2.14 (±2.01) ^b	-
	Weighted emotional symptoms score (out of 100)	45.10 (±24.7)	-
Total	Total weighted symptom scores for all domains (out of 100)	49.2 (±16.5)	45.0 (±15.1)

Items have not been presented in the order given in the questionnaire, rather ranked according to the scores given by patients.

^a Likert scales – Ado bothered (yellow card): 0=Not troubled, 1=hardly troubled at all, 2=Somewhat troubled, 3=Moderately troubled, 4=Quite a bit troubled, 5=Very troubled, 6=Extremely troubled

^b Likert scales – Ado timing (green card): 0= None of the time, 1=hardly anytime at all, 2=A small part of the time, 3=Some of the time, 4=A good part of the time, 5=Most of the time, 6=All of the time

^c Likert scales - Paed bothered (blue card): 0=Not bothered, 1=hardly bothered at all, 2=Bothered a bit, 3=Somewhat bothered, 4=Quite bothered, 5=Very bothered, 6=Extremely bothered

^d Likert scales - Paed timing (green card): 0=none of the time, 1=Hardly any of the time, 2=Once in a while, 3=some of the time, 4=Quite often, 5=Most of the time, 6=All of the time

QUALITY OF LIFE IN YOUNG CHILDREN AND ADOLESCENTS WITH AR

Unless treated, AR symptoms can persist or recur, impacting negatively on the patient's quality of life. Physicians should therefore be aware of the different symptoms of AR and how these could affect QoL. Identifying the particular symptoms that affect an individual patient is important. This ensures that patient advice and management is optimal. A validated QoL assessment tool can provide invaluable information that may be missed in a general consultation.^{18,19}

Activity limitation: Sleep is an important activity of daily living. Our paediatric participants reported that AR impacted their sleep by inhibiting the initiation of sleep as well as disturbing sleep once attained. Sleep disturbance is well documented in AR, with sufferers reporting challenges in attaining and maintaining sleep.^{9,20–22} The importance of sleep disturbance in AR is acknowledged by its inclusion in the AdolRQLQ. Adolescents in our cohort reported being moderately troubled (mean 3.0).

TABLE IV: FEASIBILITY DATE OF AdoIRQLQ AND PRQLQ (n=105)

Question	Yes	%
Did you understand all the questions of the questionnaire?	99	94.3%
Was the questionnaire easy to complete?	89	84.8%
Was the questionnaire difficult to complete?	4	3.8%
Was the questionnaire interesting?	84	80%
Was the questionnaire short?	76	72.4%
Did you need a caregiver/parent to assist you?	25	23.8%
Do you think you needed a Kinyarwanda version to answer adequately?	23	21.9%
Was the questionnaire boring?	2	1.9%
Was the questionnaire too long?	13	12.4%

Practical problems encountered by young children with AR: Young children reported having to blow their nose as being the most significant practical impact on their quality of life (mean 3.63). The impact of rhinitis is not just related to the subjective negativity from sneezing and rhinorrhoea, but also the need of frequent nose blowing and having to carry paper tissues.

Non-hayfever symptoms encountered by young children and adolescents with AR: Both adolescents and young children reported headache as the most significant non-hayfever symptom. Young children and adolescents with AR are known to have a higher incidence headache and migraine.^{8,9,23} This is an important finding as our anecdotal experience is that many healthcare professionals in our setting may not be familiar with this as a symptom of AR. This has important considerations as chronic headaches can affect school and home performance if not properly treated.²³

Nasal symptoms encountered by young children and adolescents with AR: A review of symptoms and QoL in adolescents identified rhinorrhoea, nasal congestion, itchy eyes, and sneezing as being rated the most bothersome of their symptoms.⁹ Nasal symptoms were bothersome, but in our adolescent population, other non-nasal symptoms, such as headache, appeared to score much higher. In Brazil, in paediatric patients ages 6-16 years using a modified RQLQ reported nasal symptoms were the most uncomfortable symptoms.² Our paediatric patients reported sneezing as the most bothersome symptom, which is in agreement with this paper.

