

# BMJ Open Awareness about laryngopharyngeal reflux disease among Chinese otolaryngologists: a nationwide survey

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## ABSTRACT

**Objectives** This study aimed to investigate the status of the current knowledge about laryngopharyngeal reflux disease (LPRD) among Chinese otolaryngologists.

**Design** Multi-centre cross-sectional survey.

**Setting** 220 medical centres in different regions of China.

**Participants** A total of 2254 otolaryngologists from 220 medical centres in China who were successfully on-site surveyed between November 2019 and December 2020.

**Main outcome measures** Awareness about LPRD included knowledge about risk factors, symptoms, laryngoscope signs, related diseases, current diagnostic methods and treatments.

**Results** The percentage of participants who had heard of LPRD was 96.4%, with academic conferences as the most common source of information (73.3%). The most commonly known risk factor, symptom, laryngoscope sign, related disease, diagnostic method and treatment were alcohol consumption (44.0%), pharyngeal foreign body sensation (66.9%), hyperaemia (52.4%), pharyngolaryngitis (54.8%), pH monitoring (47.6%) and medication (82.1%), respectively. Only 28.3% of all participants knew that 24 h pH or multichannel intraluminal impedance pH monitoring was the most accurate diagnostic test. As many as 73.1% of all participants knew that proton pump inhibitors were the first-line treatment drugs. An analysis of the overall status of awareness using a scoring system suggested that otolaryngologists were better aware owing to more access, working at 3A hospitals, and postgraduate or above educational background (all  $p < 0.05$ ).

**Conclusion** Although the majority of Chinese otolaryngologists had heard of LPRD, their overall awareness about the disease was not encouraging. More efforts are needed to increase the knowledge about LPRD among this group of physicians.

**Trial registration number** ChiCTR1900025581

## INTRODUCTION

Laryngopharyngeal reflux disease (LPRD) is an inflammatory condition of the upper aerodigestive tract tissues related to direct and indirect effects of gastric or duodenal

## STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ This prospective cross-sectional survey was carried out in up to 2254 otolaryngologists who worked in different hospitals around the whole China.
- ⇒ The whole surveys were all performed on-site under the supervision of designated surveyors.
- ⇒ The overall awareness status about laryngopharyngeal reflux disease knowledge was evaluated using a scoring scale basing on questions about risk factors, symptoms, laryngoscope signs, related diseases, current diagnostic methods and treatments of this disease.

content reflux.<sup>1 2</sup> The incidence of LPRD is thought to be high. The studies conducted in the USA, the UK and Greece reported that the prevalence of this disease could reach 10%, 34.4% and 18.8%, respectively.<sup>3-5</sup> A national multicentre epidemiological survey conducted in China found that the prevalence of LPRD was as high as 10.15% at the otolaryngology-head and neck surgery clinics.<sup>6</sup> However, the frequency of a previous diagnosis of LPRD was found to be extremely low among those with positive symptoms, only 14.09%.<sup>6</sup> Besides the non-specific symptoms and clinical signs which are easily to be confused with other laryngopharyngeal disorders.<sup>7</sup> We hypothesised that an insufficient knowledge about this disease among the physicians might contribute a lot to such a low diagnosis rate. One small research performed by our group in Beijing preliminarily confirmed this hypothesis.<sup>8</sup>

Beijing is an area with the highest level of medical knowledge in China. Therefore, the awareness about LPRD among otolaryngologists may be even worse in the whole country. The present survey was performed in

different regions around the whole country with the aim to conduct a comprehensive investigation about the status of the awareness about LPRD among Chinese otolaryngologists. The results could be a valuable reference for making detailed plans to improve awareness about this disease in China.

