

Assessing allergic rhinitis in developing countries

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SUMMARY

BACKGROUND: Allergic rhinitis (AR) affects 5% to 40% of the general population. In developing countries, AR is poorly documented and tracked due to a lack of appropriate diagnostic tools.

OBJECTIVE: 1) To validate a questionnaire standardised in industrialised countries to ascertain AR, the Score For Allergic Rhinitis (SFAR), in developing countries; 2) to better understand AR prevalence previously reported from developing countries by comparing results from the SFAR and the International Study of Asthma and Allergies in Childhood (ISAAC) questionnaires.

METHODS: Six African countries were selected for their climates. In each country, 70 individuals with and 30 without nasal symptoms filled out the SFAR and the ISAAC questionnaires. Skin prick tests (SPTs) for allergens were performed by the physician if necessary.

RESULTS: The SFAR presented a close match with the gold standard (the physician's diagnosis of AR backed up by SPT where necessary) in terms of various performance parameters. In particular, it showed high sensitivity (0.84) and specificity (0.81). Compared to the ISAAC questionnaire, the SFAR had greater sensitivity and equal specificity.

CONCLUSIONS: In the absence of a medical visit, the SFAR is a useful standardised screening instrument for the collection of information needed for the identification of AR in developing countries.

KEY WORDS: allergic rhinitis; screening; validation; score; skin prick test

ALTHOUGH allergic rhinitis (AR) is not usually a severe complaint, it constitutes a worldwide public health problem, with a prevalence of 10% to 40% and increasing.¹ It has a negative impact on the social life of patients, the school performance of children and productivity in the workplace, with high costs.² Asthma and rhinitis are frequently associated, and rhinitis can prove a risk factor for asthma^{2–5} and other comorbidities.⁶

Priority in developing countries is currently given to transmissible diseases, malnutrition and maternal and infant mortality; however, non-transmissible diseases, including chronic respiratory diseases (CRDs), should be included in long-term health priorities due to economic transition.⁷ In these countries, where a large proportion of the population suffer from nasal disorders, including allergy-related disorders,⁸ the pre-

vention of CRDs is currently hampered by a lack of data and resources,⁹ and by the difficulty, or even absence, of diagnosis, especially in rural areas.⁷

The use of standardised questionnaires to determine certain diseases contributes to improvements in health in many ways, and makes it possible to reach both urban and rural areas,¹⁰ especially in developing countries, due to their low cost, rapid, easy use, the low level of refusals and the possibility of distributing them through non-specialised channels (schools, dispensaries, occupational medicine, etc.). Since the 1960s, several questionnaires on respiratory diseases have been validated and used in extensive international studies.^{11,12} These have proved inadequate, however, in distinguishing between AR and non-AR, as 47% of rhinitis cases are not attributable to atopy.¹³

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Table 1 Climatic data in the six countries participating in the study

City, country	Climate	Characteristics
Tunis, Tunisia	Mediterranean	Heavy rain in the fall
Casablanca, Morocco	Mediterranean	Oceanic influence: two rainy periods in autumn and spring
Damascus, Syria	Mediterranean*	Dry and hot in summer, mild in winter—delayed seasons due to the country's altitude (700 m)
Abidjan, Ivory Coast	Equatorial*	Rains from April to mid-July and from September to November; dry December to March and second half of July to September
Brazzaville, Congo	Equatorial*	Southern hemisphere, inverted seasons: fresh and dry May to September; hot and rainy from October to May
Conakry, Guinea	Equatorial*	Two seasons: dry from November to May; heavy rain from May to September

*No data on the pollen season.

The aim of the present study was to extend the validation of the Score for Allergic Rhinitis (SFAR),¹⁴ a questionnaire used for calculating a quantitative score to ascertain AR in the absence of a medical visit, to developing countries with contrasting climates. Validation was reached in relation with the doctor's diagnosis, backed up where necessary by skin prick test (SPT) results. A secondary objective of the study was to compare the results obtained by the SFAR with those obtained with the International Study of Asthma and Allergies in Childhood (ISAAC) questions on AR, thus contributing to a better understanding of the prevalence of AR in developing countries reported in previous studies.

