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RESEARCH ARTICLE

Allergic rhinitis characterization in community pharmacy customers: a cross-sectional study

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Abstract

Background Allergic rhinitis represents a public health problem that is significantly prevalent in the global population and has been associated with asthma, a strong desire to sleep and a low quality of life. *Objective* This study aims to evaluate the prevalence, symptoms, control strategies and treatment, as well as the control of this condition and its impact on the quality of life of customers of community pharmacies with allergic rhinitis. *Setting* A questionnaire survey was carried out in nine community pharmacies in the city of Guarda, Portugal. *Method* In this cross-sectional study, data was collected by an interview between May 2014 and December 2014. The control of the illness and the impact of allergic rhinitis on the quality of life were assessed through a CARAT10 test and a WHOQOL-BREF instrument, respectively. *Main outcome measure* The impact of allergic rhinitis on the patient's quality of life. *Results* The estimated prevalence of allergic rhinitis was between 10.8% and 15.4%, from which 63 and 42 individuals were medically and symptomatically diagnosed, respectively, from a study population of 804 respondents. The majority of participants (57.1%) suffered from the symptoms more than twice a year. The symptoms, such as difficulty in falling asleep, repeated and continuous sneezing and bilateral nasal obstruction, were severe. There were patients with uncontrolled allergic rhinitis symptoms after the CARAT10 test, even when the individual's perception of the quality of life was good according to the WHOQOL-BREF score, with gender differences in the psychological domain. It should also be emphasized that there was a significant association between higher education levels with better control of the illness/quality of life. Additionally, most participants used pharmacological treatment (not alternative therapies) and the adoption of self-management measures to relieve their symptoms. *Conclusions* The findings of this study showed that the estimated prevalence of allergic rhinitis seems to be apparently lower in Guarda than that found in the general Portuguese population. From the data, some patients showed uncontrolled allergic rhinitis symptoms, strengthening the importance of the role of intervention by a health professional.

Keywords Allergic rhinitis · CARAT10 test · Community pharmacy · Guarda · Quality of life · WHOQOL-BREF

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Impacts on practice

- Better knowledge of the prevalence of symptoms and treatment of allergic rhinitis in customers of community pharmacies could be useful for both management of the illness by patients and the intervention of health professionals;
- Allergic rhinitis control was related to better quality of life in patients;
- The higher education level of patients has been shown to positively influence the control of symptoms and quality of life.

Introduction

Allergic rhinitis (AR) is very common and affects up to 25% of the European population and causes social, work and school impairment [1, 2]. AR and its Impact on Asthma (ARIA) guidelines provide evidence-based recommendations for available treatments and proposes a step-wise approach for managing AR [3, 4].

AR control is the main goal of treatment and several symptom scores/scales, which are reflective of the impact of AR on day-to-day living, have been proposed [5] to assess the quality of life and severity of symptoms of patients. The Control of AR and Asthma Test (CARAT10 test) was proposed and validated a few years ago [6–8]. Moreover, the impact of AR on quality of life has been measured using scales, such as the World Health Organization Quality Of Life-BREF (WHOQOL-BREF) tool, already validated for the Portuguese population has become standard for therapy control and research [9, 10]. AR can have a considerable effect on the quality of life, leading to impaired performance of daily activities, cognitive function and classroom productivity, as well as reduced psychosocial well-being [9, 11, 12]. Moreover, there is evidence supporting a strong pathological, physiological and epidemiological relationship between AR and asthma. Hence, appropriate management of AR becomes increasingly important for those with comorbid conditions [13, 14].