## MATERIALS AND METHODS

### Study design

This study was a multicentre cross-sectional survey designed by a core group including three study leaders (SX, JL and HZ) and one statistician (XP). The whole survey was conducted under the supervision of three study leaders between November 2019 and December 2020. One practising otolaryngologist was made in charge of the survey in the respective provincial district. The district leader and the three study leaders proposed and decided the final hospital lists where the survey was conducted according to the following criteria: (1) no more than nine hospitals in each provincial district; (2) the hospital lists in each district including both 3A and non-3A hospitals; (3) the hospital where the district leader was working not included; (4) the hospital lists could only be changed during the survey with the approval of all three study leaders; (5) hospitals in primary lists could be deleted or replaced if the local director refused the survey in his department, or if less than 80% of all otolaryngologists at this hospital successfully surveyed.

### Data collection

The survey in each provincial district was conducted by a local team, which included the district leader and at least two assistants. All surveyors were trained to be familiar with the study process to ensure the consistency of implementation. All otolaryngologists who worked in included hospitals at the time of the survey were invited to fill out an identical anonymous questionnaire. Communication with others or access to relevant information was forbidden before and during the survey. A completed questionnaire was considered ineffective if the handwriting was not clear and the otolaryngologist refused to fill it again. All completed effective questionnaires were collected and checked by local teams and then uploaded to a designated database. The final data were checked, integrated, and analysed by three study leaders and their assistants.

The English version of the questionnaire used in this study is shown in [table 1](#). This contained 15 questions that could be divided into 3 parts: (1) personal information including educational background, years of working and professional title; (2) whether the respondent knew about LPRD, and if yes, what way(s) did he (she) knew about this disease (3 options were provided for this question, which were textbooks, literature and academic conferences) and (3) awareness about LPRD including risk factors, symptoms, laryngoscope signs, related diseases, diagnostic methods and treatments. All questions in part

**Table 1** English version of the LPRD awareness questionnaire used in this study

PART 1	
1.Educational background	<input type="checkbox"/> Postgraduate or above <input type="checkbox"/> Undergraduate or below
2 .Years of working	<input type="checkbox"/> 0–5 <input type="checkbox"/> 5–10 <input type="checkbox"/> >10
3.Professional title	<input type="checkbox"/> Senior <input type="checkbox"/> Intermediate <input type="checkbox"/> Primary
PART 2	
4.Have you ever heard of LPRD?	<input type="checkbox"/> Yes <input type="checkbox"/> No
5.In what access(es) did you know LPRD?	<input type="checkbox"/> Text books <input type="checkbox"/> Literature <input type="checkbox"/> Academic conferences
PART 3 (no options were provided) (for questions 6–15, write the most comprehensive answer you think)	
6.Risk factors for LPRD	
7.Subjective symptoms of LPRD	
8.Laryngoscope signs suggesting LPRD	
9.LPRD-related diseases	
10.Current diagnostic methods for LPRD	
11.Current treatment methods for LPRD	
12.The cut-off value of RSI for diagnosing LPRD	
13.The cut-off value of RFS for diagnosing LPRD	
14.The current gold diagnostic method for LPRD	
15.The current first-line drug for treating LPRD	
LPRD, laryngopharyngeal reflux disease; RSI, Reflux Symptom Index; RFS, Reflux Findings Score	

3 did not have options. The respondents needed to write the answers they knew as much as possible.

### Quantifications for the status of awareness about LPRD

A scoring scale based on all part 3 questions (questions 6–15) was used to comprehensively evaluate the awareness about LPRD. Each ‘right answer’ to the 10 questions scored one point. Here, the ‘right answers’ were defined by consensus among three study leaders according to the current literature:

- Question 6: Smoking, alcohol drinking, unhealthy eating habits, comorbid upper digestive disease, male sex, age, psychological pressure, obesity and tea or coffee drinking had been accepted as common risk factors for LPRD.<sup>269–11</sup> A correct answer for this question was defined as the one that included at least three items of the aforementioned factors.
- Question 7: Reflux Symptom Index (RSI), proposed by Belafsky *et al*,<sup>12</sup> included scores for the severity of nine common LPRD-related symptoms. A right answer for this question was defined as the one that included at least three of the nine symptoms in the RSI.
- Question 8: Reflux Finding Score (RFS), also proposed by Belafsky *et al*,<sup>13</sup> included scores for the severity of eight common LPRD-related laryngoscope signs. A right answer for this question was defined as

the one that included at least three of the eight laryngoscope signs.

