Clinical evaluation criteria of ocular allergy by ophthalmologists in Kenya and suggested grading systems

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ABSTRACT

Background: **Despite the high prevalence (20% of the population worldwide) of ocular allergy (OA), its definition, a standard classification and grading as well as the guidelines to diagnosis and treatment are not globally accepted. Clinical evaluation criteria would allow appropriated evaluation of progression, the establishment of algorithms of treatment, as well as objective assessment for analysis of treatment efficacy.**

Objectives: **To determine the clinical evaluation of OA by ophthalmologists in Kenya, describe their practices regarding its clinical grading and propose a standardised grading system.**

Methods: **The study was a descriptive (Knowledge, Attitude and Practice) cross-sectional study carried out in the Republic of Kenya from 1st December 2012 to 31st May 2013. All qualified and practising ophthalmologists in Kenya were eligible to participate in the study. Primary data was collected using self-administered questionnaires as an online survey. Focus Group Discussions and a group key informant interview were used as a secondary data collection tool for triangulation and to get detailed information on the attitudes and practices of the ophthalmologists regarding OA.**

Results: **A total of 58 ophthalmologists were included in the study (69% response rate). All the participants reported diagnosing OA based on clinical findings. Majority, 82.8%, reported grading ocular allergy with 63.3% grading it according to the level of severity. Majority of the ophthalmologists (88.3%) felt that grading of OA is important as it impacts on the clinical decision-making. Two systems were suggested for the grading of OA with grading system 1 incorporating both the assessment of symptoms and signs with the frequency/severity of each being graded on a likert scale. The score of the more severe eye would indicate the level of severity. Grading system 2 took into consideration the signs that are picked by the clinician and the most severe sign present in the more severe eye determines the grade. Most ophthalmologists preferred the second system because of its simplicity. There was a general agreement on grading OA patients according to the levels of severity regardless of the classification.**

Conclusion: **Despite the high number of ophthalmologists reporting grading OA, there is no standardised grading system followed. The adoption of grading system 2 would allow for a common agreement for the assessment of ocular allergy, and as a result help in the establishment of set guidelines in Kenya on the management of OA.**

Key words: Ocular allergy, Allergic conjunctivitis, Vernal keratoconjunctivitis, Allergy grading

INTRODUCTION

Ocular allergy (OA) is a disease of the ocular surface, whose basic mechanism is allergic inflammation, with a prevalence of 20%[1] worldwide. Recent studies according to Rosario *et al* [1] imply rates as high as 40%. Despite the high prevalence, its definition, a standard classification and staging as well as the guidelines to diagnosis and treatment are not globally accepted. The term ocular allergy encompasses a group of diseases in which there is a high frequency of atopy, ocular itching, stringy discharge and a papillary conjunctival reaction[2-4]. Syndromically, a distinction can be made between mild presentations (Seasonal allergic conjunctivitis [SAC] and perennial allergic conjunctivitis [PAC] and more serious conditions such as vernal keratoconjunctivitis (VKC), atopic keratoconjunctivitis (AKC), giant papillary conjunctivitis (GPC) and contact dermatoconjunctivitis[2-3]. Ocular allergy can also be grouped according to the length of the disease into: acute, chronic and recurrent. Its diagnosis in African countries is mainly based on clinical findings, with meticulous questioning, emphasizing on the existence of ocular itching and looking for tarsal papillae, follicles and conjunctival pigmentation[5]. The clinical features are characterized by their wide variety therefore clinical evaluation criteria would allow appropriated evaluation of progression, the establishment of algorithms of

treatment, as well as objective assessment in clinical trials for analysis of treatment efficacy[1].

In our current set up the classification and management of OA is not standardised and there appears to be several approaches to its management depending on the understanding of severity. The purpose of this study was to determine the clinical evaluation of OA by ophthalmologists in Kenya and also to describe their practices regarding the clinical grading of ocular allergy. The findings will also be useful in creating awareness on the importance of clinical grading. This may help clinicians and researchers classify disease activity and establish a common agreement for treatment of ocular allergy, and as a result help in the establishment of set guidelines in Kenya on the management of OA.