Many patients who have AR do not seek care from primary care physicians and instead choose to self-treat their symptoms acquiring available over-the-counter (OTC) medications. In Portuguese pharmacies, there are several OTC drugs available, namely: sedative H_1 antihistamines for oral administration (clemastine, dimethindene, diphenhydramine with levomenthol and pseudoephedrine with triprolidine hydrochloride), non-sedating H_1 antihistamines for oral administration (cetirizine and loratadine) and also corticosteroids for nasal application (budesonide, fluticasone and triamcinolone). Community pharmacy professionals can play an important role in recognizing and assessing the symptoms of AR and should understand when it is necessary to refer the patient to a primary care physician. The know-how of community pharmacy professionals allows optimization of therapy and appropriate treatment selection based on symptom presentation, duration, severity and minimizing adverse events, as well as also could have an educational intervention that could enhance symptom management and improve the quality of life of patients with AR [3, 15–18]. The absence of data in the centre-east region of Portugal, called Beira Interior, regarding the prevalence, impact on quality of life and pattern treatment approaches of AR led us to conduct this study in Guarda, which is the highest city in Portugal. The city of Guarda, and capital of the district is located in the interior of Portugal and according to the 2011 Portuguese National Statistics Institute census the district population was 42,541. Another motivation was the lack of information, as far as we know, about the quality of life of individuals with AR and the correlation with control. By using a questionnaire survey among community pharmacy customers in Guarda, we intended to evaluate the prevalence, illness status and severity of AR, as well as its impact on the quality of life, control strategies and treatment. The main hypothesis raised was whether or not individuals with controlled AR perceive a better quality of life and whether or not there were differences by gender and educational level in the control of AR, as in the perception of the quality of life.

Aim of the study

This study aims to evaluate the prevalence, symptoms and treatment of AR in customers of community pharmacies and to assess AR control and its impact on the quality of life.

Ethics approval

The present study obtained a favourable opinion from the local Ethics Committee of Polytechnic Institute of Porto concerning the way it was carried out and its publication (registration number 0665/2014). Before the start of the research study, the collaboration from all pharmacies in Guarda, Portugal, was requested and the authorization of the Technical Directors was obtained in nine pharmacies. All participants who were customers of these community pharmacies were informed of the study's objectives and anonymity was guaranteed. Their participation was voluntary and they all signed

a consent form. Furthermore, the questionnaires used in the collection of data did not contain any identification of the participants and consent was kept separate from the questionnaires. As a result, there was no connection.

Method

Study design and participants

This was an observational and cross-sectional study conducted at community pharmacies in the Portuguese city of Guarda. The researchers contacted all 12 pharmacies in Guarda and obtained permission from nine pharmacies, allowing us to approach customers and inform them of the study and ask them if they would like to participate. The inclusion criteria were adults aged ≥ 18 years and who were customers that were visiting the community pharmacies in Guarda to obtain some counselling and/or obtain their medicines.

Data collection

A questionnaire survey developed and implemented on the Google Drive platform was used as the data collection instrument (Additional file 1). Data collection took place between May 2014 and December of 2014 during the weekly schedule from 09:00 to 20:00. The survey was conducted by interview (average duration of 15 min), with a pharmacy professional recording the answers using a tablet device to avoid errors that could lead to invalid answers.

After pretesting the survey to 21 individuals from the target population, changes were made to the meaning of some questions. The survey had six parts and included closed questions with single or multiple-choice responses. The first part inquired about the sociodemographic characteristics of participants and the second asked about their smoking habits and health status, focusing primarily on issues relating to respiratory disease and possible family history of allergy problems. In the third part, the participants were questioned about the clinical diagnosis of AR and the clinical situation assessment related to the symptoms to obtain its prevalence. In the next section of the questionnaire, the participants indicated the number of times that AR symptoms occurred in a year and their influence on daily life, as well as filled out the CARAT10 test to quantify the degree of AR control [8] and the WHOQOL-BREF tool, already validated for the Portuguese population, to evaluate the quality of life [10]. The last two parts of the questionnaire focused on pharmacological treatment and non-conventional/alternative therapies for controlling the symptoms of AR. It also asked about self-care strategies that they had to avoid triggering the symptoms of AR.

All participants answered parts 1 to 3 of the questionnaire and parts 4 to 6 were also answered by those participants who had consulted a medical doctor or had a symptomatic diagnosis of AR. This diagnosis was based on the clinical situation assessment from part 3 of the questionnaire, which considered symptomatic diagnosis after two positive answers of the three questions in groups I or II [1]. The estimated prevalence of AR was calculated based on both a medical and symptomatic diagnosis.

To assess the impact of AR symptoms on daily life, participants rated the occurrence of each one of the symptoms on an ordinal scale: missing, mild, moderate and severe (question 25 on part 4 of the questionnaire).