4. Question 9: Pharyngolaryngitis, vocal benign lesions, rhinitis or rhinosinusitis, laryngeal granuloma, laryngeal leukoplakia, cough, asthma, otitis media, obstructive sleep apnea syndrome, and malignant tumour were thought to be associated with LPRD.<sup>14–21</sup> A right answer was defined as the one that included at least three of the aforementioned diseases.
5. Question 10: RSI or RFS evaluations, pH or multichannel intraluminal impedance pH (MII-pH) monitoring, empiric therapeutic trial and pepsin detection were current accepted diagnostic methods for LPRD.<sup>22,23</sup> A right answer was defined as the one that included at least two items of the aforementioned methods.
6. Question 11: Behaviour modification, medication and operation were the currently accepted treatments for LPRD.<sup>24</sup> A right answer was defined as the one that included at least two items of the aforementioned treatments.
7. Question 12: The right answer was 13, as this was the most common cut-off score of RSI used in China.<sup>25</sup>
8. Question 13: The right answer was 7, as this was the most common cut-off score of RFS used in China.<sup>26</sup>
9. Question 14: The right answer was 24 h pH or MII-pH monitoring. Despite controversies, such examinations were thought to be the most accurate method for diagnosing LPRD.<sup>27</sup>
10. Question 15: The right answer was proton pump inhibitors (PPIs). Despite controversies, such drugs were thought to be the first-line medication for treating LPRD.<sup>27</sup>

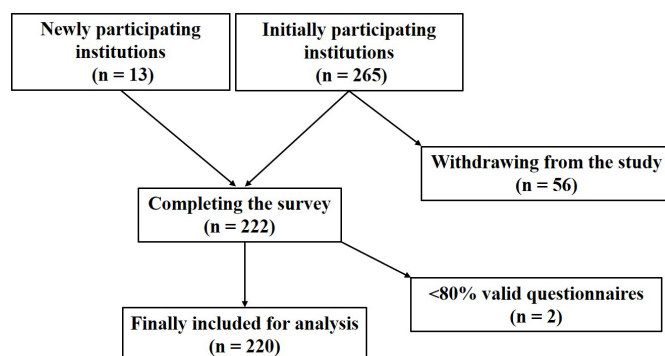
### Statistical analysis

All statistical analyses were performed using SPSS V.20.0 for Windows (IBM). Continuous variables were expressed as mean±SD. The rate of awareness about LPRD was expressed as a percentage. The comparisons of awareness scores about LPRD among different groups of participants were all made using independent-sample t-tests. A p value less than 0.05 indicated a statistically significant difference.

## RESULTS

### Medical institutions and personal information

There were 265 medical institutions from 31 provincial administrative districts of China initially participated in this study. Fifty-six institutions from 15 districts withdrew before the survey was carried out. While at the same time, 13 institutions from 10 districts took the place of some withdrew institutions. Therefore, the survey was carried out in a total of 222 institutions, of which two were excluded because of fewer valid questionnaires (less than 80% of all otolaryngologists were successfully surveyed). Finally, 2254 effective questionnaires were collected from 220 hospitals in 27 provincial



**Figure 1** The flow diagram of participating institutions.

administrative districts. The flow diagram of the participated institutions is shown in [figure 1](#). The numbers of hospitals and effective questionnaires according to geographical region are shown in [table 2](#) and [figure 2](#), suggesting that the survey covered all geographical regions and nearly all provincial administrative districts of China. The personal information of all 2254 otolaryngologists who were successfully surveyed is shown in [table 3](#), including their hospital levels, educational background, working time and professional titles.

