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Original Article

Attitude and knowledge of chinese physicians towards obstructive sleep apnea syndrome

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Abstract: Background: This study aims to investigate the attitude and knowledge of Chinese physicians towards obstructive sleep apnea syndrome (OSAS). Methods: Seven hospitals in China including 580 doctors were organized to participate in this study. In this present investigation, a self-reported questionnaire that aims to assess the attitude and knowledge of physicians towards OSAS was used. Results: A total of 563 questionnaires were returned. Among the 560 respondents who completed the questionnaires, 532 (95%) respondents thought snoring might be a disease and 507 (80.5%) respondents knew what OSAS is. Respondents in the relevant professional group (RP group) were more familiar with OSAS than those in the non-related professional group (NRP group) (P=0.027), and both groups strongly agreed on these two statements: "OSAS needs to be treated aggressively or given attention" and "knowledge of OSAS needs to be enhanced" ($P > 0.05$). Mean OSAS knowledge score of physicians was 44.87 ± 20.64. The RP group had a higher score than the NRP group, P=0.009. Based on location, Southern hospitals had a higher score than Northern hospitals (P=0.026), while Western hospitals had a higher score than Eastern hospitals (P=0.006). Tertiary level hospitals had a higher score compared with lower-level hospitals (P=0.000). Respondents had higher scores when a sleep center was present in the hospital (P=0.012). Respondents with higher professional titles had higher scores (P=0.000). Treatments from highest to lowest scores were as follows: weight loss, quit smoking and alcohol, continuous positive airway pressure (CPAP), avoid fatigue, surgery and drugs. Conclusions: Doctors recognized that snoring might be a disease and they recommended aggressive treatment or give attention for OSAS. However, their knowledge of OSAS was poor. They were willing to further their knowledge of OSAS.

Keywords: OSAS, sleep, attitudes, knowledge, Chinese, physician

Introduction

Obstructive sleep apnea syndrome (OSAS) is a clinical condition identified by recurrent apnea or hypopnea, excessive daytime sleepiness, morning dry mouth, disruptive snoring and nocturnal hypoxemia [1]. OSAS is a common disorder that affects 2-4% of the adult population in America [2]. Incidence of OSAS in China is around 4% [3]. If unrecognized and untreated, OSAS may cause daytime hypersomnolence, cognitive impairment, systemic hypertension, pulmonary hypertension, myocardial infarction, cardiac arrhythmias, stroke, or increased risk of motor vehicle crashes [4-16]. OSAS is defined as having five or more apneas-hypopneas per hour of sleep (apnea-hypopnoea index, AHI) accompanied by either excessive daytime sleepiness or two or more episodes of choking or gasping during sleep, as well as recurrent awakenings, unrefreshing sleep, daytime fatigue, or impaired concentration or memory [17]. The American Academy of Sleep Medicine classification of OSAS severity considers both AHI

(AHI classification: 5-15 for mild, 15-30 for moderate and >30 for severe) and degree of daytime sleepiness [18].

It is useful to first determine the baseline level of familiarity of physicians and specific areas of weakness in a physician's knowledge base for OSAS in order to develop effective educational strategies.

Formal articles on OSAS have been published since 1965 [19], and OSAS was first reported in China by Shiyang Han in 1982 [20].

OSAS was only introduced as a disease in Chinese medical textbooks for the past ten or more years [21]. Hence, this field of knowledge was not undertaken by many physicians during their undergraduate education. Wang et al. found that anesthesiologists lacked adequate knowledge of OSAS, and had low confidence pertaining to patients with OSAS [22]. Few researchers have focused on the attitude and knowledge of doctors with different specializations towards OSAS, which is the purpose of the current study. There is no existing questionnaire pertaining to this field in China. Thus, we adapted the obstructive sleep apnea knowledge and attitudes (OSAKA) questionnaire developed by Schotland et al., which is a good tool for evaluating a physician's attitude and knowledge in identifying and managing patients with OSAS [23]. We redesigned the questionnaire based on the current knowledge of physicians towards OSAS and applied it for this current study.

Methods

Questionnaire

A self-reported questionnaire was drafted by 30 doctors of Mianyang Central Hospital and was written in Chinese.

The questionnaire consisted of three parts: The first section consisted of questions that collected demographical data, the second section consisted of questions associated with attitudes of professionals towards OSAS, and the third section aimed to assess the baseline knowledge of medical practitioners on OSAS.