The CARAT10 test consists of 10 questions, addressing nasal symptoms, lower airway symptoms, activities of daily life, sleep impairment and treatment, to measure control of both AR and asthma in patients with comorbid illness as recommended by the ARIA guidelines [6]. Questions were classified in an ordinal scale rated between 0 and 3 points, where 0 means a higher frequency and 3 a lower frequency. The total score of the test results from the sum of the score of the questions ranges from 0 to 30 and a score ≤ 24 means poor control of the illness (section CARAT10 on part 4 of the questionnaire).

The WHOQOL-BREF instrument consists of 26 questions and allows results on four domains: physical, psychological, social relationships and environment, plus a facet of overall quality of life. Each question refers to some aspect of quality of life that is assessed through the Likert ordinal scale, rated between 1 and 5 points where 1 means very bad and 5 very good. The results were transformed in each domain to the range of 0 to 100 points, as recommended by the authors of the adaptation in Portuguese of the scale (section WHOQOL-BREF, the quality of life on part 4 of the questionnaire) [10], because it provides comparative data for interpretation. The level of quality of life perceived by participants was considered good if the values were ≥ 60 points.

Statistical and data analysis

Based on the available prevalence data of AR in Portugal of 25% [1], the sample size estimated was 800 participants, taking into consideration a standard error of 3% and a confidence level of 95%. Participation in the study was requested from 820 individuals, 2.5% more than the estimated sample size, to prevent possible non-responses.

Data processing and analysis were conducted using SPSS for Windows, version 23.0 (IBM Corp., Armonk, NY, US). The Kolmogorov–Smirnov and Shapiro–Wilk tests were used to evaluate the correspondence of the data to the normal distribution. The *t*-test for two independent samples to compare differences between two independent groups was used, but when the data did not fit the normal distribution,

the Mann–Whitney test was applied. To evaluate the association between quantitative variables, Pearson's correlation coefficient was calculated. The 95% confidence intervals (CIs) were also determined in some situations, namely for the prevalence of AR. The internal consistency of the CARAT10 test and WHOQOL-BREF tool in the sample was evaluated through Cronbach's alpha, which considered acceptable values between 0.70 and 0.95 [19]. Statistically significant differences between two variables were accepted when the probability of significance (p-value) was < 0.05.

Results

In this study, 804 participants completed the questionnaire constituting our sample and 16 individuals did not accept to respond to the questionnaire, which results in a non-response rate of approximately 2%. All participants answered parts 1 to 3 of the questionnaire, of which 105 answered the remaining parts 4 to 6 since they had a medical or symptomatic diagnosis of AR.

Sociodemographic characteristics, tobacco consumption and health status and clinical situation assessment

In terms of sociodemographic characteristics of the 804 participants (Table 1), the majority were female (66.3%), lived in an urban zone (81.3%) and had a civil status of married/civil partnership (68.3%). The participants were aged between 18 and 88 years, with a mean of 48.3 years (SD = 16.5), with the > 60 age group (25.2%) standing out. The most mentioned academic qualification was higher education (31.5%), followed by secondary education (25.1%). The most representative employment status was retired (23.6%), followed by workers in personal services, safety and security (17.7%).

Regarding tobacco consumption habits, it was observed that 15.7% smoked and 56.3% of these were female. It was noted that the most frequent situation was smoking 10 cigarettes per day (22.2%), with an average of 11 cigarettes per day in the range between 1 and 35 cigarettes.

Relative to health issues, 47.3% of participants had family members with allergic diseases, 10.4% had respiratory problems that had already been diagnosed and 7.8% had already been diagnosed with AR by a physician. The concomitant presence of asthma and AR was observed in 2.2% of participants.

For the clinical situation assessment of AR, participants were asked two groups of three questions each about the frequency of symptoms, daily and in the last 12 months, that they had suffered that could be related to AR. It was observed that symptoms of repeated sneezing and itching of the nose were the most referred to in both situations (Table 2). In terms of diagnosis of AR [1], it was concluded that 63 individuals were medically diagnosed and 42 individuals were symptomatically diagnosed, representing 13.1% of the study population that had AR (95% CI 10.8%–15.4%).