MATERIALS AND METHODS

Participants: A descriptive (KAP) study was employed, as it would adequately address the explorative nature of the objectives of this study. It was carried out during the period of 1st December 2012 to 31st May 2013. The study population included all qualified ophthalmologists practising in Kenya covering public, private and faith based hospitals/clinics who gave informed consent to participate in the study.

Since there were no previous studies on prevalence of grading of OA in the region, the maximum sample size was determined using the Fishers *et al* 2003 method with a prevalence assumption of 50% grading by ophthalmologists'. There was need to correct the sample size for finite population and therefore a minimum of 53 ophthalmologists were needed. Ethical approval was sought from the Kenyatta National Hospital (KNH)/University of Nairobi (UoN) Ethics and Research Committee.

Data collection: Both self-administered questionnaires and focus group discussions/key informant interview were used for data collection. The self-administered questionnaires were generated on Google docs as an online survey and served as both a qualitative/ quantitative tool.

Moderated focus group discussions (FGD) and a group key informant interview were used to complement data collected from the questionnaires especially in the attitude section and this was exclusively qualitative. They were used to get more in-depth information from a smaller group of people. This helped in understanding the context behind the answers given in the written survey; explore topics in more detail. A minimum of 6 participants was expected for each FGD as the recommended size of a group is of 6 – 10 people[7]. The FGDs were held in the month of January 2013 at the UoN (6 participants) and the Kikuyu Eye Unit (7 participants). The group key informant interview was held at KNH (2 participants). Majority of the FGD and group key informant interview participants also practice in the private sector, representing many views of the ophthalmologists in that area.

Statistical analysis: Quantitative data analysis was undertaken using Stata version 11.0. Qualitative data was imported into NVivo 10 software for coding and data analysed through content analysis.

RESULTS

The relevant quotes from the open-ended questions in the questionnaire and the discussions are presented in the results section in italicized font.

Demographics: The online survey had a 69% response rate with 58 responses received out of the 84 ophthalmologists selected to participate in the study. Therefore a total of 58 ophthalmologists were included in the study. The median age was 39 years (range: 32 - 66 years) and 70.7% of the participants were male. The majority (65.5%) practised in government hospitals. 24.1% of the ophthalmologists had practised for less than two years while only 8.6% had practised for more than 20 years.

Diagnosis: All respondents reported that the diagnosis of OA is clinical, based on patients' symptoms/signs. Approximately 3.4% of the respondents suggested '*swabs and/or allergy testing for severe cases.'* The recurring symptoms and signs mentioned by the ophthalmologists as being important for the diagnosis of OA included: itchy eyes, tearing, redness, papillae/cobblestones, mucoid/stringy discharge and hyperpigmentation of lids and conjunctiva.

Classification: The majority (86.2%, 95% confidence interval: 74.6 – 93.9%) of ophthalmologists reported classifying ocular allergies. Most classified the allergies as mild, moderate or severe. The other form of classification mentioned included the syndromic classification into: atopic keratoconjuctivitis (AKC), seasonal allergic conjunctivitis (SAC), perennial allergic conjunctivitis (PAC), vernal keratoconjuctivitis (VKC), giant papillary conjunctivitis (GPC) and others.

Grading: Majority (82.8% (95% CI: 76.1 – 89.4%) of the ophthalmologists reported grading OA. Approximately 63.3% graded the allergies depending on whether they were mild, moderate or severe, while the others graded them as acute or chronic. Of those who did not grade OA, 7 of 10 were not aware of a grading system, the remaining three were aware of a grading system but did not grade it as one felt that grading OA was *'not practical'* while the other two felt that grading it would not change the management. Fifty percent of the ophthalmologists felt that grading of OA was very important while one ophthalmologist felt that it was not important (Figure 1).

