EDUCATION ASSESSMENT ABOUT TRIGGERS AND ENVIRONMENTAL CONTROL STRATEGIES IN ASTHMATIC CHILDREN

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KIGALI April, 2016

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Registration number: 213003800

A dissertation submitted in partial fulfillment of the requirements for the degree of

MASTER OF Pediatrics

In the College of Medicine and Health Sciences

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April, 2016

DECLARATION

I, Dr Diane Patricie KAYITESI, resident in Pediatrics, hereby declare that this research document named "EDUCATION ASSESSMENT ABOUT TRIGGERS AND ENVIRONMENTAL CONTROL STRATEGIES IN ASTHMATIC CHILDREN"

Is my original work, except where due reference has been acknowledged, and that it has never been submitted to any university for any academic award.

April, 2016 Dr Diane Patricie Kayitesi, Registration number: 213003800

DEDICATION

To almighty God who guides us

To my husband Theoneste Niyonzima whose unconditional love, technical support and daily encouragement helped me so much in this work

To my sons: Ineza Ganza Cedric and Micomyiza Sangwa Nolan

To my beloved parents

I dedicate this work

AKNOWLEDGEMENT

This work would not have been achieved without support of many benefactors. We wish to thank all of those, close or far, who contributed to the realization of this work.

We wish to express our sincere gratitude to University of Rwanda and teachers for the quality education and useful knowledge they have provided to us.

Our special thanks go to our supervisors Dr Lisine Tuyisenge and Dr Karambizi Angelique Charlie who, in hard times, provided continuous support and motivation. Their guidance helped us in all the time.

We also take the opportunity to express our gratitude to our husband Theoneste Niyonzima for the moral, technical and financial support through this work.

We must express our sincere gratitude to our parents, brothers and sisters for providing us with unfailing support and continuous encouragement through this venture.

Finally, our thanks go to our classmates, friends and all of those who supported us in this work

To all of you, we say thanks a lot.

ABSTRACT

Introduction

Asthma, a chronic inflammatory disease of airways, is one of the most common chronic conditions in children, and its prevalence has been increasing over the past two decade (1). In addition to therapeutic measures, new guidelines are emphasizing on the role of patient education to achieve a good asthma control and self management. In our settings, Pediatric department has been following up asthmatic patients. For a good outcome, education about asthma by the treating team is crucial. The main objective of this study was to assess the level of education and communication of patients and caretakers on asthma triggers and environmental risk factors.

Methods

Children from 3 to 15 years old known asthmatic who consulted during a period of 6 months from July 1st 2015 to January 30th 2016 were included. Demographic and physiologic characteristics were gathered for each patient, with education status on asthma triggers and control strategies. This study assessed the education status of pediatric asthmatic patients on triggers and environmental control strategies, and logistic regression was used to assess the association between exacerbations and education variables.

Results

We had a population of 58 children, 51% were older than 5 years and we found the male gender predominant at 62%. Asthma triggers education and discussion was found to be 15.2% and 14.4% respectively and environmental risk factors education and discussion were respectively 10.4% and 10.1%. Only pollen (P value: 0.028) and weather education (P value: 0.003) were significantly associated with exacerbation: on average, the odds of having exacerbation were reduced by 87% (1-0.13) if a patients/caregiver has been educated on effect of allergies/pollen; also study participants who reported that they were educated on weather, their chances of having exacerbations were reduced by 6% (1-0.94).

Conclusion:

Health care providers discussed and educated caretakers about some asthma triggers and environmental control strategies partially. Given this finding, more research to explore this subject, guidelines and intervention efforts aimed to improve patient education and adequate asthma management still remain important.

KEY WORDS:

Asthma

Children

Education

Discussion

Triggers

Environmental factors

Exacerbation

LIST OF SYMBOLS AND ACRONYMS

CHUB: University Teaching Hospital of Butare

CHUK: University Teaching Hospital of Kigali

CMHS: College of Medicine and Health Sciences

ICU: Intensive Care Unit

IRB: Institutional Review Board

MS: Mutuelle de Sante

NAEPP: National asthma education and prevention program

NHLB: National Heart, Lung and Blood institute

OPD: outpatient department

RMH: Rwanda military hospital

RSSB: Rwanda social security board

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CHAPTER ONE: INTRODUCTION

Key definition

Asthma is a chronic inflammatory disorder of the airways. This inflammation causes recurrent episodes of coughing, wheezing, breathlessness, and chest tightness. Those episodes are associated with variable airways obstruction which is either spontaneously or with medications reversible(2).

Asthma exacerbations: Called asthma attacks or acute asthma as well, they are acute episodes of progressively worsening shortness of breath, cough, wheezing, and chest tightness, or combination of these symptoms(2), (3), (4).