Demographic section: The first six items of the demographic section contains the information of the doctor (e.g. gender, age, title, specialty, hospital level and whether hospitals had a sleep center?). Titles were classified as beginner, intermediate or advanced. Doctors were divided into two groups: relevant professionals group (RP group) and non-relevant professionals group (NRP group). The RP group included doctors from the following categories: sleep center, respiratory medicine, neurology, ENT and dentistry. The remaining doctors were included in the NRP group.

Attitude section: Items in the attitude section aimed to collect data associated to attitudes of doctors towards OSAS. Questions included: "do you think snoring may be a disease?" (Yes or No), "which department would you recommend snoring patients for a consult?" (answers in multiple choice), "are you familiar with OSAS?", "do you think OSAS needs to be treated aggressively or given more attention?", "would you like to learn more about OSAS?", For the question, "which treatment would you choose?", treatment options were as follows (answers in multiple choice): (i) weight loss, (ii) quit smoking and alcohol, (iii) avoid fatigue, (iv) drugs, (v) CPAP, (vi) surgery. The four latter questions were listed with a five-point Likert scale, where three was neutral. Higher scores were more positive, while lower scores were more negative.

Knowledge section: Items in the knowledge section evaluated a doctor's knowledge of OSAS (answers in multiple choice). Risk factor options were: nasal disease, pharyngeal disease, maxillofacial abnormalities, obesity, gender, age. Symptom options were: Snoring, narcolepsy suffocation and choking, nocturnal polyuria, morning dizziness, dry throat, daytime sleepiness. Related disease options were: hypertension, coronary heart disease, arrhythmia, heart failure, atherosclerosis, epilepsy, cerebrovascular diseases, alzheimer, psychosomatic diseases, asthma, bronchiectasis, respiratory failure, pulmonary hypertension, chronic pulmonary heart disease, gastroesophageal reflux, diabetes, metabolic syndrome, renal insufficiency, sexual dysfunction, rheumatoid arthritis, gout, systemic sclerosis, blood diseases, eye disease, anesthesia accident, preoperative accident. Treatment options were as described above. Total score was computed as follows: total score = the total number of correct options/standard answer options ×100.

Survey sample and procedure

Seven hospitals in China including 580 doctors such as physicians, surgeons and other spe-

Table 1. Doctor demographics (*N*=560)

Characteristics	N (%)
Age	Y
Mean	34.6
SD	8.8
SE	0.4
Gender	
Male	284 (50.7%)
Female	276 (49.3%)
Professional titles	
Beginner	227 (40.5%)
Intermediate	199 (35.5%)
Advanced	134 (23.9%)
Location	
South	278 (49.64%)
North	282 (50.36%)
East	284 (50.71%)
West	276 (49.29%)
Hospital level	
Tertiary level	275 (49.11%)
Lower level	285 (50.89%)
Relevant professional	
Yes	162 (28.9%)
No	398 (71.1%)
Doctors from hospitals that have a Sleep center	
Yes	282 (50.4%)
No	278 (49.6%)

cialists were organized and selected for this study. Uniform questionnaires were distributed in Mianyang Central Hospital and simultaneously mailed to a coordinator in the other six hospitals. All questionnaires were recovered by mail after a month, regardless of whether the questionnaires were completed or not. No economic incentive was offered in the course of this investigation. The research protocol was approved by the ethics committee of the Mianyang Central Hospital, and all physicians provided informed consent.

Statistical analysis

Data were entered into an SPSS 20.0 dataset. Descriptive statistics was used to describe all respondent characteristics and knowledge. Independent-sample *t*-test was performed to compare differences between the two groups based on attitude and knowledge scores. ANOVA was performed to compare differences in knowledge scores between different doctor professional titles. Binary logistic regression was used to assess correlations between doctor's characteristics and the "snoring may be a disease" statement. All reports were two-tailed *P* values.

Results

In this study, a total of 580 questionnaires were sent to doctors, and 563 (97.07%) questionnaires were returned. Among the returned questionnaires, three doctors did not complete the questionnaire. Although some answers were missing, the effective response rate was 96.55%. Mean age of respondents was 34.6 years old (y) and standard deviation was 8.8 y. There were 284 (50.7%) male and 276 (49.3%) female respondents. Among the completed questionnaires, 227 (40.5%) had beginner professional titles, 199 (35.5%) had intermediate professional titles, and 134 (23.9%) had advanced professional titles. Based on hospital location, 50.71% were from Eastern China and 49.29% were from Western China; 49.64% were from Southern China, and 50.36% were from Northern China. Based on hospital level, 275 (49.11%) respondents were from tertiary hospitals and 285 (50.89%) respondents were from lower-level hospitals. There were 162 (28.9%) respondents in the RP group and 398 (71.1%) respondents in the NRP group. Half of the total respondents (282, 50.4%) worked in hospitals that had a sleep center (**Table 1**).