Important symptoms and signs for the grading ocular allergy: Approximately 36.2% of the ophthalmologists felt that ocular itch was extremely important (Table 3). Overall, ocular itch, heperaemia and foreign body

sensation had the highest cumulative scores (Figure 2). Conversely, about half of the ophthalmologists (48.3%) felt that ocular pain was not an important symptom or was slightly important in the grading of OA severity. Majority of the ophthalmologists considered limbal proliferation/Horner-Trantas dots (51.7%), papillary hyperplasia (50%) and shield ulcer (56.9%) as extremely important signs (Table 4). However the presence of follicles was not regarded as an important sign and had the least cumulative score (Figure 3).

Figure 1: Perceived importance of grading OA (n=58)

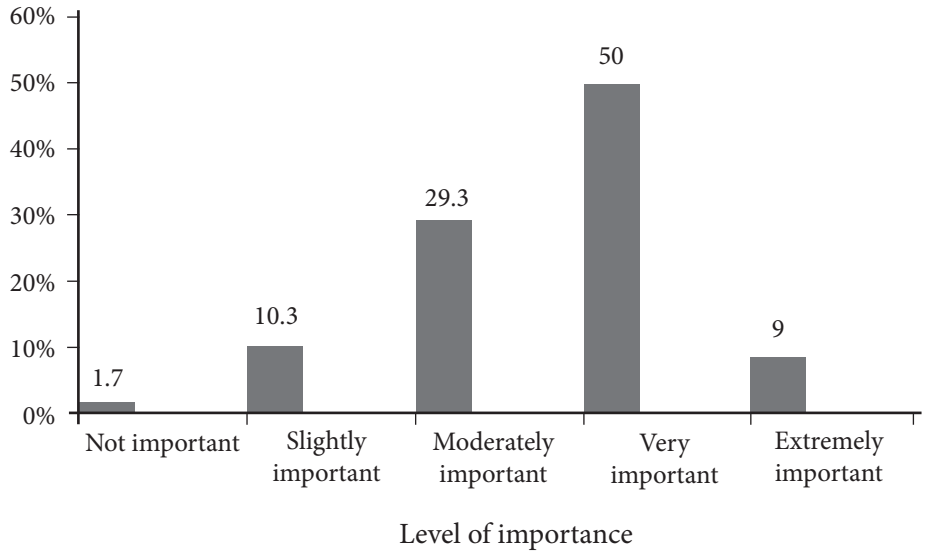
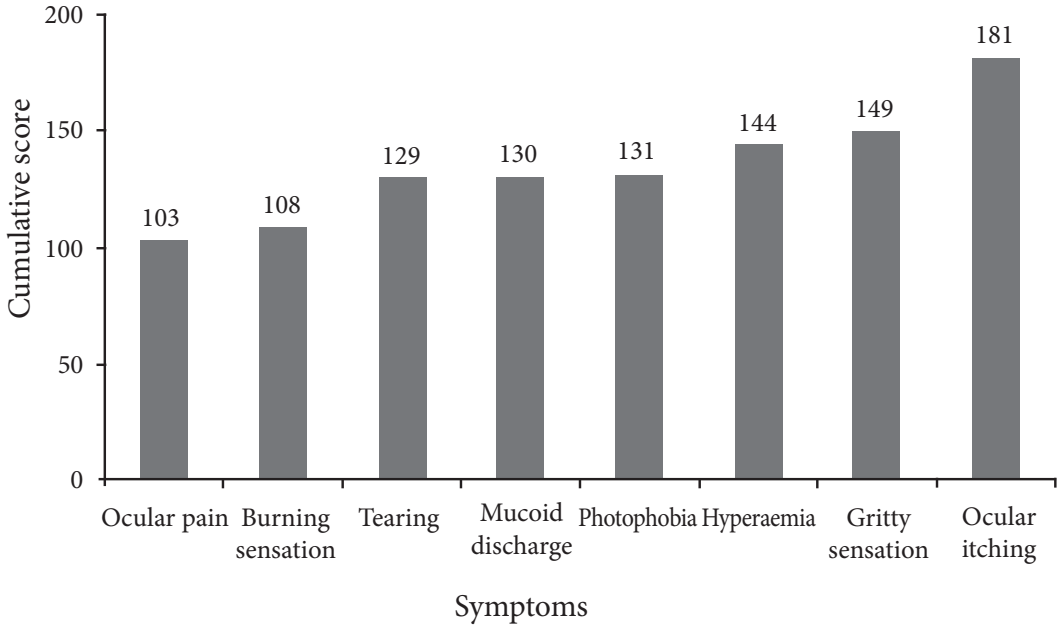