So far, the following analysis was performed only for 105 out of the 804 participants, as 699 were not asked to complete the whole questionnaire, finishing after parts 1 to 3 because they did not have a medical or symptomatic diagnosis of AR.

In terms of the specific characterization of participants with AR, it should be emphasized that females were predominant (70.5%) over the males (29.5%) and the age range from 30 to 40 stands out (29.5%). However, it was observed that the average age of females was similar to males ($p = 0.48$), with 45.2 (SD = 16.5) and 42.8 (SD = 14.4) years, respectively. It should be noted that 11.4% of participants with AR were smokers (95% CI 5.3%–17.5%).

Symptoms and control of allergic rhinitis and its impact on the quality of life

Concerning the frequency with which the participants manifested symptoms of AR, the majority (57.1%) suffered from the symptoms more than twice a year, followed by two periods a year (28.6%) and, in the end, only one period a year (14.3%).

Considering the perceptions of the participants (Fig. 1), the symptom that stands out daily as most frequently perceived as a severe symptom was difficulty in falling asleep (24.8%), repeated and continuous sneezing (21.9%) and bilateral nasal obstruction (21%). They also noted suffering severely from snoring while sleeping, difficulty in breathing through the nose and headache. Nasal rash was equally reported (19%), followed by eye pruritus (18.1%).

From the results of the CARAT10, the individuals with AR did not have, on average, the symptoms of AR controlled, because the mean result was 21.9. Of the participants with AR, 66.7% obtained a test total ≤ 24, showing poor control of symptoms, and the remaining 33.3% of patients with AR had good control of the illness. The internal consistency of this instrument for the study sample showed an acceptable internal consistency, since the mean Cronbach's alpha value was 0.75. From the analysis performed relative to gender and higher education in the control of symptoms of AR, the results indicated that gender had no relationship with the control of symptoms of AR ($p = 0.187$), but there was a statistically significant increase in the control of symptoms of AR from participants with higher education compared with those without higher education ($p = 0.019$).

Of the different domains considered in the evaluation of the quality of life of participants through the WHOQOL-BREF tool, the highest mean score was obtained in

Table 1 Participant characteristics ($n = 804$)

Characteristics	No. of respondents (%)			
	Allergic rhinitis diagnosis			Total
	Yes		No	
	Medical	Symptomatic		
Gender				
Female	43 (8.1)	31 (5.8)	459 (86.1)	533 (66.3)
Male	20 (7.4)	11 (4.0)	240 (88.6)	271 (33.7)
Area of Residence				
Urban	53 (8.1)	34 (5.2)	567 (86.7)	654 (81.3)
Rural	10 (6.7)	8 (5.3)	132 (88.0)	150 (18.7)
Civil Status				
Single	17 (10.1)	11 (6.5)	141 (83.4)	169 (21.0)
Married/Civil partnership	39 (7.1)	29 (5.3)	481 (87.6)	549 (68.3)
Divorced	3 (10.4)	1 (3.4)	25 (86.2)	29 (3.6)
Widow/Widower	4 (7.0)	1 (1.8)	52 (91.2)	57 (7.1)
Age (years)				
≤ 30	11 (8.7)	8 (6.4)	107 (84.9)	126 (15.7)
30–40	23 (13.3)	8 (4.6)	142 (82.1)	173 (21.5)
40–50	11 (7.4)	6 (4.1)	131 (88.5)	148 (18.4)
50–60	9 (5.8)	12 (7.8)	133 (86.4)	154 (19.2)
> 60	9 (4.4)	8 (4.0)	186 (91.6)	203 (25.2)
Professional Status//Labour Activity				
Unemployed	7 (6.9)	8 (7.8)	87 (85.3)	102 (12.7)
Student	6 (14.6)	6 (14.6)	29 (70.8)	41 (5.1)
Retired	9 (4.7)	12 (6.3)	169 (89.0)	190 (23.6)
Unskilled worker	6 (6.7)	3 (3.4)	80 (89.9)	89 (11.1)
Specialist in intellectual and scientific activities	5 (7.1)	2 (2.8)	64 (90.1)	71 (8.8)
Administrative staff	4 (8.5)	2 (4.3)	41 (7.2)	47 (5.8)
A worker in personal services, safety and security	8 (5.7)	6 (4.2)	128 (90.1)	142 (17.7)
A skilled worker in industry or craftsman	6 (13.6)	1 (2.3)	37 (84.1)	44 (5.5)
Technical and professional intermediate level	10 (21.3)	1 (2.1)	36 (76.6)	47(5.8)
Farmer, a representative of a legislative and/or executive organ, or machine operator	2 (6.5)	1 (3.2)	28 (90.3)	31 (3.9)
Educational Level				
No official educational level	1 (8.3)	0 (0.0)	11 (91.7)	12 (1.5)
1st cycle of basic education	5 (3.2)	9 (5.8)	141 (91.0)	155 (19.3)
2nd cycle of basic education	1 (2.1)	0 (0.0)	46 (97.9)	47 (5.8)
3rd cycle of basic education	7 (5.6)	7 (5.6)	111 (88.8)	125 (15.6)
Secondary education	21 (10.4)	11 (5.4)	170 (84.2)	202 (25.1)
Post-secondary education	1 (10.0)	2 (20.0)	7 (70.0)	10 (1.2)
Higher education	27 (10.7)	13 (5.1)	213 (84.2)	253 (31.5)
Smoking habits				
Yes	8 (6.3)	4 (3.2)	114 (90.5)	126 (15.7)
No	55 (8.1)	38 (5.6)	585 (86.3)	678 (84.3)
Family with a clinical history of allergic diseases				
Yes	52 (13.7)	27 (7.1)	301 (79.2)	380 (47.3)
No	11 (2.6)	15 (3.5)	398 (93.9)	424 (52.7)