Attitude

In the self-answer section, most doctors (532, 95%) knew that snoring may be a disease. Binary logistic regression analysis results indicated that there was no significant difference between the answers and characteristics of respondents including age, gender, professional title, relevant professionals and the sleep center.

Many respondents (507, 80.5%) were familiar with OSAS, and we found that doctors in the RP group were more familiar with OSAS than doctors in the NRP group (4.76 ± 0.597, 4.59 ± 0.903, *P*=0.027, **Table 2**). There was no significant difference in "OSAS needs to be treated aggressively or given attention" and "knowledge of OSAS needs to be enhanced" statements between the two groups ($P > 0.05$), and both groups strongly agreed with the two statements.

Table 2. Attitude scores of physicians

	RP		NRP		*t*	*P*	95% CI	
	Mean	SD	Mean	SD				
Level of OSAS knowledge	4.76	0.597	4.59	0.903	2.214	0.027	0.019	0.323
OSAS needs to be treated aggressively	4.78	0.619	4.69	0.712	1.43	0.153	0.034	0.218
Willing to learn OSAS	4.53	0.949	4.40	1.016	1.369	0.172	-0.055	0.305

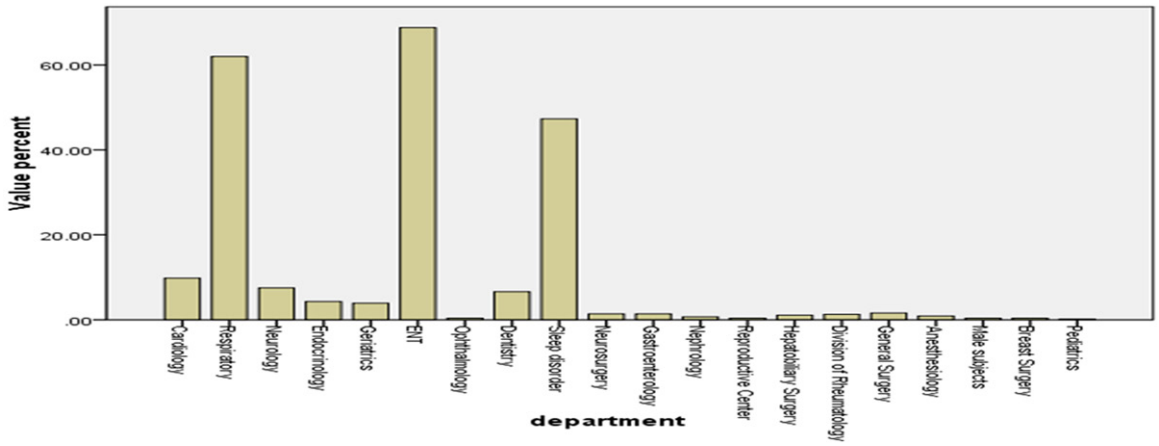

Figure 1. Physicians were asked, in which department should OSAS patients be recommended for a consult? The figure denotes the percentage of doctors that recommended a particular department.

Table 3. Attitude of physicians towards OSAS treatment

	RP		NRP		*t*	*P*	95% CI	
	Mean	SD	Mean	SD				
Weight loss	4.78	0.689	4.55	1.01	2.644	0.008	0.059	0.4
Quit smoking and alcohol	4.6	1.08	4.23	1.364	3.017	0.003	0.127	0.6
Avoid fatigue	4.19	1.384	3.98	1.491	1.522	0.129	-0.059	0.462
Drugs	3.03	1759	3.29	1.667	1.605	0.110	-0.579	0.059
CPAP	4.52	1.141	3.98	1.537	4.024	0.000	0.306	0.773
Surgery	3.98	1.443	3.82	1.521	1.157	0.248	-0.111	0.428

For the question, "which department would you recommend snoring patients for a consult?" (answers in multiple choice), most doctors recommended snoring patients to consult ENT (68.8%), respiratory medicine (62%) or sleep center (47.3%), as shown in **Figure 1**. Meanwhile, other recommendations were: cardiology (9.8%), neurology (7.5%), dentistry (6.6%), endocrinology (4.3%), and geriatrics (3.9%). At the same time, other departments (neurosurgery, gastroenterology, etc.) taken together accounted for 10.2%.