Background

Asthma is one of the chronic diseases with high morbidity and mortality worldwide about 300 million people are affected (1). It is one of the most common chronic conditions of childhood and it affects about 6 millions children worldwide(2). Its prevalence has been increasing in last 20 years and literature confirms that it has been increasing also in Africa where that rise has been associated with rapid urbanization and westernization.(3), (5). The prevalence of asthma may be even higher than what has been found because of lack of data in many of African countries: Ethiopia 9.3%, Kenya 15.8%, Nigeria 13%, Mozambique 13.3% and South Africa 20.3% (6), (5), 20.8% in Uganda (7) and in Rwanda, unpublished data in adolescents found that asthma prevalence was 10.9%. In adults, a research found the prevalence of 8.9% (8)

In fact, asthma is a chronic disease but it can be controlled with adequate management, and the patient can regain normal life activity, free of symptoms and be a productive citizen. Many studies have been conducted about asthma prevalence, management and control, but few is known about patient education in several low income countries of Africa and in our settings. Patient education has been recognized by NAEPP guidelines to be an important step in overall asthma management with the 3 other ones: assessing asthma severity, control of triggers and environmental risk factors and medications.(2). Patient education is a crucial step to achieve good asthma control. Thus, assessing asthma education specifically, about triggers and environmental risk factors control strategies will help us to know where we are on that topic, and

end up by improving the overall care we are providing to asthmatic children, therefore improve patient self management of triggers and their quality of life.

CHUK is one of the referral hospitals of Rwanda and it receives patients who are transferred from district hospitals mostly those who require specialized consultation. It has many departments among them Pediatrics which has wards for hospitalization, OPD and Emergency departments. Pediatric department counts many pediatricians, residents, general practitioners and nurses to take care of sick children including asthmatic children. Many of them are followed in OPD and some are received at emergency when they have acute exacerbations.

Muhima hospital is the nearest district hospital transferring patients to CHUK. It is located in capital of Rwanda: Kigali, in Nyarugenge district and it's It receives patients transferred from health centers, adult and children including asthmatic patients. The hospital has two main departments: Gynecology and obstetrics and pediatrics, and the emergency unit which receives all new cases, adults and children and acute asthma attacks are managed there.

Muhima Pediatric department has wards for hospitalization and OPD which receives outpatients and asthmatic children are followed at OPD.

Asthmatic children receive prescriptions for medications from the healthcare providers, but we don't know at which level they are being educated after this. Studies have been done on pediatric asthma, but to our knowledge none assessed how healthcare providers are providing education to parents or caregivers in our settings. This descriptive study is conducted to fill that literature gap about patient education specifically about asthma triggers and environmental factors with control measures as well.

Problem statement

In daily practice, we take care of children with asthma in regular follow up so that they can have a good asthma control. We receive them also at Emergency department when they have exacerbations or other illnesses. Recent NAEPP guidelines 2007 have recognized patient education to be a crucial part of asthmatic patients' management. To our knowledge, no study

has examined asthmatic patient's education on triggers and environmental factors control in RWANDA, so the study relevance.

Research question:

Our study wants to answer this question:

-How is patient education on asthma triggers and environmental risk factors control strategies at Kigali University Teaching hospital and Muhima district hospital and what's the relationship with exacerbations?

Objectives of the study:

Main objective:

To assess the level of education and communication of patients and caretakers on asthma triggers and environmental risk factors.

Secondary objective:

To examine the relationship between education level of caretaker and asthma exacerbations in asthmatic children included in the study.

CHAPTER TWO: LITERATURE REVIEW

Asthma is a chronic inflammatory disease of airways. It accounts for important mortality and morbidity worldwide and there is sufficient evidence that its prevalence has been increasing over the past 20 years particularly in children (1). It is the most common chronic condition in children. The Centers for Disease Control and Prevention 2011 reported that asthma affected 7.1 million children, with 4.1 million experiencing an asthma attack during that period and many others had non diagnosed asthma. (9).

For effective asthma management, it is important to develop a partnership between health care provider and the patient or caregiver; to isolate and prevent risk factors, to treat and monitor asthma and to manage exacerbations.(1) . All of these goals can be accomplished with a good patient education during patient follow-up visit. Education should be an integral part of all communications between the health care provider and the patient or care giver and different methods can be used where available to help them to achieve asthma control over time , (1), (10). Asthma education is a wide topic where Health care providers should take time and give clear informations about asthma chronicity, medications types, use and side effects, discuss and show how to use different devices. Patients also have to be educated on isolation and control of asthma triggers and environmental factors in order to reduce acute asthma attacks.

Even though it is important to prescribe pharmacological asthma treatment appropriate to the level of severity, education and guidance on asthma self management have recently been recognized as aspects that must also be addressed within their clinical context. (11), (12).

Studies have found that effective asthma education results in decreased number of visit at Emergency and improvement of adherence to medications for a good asthma control .(13),(14)

New guidelines encourage improving patients self assessment capacities to achieve self control and highlight asthma education to be a routine part of care.,(10) ,(12). These guidelines emphasize on the importance of isolating and preventing all possible environmental triggers including: allergens, tobacco smoke, smoke from any burning, dust, pets, dust mites, molds etc.

There has been evidence that environmental triggers control reduces asthma exacerbations. (15), (16) And health care providers play a potential role in providing education on the topic to caregivers of children with asthma.

Even though many asthma researches have been centered on physiologic aspect of the illness, few focused on the education given to children and caretakers on asthma disease especially about triggers and environmental factors control.

Not much information is known about at which level environmental control triggers are discussed during hospital visits of children with asthma. Some studies found it was discussed in 42 to 61% of visits using medical records and patient or caregiver self report. (17),(18) and we think this study may fill the literature gaps in our settings on this information.