Figure 2: Cumulative scores of perceived importance of symptoms in OA grading



All the above signs are assessed and the most severe sign present in the more severe eye determines the grade.

Figure 3: Cumulative scores of perceived importance of signs in OA grading

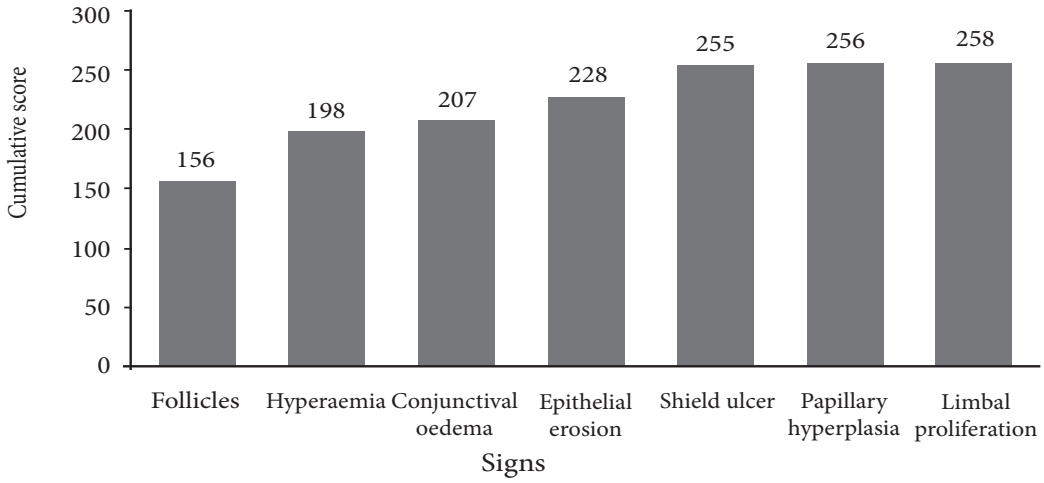


Table 1a-b: Suggested grading system 1

Table 1a: Evaluation of grade of subjective symptoms severity

	0 None of the time	1 Some of the time	2 Half of the time	3 Most of the time	4 All of the time
Itching Tearing Light sensitivity Gritty Sensation Burning sensation					

Table 1b: Evaluation of grade of objective symptoms severity

Grade/Level	1 Mild	2 Moderate	3 Moderately Severe	4 Severe
Papillae	Micro: <0.3mm	Macro: >0.3- <0.5mm	Cobblestone: 0.5-<1mm +/-Fibrosis	Giant: ≥ 1mm
Conjunctiva	Hyperaemia	Hyperaemia + partial conjunctival swelling	Hyperaemia + Diffuse thin chemosis	Hyperaemia + Cyst like chemosis/ scar
Cornea	Sectoral SPKs	Diffuse SPKs	Shield ulcer or epithelial erosion	Keratoconus +/- central leucoma
Limbus (Limbal oedema/trantas dots)	No manifestations	< ½ of limbal circumference affected	½ or > of limbal circumference affected	Conjunctivalisation of cornea encroaching on visual axis

Mild: 1-9 Moderate: 10-18 Moderately Severe: 19-27 Severe: 28-36

Table 2: Suggested grading system 2: Evaluation of grade of objective symptoms severity