Table 3 shows the attitude of doctors in the RP and NRP groups towards OSAS treatment. Treatments from highest to lowest scores were: weight loss, quit smoking and alcohol, CPAP, avoid fatigue, surgery and drugs. Score in the RP group was significantly higher than the NRP group in weight loss, quit smoking and alcohol and CPAP ($P<0.05$). There was no significant difference in treatment for avoid fatigue, surgery and drugs between the two groups ($P > 0.05$).

Knowledge

Mean score of physicians was 44.87 and standard deviation was 20.64. Score in the RP group (48.48 ± 23.19) was higher than the NRP group (43.46 ± 19.36), $P=0.009$. Southern hospitals had a score (46.83 ± 19.34) higher

Table 4. Mean responses of medical professionals for OSAS knowledge

	Mean	S.D	*t*	*P*	95% CI	
RP	48.48	23.19	2.618	0.009	-8.788	-1.254
NRP	43.46	19.36				
Southern hospitals	46.83	19.34	2.239	0.026	0.476	7.299
Northern hospitals	42.94	21.70				
Eastern hospitals	42.52	18.06	2.752	0.006	-8.179	-1.366
Western hospitals	47.29	22.77				
Tertiary level hospitals	51.40	23.64	7.728	0.000	9.565	16.084
Lower-level hospitals	38.57	14.77				
Hospitals that have a Sleep center	47.05	23.39	2.534	0.012	-7.808	-0.989
Hospitals that does not have a Sleep center	42.65	17.17				

Table 5. Mean responses of different professional titles for OSAS knowledge

	Mean	S.D.	95% CI		*F*	*P*
Beginner	38.41	17.804	35.841	40.979	28.042	0.000
Intermediate	45.83	20.206	43.090	48.578		
Advanced	54.38	21.907	51.037	57.724		

than Northern hospitals (42.94 ± 21.70), *P*=0.026; while Western hospitals had a score (47.29 ± 22.77) higher than Eastern hospitals (42.52 ± 18.06), *P*=0.006. Tertiary hospitals had a score (51.40 ± 23.64) higher than lower-level hospitals (38.57 ± 14.77), *P*=0.000. Doctors had a higher score when a sleep center was present in the hospital (47.05 ± 23.39, 42.65 ± 17.17, *P*=0.012) (**Table 4**). Scores for different professional titles were 38.41 ± 17.80 (beginner), 45.83 ± 20.21 (intermediate), and 54.38 ± 21.91 (advanced); and the difference were significant, *P*=0.000 (**Table 5**). Respondents were not familiar with the statement, "which disease do you think is related to OSAS? (Multiple choice)". The correct disease response rate is shown in **Figure 2**.

Discussion

Previous studies have confirmed that OSAS is a multi-system disease. Rosen *et al.* found a low rate of recognition and diagnosis for sleep disorders in both community-based outpatient health settings and university-based clinics at the same geographical location in 2000 [24].

OSAS was only included in undergraduate courses of doctors in China ten years ago [21], and was taught for a few hours in school or as an elective only. Miao *et al.* conducted a survey for different professional medical students to understand their knowledge of sleep disorders [25]. Their study showed that Chinese medical students indicated the importance of sleep disorders, but knew little about this field. How do physicians know about it? This study surveyed a medical practitioner's attitude and knowledge towards OSAS.

Attitude

We found that respondents generally believed that OSAS needed aggressive treatments or given attention (92.5%). This survey also revealed that respondents (83.6%) considered that it was necessary to enhance OSAS knowledge.

The positive side of the survey was that most doctors agreed that snoring might be a disease (95%). In China, there are no sleep centers in most hospitals; and sleep disorders were mostly managed in respiratory, ENT or neurology departments. This was consistent with findings; wherein, most doctors recommended snoring patients to consult with these departments: ENT (68.8%), respiratory medicine (62%), sleep center (47.3%) and neurology (7.5%). These professionals were therefore chosen as OSAS relevant professionals, while others were unrelated to OSAS; and differences between them were analyzed.

