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ORIGINAL RESEARCH

Development and validation of obstructive sleep apnea knowledge questionnaire for physical therapists:

Desenvolvimento e validação do questionário de conhecimento em apneia obstrutiva do sono para fisioterapeutas:

Desarrollo y validación del cuestionario de conocimiento sobre apnea obstructiva del sueño para fisioterapeutas:

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ABSTRACT | Obstructive sleep apnea (OSA) is a highly prevalent sleep breathing disorder. Its treatment encompasses an interdisciplinary approach, with the physical therapist playing a key role in the adaptation process, home titration, and monitoring of patients who use continuous positive airway pressure. This study developed and validated an instrument to assess the knowledge and attitudes of physical therapists regarding OSA. This is a methodological and multicenter study conducted in all Brazilian regions. After the stages of construction, content validation, and pre-testing, the instrument defined as OSAKQ-P (OSA knowledge questionnaire for physical therapists), composed of 26 knowledge items and three attitude items, was applied electronically to a sample of 150 physical therapists. During validation process, the following psychometric properties were analyzed: internal consistency, content validity, construct validity and test-retest reliability. The OSAKQ-P presented excellent internal consistency (α= 0.84), excellent test-retest reliability (ICC=0.90) and strong correlation with the auxiliary instrument (r=0.753, p<0.001) evidencing its convergent validity. In addition, the OSAKQ-P instrument detected differences between knowledge in different Physical Therapy areas. The attitude items presented low internal consistency (α=0.62), but detected the difference in physical therapists' attitudes according to their clinical experience with OSA or lack thereof. The OSAKQ-P instrument proved to be valid and reliable for assessing physical therapists' knowledge of OSA.

Keywords | Knowledge; Attitudes and Practice in Health; Obstructive Sleep Apnea; Physical Therapy.

RESUMO | A apneia obstrutiva do sono (AOS) é um distúrbio respiratório do sono de alta prevalência e

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seu tratamento engloba uma abordagem interdisciplinar, tendo o fisioterapeuta um papel fundamental no processo de adaptação, titulação domiciliar e monitoramento de pacientes que utilizam pressão positiva contínua nas vias aéreas. Este estudo desenvolveu e validou um instrumento para avaliar o conhecimento e atitudes de fisioterapeutas em relação à AOS. Trata-se de um estudo metodológico e multicêntrico realizado nas cinco regiões brasileiras. Após passar pelas etapas de construção, validação de conteúdo e pré-teste, o instrumento definido como OSAKQ-P (Questionário de conhecimento sobre AOS para fisioterapeutas), composto por 26 itens de conhecimento e 3 itens de atitudes, foi aplicado eletronicamente a uma amostra de 150 fisioterapeutas. No processo de validação do instrumento foram analisadas as seguintes propriedades psicométricas: consistência interna, validade de conteúdo, validade de construto e confiabilidade teste-reteste. O OSAKQ-P apresentou excelente consistência interna (α=0,84), excelente confiabilidade no teste de reteste (ICC=0,90) e forte correlação com o instrumento auxiliar (r=0,753, p<0,001) evidenciando sua validade convergente. Além disso, o instrumento OSAKQ-P detectou diferenças entre conhecimentos nas diferentes áreas da Fisioterapia. Os itens de atitudes apresentaram baixa consistência interna (α=0,62), mas conseguiram detectar diferenças nas atitudes de fisioterapeutas com ou sem experiência clínica em AOS. O instrumento OSAKQ-P mostrou-se válido e confiável para avaliar o conhecimento de fisioterapeutas sobre AOS.

Descritores | Conhecimento; Atitudes e Práticas em Saúde; Apneia Obstrutiva do Sono; Fisioterapia.