Eye symptoms encountered by young children and adolescents with AR: Ocular symptoms are known to be more common in adolescent patients, compared to paediatric AR sufferers.^{9,24} Our population had similar findings, with adolescents much more likely to be impacted by watery eyes and eye itching.

Emotional symptoms encountered by adolescents with AR: Emotional symptoms were assessed only in adolescents, with high rates of irritability reported. AR may affect emotional wellbeing and thus relationships with peers, family members, and the community. Previous studies found a correlation between AR and a dominant anxious trait.²⁵ Attention should be paid to the psychological effects of AR symptoms. AR may be a chronic condition and the psychological aspects involved are well documented.² However, the emotional aspects go further

than just irritability, frustration, restlessness or embarrassment. AR is known to be associated with increases in somatisation, anxiety, and depression.⁹

FEASIBILITY OF USE OF PRQLQ/AdoIRQLQ IN RWANDA

The PRQLQ and AdoIRQLQ were reported to be user-friendly for the study participants overall, although 24% of the respondents would have liked parental assistance. This is an important consideration, especially in younger patients. However, parental assistance may affect the responses given and could bias the reported symptoms. English and French are second languages for the majority of the Rwandan population and 23% of participants felt they would have benefited from a Kinyarwanda version. The majority of our participants had well-educated parents (91% with secondary or university level education) and it is unlikely that the English and French versions would be suitable for the general Rwandan population, especially in rural areas where education is limited. Therefore, if this questionnaire is to be used, a Kinyarwanda version should be produced, validated and made available. For the AdoIRQLQ, participants choose activities from a list of 29 pre-defined activities that could be impacted by their AR. Our opinion is that this list of 29 activities is long and may lead to questionnaire fatigue and biased responses. Furthermore, many of the activities may not be as relevant to the Rwandan population where hobbies and activities of daily living are different. The copyright holders might look to explore robust systems to allow professionals to develop and validate locally relevant versions of the questionnaires.

STRENGTHS OF THE STUDY

This is the first study in Rwanda assessing the symptoms and impact of AR on quality of life in young children and adolescents with AR in Rwanda.

LIMITATIONS OF THE STUDY

The study was performed in only one urban setting, which may not be indicative of the case-presentation rate of AR in the rest of the country. We did not compare the SFAR score with a physician diagnosis and/or skin prick testing. As the AR diagnosis was not confirmed with allergy testing, participants with non-AR conditions may have been included in the study. No data was collected on whether patients were on AR medications. Those patients on AR medication have the potential to have their quality of life improved, thereby biasing the results. The

study was undertaken in a public-private tertiary hospital and the majority of patients were not using the governmental health insurance scheme. Therefore, the demographic of patients was different from much of the Rwandan population. This has implications in terms of the feasibility of the questionnaires.

CONCLUSION

The allergic and non-allergic symptoms of AR have a negative impact on the quality of life for young children and adolescents with AR in Rwanda. Diagnosis of this condition is paramount given that early recognition and treatment, as well as appropriate parent/patient education will improve the well-being of the patients with AR. The AdolRQLQ and PRQLQ questionnaires are feasible tools for measuring quality of life, but a Kinyarwanda version should be produced, validated and made available for the local population.

ETHICS/STUDY OVERSIGHT:

Risks to subjects: No physical, financial, social, legal or emotional risks were anticipated.

Consent process: Written consent was obtained from parents and assent obtained from children prior to study enrolment.

Confidentiality: Unique Patient Identifiers were used on

questionnaires. Data was stored in a password-protected document without any patient identifiers.

Incentives: No incentives were given to participants.

Potential conflicts of interest/competing interests: There are no potential conflicts of interest.

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Academic approval: The research was undertaken as the MSc dissertation of the principle investigator (AN). The study protocol was approved by the University of Rwanda paediatric academic team in December 2016.

Institutional Board Review (IRB): The protocol was reviewed and approved by the University of Rwanda IRB (Ref: No201/CMHS IRB/2017) on 27 March 2017.

Contributions: AN was principle investigator and identified the concept with EK. PC supervised the project. AN, PC undertook analysis of the data. AN, PC, undertook interpretation of the results. All authors contributed to and approved the final manuscript.

This article has been peer reviewed.

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