Grade	Mild	Moderate	Severe
Papillae	Micro: <0.3mm	Macro: 0.3-<0.5mm, +/- Fibrosis	Cobblestones/ Giant Papillae: ≥ 0.5mm
Conjunctiva	Hyperaemia	Hyperaemia Diffuse thin chemosis	Hyperaemia Cyst like chemosis /scar
Cornea	Sectoral SPKs	Diffuse SPKs or epithelial erosion	Shield ulcer, Keratoconus ± central leucoma
Limbus (Limbal oedema/ trantas dots)	No manifestation	< ½ of limbal circumference affected	½ or > of limbal circumference affected

Table 3: Perceived importance of symptoms in OA grading (n=58)

	Not important n (%)	Slightly important n (%)	Moderately important n (%)	Very important n (%)	Extremely important n (%)
Ocular itching	1 (1.7)	1 (1.7)	9 (15.2)	26 (44.8)	21 (36.2)
Hyperaemia	1 (1.7)	9 (15.2)	15 (25.9)	27 (46.6)	6 (10.3)
Tearing	4 (6.9)	7 (12.1)	24 (41.4)	18 (31.0)	5 (8.6)
Photophobia	2 (3.5)	8 (13.8)	26 (44.8)	17 (29.3)	5 (8.6)
Foreign body sensation	0	8 (13.8)	20 (34.5)	19 (32.8)	11 (19.0)
Ocular pain	6 (10.3)	22 (37.9)	16 (27.6)	7 (12.1)	7 (12.1)
Mucoid discharge	3 (5.2)	6 (10.3)	26 (44.8)	20 (34.5)	3 (5.2)
Burning sensation	3 (5.2)	15 (25.9)	29 (50.0)	9 (15.2)	2 (3.5)

Table 4: Perceived importance of signs for grading severity of OA (n=58)

	Not important n (%)	Slightly important n (%)	Moderately important n (%)	Very important n (%)	Extremely important n (%)
Hyperaemia	0	11 (19.0)	18 (31.0)	23 (39.7)	6 (10.3)
Horner-Trantas dots	0	0	4 (6.9)	24 (41.4)	30 (51.7)
Papillae	0	0	5 (8.6)	24 (41.4)	29 (50.0)
Conjunctival oedema	2 (3.5)	7 (12.1)	18 (31.0)	18 (31.0)	13 (22.4)
Follicles	13 (22.4)	12 (20.7)	17 (29.3)	12 (20.7)	4 (6.9)
Shield ulcer	1 (1.7)	2 (3.5)	3 (5.2)	19 (32.8)	33 (56.9)
Corneal epithelial erosions & SPKs	2 (3.5)	4 (6.9)	10 (17.2)	22 (37.9)	20 (34.5)

Focus group discussions and group key informant interview results

The key areas that arose from the discussions are summarised below with the relevant quotes in italics.

Grading of severity

This area of discussion was broad and it included a description of the grading systems used by the participants. They suggested symptoms/signs of different OA grades; these are highlighted in Tables 5-7. The most common response on how the participants grade OA, was grading based on the patients' symptoms and clinical findings into mild, moderate and severe.

'In terms of severity I put it as mild, moderate and severe depending on how they present, in terms of how they deem it affects their activities of daily living…'

Minority of the participants felt that it is important to distinguish between the blinding and non-blinding allergies due to presence of limbal stem cell deficiency in the blinding cases and the difference in counseling and follow up of the patients. They also felt that blinding allergies may not be that symptomatic until they reach a severe stage.

'*VKC and AKC are blinding, PAC and SAC are irritating but visual acuity is not affected. The patient with seasonal has no need to recall for an appointment, but with the blinding cases, appointments should be scheduled*.'

A differing opinion was from a participant who pointed out that in spite of categorizing it as such, there is still need to grade the severity of the disease into mild, moderate and severe irrespective of whether it is a blinding or non-blinding form '*because at the end of the day I find that is the one that will determine my kind of treatment, it might be non-blinding but it is severe. I will still do mild, moderate and severe and I will still decide if it is vernal or not vernal*.'