By controlling the environmental triggers children exposure, it is a cost effective approach to improve asthmatic children overall quality of life by decreasing activity limitation, daily use of rescue medications and decreasing frequent visits at emergency department for exacerbations(19), (20),

To decrease the number of exacerbations and therefore achieve good asthma control for our patients , it is important to understand at which level healthcare providers are discussing asthma triggers and environmental factors control strategies with caregivers and patients, so the relevance of the study.

CHAPTER THREE: MATERIALS AND METHODS

Type of study

This is a descriptive cross sectional study design

Study population:

Children known with asthma followed- up at CHUK in Pediatric Department and at Muhima District hospital.

Inclusion criteria:

- Eligible children are those aged 3 to 15 years old known with asthma, who have been followed in Pediatrics, either in OPD or received at Emergency Department during 6 months from July 1st 2015 to January 30th 2016.
- Children whose caretaker have signed the consent form

Exclusion criteria:

- Children younger than 3 years and older than 15 years,
- Children whose caregivers did not sign the consent form

Study site:

This study has been conducted in Department of Pediatrics at CHUK and at Muhima District hospital in Pediatric Department.

CHUK is located in the capital of Rwanda: Kigali, in Nyarugenge district and it is one of the three public national referral hospitals: CHUK, CHUB and Rwanda Military Hospital. It receives mainly patients transferred from district hospitals, those who require specialized consult. Most patients are chronic, but also it receives acutely ill patients coming from home or transferred from private clinics.

Pediatrics Department is composed of neonatology unit and pediatric wards having cardiology, oncology units, General ward, chronic ward and surgical ward. It has also Pediatric Intensive

Care Unit and emergency unity which receives acutely ill patients including asthmatic children when they present with exacerbations.

It has also outpatient unit which has two parts: The section for follow up of children living with HIV/AIDS and general pediatric section which receives all children with various diseases from district hospitals, home and private clinics around. Regular follow-up for asthmatic children are done at OPD also. Among those asthmatic children, some are coming from Muhima Hospital which is one of the district hospitals transferring patients to CHUK.. It is located in capital of Rwanda: Kigali, in Nyarugenge district and it is the nearest district hospital to CHUK .It receives patients transferred mostly from health centers or from private clinics. Its main departments are Gynecology and obstetrics and Pediatrics. It provides mainly maternal and child care services. It receives 600 to 700 mothers per month and around 30 babies are born daily.

Muhima Pediatric department has many wards for hospitalization, Neonatology unit, OPD where outpatients are followed including regular follow-up for asthmatic children and emergency unit where acutely ill children are received including acute asthma attacks

Data collection procedures:

Study Instrument

There was a pre-coded and pretested questionnaire in English and Kinyarwanda that has been filled by the Principal Investigator and the data collector.

Sample collection

The data collecting team used medical records and interview of patients and caretakers who consulted during the study period and also interviewed the parents after giving their consent and signing the consent form.

Data collection

Patients and caregivers were interviewed by the principal investigator and data collector, on discussion and education they got on asthma triggers and environmental risk factors control based on NAEPP 2007 guidelines.

CHUK being the referral hospital, asthmatic children are transferred from district hospitals for better management and new asthma cases are diagnosed as well. As they are followed-up monthly at least, we met them at the pediatric OPD on their appointments dates and at pediatric emergency department when they had acute exacerbations during the study period.

One data collector has been hired and trained for one day on interviewing technique and questionnaire content. He thereafter pre-tested the questionnaire under supervision of the principal investigator. Data were collected using a designed questionnaire and a data base was created using Epi data version 3 and exported into Stata 12.0 version.

The questionnaire contained: age, gender, socio economic information, years of education of the caregiver, insurance type, predisposing family history (asthma, eczema, allergic rhinitis or sinusitis, allergic conjunctivitis), other chronic disease, number of exacerbations in last 12 months, time of diagnosis , triggers educated on and discussed with health care provider : allergies to pollen, cold, exercise, pets, weather, viral infections, cockroaches, wood burning stoves, volatile compound organic, and environmental risk factors: smoking, volatile organic compounds, wood burning stoves , dust mites .

Data processing

Clinical and Socio-demographic information was obtained from caregiver interviews and from medical records by the data collector.

Information from these sources included personal variables: age, sex, residence, anthropometric measures, time of asthma diagnosis, time of asthma follow up visits, number of extra consultations not scheduled on follow up visits, asthma risk factors: triggers, environmental factors, family history, co morbidities, etc…

Education and discussion about asthma triggers and environmental factors was examined,

where the healthcare provider and the parent discussed about control strategies of various asthma triggers

Asthma education level was assessed using percentages of participants who have or have not been educated about each asthma trigger and environmental risk factor considered.

Data analysis

Data were analyzed using stata 12.0 version and presented in form of tables, pie charts and graphs where appropriate.

We used frequencies and percentages to describe clinical aspects of children, we then used frequencies and percentages to describe potential demographic and medical predisposing risk factors for asthma.

Logistic regression s' adjusted odd ration were used to assess the association between exacerbations and education variables and variables with a P value <0.05 were considered statistically significant.