METHODS

Population and tools

The already operational SFAR questionnaire, developed and validated in metropolitan France in both adults¹⁵ and children,¹⁶ was validated in six Franco-phone African countries with different climates (Table 1): Morocco (Casablanca), Tunisia (Tunis) and Syria (Damascus), in the Mediterranean region, and Ivory Coast (Abidjan), Congo (Brazzaville) and Guinea (Conakry), which have an equatorial climate.

To obtain a minimum AR prevalence of 30% in patients with nasal problems and of 15% in controls, assuming a power of 80%, it was estimated that a total of 240 subjects would be necessary for the study (formula for case-control studies with the same breakdown between two groups). AR prevalence values of 30% and 15% were proposed on the basis of existing figures in the literature. To obtain at least 100 subjects at each centre, an initial sample of 180 subjects was targeted on the basis of a response rate of approximately 70%. Cases and controls were included after consulting referral records.

In each centre, the first 70 consecutive out-patients attending the ear, nose and throat department, or presenting at the main hospital for allergy and/or pneumological consultations with a referral for nasal symptoms (i.e., rhinitis, sinusitis, polyposis . . .) (cases), and the first 30 individuals in another ward of the same hospital during the same period consulting for conditions other than nasal pathologies (controls), were included in the study (Table 2). All participants gave informed consent. Ethical approval was not necessary, as the questionnaire was included in routine visits. Apart from the two exceptions shown in Table 2, the study sample was closed in each centre once at least 70 patients and 30 controls had been obtained.

The following tools were used in the study: 1) an information sheet on the study; 2) the SFAR questionnaire (Appendix A); 3) the doctor's diagnosis form (Appendix B); and 4) the SPT form. SPTs (Stallergènes Laboratories, Antony, France) were performed by or under the supervision of a previously trained doctor to check for allergic sensitisation to peanuts, household pets, pollens, moulds and cockroaches. A reaction of 3 mm greater than the negative control was regarded as positive. To confirm that the subject had not received treatment with anti-histamines, the positive control had to be other than zero. All physicians received training in an ad hoc workshop held in Paris chaired by one of the authors (JB).

The SFAR questionnaire was filled out by the patient in the waiting room before seeing the physician. Illiterate subjects were assisted by a nurse trained for the purpose. Parents filled out the questionnaires for their children. The completed SFAR was placed in an envelope that was sealed. Individuals were then seen by a physician and underwent SPT. A diagnosis form

Table 2 Period of investigation, participant data

City, country	Period of investigation	Participants <i>n</i>	Male <i>n</i> (%)	Female <i>n</i> (%)	Age years (mean)
Tunis, Tunisia	19 June–18 Dec 2002	88	32 (36.4)	56 (63.6)	6–18 (10.3)
Casablanca, Morocco	12 Sept–18 Dec 2002	110	81 (73.6)	29 (26.4)	11–64 (33.9)
Damascus, Syria	25 Aug–13 Oct 2002	109	64 (58.7)	45 (41.3)	18–64 (32.7)
Abidjan, Ivory Coast	23 Oct 2002–24 April 2003	100	43 (43)	57 (57)	18–64 (31.3)
Brazzaville, Congo	5 Sept–25 Nov 2002	100	48 (48)	52 (52)	15–63 (33.0)
Conakry, Guinea	18 Nov 2002–16 May 2003	90	42 (46.7)	48 (53.3)	13–66 (36.1)
Total		597	310	287	(29.8)

was filled out by the physician and enclosed with the SFAR questionnaire. All documents were photocopied before being sent to France for statistical analysis, with a copy kept at the respective centres.

Development and validation of the SFAR

The SFAR (Appendix A, Appendix C) consists of four standardised questions on nasal symptoms taken from the six ISAAC questions on rhinitis, with the addition of questions on personal and family history of asthma and allergies and individual perception of allergy and quality of life (question not shown), to give a total of 10 questions validated in both adults¹⁴ and children.¹⁶ In metropolitan France, the quantitative SFAR score was subjected to four types of validation among adults:¹⁵ 1) clinical validation compared with the physician's diagnosis and SPT results, 2) biological validation compared with specific immunoglobulins, 3) internal validation and 4) acceptability by the population.¹⁴ In line with previous validations,^{14–16} an SFAR of ≥ 7 was adopted to define the presence of AR in our study; however, an SFAR of ≥ 6 was adopted in analyses that did not take the pollen season into account. There were no data available on the pollen season other than in Morocco, Tunisia and Syria (non-systematic data collected locally for Syria). Asthma was defined on the basis of a positive response to the European Community Respiratory Health Survey question: 'Have you ever had an attack of asthma?'