Table 5: Mild ocular allergy

Symptoms and signs
– Mild papillae, first timers, most of them with tearing itching, photophobia, gritty sensation.
– Complaining of foreign body sensation and itching with a bit of tearing and redness but nothing major
– If they say 'occasionally I itch' or sometimes they feel like they have something in their eye, they rub their eye...'
– Some papillae, a bit of conjunctival hyperpigmentation,
– Papillae that are minute
– Few papillae, no corneal or limbal disease

Table 6: Moderate ocular allergy

Symptoms and signs
– Long, recurrent histories, and from far, with conjunctival discoloration. The papillae are small; there is no corneal disease and probably just small melanosis of the conjunctiva.
– Cobblestones, a little bit of limbal disease and SPKs (Superficial punctate keratopathy)
– A little bit of cobblestones but I will also be looking at whether they have limbal disease or not and they rarely have any corneal involvement.
– Large papillae

Table 7: Severe ocular allergy

Symptoms and signs
– Long, recurrent histories,
– Large papillae, corneal complications of whatever type and SPKs, pannus, limbal scarring, trantas dots,
– Large cobbling, corneal ulcers, SPKs and bad limbal disease with tear film problems and vision will be affected
– Giant papillae, limbal involvement and have corneal problems sometimes they will have shield ulcers, a lot of SPKs and sometimes the vision is affected
– Always photophobic, scratching their eyes, tearing and eyes most of the time are red
– Cobblestones, SPKS or corneal ulcers, corneal infiltration and limbal hypertrophy that is almost blinding them.
– Visually endangering disease such as shields ulcers, keratoconus, pseudogerontoxon or scars encroaching on optical axis
– Corneal complications
– Huge cobblestones

Effect of grading on clinical decision-making

The respondents generally agreed that grading of ocular allergy is important. Though majority felt that it was beneficial, one respondent felt that grading of OA is only of interest to the practitioner but of no benefit to the patient because *'the morbidity of the condition and the way it affects the patients, to them [the patient] what is important is relief of the symptoms. So no matter how you grade it, to them [the patient], what matters is its relief and alleviating any complications that may come from it.'*

The grading of OA was viewed by the respondents as a means to impact on the clinical decision making because it influences the type of medication prescribed to the patient, the dosage, follow-up and counseling.

'*...it influences what medication you give the patients and how often you give them, how soon you see them back and how often you see them thereafter...*'

Despite this, it was clear from the respondents that there is no standardised grading system used and the participants felt that it would be good to come up with one as it will help in giving an objective assessment of the patients' condition. This is especially for better documentation and assessment of treatment response during patient follow-up.

'... if you are in a setting where you are not the only one seeing the patient, it's good to write the details on how you arrived at a particular grade so that if a different doctor sees the patient they are able to follow up from that and know if the patient is getting better or worse but if it's a patient that you are seeing most of the time, fine, it's good to record it so that you know where you are.'

Clinical grading systems

Two clinical grading systems were designed with reference to suggested grading systems by dos Santos *et al.* [2], Uchio *et al.* [6] and Atzin Robles-Contreras *et al.*[8]. They were presented to the participants for discussion on preferences and suggestions for improvement. Grading system 1(Table 1a-b) incorporated both the grading of symptoms and signs, with the frequency/severity of each being graded on a likert scale. The clinician would then total up the findings and the score of the more severe eye would indicate the level of severity. Grading system 2 (Table 2) took into consideration the signs that are picked by the clinician. All the signs are assessed and the most severe sign present in the more severe eye determines the grade.

Grading system 2 (Table 2) was preferred with the recurring reason being that '*the simpler the grading system the easier it is to be used by people who see patients in a crowded clinic*.' It was suggested that the two grading systems would also be beneficial in that grading system 1 (Table 1a and Table 1b) can be used as the expanded grading system for research and educational purposes and grading system 2 (Table 2) can be used as the simplified grading system used in the field.