Table 2 Symptoms of participants ($n=804$)

Symptoms	Daily (%)	Last 12 months (%)
Repeated sneezing and itching of the nose	199 (24.8)	191 (23.8)
Nose bleed even without a cold or flu	151 (18.8)	144 (17.9)
Stuffy nose for more than an hour	140 (17.4)	140 (17.4)

personal relationships (73.7), while the lowest mean score was obtained in environment (65.3) (Table 3). Also, as the perception of overall quality of life was 64.1, it can be pointed out that, for most respondents, their quality of life was good (Table 3). The internal consistency of this instrument for the study sample showed an acceptable internal consistency, since the mean Cronbach's alpha value was 0.91.

The quality of life analysis shows that the male gender had higher values in the psychological domain in comparison with females ($p=0.01$). Analogously, it was verified that the participants with a higher education level perceived a better quality of life ($p=0.001$).

A bivariate correlation was determined by Pearson's correlation coefficient to quantify the linear relationship between the results of the CARAT10 test and the WHOQOL-BREF tool, since the control of the symptoms of AR may be related to the quality of life of patients. The results indicated that the relationship was weak and positive (Pearson's $r=0.292$), but statistically significant ($p=0.003$). The positive correlation showed that better control of the symptoms of AR was associated with a better quality of life.