RESUMEN | La apnea obstructiva del sueño (AOS) es un trastorno respiratorio del sueño altamente prevalente, y su tratamiento implica un enfoque interdisciplinario, en el que el fisioterapeuta desempeña un papel clave en el proceso de adaptación, de la poligrafía y del monitoreo de pacientes que utilizan los dispositivos de presión positiva continua en las vías respiratorias. Este estudio desarrolló y validó un instrumento que evalúa los conocimientos y las actitudes de los fisioterapeutas sobre la AOS. Se trata de un estudio metodológico y multicéntrico realizado en las cinco regiones brasileñas. Pasadas las etapas de construcción, validación de contenidos y pretest, se aplicó electrónicamente a una muestra de 150 fisioterapeutas el instrumento definido como OSAKQ-P (Cuestionario de conocimientos sobre AOS para fisioterapeutas), que estuvo constituido por 26 ítems de conocimiento y tres ítems de actitudes. En el proceso de validación del instrumento se analizaron las siguientes propiedades psicométricas: consistencia interna, validez de contenido, validez de constructo y confiabilidad test-retest. El OSAKQ-P presentó excelente consistencia interna (α=0,84), excelente confiabilidad en el test de retest (ICC=0,90) y fuerte correlación con el instrumento auxiliar (r=0,753, p<0,001), lo que indicó una validez convergente. Además, detectó diferencias entre los conocimientos en diferentes áreas de la Fisioterapia. Los ítems de actitud mostraron baja consistencia interna (α=0,62), pero fueron capaces de detectar diferencias en las actitudes de los fisioterapeutas con experiencia clínica en AOS o sin ella. El instrumento OSAKQ-P demostró ser válido y confiable para evaluar el conocimiento de los fisioterapeutas sobre la AOS.

Palabras clave | Conocimiento; Actitudes y Prácticas en Salud; Apnea Obstructiva del Sueño; Fisioterapia.

INTRODUCTION

Obstructive sleep apnea (OSA) is characterized by recurrent events of total or partial obstruction of the upper airways during sleep, despite increased effort to breathe for 10 or more seconds, with or without a decrease in oxygen saturation and transient hypercapnia[1]. OSA is considered an independent risk factor for developing significant clinical outcomes, such as cardiovascular diseases[2], type 2 diabetes mellitus[3], stroke[4], hospitalization, and death by exacerbation of chronic obstructive pulmonary disease[5], in addition to contributing to the occurrence of automobile accidents[6]. Estimates indicate that almost one billion adults aged 30–69 years may have OSA worldwide, and of these, almost 425 million may present moderate to severe OSA, needing treatment[7].

OSA treatment encompasses an interdisciplinary approach. Treatment options may vary between surgical and conservative procedures, depending on procedure classification and the particularities of each individual[8]. However, continuous positive airway pressure (CPAP) is considered the gold standard for treating moderate to severe OSA, minimizing sleep-related symptoms, reducing apnea and hypopnea index (AHI), and improving quality of life[9].

A physical therapist with expertise in Sleep Medicine plays a fundamental role in the adaptation process, interface indication,[10] titration of therapeutic pressure,[11] and clinical follow-up of patients who use CPAP to ensure adherence and success in treatment[8]. Given the specificity of the physical therapist's performance in the context of OSA, this study

develops and validates a tool that assesses the OSA knowledge of the physical therapist, including its etiology, risk factors, and positive pressure treatment, in addition to evaluating physical therapists' attitudes regarding their confidence in managing patients diagnosed with OSA. Despite holding a relevant role in treating individuals with OSA, the acquisition of skills and competencies related to sleep issues is not yet a part of the Physical Therapy program. Thus, an instrument with adequate measurement capacity will facilitate the obtention of indicators that identify weaknesses in OSA knowledge. Similarly, an instrument will further the investigation of processes or results regarding sleep health in Physical Therapy programs as well as indicate whether any Physical Therapy specialty has more affinity with Sleep Medicine.