Ethical consideration

This research proposal has been submitted to CMHS Ethical committee IRB (Institutional Review Board) for review and the approval was granted. It has been also presented to the local ethics and research committee of the CHUK and approval was obtained. The aim of this study and its significance has been explained to the care-givers before deciding to be included in the study. This study has been conducted according to the tenets of Helsinki declaration and good clinical practice. In addition, enrollment to the study was based on the consent given to the parent or authorized legal person to give consent accordingly. All data were kept in Pediatrics in a locked drawer.

References management

Our references have been managed by Mendeley software in Vancouver style.

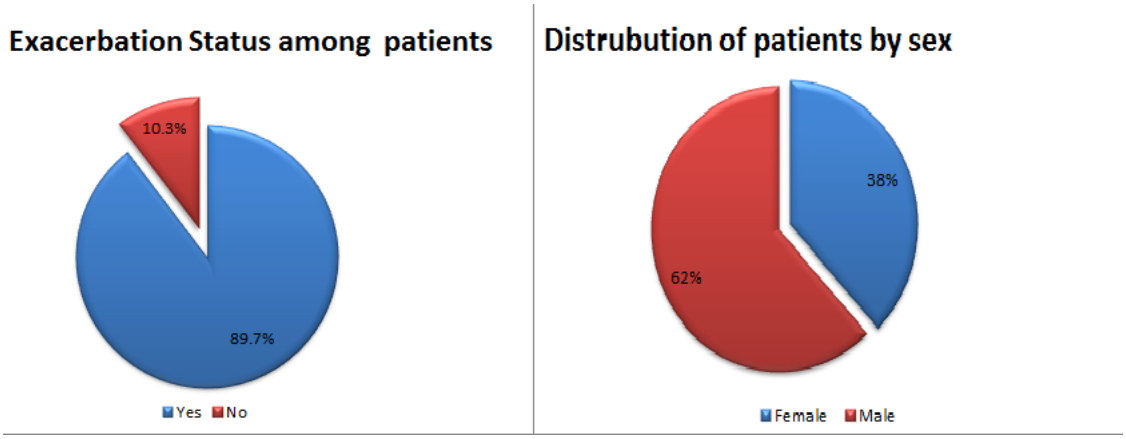
CHAPTER FOUR: RESULTS

Table 1 Tab1: Child and caregiver characteristics

Variable	Labels	N	%
Age	3-5 years	24	*41%*
	5-15years	34	*59%*
Gender	Male	36	*62%*
	Female	22	*38%*
Parent Education	None & Primary	3	*5%*
	Secondary & Higher	55	*95%*
Insurance	Public (MS)	21	*36%*
	Private (RSSB and others)	37	*64%*
Socio demographic Status	Category I & II	0	*0%*
	Category III	58	*100%*
Predisposing Family history	Yes	53	*91%*
	No	5	*9%*
Exacerbations	Yes	52	*90%*
	No	6	*10%*
Other Chronic Illness	Yes	1	*2%*
	No	57	*98%*
Diagnosis Time	3 Years & Below	17	*29%*
	Above 3 Years	41	*71%*

The previous table shows the distribution of the followed children together with their caregivers, we observed that: only 38% were females and the remaining 62% were male children; 41% were below the age of 5 years while 59% were above 5 years of age. Only 3 (5%) of the child caregiver reported that their education level was at primary level or none. Only 21 (36%) of the patients had "Mutuelle de Sante" insurance whereas the remaining 37 (64%) had private insurance (RSSB and Others); all the followed patients were in socio economic category III and 53 (91%) , 52 (91%) of our subjects had family predisposing history and (90%) had exacerbations. 57 (97%) of the followed patients had no other clinical illness; many of the caregivers 41 (71%) reported that the diagnosis time was above 3 years.

Figure 1: Distribution of patients by exacerbation status and gender (N=58)



The table below shows the distribution of asthma triggers and environmental control variables, these include allergies, cold, exercise, pet, weather and viral infection. Only 11(19%) caregivers were educated on pollen allergies; 9 (15.5%) were educated on cold effects; only 4 (6.9%) patients/caregiver were educated about exercise. The education on pets and viral infection among caregiver/patients were low at 8.6% and 6.9% respectively; a slightly high number of educated caregiver/patients was observed on weather, with 34.5% of the caregiver were aware on how the weather changes(cold or hot) can affect asthmatic patients. The average score on education and discussion about asthma triggers was found to be 15.2% and 14.4% respectively.

Looking at the environmental control, caregivers reported that only 7 (12.1%) were aware or had discussed on the effects of smoking environment on asthma patients. 4 (6.9%) caregivers

reported that they have discussed about the indoor mold, cockroaches, or wood burning stove. A total number of 7 (12.1%) caregivers mentioned that they have been educated on effect of dust mites and/or volatile organic compounds. The average score for environmental control education and discussion was found to be 10.4% and 10.1% respectively.