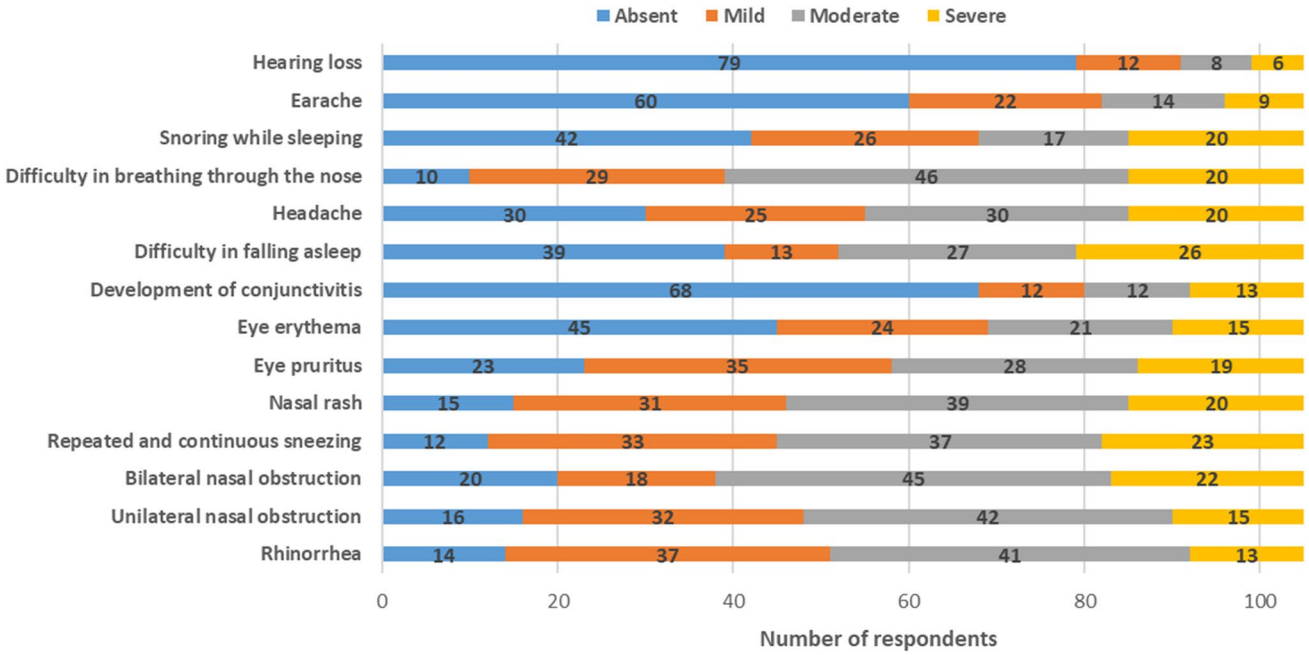

Fig. 1 Classification of allergic rhinitis symptoms according to their influence on daily life ($n=105$)

Table 3 Descriptive measures of the score in the WHOQOL-BREF domains and CARAT10 test in a global use of non-conventional/alternative and pharmacological therapies

	Global		Non-conventional/alternative therapy				Pharmacological therapy			
			Yes		No		Yes		No	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
CARAT10	21.9	5.4	20.6	5.0	22.3	5.5	21.9	5.4	21.8	5.3
WHOQOL-BREF domains										
Overall quality of life	64.1	16.6	64.9	14.6	63.8	17.3	65.4	15.2	55.4	22.3
Physical	71.7	17.0	70.6	19.0	72.1	16.5	73.0	15.3	63.8	24.8
Psychological	72.5	14.6	72.1	14.9	72.7	14.6	73.6	12.7	65.8	23.4
Personal relationships	73.7	16.9	74.4	15.3	73.5	17.5	74.5	15.1	68.5	26.0
Environment	65.3	12.0	66.9	10.5	64.8	12.6	66.0	11.0	60.8	17.2

Management therapy and self-management

Given the importance of control of the illness, namely on the quality of life, it was intended to identify the need and therapeutic habits of individuals with AR.

When asked about their pharmacological therapy, it was observed that most participants (86.7%) were taking one or more pharmaceutical product(s) to relieve their symptoms. In particular, mostly used solid oral forms (80.9%) and nasal preparations (57.1%), followed by seawater preparations (41.9%) and eye drops (12.4%), although some did not specify the type of product (11.4%). There were a low number of individuals with AR who reported not using a pharmaceutical product (13.3%). From the results depicted in Table 3, it is evident that the degree of control of AR (CARAT10 test) values are slightly < 24, on a scale of 0–30, showing slightly poor control of the illness in both groups and the quality of life perception (WHOQOL-BREF tool) values are > 60 points, on a scale of 0–100, showing a good quality of life in the participants diagnosed with AR, except the overall quality of life is slightly < 60 points in the group of individuals not subjected to pharmacological treatment.

Concerning the question of who advised the pharmaceutical product(s) for symptom relief of AR, the majority referred to a physician (69.5%) or pharmacy professional (26.7%). Some participants self-medicated (1.9%) and some participants did not respond (1.9%). Some of the participants with AR sought a second opinion (34.3%) and half of these participants went to a specialist physician.