'I would go for the 2nd one too because sometimes you may want to break something into very small details like system 1 but it doesn't change your management so for me to waste time on it, I need to get the benefit and the patient also needs to get the benefit. So, if you want somebody to use something, make it simple and to the point.'

Discussions identified the following suggestions for improvement: simplifying the grading system by reducing the categories to mild, moderate and severe, re-organising the areas to be assessed to follow the usual examination pattern, mild cases should not have any corneal changes, and use of a pictorial flow chart including the drug options and follow up for each level of severity.

Few participants suggested a separate grading system that will highlight AKC and VKC ('*to avoid mixing oranges and apples')* this is because they were of the opinion that they should not be grouped together with allergic conjunctivitis. They felt that there should be a separate grading system that will highlight AKC/VKC and were of the opinion that they should not be grouped together with allergic conjunctivitis because '*…it's like mixing oranges and apples, and then trying to sort them out, you can't, you can only discuss oranges and then apples. So I see that you will get into a lot of problems if you try to bring VKC into this category. Probably you need to leave VKC out of this, the management is quite different, and its level of severity is different, considering that is the blinding part, so I would think about VKC hard before putting it in OA*.'

Grey area in ocular allergy Keratoconus

During the discussions a debate emerged among the ophthalmologists, on whether keratoconus is a *'different condition all together'*, if it is an association or if it is a complication of ocular allergy. Majority of the participants agreed that if keratoconus is present, the patient should be placed in the severe category. *'If you think it's going to affect the way you manage a patient, you just need to be more careful with it and you can get away with putting it here. Because you need to pick up those allergic patients with keratoconus and treat them more carefully, so you put them in the severe category.'*

DISCUSSION

Ocular allergy is a condition encountered daily in the outpatient clinics. Its diagnosis is based on clinical findings as shown in the online survey responses, with all the respondents reporting that the diagnosis of OA is clinical, based on patients' signs/symptoms. This in keeping with the findings by Wade *et al*[5]. in Gambia, and by Dos Santos *et al*[2] at the ocular allergy Latin American consensus[2]. Only 2 (3.4%) respondents suggested the use of swabs and/or allergy testing for severe/refractory cases. The main symptom of ocular allergy is itching, without itching; a condition should not be considered ocular allergy[8]. It was mentioned by all the participants as one of the important symptoms/ signs in the diagnosis of OA, the rest included: tearing, redness, papillae/cobblestones, stringy mucoid discharge and hyperpigmentation of lids and conjunctiva.

Ocular allergy may be classified into various sub-groups according to the underlying pathophysiology and clinical findings[6]. Few participants felt that VKC and AKC should not be grouped as OA because they are sight threatening conditions. At the Ocular allergy Latin American consensus, half of the panellists suggested the inclusion of SAC, PAC, VKC, AKC, GPC and contact blepharoconjunctivitis (CBC) under the term "Ocular Allergy" [2]. There was a lot of overlap between the number of respondents classifying OA (86.2%) and those grading it (82.8%). This could be as a result of the mix-up between the two terms with reference to OA because the majority reported classifying it into mild, moderate and severe at the same time grading it according to the same levels of severity. This may explain the similarity in the percentages of the ophthalmologists classifying and those grading ocular allergy.

Approximately 63.3% of the participants of the online survey and majority of the ophthalmologists at the face to face discussions stated that they grade the signs/symptoms of OA patients according to the levels of severity. It is important to note that despite the high number of ophthalmologists grading OA (82.8%), none reported following a laid down criteria. Each ophthalmologist graded the severity of the patients' condition based on their discretion and this determined the patients' treatment and follow up. At the ocular allergy Latin American consensus, majority of the panellists agreed on the significance of establishing a staging of ocular allergic diseases based on levels of severity[2].