Physician's diagnosis

The physician's diagnosis was blinded to SFAR answers, and was based on the patient's visit and on international consensus on AR,^{2,17–19} backed by the SPT result (performed if considered useful in improving diagnosis).

Statistical methods and analysis

The SFAR was computed (Appendix C) and validated against the physician's diagnosis of AR as a gold standard by estimating:

- 1 the sensitivity and specificity of an SFAR (≥ 7 ; the proportion of subjects with AR who tested positive with the SFAR [SFAR ≥ 7] and the proportion of healthy subjects who tested negative with the SFAR, respectively);

- 2 the likelihood ratio (LR) for a positive test result (LR+; probability $[P]$ of an SFAR ≥ 7 for a person with a physician's diagnosis of AR divided by the P of a positive test result for a person without a physician's diagnosis) and LR for a negative test result (LR–; $P[\text{false-negatives}]/P[\text{true-negatives}]$). The larger the LR+, the stronger the link between having an SFAR ≥ 7 and having a physician's diagnosis of AR. The lower the LR–, the greater the association between having an SFAR < 7 and not having a physician's diagnosis of AR;
- 3 pre-test odds of AR, the estimate before using an SFAR ≥ 7 of the probability that a patient has a physician's diagnosis of AR divided by the probability that the patient does not have AR and post-test odds, given by the pre-tests odds $\times$ LR+. This is defined by the estimate after using the SFAR of the probability that a patient has AR divided by the probability that the patient does not have AR;
- 4 pre-test probability of AR, the best initial estimate of the probability of the presence of AR before using the SFAR; and post-test probability, the best estimate of the probability after using the SFAR of the presence of AR.

No positive or negative predictive values (PPV, NPV) were estimated in our case-control design because they depend on the frequency of the disease. When the pollen season was not taken into account, an SFAR of ≥ 6 was used.

The SFAR and the ISAAC questionnaires were compared using sensitivities and specificities with the physician's diagnosis of AR as gold standard. In the ISAAC questionnaire, AR is defined as a positive answer to two questions (nasal symptoms and concomitance of such symptoms with conjunctivitis).¹⁹ The comparison test of two percentages observed was used to compare the scores. We did not use the receiver operating characteristic curves, which do not give the degree of significance of an observed difference.

RESULTS

Participation

Table 2 shows the study and participant details. The distribution of subjects suffering from AR and those with asthma varied by country (Table 3). The SFAR

Table 3 Allergic rhinitis (AR) and asthma patients

City, country	<i>n</i>	Subjects without AR <i>n</i>	Subjects with AR <i>n</i> (%)	Asthma patients <i>n</i> (%)	Subjects with AR and asthma <i>n</i> (%)	Skin prick test %
Tunis, Tunisia	88	49	39 (44)	45 (51)	29 (76.3)	81
Casablanca, Morocco	110	25	85 (77)	60 (55)	41 (48.8)	99
Damascus, Syria	109	30	79 (72)	34 (31)	31 (40.8)	99
Abidjan, Ivory Coast	100	30	70 (70)	12 (12)	12 (17.4)	100
Brazzaville, Congo	100	47	52 (52)	17 (17)	11 (21.2)	99
Conakry, Guinea	90	42	42 (47)	42 (47)	18 (43.9)	93
Total	597	223	367	210	142	

Table 4 Performance of the SFAR by sensitivity, specificity, LRs and pre- and post-test probability and odds

	SFAR with pollen season Morocco, Tunisia, Syria*	SFAR without pollen season all 6 countries†
Sensitivity	0.84	0.83
Specificity	0.81	0.77
LR+	4.3	3.7
LR−	0.2	0.22
Pre-test probability of AR	0.55	0.52
Pre-test odds of AR	1.24	1.08
Post-test probability of AR	0.84	0.80
Post-test odds of AR	5.35	4.00

* A SFAR of ≥ 7 was used to define the presence of AR when data on pollen were available.

† A SFAR of ≥ 6 was used to define the presence of AR when data on pollen were not available.

SFAR = Score for Allergic Rhinitis; LR = likelihood ratio; LR+ = LR of a positive result; LR− = LR of a negative result; AR = allergic rhinitis.

was well accepted by participants, and took a maximum of 5 min to fill out.