### Rate of awareness about LPRD and the way(s) of knowing this disease

Only 81 of 2254 otolaryngologists (3.6%) from 46 hospitals (range 1–7) had never heard of LPRD. Therefore, a total of 2173 otolaryngologists (96.4%) had heard about this disease. Among the three choices provided, academic conferences were the most common source of knowing LPRD (1653, 73.3%), followed by literature (1382, 61.3%) and textbooks (1350, 59.9%). The number of otolaryngologists who knew about LPRD via zero, one, two, and all three ways was 183 (8.1%), 608 (27.0%), 612 (27.2%) and 851 (37.8%), respectively.

**Table 2** Numbers of hospitals and effective questionnaires according to geographical region

Region	No of hospitals	Hospital level		No of effective questionnaires
		3A	Non-3A	
Northeast China	17	12	5	202
East China	54	35	19	647
North China	47	29	18	440
Central China	26	16	10	277
South China	30	18	12	269
Southwest China	26	17	9	231
Northwest China	20	12	8	188
Total	220	139	81	2254



**Figure 2** The provincial administrative districts with medical institutions participating in the study (marked in red).

### Status of awareness about LPRD risk factors, symptoms, laryngoscope signs and related diseases

The most commonly known risk factor was alcohol drinking, followed by smoking, unhealthy eating habits and comorbid upper digestive disease. The most commonly known symptom was pharyngeal foreign body sensation, followed by stomach acid or heartburn, hoarseness and cough. The most commonly known laryngoscope sign was hyperaemia, followed by laryngeal oedema, granuloma and vocal cord oedema. The most commonly known LPRD-related disease was pharyngolaryngitis, followed by vocal benign lesions, rhinitis or

**Table 3** Personal information of all 2254 otolaryngologists surveyed

	No of otolaryngologists	Per cent
Hospital level		
3A	1666	73.9
Non-3A	588	26.1
Educational background		
Postgraduate or above	1157	51.3
Undergraduate or below	1097	48.7
Working time (years)		
≥10	1037	46.0
<10	1217	54.0
Professional titles		
Senior	755	33.5
Primary intermediate	1499	66.5

rhinosinusitis and laryngeal granuloma. The details of the aforementioned results are shown in [figure 3](#).

### Status of awareness about LPRD diagnoses and treatments

The most common answer for diagnostic methods was pH monitoring, followed by laryngoscopy, RSI or RFS evaluation, gastroscopy, empiric therapeutic trial and salivary pepsin test. The most common answer for treatment options was medication, followed by behavioural modifications and operation. The detailed results are shown in [figure 4](#).

The correct rate of awareness for the cut-off values of RSI and RFS was only 46.6% (1051/2254) and 44.9% (1012/2254), respectively. Only 28.3% (639/2254) of all participants knew about the use of 24-hour pH or MII-pH monitoring as a gold diagnostic test. As many as 73.1% (1647/2254) of all participants considered PPIs the first-line drugs.