METHODOLOGY

Study design

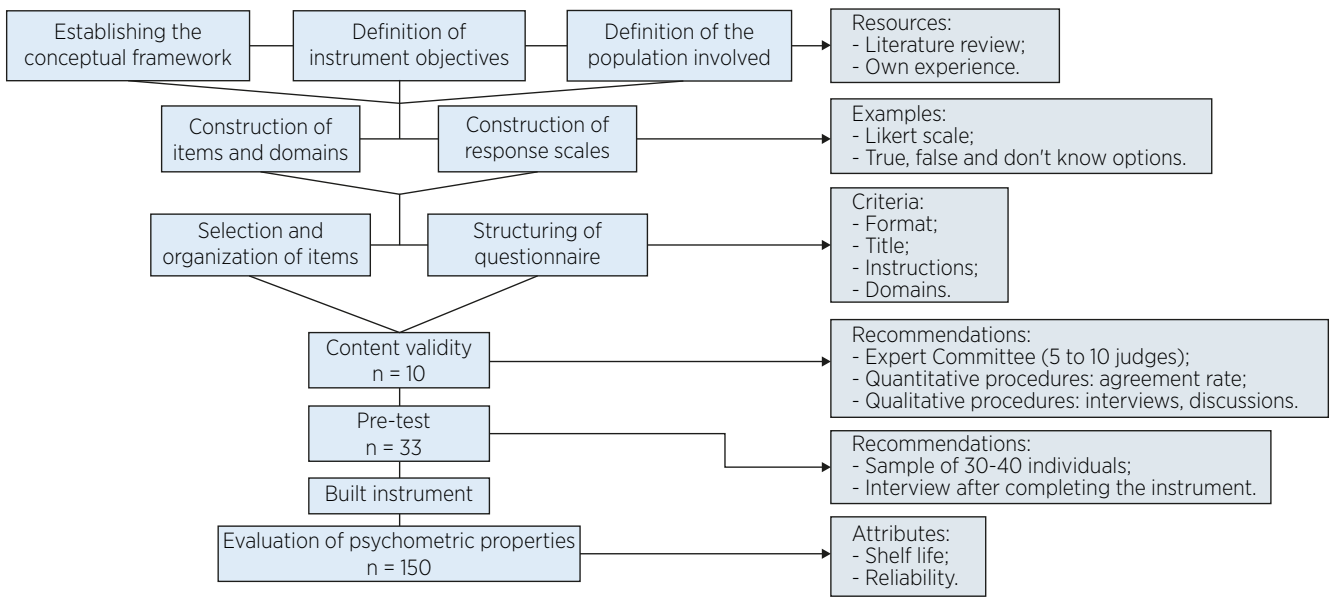
This is a methodological and multicenter study to create and validate an instrument to assess physical therapists' knowledge and attitudes regarding OSA. The instrument was developed by three doctoral researchers, with clinical and scientific experience in Sleep Medicine. The validation process of the constructed instrument was facilitated by a group of researchers representing the five Brazilian regions that intended for the instrument to be free of cultural biases, given the extensive national territory.

Figure 1 shows the research development and validation steps of the instrument.

Construction of the instrument

The development process of a new measurement instrument followed the steps described by Coluci et al.[12] (Figure 1). Regarding instrument creation process, the stages of establishing the conceptual structure and defining its objectives were anchored by the researchers' own experience. Next, for the construction of the items/domains of the instrument and the response scale, a literature review was used as a resource, using the following descriptors to search in the PubMed and Bireme databases: "obstructive sleep apnea" AND "knowledge" AND "surveys" AND "questionnaires." The search resulted in 172 articles. After reading the title, summary, and full text, only four articles were selected and used to guide the instrument construction[13-16]. Regarding physical therapists, no instruments with equal purpose were found, and the researchers defined the items based on their experience. Thus, the initial version of the instrument was constructed using 45 items.

Figure 1. Steps of development process of the instrument.



Source: Adapted from Coluci et al.[12]

Content validity

After the construction and structuring of the first version of the questionnaire, an expert committee (10 physical therapist with at least three years of clinical experience in Sleep Medicine, and/or involved in research in the area as proven by their Lattes curriculum) performed the content validity evaluation. During this process, the experts completed the instrument and evaluated whether the content of each item accurately represented its intended concept.