SFAR performance

The SFAR was well accepted at all centres. Pooling the data from all the centres, both SFAR ≥ 7 and SFAR ≥ 6 gave satisfactory performance in terms of sensitivity and specificity against the physician's diagnosis of AR, independently of the season (Table 4). The overall sensitivity was 0.84 (95% confidence interval [CI] 0.77–0.91) when the season was taken into account (SFAR ≥ 7) vs. 0.83 (95%CI 0.78–0.88) when it was not (SFAR ≥ 6). The overall specificity was 0.81 (95%CI 0.73–0.89) when the season was taken into account vs. 0.77 (95%CI 0.71–0.83) when it was not. In the case of SFAR ≥ 7 , LR+ value was high and LR− low, as expected (Table 4). Even when the season was not taken into account, the probability of having AR ranged from 0.52 (pre-test probability) to 0.80 (post-test probability), i.e., there was an appreciable increase in the estimation of likelihood of the

disease using the SFAR. The results improved slightly when the pollen season was taken into account (pre-test probability = 0.55, post-test probability = 0.84).

Comparison between the ISAAC and SFAR questionnaires

A comparison of the sensitivity and specificity of the results obtained from the ISAAC and SFAR questionnaires against the physician's diagnosis of AR, omitting the pollen season, showed that the SFAR performed significantly better than the ISAAC questionnaire in terms of sensitivity but did not have significantly higher specificity (Table 5). The calculation of the SFAR in the three sub-Saharan countries revealed that in the Congo and the Ivory Coast the SFAR had greater sensitivity but less satisfactory specificity. The specificities obtained with SFAR were, however, acceptable (>0.70). On the other hand, the results were more difficult to interpret in Guinea, as no significant difference was observed (Table 5), and they were certainly more difficult to relate to the very different climatic conditions, although the study sample was recruited during the dry season, from November to May. When the pollen season was taken into account, the SFAR maintained its superiority over the ISAAC questionnaire in terms of sensitivity, but without any significant difference in specificity, which was nonetheless high (Table 5).

DISCUSSION

AR and asthma prevalence are increasing in developing countries due to the introduction of a Western lifestyle.¹⁹ Diagnostic facilities therefore need to be developed in these countries. Standardised questionnaires on AR offer the advantage of simplicity, rapidity and low cost and the ascertainment of AR phenotypes in both children^{16,20,21} and adults.²² They also allow data to be collected on the severity of the

Table 5 Sensitivity and specificity of the ISAAC and SFAR questionnaires in the six participating countries*

	Sensitivity				Specificity			
	ISAAC	SFAR	Difference between ISAAC and SFAR	Significance*	ISAAC	SFAR	Difference between ISAAC and SFAR	Significance*
No pollen season†								
Morocco	0.6	0.93	−0.33	<0.0001	0.84	0.56	0.28	NS
Syria	0.47	0.97	−0.50	<0.0001	0.84	0.64	0.20	NS
Tunisia	0.54	0.72	−0.18	NS	0.82	0.88	−0.06	NS
Congo	0.73	0.94	−0.21	0.01	0.98	0.84	0.14	0.01
Ivory Coast	0.4	0.97	−0.57	<0.0001	1	0.7	0.30	0.001
Guinea	0.79	0.6	0.19	NS	0.48	0.78	−0.30	NS
Pollen season‡								
Morocco	0.6	0.82	−0.22	0.01	0.84	0.79	0.05	NS
Syria	0.47	0.82	−0.35	0.001	0.84	0.93	0.09	NS
Tunisia	0.54	0.9	−0.36	0.01	0.82	0.74	0.08	NS

* Comparison of observed percentages.

† A SFAR of ≥ 6 was used to define the presence of AR when data on pollen were not available.

‡ A SFAR of ≥ 7 was used to define the presence of AR when data on pollen were available.