### Overall status of awareness about LPRD

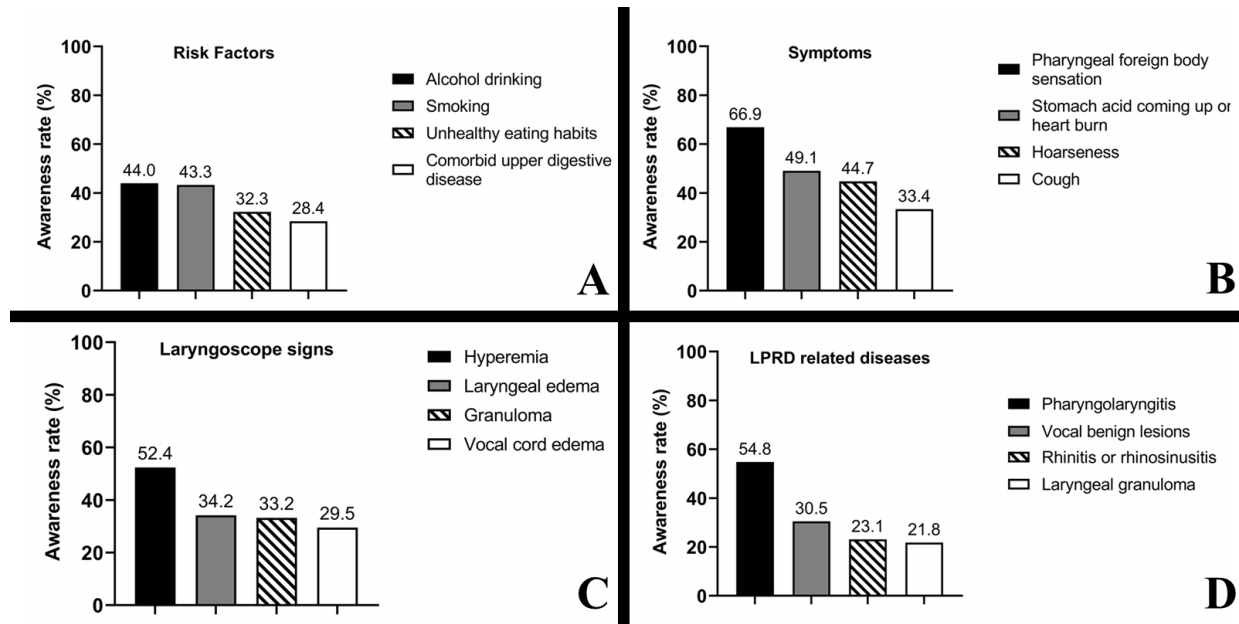
The overall awareness scale score for all participants was  $4.1 \pm 2.8$ , with a range of 0–10 (the score of 81 otolaryngologists who never heard of LPRD was considered as 0). The number of participants according to different scores is shown in [figure 5](#). The data indicated that only 1.4% (32/2254) of all participants got full marks, and as many as 57.6% (1298/2254) of all participants could not even reach half marks (0–4).

The awareness scale scores according to different ways of knowing this disease are shown in [table 4](#). The data suggested that knowing this disease via either of the three ways could increase the final scores (all  $p < 0.05$ ). Moreover, the awareness scale scores were significantly higher for otolaryngologists who knew about this disease via two to three ways (vs those who knew about this disease via only 0 to one way) ( $p < 0.05$ ).

The awareness scale scores according to different personal information are shown in [table 5](#). The data suggested that the scores were significantly higher in otolaryngologists who worked at 3A hospitals (vs non-3A hospitals) and with postgraduate or above educational backgrounds (vs undergraduate or below educational backgrounds) (both  $p < 0.05$ ). No significant differences were found in this score among otolaryngologists who had different professional titles and working times (both  $p > 0.05$ ).

### DISCUSSION

LPRD has gradually gained attention during the last decades,<sup>2</sup> since Koufman systematically investigated the throat-related symptoms of gastro-oesophageal reflux disease (GERD) in 1991.<sup>3</sup> LPRD symptoms could exist in the absence of typical GERD symptoms, as the laryngopharyngeal mucosa is more sensitive to acid reflux.<sup>6 28–30</sup> However, unlike the widespread awareness about GERD among gastroenterologists, insufficient awareness about LPRD among otolaryngologists has been suggested in