In this step, nine items were excluded: (1) Knowledge domain: two items were excluded for obtaining less than 85% of correct answers from the specialists; one for being considered irrelevant; four for receiving criticism from most experts; and one for being a confounding factor when evaluating professional knowledge due to its proclivity to being influenced by user preferences; (2) Attitude domain: one item was excluded from consideration in a previous issue. The other items of the questionnaire were reformulated to achieve greater clarity and coherence.

After this stage, the instrument, initially composed of 45 items, was reduced to 36 items (33 knowledge- and 3 attitude-related), and applied in the subsequent stage.

Content Assessment Approach – Pre-testing

In the content evaluation stage, 33 physical therapists with different specializations and lengths of professional experience, residing in the five Brazilian regions, were selected for convenience. These professionals answered an electronic version of the instrument on Google Forms and then critically evaluated it during interviews, in which they offered qualitative and/or quantitative feedback about the items of the instrument regarding their clarity and organization.

In this stage, the instrument presented a 0.81 Cronbach's alpha coefficient (considering the 33 knowledge items of the 36-item version), but adjustments were needed in the questionnaire: two knowledge items were eliminated because all physical therapists answered correctly, with no response variation[13] and another five items were excluded due to presenting a total item-correlation <0.20[17].

Thus, in this version, the questionnaire was named obstructive sleep apnea knowledge questionnaire for physical therapists (OSAKQ-P) (Supplementary Material 1), composed of 26 knowledge items, with the following answer options: "TRUE," "FALSE," and "DO NOT KNOW[13]." Three attitude items answered via a Likert scale with three options: "DISAGREE," "NEITHER AGREE NOR DISAGREE," and "AGREE[18]." Additionally, the instrument presents questions on sociodemographic and professional issues. The OSAKQ-P is self-administered, and the time required to complete it is 10 min on average.

The final score of the instrument considers the number of correct answers, regarding the knowledge questions. Items checked as "DO NOT KNOW" are considered incorrect. The final score ranges from 0 to 26, and the higher the score, the greater the respondent's OSA knowledge.

Afterwards, the OSAKQ-P was subjected to psychometric properties analysis. In addition to internal consistency, content validity, construct validity and test-retest reliability were evaluated.

The OSAKQ-P validation process

In total, 150 physical therapists with different specializations and lengths of professional experience, selected for convenience, participated in the OSAKQ-P validation process. The sample sized enabled a 95% CI of ±0.34SD, considering an 8% error[19]. Physical therapists from the five Brazilian regions answered the OSAKQ-P via an online questionnaire from November 2020 to April 2021. Participants were invited to participate in the research via email sent by researchers from each Brazilian region. The physical therapist sample was comprised of professors, graduate students, and physical therapists with previous work experience in the university hospitals of participating institutions. All participants included in the study signed an informed consent form, which was made available electronically via the Research Electronic Data Capture (REDCap) tool[20]. Then, participants completed the OSAKQ-P and the Obstructive Sleep Apnea Knowledge and Attitudes questionnaires (OSAKA)[21] in electronic format using REDCap.

The OSAKA questionnaire, translated into and validated for Brazilian Portuguese[21], was used as an auxiliary instrument for the validation process of the OSAKQ-P. The OSAKA questionnaire was developed and validated in 2003 in its original English version[13] and has already been used to screen professional's knowledge about OSA in various medical specialties[22-24]. OSAKA was used as an auxiliary instrument to analyze construct validity, defined as the measure of the

relationship between the instrument to be validated and another instrument[25].

Seven days after the first stage, the OSAKQ-P was presented to the research participants for the retest, considering the answers sent in the interval of 7-1 days after the first instrument application. The reenactment of the instrument and recording of the answers are important for checking reliability, which is related to the stability of the instrument in two measurements performed in different periods; a sample of at least 50 participants is necessary for reliability analysis of the retest[25,26]. At this stage, respondents were asked if they had sought information on OSA during the period between the initial application of the instrument and the retest date.