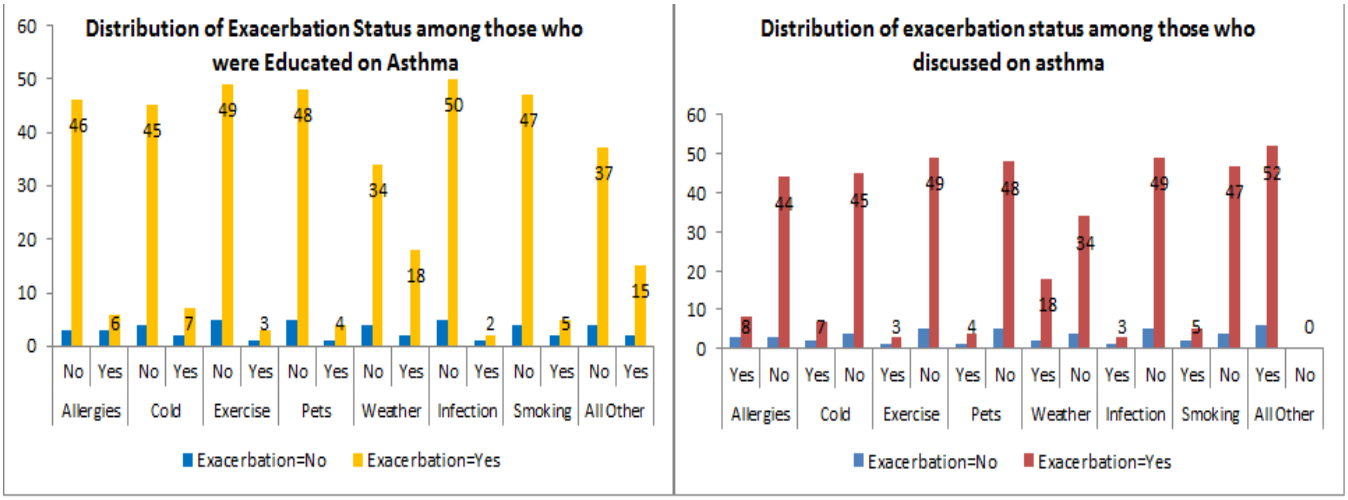
Table 2: Distribution of trigger/environmental education and discussion variables

Variable	Label	Education		Discussion	
		N	%	N	%
Asthma Trigger (Any)					
Allergies/ pollen	Yes	11	19.0%	9	15.5%
	No	47	81.0%	49	84.5%
Cold	Yes	9	15.5%	9	15.5%
	No	49	84.5%	49	84.5%
Exercise	Yes	4	6.9%	4	6.9%
	No	54	93.1%	54	93.1%
Pets	Yes	5	8.6%	5	8.6%
	No	53	91.4%	53	91.4%
Weather(cold and hot)	Yes	20	34.5%	20	34.5%
	No	38	65.5%	38	65.5%
Viral Infection	Yes	4	6.9%	3	5.2%
	No	54	93.1%	55	94.8%

Environmental Control (Any)		EDUCATION		DISCUSSION	
	Label	**N**	**%**	**N**	**%**
Smoking	Yes	7	12.1%	7	12.1%
	No	51	87.9%	51	87.9%
Indoor Mold	Yes	8	13.8%	8	13.8%
	No	50	86.2%	50	86.2%
animal dander	Yes	4	6.9%	4	6.9%
	No	54	93.1%	54	93.1%
Dust Mites	Yes	7	12.1%	7	12.1%
	No	51	87.9%	51	87.9%
Cockroaches	Yes	4	6.9%	4	6.9%
	No	54	93.1%	54	93.1%
Volatile Organic	Yes	8	13.8%	7	12.1%
	No	50	86.2%	51	87.9%
Wood Burning Stove	Yes	5	8.6%	4	6.9%
	No	53	91.4%	54	93.1%

In this study, we observed that among all the followed patients, 93% of those with public insurance (Mutuelle de Sante) had exacerbations as compared to 75% with private insurance; the patient whose age group was from 3 to 5 years were more affected with exacerbation (96%) as compared to children over 5 years of age (85%); 92% of the followed boys children were affected with exacerbation whereas 86% of the girls are the ones affected with exacerbations.

Figure2: Distribution of patients by exacerbation status and asthma triggers/environmental variables



Logistic regression s' unadjusted odd ration were used to assess the association between exacerbation and education variables. The above table shows the odds ration associated to each variable and its significance; allergies, cold, exercise, pets, weather, viral infection, smoking, indoor mold, animal dander, dust mites, cockroaches, volatile organic compounds and wood burning stove education were used in the model and we found that only allergies and weather education were significantly associated with the response of interest: On average, the odds of having exacerbation are reduced by 87% (1-0.13) if a patients/caregiver has been educated on effect of allergies/pollen on asthmatic patients; also study participants who reported that they were educated on weather, their chances of having exacerbations are reduced by 6% (1-0.94). All the remaining education factors were not significant at a significance level of 5%.