Current treatments for OSAS include positional therapy, weight loss, avoid smoking and alcohol, CPAP, oral appliances (OAS) and surgery

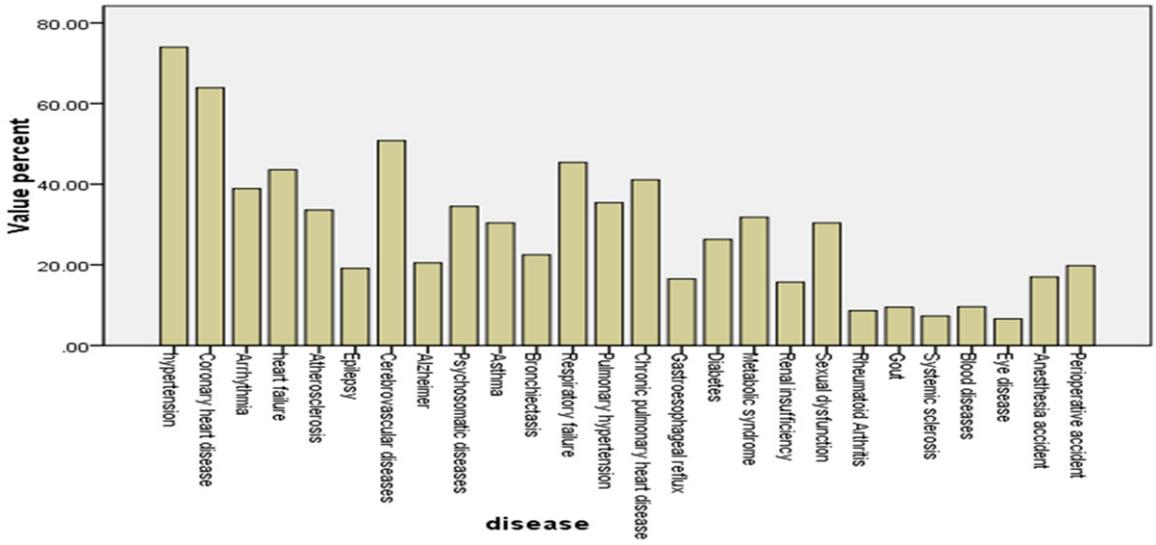

Figure 2. Medical professionals were asked, if OSAS is related to a particular disease. The figure demonstrates the percentage of responses of professionals for a particular disease.

[21]. HuiBian suggested the need for further education and training regarding OSAS and OAS in dental school [26].

Doctors generally believed that weight loss was an important treatment (89.1%). Drug treatment opinions were very much dispersed. Choice of treatments was more ideal for doctors in the RP group.

Knowledge

Several authors have shown that knowledge of sleep disorders in majority of primary care physicians was fair or poor [27, 28]. Meanwhile, related specializations of physicians (e.g. cardiologists and anesthesiologists) were also less acquainted on OSAS [29].

In the self-answered part of the questionnaire, a vast majority of respondents thought they clearly knew OSAS (80.5%). Actually, respondents had little knowledge of OSAS; and mean score was only 44.87. Doctors in the RP group had a score (48.48 ± 23.19) higher than those in the NRP group (43.46 ± 19.36), *P*=0.009. In China, hospitals were divided into three levels. Hospitals were better when the level of the hospital was higher. This survey has also shown that doctors in higher-level hospitals had higher knowledge scores (51.40 ± 23.64, 38.57 ± 14.77, *P*=0.000). Doctor's professional titles were classified as beginner, intermediate and advanced in China. This study has shown that doctors with higher professional titles had a better grasp of OSAS knowledge (*P*=0.000). Doctors mastered the knowledge of sleep disorders better when the hospital had a sleep center. Responses associated with OSAS were hypertension (74%), arrhythmia (38.9%), diabetes (26.3%), metabolic syndrome (31.8%), and cerebrovascular disease (50.8%). These conditions have been confirmed to be associated with OSAS, and have been the focus of studies in recent years. Few respondents were familiar of anesthesia accidents (17%), gout (9.5%) and eye diseases (6.6%).

OSAS has been known in China for less than 30 years. The extent and depth of knowledge for OSAS remains far from developed countries. Investments are needed for research, to explore the pathogenesis of OSAS and find innovative treatments. OSAS is a chronic systemic disease, and its complications may endanger life. Taken together, this study has indicated that doctors in China lack OSAS knowledge, and that their attitude towards OSAS therapeutic treatment was positive. Doctors were willing to learn more about OSAS.

Limitations of the study: there was no uniform questionnaire; thus, we established and used our own questionnaire. China is vast, and it is difficult to cover doctors in various areas. Thus, the study avoided first-tier cities and remote poor areas; and selected doctors and hospitals

from medium-sized cities. This study revealed that Western hospitals in China had a score higher than Eastern hospitals, while Southern hospitals had a score higher than Northern hospitals. However, because the source of the data was limited, it did not fully explain the differences in various regions.

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Disclosure of conflict of interest

None.

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