Statistical analysis

The database with the answers of the OSAKQ-P survey was obtained in the RedCap platform, and the data were analyzed without the possibility of linking the responses to the participant's identity. The statistical program SPSS version 22.0 was used. Descriptive analysis was used to characterize the sample and compare the data. Data normality was tested using the Kolmogorov-Smirnov normality test. The percentage of participants with the lowest and highest possible score in the instrument was calculated to detect the floor or ceiling effects (considering the extreme scores by 15% of the sample)[26]. Internal consistency was analyzed using Cronbach's alpha coefficient, considering values between 0.80 and 0.90 as excellent, values below 0.70 as low internal consistency, and above 0.90 as redundant or duplicated[27]. Convergent construct validity was analyzed using Pearson's correlation coefficient, considering the following criteria:<0.3 as a weak correlation, 0.3 to 0.6 as moderate, and >0.6 as strong[27]. For the analysis of discriminant validity and comparison between knowledge and attitude, the Kruskal–Wallis test with post-hoc Bonferroni analysis was used, with a $p<0.05$ statistical value. The intraclass correlation coefficient (ICC) was used to verify test-retest reliability, considering values 0.6–0.8 as good reliability and >0.80 as excellent reliability[28].

RESULTS

A total of 223 physical therapists distributed in the five Brazilian regions were invited to participate in the validation of the OSAKQ-P; 171 agreed to participate in the research and, of these, 21 were excluded (20 for not having answered all questions and one for having declared to be a student). The final sample consisted of 150 respondents in the validation process of the instrument. Of these, 103 responded to the retest. Table 1 presents the characterization of the study sample.

Table 1. Sample characteristics

Characteristic	N (%) or Mean(±SD)
Sex	
Male	29 (19.3)
Female	121 (80.7)
Age	32.80±8.12
Type of institution	
Public	77 (51.3)
Private	72 (48.0)
Another category	1 (0.7)
Type of teaching	
Traditional learning	148 (98.7)
Distance learning	3 (1.3)
Years of clinical practice	9.78±7.37
Degree	
Specialization	129(86.0)
Master	75 (50.0)
Doctorate	25 (16.7)
Areas of expertise	
Orthopedic	23(15.3)
Intensive care	67 (45.3)
Cardiorespiratory	51 (34.0)
Dermato-functional	2 (1.3)
UrogynecologicalSports	6 (4.0)
Neurofunctional	9 (6.0)
Neopediatrics	13 (8.7)
Other	15 (10.0)
	36 (24.0)
Experience in care provided to individuals with OSA	
Yes	7 (4.7)
No	143 (95.3)

Note: The data are number (%) or mean±SD; SD: standard deviation; OSA: obstructive sleep apnea.

In the knowledge domain of the OSAKQ-P, no item was answered correctly by all participants, with different responses. The internal consistency of the knowledge section (Items 1 to 26) analyzed by Cronbach's alpha coefficient was 0.84, which is considered excellent internal consistency. There was no floor or ceiling effect, and no respondent achieved the lowest possible score (0 point) or the highest possible score (26 points). The lowest score was 3 recorded in 2% (n=3) of the sample; 25 was the highest score, recorded in 0.7% (n=1) of the sample.

The questionnaire discriminated differences in knowledge based on the number of correct answers between physical therapists with and without experience in providing clinical care to individuals with OSA. The respondents who reported having clinical experience with patients with OSA had a mean number of correct answers of 20.86±3.24 and those who declared to have no experience had a mean number of correct answers of 17.3±3.94, which were statistically significant (p=0.01). There was no correlation between years of clinical practice and knowledge (r=0.100; p=0.273).

In addition, the instrument could detect differences in knowledge between Physical Therapy areas of expertise. Therefore, it was observed that physical therapists working in musculoskeletal services presented a lower mean of correct answers in relation to other areas (p<0.001; Table 2). For this analysis, physical therapists working in intensive care, cardiorespiratory, and neopediatrics were grouped in the "cardiorespiratory" category, physical therapists working in traumato-orthopedics and sports were grouped in the "musculoskeletal" category and physical therapists working in urogynecological, neurofunctional, dermato-functional or generalists (active in two areas or more) were categorized as belonging to "other specialties."