When asked about the use of non-conventional/alternative therapies, the majority responded that they did not use them (79.2%). From the participants that answered that they used one or more alternative therapies, most referred to using thermal treatments (76.9%), followed by acupuncture (23.1%) and homoeopathy (15.4%). The results indicated no statistically significant differences in the quality of life and the control of the symptoms of AR due to the use of these therapies alone or in combination with the pharmaceutical ones ($p > 0.05$). The degree of control of AR (CARAT10 test) and quality of life perception (WHOQOL-BREF tool) presented in Table 3 again showed slightly poor control of the disease, as CARAT10 test values were < 24 (on a scale of 0–30) and the quality of life values in the different domains of the WHOQOL-BREF instrument showed a good quality of life in both groups.

Based on recommendations of measures of self-management for individuals with AR, it was intended to assess their practice in study participants (Fig. 2). Thus, participants reported mainly being careful about vacuuming and cleaning the house (84.8%), washing and/or vacuuming the mattress (73.3%), wearing goggles to protect the eyes (72.4%), washing duvets and pillows at elevated temperatures (67.6%) and avoiding exposure to smoke (50.5%).

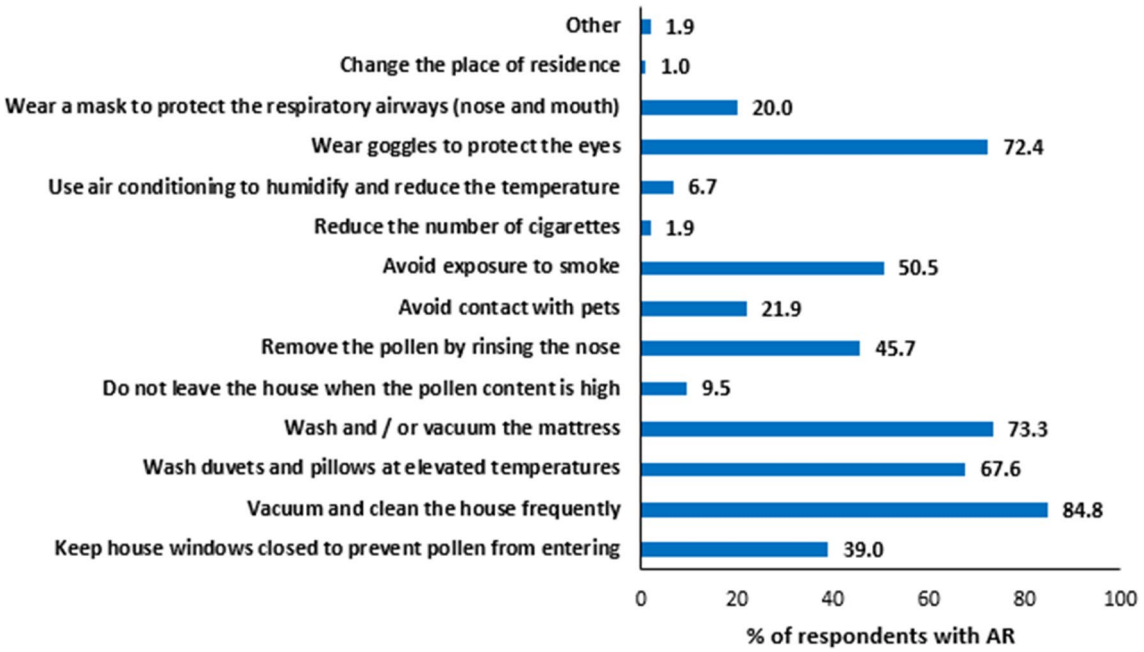

Fig. 2 Distribution of self-management of 105 respondents with allergic rhinitis (AR)

Discussion

Based on the data collected, it was verified that the estimated prevalence rate of AR (10.8%–15.4%) in the study group population seems to be apparently lower in comparison with the prevalence reported by Morais et al. [1] in Portugal (25%) and in Europe (about 25%; ranging from 17 to 29%), in which a similar tendency of physician-based diagnosis (13%) was lower than the self-awareness of AR (19%) [2].