ISAAC = International Study of Asthma and Allergies in Childhood; SFAR = Score For Allergic Rhinitis; NS = not significant.

complaint.¹⁴ The ISAAC questionnaire was used to assess AR using a questionnaire at 150 centres in 56 countries throughout the world.^{12,20} Nevertheless, no questionnaire on AR has been objectively validated in any developing country except Brazil.²³ The allergic nature of rhinitis has been confirmed in only 53% of subjects reporting AR in a meta-analysis,¹³ which may explain the excessively high rates of AR prevalence observed in developing countries.²⁴

The SFAR has already been used in France,^{14,22,25} and was used here for the first time in six African countries, where it showed better sensitivity in identifying AR than in Metropolitan France (0.83 vs. 0.74).¹⁴ The absence of data on the pollen season, associated not only with the absence of collected data, but also with the specific, very different climatic conditions, especially in countries with an equatorial climate, was successfully overcome by omitting such data in the calculation of the SFAR. Furthermore, the SFAR was more sensitive than and as specific as the ISAAC questionnaire. The poorer performance of the ISAAC questionnaire could explain the very high prevalence of AR observed in ISAAC Phases I and III,^{1,26} as the ISAAC questionnaire is unable to distinguish between AR and infectious rhinitis. A dissociation between allergic sensitisation (positive reaction to SPT) and asthma and allergies had already been found in the case of asthma in certain developing countries,^{27,28} as well as more recently in European countries.²⁹ Large variations in specificity and sensitivity for both ISAAC and SFAR among countries were observed. This could be due to a statistical problem, namely the small sample size in some countries compared to others. Social and economic differences in perception, reporting and management of AR symptoms may also occur. In particular, the countries studied have very different GDPs. The fact that the age range was quite wide did not influence the results, as shown by the exclusion of children from the analysis (data not shown).

To ensure the feasibility and quality of the data collected, our study was undertaken in the hospitals of major cities with specialised services providing medical diagnosis and standardised use of SPT. However, our study has some limitations. All study participants were patients attending a hospital clinic and were not part of a general population, which may have influenced the results. As patients attending clinics tend to suffer from more severe diseases, the test can therefore detect AR more easily than in the general population, where cases tend to be less severe. Our validation study was performed in major hospitals with specialised services, whereas the diagnosis of CRDs in the absence of a physician is more of a challenge in rural areas. Our conclusions should therefore be extrapolated with caution. Finally, although the allergy epidemic is expected to continue in the years to come in developing countries, these countries

have other health priorities. However, we believe that the availability of a screening tool that can be used by non-specialised personnel can be relevant in countries with limited resources.

Whether or not data on pollen are taken into account, the high specificity of the SFAR questionnaire is maintained and its sensitivity is higher, which enables this questionnaire to be used by non-specialised personnel (medical or otherwise) for population studies.

In conclusion, this is the first time that the validation of an instrument has been undertaken enabling the identification of AR, simply (filling in the SFAR questionnaire took less than 5 min even for illiterate subjects who needed help) and with satisfactory sensitivity and specificity, in the absence of any medical examination in developing countries.

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APPENDICES

Appendix A: Score for Allergic Rhinitis (SFAR)

Standardised questionnaire for SFAR assessment

Patient Number ()

1. In the past 12 months, have you had a problem, apart from cold or flu, with

A. sneezing?	Yes () No ()
B. a runny nose?	Yes () No ()
C. a blocked nose?	Yes () No ()
2. In the past 12 months, has this nasal problem been accompanied by itchy/watery eyes?

	Yes () No ()
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3. In which of the past 12 months (or in which season) has this nasal problem occurred?

Jan ()	Feb ()	Mar ()	Apr ()	May ()
June ()	July ()	Aug ()	Sept ()	Oct ()
Nov ()	Dec ()			

 Alternatively, Winter () Summer () Autumn ()
4. What trigger factors provoke or increase your nasal problem?

a. House dust ()	
b. Pollens ()	
c. Animal (cat, dogs) ()	
d. Others (please specify): _____	
5. Do you think you are allergic?

	Yes () No ()
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6. Have you already been tested for allergies (skin prick tests for allergens, IgE)?

	Yes () No ()
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 If Yes: Were they positive?

	Yes () No ()
--	----------------
7. Has a doctor already diagnosed you with an allergy (asthma, eczema, allergic rhinitis)?

	Yes () No ()
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8. Have you ever had an attack of asthma?

	Yes () No ()
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9. Does any member of your family suffer from:

	Father	Mother	Siblings
a. Asthma?			
Yes () No ()	()	()	()
b. Eczema?			
Yes () No ()	()	()	()
c. Allergic rhinitis?			
Yes () No ()	()	()	()

Appendix B: Doctor's diagnosis form

Name of patient:

Age: Sex:

Profession:

1. Does the subject suffer from allergic rhinitis?
Y () N ()

If so, which allergens?