Table 2. Median number of correct answers to obstructive sleep apnea knowledge questionnaire for physical therapists knowledge items according to physical therapy area of expertise

Area of expertise	Median	Percentile 25-75	p-value
Cardiorespiratory	19.00	17.00 – 20.00	0.001[C]
Skeletal muscle	14.00	12.00 – 15.50	<0.001[A]
Other specialties	17.00	14.00 – 19.00	0.023[B]

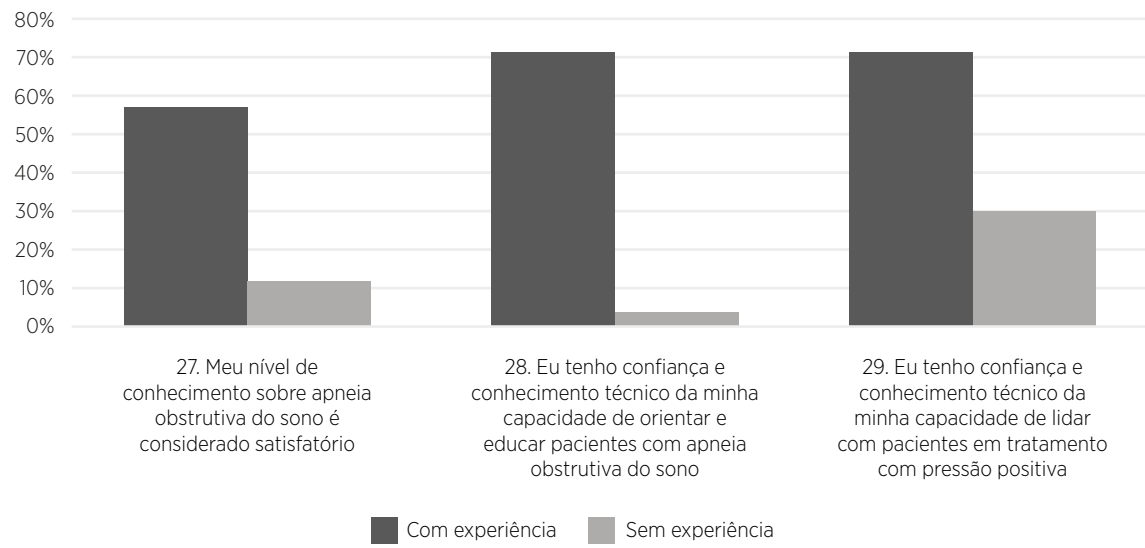
Note: Kruskal-Wallis test of independent samples considering p≤0.05 with Bonferroni post-hoc analysis.

When the convergent construct validity was analyzed, the OSAKQ-P showed a strong correlation with the OSAKA questionnaire (r=0.753), reaching statistical significance (p<0.001).

Regarding test-retest reliability, OSAKQ-P presented excellent reliability, with an 0.90 ICC, demonstrating the stability of the instrument in two measurements in different periods.

In the attitude domain of the OSAKQ-P (Items 27 to 29), evaluated using a Likert scale, low internal consistency was observed, with a 0.62 Cronbach's alpha coefficient. When comparing the agreement in response to the attitude between physical therapists with and without OSA experience, we observed that experienced physical therapists felt more confident in the care provided to individuals with OSA. However, confidence increases among physical therapists without experience in managing patients using positive pressure (Figure 2).

Figure 2. Agreement on the attitude items of the OSAKQ-P between physical therapists with experience in treating individuals with OSA and those without experience.



In the comparative analysis of the scores of OSAKQ-P knowledge items with the Kruskal-Wallis test attitude items, we observed higher scores in the knowledge items in alignment with attitude items (p<0.001), that is, participants who agreed with the attitude items presented higher scores in the OSAKQ-P, suggesting that individuals with a higher knowledge level tend to feel more confident in the management of patients with OSA.

DISCUSSION

The OSAKQ-P instrument proved to be valid and reliable for assessing the knowledge of physical therapists about OSA, presenting excellent internal consistency and test-retest reliability, besides discriminating potential among physical therapy specialties, and not presenting floor or ceiling effect. Differences in the attitudes of individuals with and without OSA experience were identified, although attitude items presented low internal consistency.