In the present study, the majority of participants suffered from the symptoms more than two times a year. The most often referred to symptoms that were classified as severe disruption and interference with daily activities included difficulty in falling asleep, repeated and continuous sneezing and bilateral nasal obstruction. Nasal congestion or nasal obstruction has been described to be associated with sleep-disordered breathing, resulting in decreased quality of life and productivity and increased daytime sleepiness [20]. The nasal obstruction has been described as a predictive marker of poor control of the illness [21] and consequently could influence the population's quality of life [11].

From the CARAT10 results, we assumed that most participants did not have the symptoms of the illness controlled. Compared with the literature in another survey conducted in a real-life setting, Gani et al. [21] also observed that AR was overall poorly controlled with > 60% of patients having uncontrolled AR. At this point, it should be highlighted that healthcare professionals, in particular physicians and pharmacy professionals, can intervene in the development of effective AR self-management techniques, leading to important benefits in perceived symptom severity and quality of life [14, 22].

Many patients with AR also did not have an adequate therapeutic follow-up and were at risk of acute exacerbations, resulting in decreased productivity at work, school performance and quality of life. The application of treatment guidelines was not enough to determine the assessment of symptom control [23, 24]. Community pharmacy professionals may also play an important role in integrated care pathways (ICPs) for AR with the ARIA-pharmacy ICP being a useful tool for this purpose [25]. ARIA-pharmacy ICP may be used as a model for the implementation of ICPs in different countries, although each recommendation varies between countries due to the available OTC medications, legislation and cultural differences [25]. Currently, the ARIA initiative has implemented the "Mobile Airways Sentinel Network" (MASK) as a new tool for the intervention of pharmacy professionals in many areas of AR: identification, risk assessment, OTC treatment, manage refills, patient education, referral to a physician, administration of topical treatment techniques and adherence to treatment [5].

Due to the reduced number of asthmatics and smokers in the sample, it was not possible to collect information to assess the impact of asthma and smoking habits on quality of life. Even so, it should be noted that individuals with AR are more likely to have asthma and other associated comorbidities [26, 27]. The ARIA programme recommends that patients with AR should be assessed for the presence of asthma and should be subjected to a planned pharmacotherapeutic strategy for the treatment of diseases of the upper and lower airways [7].

Regarding management therapy and self-management, most participants referred to the use of pharmaceutical products for AR symptom relief, instead of non-conventional/alternative therapies. In fact, in Portugal pharmacies, several antihistamines and corticosteroids are used for AR, with some of them being dispensed as OTC medications by pharmacy professionals.

Given the research hypotheses and the results of the statistical inference methods applied to the data, it was verified that there were statistically significant differences by gender only in the psychological domain of quality of life evaluated through the WHOQOL-BREF instrument, but there were no differences in the control of the symptoms of AR. On the other hand, the educational level has been shown to positively influence the quality of life and symptom control. This association between higher education and less impairment of quality of life in patients with AR is in agreement with the literature, probably because a higher level of education is associated with greater knowledge about AR [28].

As this study has limitations, it should be mentioned that it was not possible to guarantee a sample that reflects the composition of the target population, which does not allow for extrapolating the results of the prevalence of AR to the district of Guarda. The seasonality of this condition also should have an impact on the collected data. In particular, this questionnaire was applied from May to December, rather than targeting patients during the peak spring months, having a potential impact on a lower estimated prevalence of AR. Another factor to consider was the application of the WHOQOL-BREF tool data collection instrument to random individuals of the population, without AR, to obtain a term of comparison between individuals with and without AR. Quality of life is a complex composite dependent variable and could be influenced not only by pathological factors but also by geographic or economic factors, which should also be considered in the analysis of a sample or specific group of individuals [29].

Conclusions

The estimated prevalence rate of AR in Guarda based on medical and symptomatic diagnosis seems to apparently be lower than that found in the Portuguese population.

Interventions by pharmacy professionals could be useful to improve control of AR symptoms. Among these interventions, it would be important to improve the rate of medical diagnosis of AR, as well as to monitor the use of drugs by pharmacy professionals. Although there were patients with uncontrolled AR symptoms, a good level of quality of life was observed, with gender differences in the psychological domain. Additionally, correlations between higher education and better control of the disease symptoms and quality of life were found. As future perspectives, it would be interesting to conduct a broader study including not only the pharmacies but also local health units/clinics to have a broad assessment of the prevalence of AR with more focus on these patients.

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