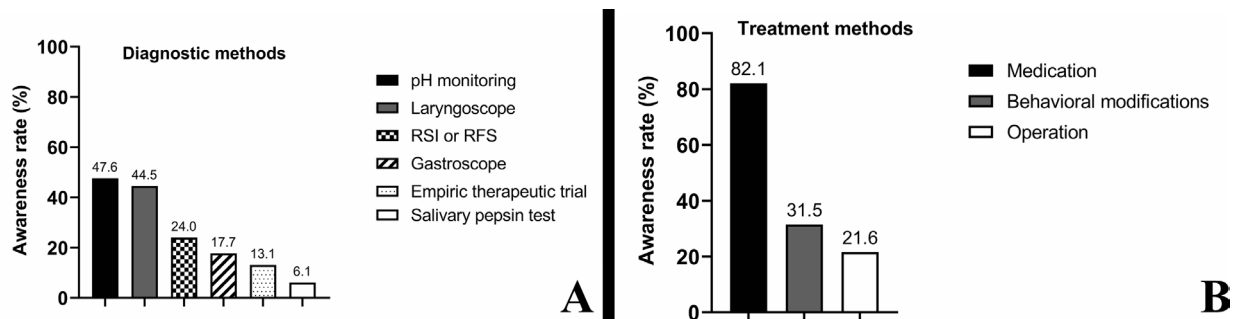
**Figure 3** The most commonly known LPRD risk factors (A), symptoms (B), laryngoscope signs (C), and related diseases (D). LPRD, laryngopharyngeal reflux disease.

several small sample studies conducted in the UK, Europe and Beijing district of China.<sup>8,31,32</sup> China is vast in territory, and the levels of medical knowledge differ significantly with regions. Therefore, this nationwide survey, including the largest sample size to date, comprehensively evaluated the status of awareness about LPRD among Chinese otolaryngologists.

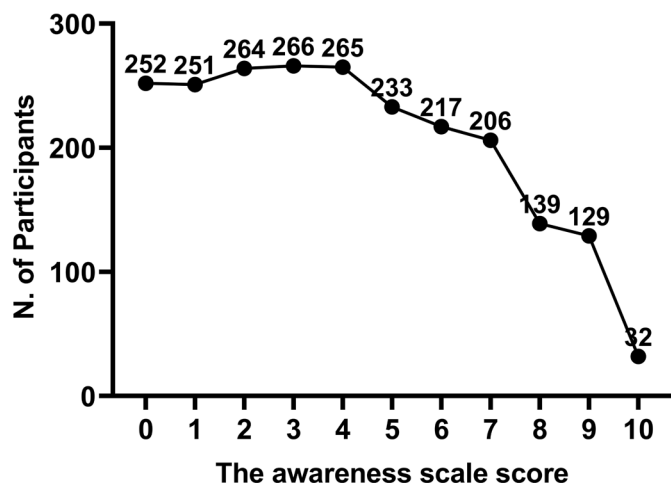
The most important finding of this study was that, although the majority of otolaryngologists surveyed had heard of LPRD, the overall status of awareness about LPRD was not encouraging: only very few otolaryngologists attained satisfactory scores. The insufficient awareness about LPRD was embodied in all aspects of this disease, including risk factors, symptoms, clinical signs, related diseases, diagnoses and treatments. This could undoubtedly cause great difficulties in the correct management of this disease. Therefore, the extremely low diagnosed rates of LPRD in Chinese patients might be attributed to a great extent to insufficient knowledge about this disease among otolaryngologists.

Thorough knowledge of the disease among medical specialists is the primary requirement for its timely

diagnosis and suitable treatment. Specifically, insufficient awareness about LPRD showed in this study could cause the following potential problems: (1) An insufficient awareness about the unspecific symptoms and laryngoscope signs might cause missed diagnoses, as this disease could be easily confused with some other laryngeal problems.<sup>7</sup> On the contrary, this might also cause false diagnoses of LPRD, which showed that the use of empirical PPI therapy did not lead to any improvement in persistent throat symptoms in 16 weeks or 12 months.<sup>33</sup> (2) An insufficient awareness about related diseases could cause poor efficacies or recurrences in treating such diseases, as antireflux therapy has been accepted in treating some of these diseases, such as laryngeal leukoplakia,<sup>34</sup> laryngeal granuloma<sup>35</sup> and cough.<sup>36</sup> (3) Currently, no perfect diagnostic and treatment methods exist for LPRD: simple ones are not so accurate or effective, such as RSI or RFS evaluations (diagnosis) and behavioural changes (treatment), while accurate or effective ones are always invasive, such as pH-MII monitoring (diagnosis) or antireflux operations (treatment). Therefore, a reasonable practical algorithm is necessary for the efficient management of



**Figure 4** The rates of awareness about LPRD diagnostic methods (A) and treatment methods (B). LPRD, laryngopharyngeal reflux disease; RFS, Reflux Finding Score; RSI, Reflux Symptom Index.