In our set-up 88.3% of the ophthalmologists felt that grading of OA is important with 50% of them indicating it as being moderately important. During the face-to-face discussions, we were able to explore reasons why they felt it was important. Majority agreed that grading of OA severity impacts on the clinical decision-making. This is because it determines the choice of treatment, timing and frequency of follow up; leads to better documentation and assessment of treatment response during patient follow up. Dos Santos *et al*[2] and Uchio *et al*[6] stressed that such staging would allow the establishment of algorithms of treatment, as well as objective assessment in clinical trials for analysis of treatment efficacy. According to Atzin Robles-Contreras *et al*[8], a grade of severity is crucial to establishment of ocular clinical status, and possible vision compromise in ocular allergy patients.

Patients with OA can present with a wide array of signs and symptoms making its grading a challenge.

During the discussions and interview, there was a general agreement on using the suggested grading system to grade OA patients according to the levels of severity regardless of the classification. The reason given was that the clinical severity would be the greatest determinant of the treatment offered. In contrast during the OA Latin American consensus, there was no consensual agreement regarding a general staging applicable to all types of OA. The possible reason given is the difficulty of effectively evaluating the severity of different diseases together with all their diverse symptoms [2].

Some participants at the face to face discussions further stressed that more focus should be given to the importance of classifying patients into blinding and non-blinding conditions mainly due to the limbal stem cell deficiency secondary to chronic inflammation in VKC/AKC and the difference in counselling offered between the two categories. This was mainly so as to ensure that patients with blinding conditions were well informed of their condition so that they would not be lost to follow up because of the risk of presenting late with corneal complications as they may not be that symptomatic until they reach a severe stage. They therefore felt that it would be better to come up with a separate grading system for the blinding conditions such as VKC and AKC. This is in keeping with the findings at the ocular allergy Latin American consensus where panelists were in agreement that staging of specific types of ocular allergic diseases are recommended, as those recently published based on severity of signs and symptoms of VKC[8] and AKC[9] based on severity of signs and symptoms[2].

At the end of the discussion on clinical grading, the proposition given was that each patients' clinical grading of severity should be assessed as it determines the treatment plan and at the same time the clinician should note if the condition is sight threatening or non sight threatening as it will also influence the counselling and the patient follow-up plan. The findings relating to the two grading systems presented to the ophthalmologists showed that a simple grading system which is easy to use has a higher likelihood of being used for objective assessment of the OA patient in a busy set up. The consensus was that a detailed grading system such as grading system 1 can be used as the expanded grading system for research and educational purposes. This in agreement with Uchio *et al*[6], who stated that a grading system with a small number of categories is easy to use; however, a large number of categories are necessary to recognize variations over time with changes in season and patient responsiveness to medication in clinical trials. Various suggestions were given for improvement of the suggested grading system 2 so that it can eventually be incorporated in the development of OA treatment guidelines and there in improve the services offered to OA patients at the eye clinic at all levels of the health care system.

CONCLUSION

Ocular allergy is a condition seen daily in the ophthalmology outpatient clinics and its diagnosis is based on clinical findings. Despite the high number of ophthalmologists grading OA (82.6%), there is no standardised clinical grading system followed in our set up. Approximately 88.3% of the ophthalmologists felt that grading of OA is important and greatly impacts clinical decision making as it determines the choice of treatment, timing and frequency of follow up, allows for better documentation and assessment of treatment response during patient follow up. Grading system 2 (Table 2) was the preferred grading system by most ophthalmologists and its adoption would allow for objective assessment and better documentation of the patients' clinical grade.

RECOMMENDATIONS

We recommend the use of grading system 2 for the assessment of ocular allergy patients at the outpatient clinics. This is so as to establish a common agreement for the assessment of ocular allergy, and as a result help in the establishment of set guidelines in Kenya on its management.

LIMITATIONS

There was difficulty in ascertaining if the participants' email addresses were in use during the study period and this may have influenced the response rate. Being an online self administered online survey may have also influenced the response rate as there is a tendency of some individuals to respond to an invitation to participate in an online survey, while others ignore it, leading to a systematic bias. It was also difficult to assemble groups of ophthalmologists for the FGDs due to the nature of duties/busy schedules. It would also have been better to carry out several FGD sessions with the same groups so as to make them more comprehensive but this was not possible due to time constraints.

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