Table 3 Association between exacerbation and education variables

Exacerbation	Odd Ration	95% C.I		P value
Pollen allergies Education	*0.130*	*0.021*	*0.799*	***0.028***
Cold Education	*0.311*	*0.048*	*2.028*	*0.222*
Exercise Education	*0.306*	*0.027*	*3.523*	*0.342*
Pets Education	*0.417*	*0.039*	*4.489*	*0.470*
Weather Education	*0.941*	*0.177*	*6.348*	***0.003***
Infection Education	*0.200*	*0.015*	*2.614*	*0.220*
Smoking Education	*0.213*	*0.031*	*1.468*	*0.116*
Indoor Mold Education	*0.778*	*0.079*	*7.680*	*0.830*
animal dander Education	*0.306*	*0.027*	*3.523*	*0.342*
Dust Mites Education	*0.652*	*0.065*	*6.567*	*0.717*
Cockroaches Education	*0.306*	*0.027*	*3.523*	*0.342*
Volatile Organic Education	*0.652*	*0.065*	*6.567*	*0.717*
Wood Burning Stove Education	*0.306*	*0.027*	*3.523*	*0.342*

CHAPTER FIVE: DISCUSSION

In our study, we found that education on asthma triggers was provided to asthmatic patients at 15.2% and environmental risk factors at 14.4%. Only weather and pollen allergies education was significantly associated with exacerbations (P value: 0.003).

Child and caregiver characteristics

Among the 58 subjects enrolled in our study, we found that 36 (62%) were male, and exacerbations were more frequent in males: 92%. Several studies reported that the prevalence of asthma has been increasing worldwide especially in childhood, (1)., and it is higher in male gender than female although this situation reverses at puberty. (21). Many theories have been developed explaining the male predominance in asthma childhood epidemiology, including that genetic factors may play a role as well as immunological and anatomic factors.(21).

In a review done in Europe, a number of studies found that 2/3 of asthmatic children were male and 1/3 female.(22) In the same review, acute exacerbations were more prevalent in boys than girls in some studies but others did n't confirm that association, it's still a field of discussions. In our study, 91% of the children had a family predisposing history and this is similar to Nantanda findings in Uganda who found that childhood asthma was strongly associated with genetic factors especially maternal asthma.(23).

Asthma triggers and /environmental risk factors education and discussion

In our study, we have found that all caregivers have been educated at least about one trigger. The average for triggers education and discussion was at 15.2% and 14.4% respectively. Health care provider mostly discussed on Weather in 34.5% of subjects, then pollen in 19% of subjects. The least triggers discussed were infections and exercise; each 6.9% of subjects. The environmental risk factors were less discussed with average score for education and discussion 10.4% and 10.1% respectively.

Few authors examined this topic in children, but some studies in US reported that asthma triggers and environmental control were discussed in 42 to 63% of visits. (17),(18). Our results are lower

due to methodological differences between studies. Our results are comparable with another study conducted in North Carolina in 2012, where they used audio recording with 296 subjects and found that at least one trigger was discussed in 86% of visits, and the most common discussed topic was exercise in 70%, then weather in 45% and allergies/pollen in 35% visits. Environmental factors control strategies were less discussed and educated as well: in 27%, 17% of visits. (24). Our results look lower than theirs, and this difference can be explained by their sample size which was 4.5 times ours and socio cultural differences between populations.

Weather and pollen allergies were the most discussed triggers in our study. This can be explained by studies findings which confirm an association between climate changes and pollen abundance. There is known role of weather changes on aeroallergens like pollen release and fragmentation which results in increasing incidence of asthma and allergic diseases(25),.(26) .

It can be explained also by our tropical weather comprising rainy and sunny seasons, and there are many asthma attacks and consultations during weather changes. This situation may influence the healthcare provider receiving the patient to discuss more on weather and pollen allergies as it's the trigger of the moment. Similarly, many literatures support that climate changes are associated with asthma symptoms, new exacerbations and increased hospitalization rate (27). Another possible reason is that skin test to identify allergens is not done at CHUK, and this can have affected the number of triggers discussed. With no evidence of what triggers patient symptoms, discussion may be influenced by caregiver's perceptions and observations. In our study like in Peatts al's, environmental factors were less discussed. There is much evidence that underlines that patient education and communication is suboptimal in practice. A study in Iran found that just 30% of patients received advices for triggers control and 6% only were compliant to these advices.(28) Another one in China found poor communication between healthcare provider and patient in 54.6% and most patients did n't discuss measures to prevent exacerbations (29). Gillette reported that education and discussion about action plan was only in 21% of patients.(30).

Astudy reported that only one third of parents were aware of measures of triggers avoidance.(31)

In Africa there is few data on the topic reported comparable results to ours: In Tanzania, (32) assessed knowledge and perceptions of asthmatic children and found that dust, cat hair and cold weather were most reported known triggers (only 5% knew about cold weather) and about only 20% of the subjects reported being educated about avoidance of triggers as a mean to reduce exacerbations. (33).

Many studies have highlighted that there are gaps in patient education, an issue which needs to be addressed.

In this study, we realized that there are important asthma triggers which were insufficiently discussed and this is a challenge to all health care providers, as education has several benefits: it is a cost effective process, and improves self management of patients at home ending up by good asthma control.

Smoking was only discussed in 12.9% subjects when several literatures have associated smoke exposure with increasing asthma prevalence and exacerbations (34). It has been reported by NHLB guidelines as the most common irritant (10) and most smoke exposure occurs at home by parents.(35) . A study in Ethiopia reported smoke exposure as the main trigger for exacerbation. (33). DHS estimates in subsahara Africa tobacco use in 2009 found that highest use was in men in East central Africa (36), therefore, healthcare providers should be aware of the danger of smoke exposure in our region, and give clear informations about avoidance measures.