**Figure 5** The numbers of participants according to different awareness scale scores.

this disease.<sup>1 2 27</sup> Insufficient awareness about its diagnostic and treatment methods may prevent otolaryngologists from providing reasonable advice. For example, few Chinese otolaryngologists knew about other treatments besides medication. This meant that they had no idea of treating patients who did not respond to medication. On the contrary, a simple dietary change was an alternative cost-effective therapeutic approach for some patients with LPRD.<sup>37</sup> However, insufficient awareness about behavioural modifications might prevent otolaryngologists from giving clear advice on dietary changes.

In this study, we found several potential factors that influenced the status of awareness about LPRD, including hospital level, educational background and number of ways of knowing this disease. Such results could be valuable references for making further plans in improving the overall status of awareness about LPRD in China. Specifically, otolaryngologists who work at low-level hospitals or with low educational backgrounds should be encouraged

**Table 4** Awareness scale scores according to different ways of knowing LPRD

	Awareness scale scores	P value
Textbooks		<0.001
Yes	4.5±2.7	
No	3.4±2.7	
Literature		<0.001
Yes	4.8±2.6	
No	2.9±2.6	
Academic conferences		<0.001
Yes	4.3±2.6	
No	3.5±3.0	
No of ways		<0.001
2–3	4.7±2.7	
0–1	2.9±2.6	

LPRD, laryngopharyngeal reflux disease.

**Table 5** Awareness scale scores according to different personal information

	Awareness scale scores	P value
Hospital level		<0.001
3A	4.3±2.7	
Non-3A	3.3±2.9	
Educational background		<0.001
Postgraduate or above	4.5±2.6	
Undergraduate or below	3.6±2.8	
Working time (year)		0.981
≥10	4.1±2.8	
<10	4.1±2.7	
Professional titles		0.342
Senior	4.1±2.7	
Primary intermediate	4.0±2.8	

to study this disease. More ways should be provided for studying this disease, such as continuously updating textbooks to include the latest LPRD knowledge or holding more academic conferences about LPRD. These strategies may also help in facilitating timely diagnoses and suitable treatments for the large population of patients with LPRD in China.

The main strengths of this study compared with others were as follows: First, the sample size was the largest to date; moreover, the surveyed otolaryngologists came from different levels of hospitals around the country. Second, the whole surveys were performed onsite under the supervision of designated surveyors. Therefore, the veracity of the results could be ensured to a great extent. Third, questions 6–15, which were the major part of our questionnaire, were all provided with no options. Therefore, the intimation effects could be avoided to a great extent.

Several limitations also needed to be addressed. First, data from different regions were collected by different groups of surveyors; therefore, intergroup differences in study implementation could not be avoided. However, because China is a vast territory, conducting all surveys by one group was unrealistic and extremely expensive. Second, the calculation criteria of the awareness scale were made subjectively by three experts based on the current literature. This probably led to some subjective bias and controversies. However, no international guideline exists for the management of LPRD.<sup>38</sup> Such evaluations could well reflect the overall status of awareness about this disease.

## CONCLUSION

In summary, the results of this study suggested that the overall status of awareness about LPRD in Chinese otolaryngologists was not encouraging. More efforts are needed

to increase such knowledge among this group of physicians, especially among those who work in low-level hospitals or have low educational backgrounds or few ways of studying this disease.

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