2. Does the subject suffer from any other nasal pathology?
Y () N ()

If so, which? Please specify

3. Does the subject have asthma? Y () N ()

4. Has the subject recently (in the last 7 days) taken drugs?
Y () N ()

If so, which? Please specify

Appendix C: Scores awarded and distribution of the items in the Score for Allergic Rhinitis (SFAR)

Items/discriminators	Score (points) awarded by experts	Cumulative score
Blocked, runny nose, sneezing in past year (nasal symptoms)	1 per symptom	3
Months of the year	1 for perennial 1 for pollen season	5
Itchy eyes	2	7
Triggers		
Pollens, house dust mites, dust	2	
Epithelia (cat, dog)	1	9*
Perceived allergic status	2	11
Previous positive allergic tests	2	13
Previous medical diagnosis of allergy	1	14
Family history of allergy	2	16
Total		16

* Maximum 2.

RÉSUMÉ

CADRE : Entre 5% et 40% de la population générale souffre de rhinite allergique (RA) dans les pays industrialisés. Cette affection est peu connue dans les pays en développement et elle est peu recherchée par suite du manque d'outils appropriés de diagnostic.

OBJECTIF : 1) Valider dans les pays en développement le score de RA (SFAR), un questionnaire standardisé dans les pays industrialisés permettant de confirmer l'existence d'une RA ; 2) mieux comprendre la prévalence de la RA signalée antérieurement dans les pays en développement en comparant les résultats du SFAR et ceux obtenus avec le questionnaire de l'International Study of Asthma and Allergies in Childhood (ISAAC).

MÉTHODES : Six pays d'Afrique ont été sélectionnés pour leurs conditions climatiques. Dans chaque pays, les

questionnaires SFAR et ISAAC ont été remplis par 70 consultants pour des symptômes nasaux et par 30 qui en étaient dépourvus. Des tests cutanés (SPT) à des allergènes ont été pratiqués par le médecin en cas de nécessité.

RÉSULTATS : Le SFAR est en étroite relation avec le gold standard (diagnostic de la RA par le médecin confirmé en cas de nécessité par les SPT) en termes de divers paramètres de performance. En particulier, la sensibilité du SFAR est élevée (0,84), comme sa spécificité (0,81). Par comparaison avec le questionnaire ISAAC, la sensibilité du SFAR est plus élevée et sa spécificité est égale.

CONCLUSIONS : Le SFAR, en l'absence d'une visite médicale, est un instrument de dépistage standardisé pour la collecte d'informations nécessaires à l'identification de la RA dans les pays en développement.

RESUMEN

MARCO DE REFERENCIA: La rinitis alérgica (RA) afecta del 5% al 40% de la población general. Existen pocos datos y seguimiento de la RA en los países en desarrollo, debido a la falta de instrumentos apropiados de diagnóstico.

OBJETIVOS: 1) Validar en los países en desarrollo, la escala de puntuación de la RA, que es un cuestionario estandarizado que se aplica en países industrializados y permite confirmar el diagnóstico. 2) Comprender mejor la prevalencia de RA notificada anteriormente en países en desarrollo, comparando los resultados de este cuestionario y el cuestionario del International Study of Asthma and Allergy in Childhood (ISAAC).

MÉTODOS: Se escogieron seis países africanos por sus condiciones climáticas. En cada país, 70 personas con síntomas nasales y 30 sin ellos rellenaron el cuestionario

de RA y el cuestionario ISAAC. En caso de necesidad, el médico practicó las pruebas de punción cutánea (SPT) con alérgenos.

RESULTADOS: El cuestionario de la RA ofreció una buena concordancia con el método diagnóstico de referencia (diagnóstico clínico de RA, respaldado por las SPT en los casos necesarios), basándose en varios criterios de evaluación. El cuestionario presentó alta sensibilidad (0,84) y especificidad (0,81). Comparada con el cuestionario ISAAC, la escala de la RA ofreció mayor sensibilidad, con una especificidad equivalente.

CONCLUSIÓN: La escala de la RA representa un instrumento estandarizado de recogida de datos sin necesidad de consulta médica, útil en el diagnóstico de rinitis alérgica en los países en desarrollo.