Exercise education was provided in only 6.9% subjects. Although exercise induced asthma exists, Doctors should discuss the importance of physical activity in asthmatic children for their wellbeing, to prevent obesity which has been associated with poor asthma control and exacerbations (37),(38), and they need to provide clear information on what is safe and appropriate regarding exercise in asthmatic children.

Viral infections were discussed only in 6.9% of patients. Litteratures have reported the role of viral infections (39), mostly rhinovirus in exacerbations,(40).In Mulago hospital, viral infection was the main risk factor for patients who consulted at emergency (7) and in Rabbat as well.(41)

We don't yet know what the viral infections impact in our settings is, but healthcare providers should provide education and guidance about viral infections in asthmatic children.

In our settings, the reasons behind the insufficient education are not yet clear, it may be associated with the number of children seen by a one doctor, education level, socio economic factors etc… future interventions should investigate more in order to maximize patient education in our settings. Annexe 1 summarizes these environmental triggers and their control strategies (adapted from NHLBI Asthma guidelines 2007) which health care providers should know, educate and share with parents. (2).

Association between patient exacerbation and asthma triggers /environmental factors education

In this study, we observed high frequency of exacerbations (90% of our subjects) and we found that poor patient education and discussion was associated with more exacerbations generally, but allergies/pollen and weather education were significantly associated with exacerbations. Our findings are comparable to those of literatures which have reported that providing adequate asthma education to patients has a good general impact as it decreases hospital admissions, and exacerbations frequency and improves self management and overall quality of life of patients. (10), (19), (28) . This has been emphasized by NAEPP guidelines 2007 where asthma patient education topic is highlighted in the management of asthma focusing on triggers identification and avoidance to decrease number of acute asthma attacks. Several literatures in different countries have underlined the role of weather fluctuations in temperature and humidity and pollen in acute exacerbations: (26) ,(42),(43). Another study (44) found that a high number of self reported triggers is associated with increased frequency and severity of exacerbations in adolescents.

We found that the exacerbations rate was higher in boys more than girls and younger children 3 to 5 years old were more affected. The younger age predominance in asthma may be associated with airways anatomy differences as youger children has small and deformable airways therefore they present difficult in breath rapidly. Several literatures reported similar findings: a review in

Europe reported that boys were more concerned by exacerbations.(22) , a study in Nigeria also reported the high prevalence of exacerbations among asthmatic children specifically in rainy cold weather (45), another one in Rabbat found similar results (41) .

Challenges and limitation

The important strength for this study was that we never had data on education of asthmatic children on triggers and environmental factors avoidance.

The main limitation was the limited time and subsequently leading to a small sample size used in this study period which makes its results difficultly comparable to other studies. We missed some asthmatic children and miss data as we were using files as another source of information with possible incomplete records and others may have missed especially those who consulted over night and discharged immediately.

As we used patient or caregiver self report method we can't assure fully the reliability of the information as caregivers responses may have been affected by inappropriate recall.

CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

Health care providers discussed and educated caretakers about some asthma triggers and environmental control strategies partially. Given this finding, more research to explore this subject, guidelines and intervention efforts aimed to improve patient education and adequate asthma management still remain important.

We recommend further research on this topic with a larger sample size and clinical guidelines implementation about asthma triggers and environmental control strategies in all district hospitals

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ANNEXES

Environmental Trigger Related Home Management Strategy: adapted from NHLBI 2007 guidelines

1. **Pollens** (from trees, grasses, weeds):

Those with allergies should stay indoors with windows closed, during periods of peak pollen exposure, usually during the midday and afternoon. This may be challenging for children.

2. **Indoor Mold:**

Fix all leaks and eliminate water sources associated with mold growth; clean moldy surfaces. Reduce indoor humidity to or below 60 percent (ideally 30–50%). Dehumidify basements if possible.

3. **Animal dander:**

Remove animal from house, or at minimum keep animal out of the patient's bedroom

4. **Dustmites:**

Encase mattresses and pillows in allergen-impermeable covers; wash sheets and blankets on the patient's bed in hot water weekly. Reduce indoor humidity to or below 60 percent (ideally 30–50%); remove carpets from the bedroom and any carpets laid on concrete.

5. **Cockroaches**

Use poison bait or traps to control insects; Conduct intensive cleaning to reduce reservoirs. Do not leave food or garbage exposed.

6. **Tobacco Smoke** :

Advise caregivers who smoke to stop smoking or to smoke outside the home. Advise adolescents to stop smoking, and warn against initiating smoking.