In this study, physical therapists with no OSA experience were less confident in the management of these patients and had a lower mean number of correct answers in knowledge items when compared with experienced professionals. The findings suggest that experience and knowledge about OSA are necessary for professionals to feel confident in identifying risk factors, referring patients to specialized care, and treating patients diagnosed with OSA[29].

A study conducted with physical therapists that investigated attitudes and perceptions about the need to evaluate sleep and educate patients on this subject showed that, although most recognize that poor sleep quality causes functional impairments and aspects of sleep should be evaluated by the physical therapists, the majority did not receive sleep health education in graduate or postgraduate degrees in physical therapy. Additionally, a small minority evaluate the sleep habits of their patients and educate them regarding sleep; lack of knowledge is the main reason cited for not evaluating patients' sleep. The study also revealed that a minority of physical therapists refer their patients to a sleep specialist[30].

According to a study conducted in 2013, physical therapists trained in respiratory care can play a key role in in the management of noninvasive ventilation (NIV) and CPAP[31] for patients with respiratory diseases and sleep breathing disorders. It was observed in this study that physical therapists with no experience in OSA were confident in the management of patients using positive pressure, which is probably related to the fact that physical therapists in the areas of cardiorespiratory and intensive care constantly deal with patients using NIV, which guarantees them confidence in the management of positive pressure therapy.

Physical therapists working in the musculoskeletal area presented lower scores than other specialties, thus demonstrating the ability of the OSAKQ-P instrument to detect differences in knowledge between the different areas of expertise, where unrelated areas of cardiorespiratory physical therapy had a lower median of correct answers in relation to the knowledge items. This result was previously expected because of the clinical practice of professionals working in these areas.

According to the guidelines of the Brazilian Sleep Association (ABS), one of the main objectives of physiotherapeutic practice in patients with sleep apnea is to promote good sleep habits, like: resolving the main complaints and other sleep-related symptoms; ensuring efficacy and adherence to CPAP and/or therapeutic exercises and/or respiratory muscle training; eliminating possible adverse effects related to CPAP therapy; and promoting better quality of sleep and life, considering aspects of functioning[32].

Once the level of knowledge about OSA-related issues is found among physical therapists from different specialties and areas of activity, useful indicators may emerge to raise awareness among managers and coordinators of the education network about the importance of sleep in higher education institutions, as well as professional associations, to offer training tools to the graduate professional and, thus, return professionals with knowledge and technical capacity to treat patients with sleep disorders to the labor market, aiming at improving/restoring the functioning of these individuals. For the health system, the instrument can bring visibility to the importance of this health condition and the physical therapy professional who works in this area, in view of the serious complications with which OSA is associated, and there may be a greater entry of qualified professionals into health services.

It is also expected that the OSAKQ-P will be used in future studies that aim to understand, more broadly, the knowledge and attitudes of physical therapists from different areas and lengths of experience, academics, working in public and private services, contributing to the scientific environment through new research on the subject, and highlighting the importance of the physical therapist for OSA treatment.

This study presents, as a limitation, the reduced number of items in the attitude domain of the OSAKQ-P instrument, as well as the generalist character of its last item, which may have prompted the low internal consistency found. However, these items detected differences in the attitudes of physical therapists with or without experience in OSA management and can be applied as an auxiliary in the analysis of the perception of confidence in treating

and educating individuals with OSA, as well as in the use of positive pressure as a treatment option for this sleep breathing disorder. Another limitation is the low number of physical therapists with experience in Sleep Medicine who participated in the sample of physical therapist respondents.

As a highlight of the study, the sample composed of physical therapists from the five Brazilian regions corroborates the need to reduce the risk of cultural bias, given the territorial extension of the country.

CONCLUSION

We propose the OSAKQ-P is a reliable and valid instrument that shows adequate psychometric properties to be used in assessing the knowledge and attitudes of physical therapists about OSA.

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