Other indoor air pollutants Discuss ways to reduce exposures to the following: Unvented gas stoves (NO_2 exposure)

7. **Other irritants** (perfumes, cleaning agents, sprays)

Discuss ways to reduce exposures to the following: Unvented gas stoves (NO_2 exposure)

Other irritants (perfumes, cleaning agents, sprays),Volatile organic compounds (VOCs) such as new carpeting, painting, particle board, Wood burning stoves or fireplaces

Questionnaire

I. Child and caregiver characteristics:

Age: 3-5years:

6-15years:

Gender: Female:

Male:

Parents' education: None:

Primary:

Secondary:

High level:

Insurance:

None:

Public (MS)

Private: RSSB and others

Socio-demographic status : ubudehe 1

2

3

Predisposing Family history (asthma, eczema, food allergy, allergic rhinitis, allergic conjunctivitis): yes/no

II. Discussion and education about Asthma Triggers and Environmental control strategies:

Asthma triggers control (any): Discussed (yes/no) Yes, No: Education provided (yes/no): Yes=, No=

Allergies/ pollen education Yes=, No=

Allergies pollen discussion Yes, No:

Colds education

Cold discussion

Exercise education

Exercise discussion

Pets (cats, dogs) education

Pets' discussion

Weather/season education:

Weather discussion

Infections education

Infections discussion

Smoking education

Smoking discussion

Indoor mold education

Indoor mold discussion

Animal dander education:

Animal dander discussion

Dust mites education:

Dust mites discussion

Cockroaches education:

Cockroaches discussion

Volatile organic compounds education (new paints, new carpeting):

Volatile organic compound discussion

Wood burning stoves or fireplaces education:

Wood burning stoves discussion

III.Exacerbations Assessment:

Did your child consult in ER for Shortness of breath in last 12 months: Yes=, No=

Consultations number: 0-1.:

>/=2:

Hospital admission: yes/ no:

ICU admission? YES/NO

Other chronic illness? YES/NO

Diagnosis time: 1 < 1year

2: 1-3yrs

3: >3year

Ethics committee approval

CENTRE HOSPITALIER UNIVERSITAIRE

UNIVERSITY TEACHING HOSPITAL

Ethics Committee / Comité d'éthique

August 03, 2015 **Ref.: EC/CHUK/147/2015**

Review Approval Notice

Dear **Dr. Diane Patricie Kayitesi.**

Your research project: ***"Education assessment about triggers and environmental control strategies in asthmatic children followed at University Teaching Hospital of Kigali-CHUK."***

During the meeting of the Ethics Committee of University Teaching Hospital of Kigali (CHUK) that was held on 03/08/2015 to evaluate your protocol of the above mentioned research project, we are pleased to inform you that the Ethics Committee/CHUK has approved your protocol.

You are required to present the results of your study to CHUK Ethics Committee before publication.

PS: Please note that the present approval is valid for 12 months.

Yours sincerely,

Dr. Georges Ntakiyiruta
The Vice President, Ethics Committee,
Kigali University Teaching Hospital

UNIVERSITY OF RWANDA

COLLEGE OF MEDICINE AND HEALTH SCIENCES

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 4/12/2015

Dr. Diane Patricie Kayitesi
School of Medicine and Pharmacy, CMHS, UR

Approval Notice: No 356 /CMHS IRB/2015

Your Project title ***"Education assessment about triggers and Environmental control strategies in Asthmatic children followed up at CHUK in paediatric Department"*** has been evaluated by CMHS Institutional Review Board.

Name of Members	Institute	Involved in the decision		
		Yes	No (Reason)	
			Absent	Withdrawn from the proceeding
Prof Kato J. Njunwa	UR-CMHS	X		
Prof Jean Bosco Gahutu	UR-CMHS	X		
Dr Brenda Asiimwe-Kateera	UR-CMHS	X		
Prof Ntaganira Joseph	UR-CMHS	X		
Dr Tumusiime K. David	UR-CMHS	X		
Dr Kayonga N. Egide	UR-CMHS	X		
Mr Kanyoni Maurice	UR-CMHS	X		
Prof Munyanshongore Cyprien	UR-CMHS	X		
Mrs Ruzindana Landrine	Kicukiro district		X	
Dr Gishoma Darius	UR-CMHS	X		
Dr Donatilla Mukamana	UR-CMHS		X	
Prof Kyamanywa Patrick	UR-CMHS		X	
Prof Condo Umutesi Jeannine	UR-CMHS		X	
Dr Nyirazinyoye Laetitia	UR-CMHS		X	
Dr Nkeramihigo Emmanuel	UR-CMHS		X	
Sr Maliboli Marie Josee	CHUK	X		
Dr Mudenge Charles	Centre Psycho-Social	X		

After reviewing your protocol during the IRB meeting of where quorum was met and revisions made on the advice of the CMHS IRB submitted on 2nd December 2015, **Approval letter has been granted to your study.**

Please note that approval of the protocol and consent form is valid for **12 months**.
You are responsible for fulfilling the following requirements:

1. Changes, amendments, and addenda to the protocol or consent form must be submitted to the committee for review and approval, prior to activation of the changes.
2. Only approved consent forms are to be used in the enrolment of participants.

3. All consent forms signed by subjects should be retained on file. The IRB may conduct audits of all study records, and consent documentation may be part of such audits.
4. A continuing review application must be submitted to the IRB in a timely fashion and before expiry of this approval
5. Failure to submit a continuing review application will result in termination of the study
6. Notify the IRB committee once the study is finished

Sincerely,

Date of Approval: The 4th December 2015
Expiration date: The 4th December 2016

Professor Kato J. NJUNWA
Chairperson Institutional Review Board,
College of Medicine and Health Sciences, UR

Cc:
- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate studies, UR