

# Treatment of shoulder impingement syndrome: a survey of physical therapists in Saudi Arabia

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**Abstract. – OBJECTIVE:** Shoulder impingement syndrome (SIS) is one of the most frequent causes of shoulder pain. Evidence supported the use of conservative treatment for SIS. Clinical practice guidelines (CPGs) indicated that physical therapy interventions, including therapeutic exercises, manual therapy, patient education, and advice, were recommended for the treatment of SIS. This study's purpose was to investigate physical therapists' adherence to the CPGs for treating SIS.

**SUBJECTS AND METHODS:** Physical therapists in Saudi Arabia were invited to participate in an online survey via the Saudi Physical Therapy Association between May and December 2022. The developed online survey consisted of 36 questions, divided into five sections: eligibility, demographics, clinical practice regarding the treatment of SIS, barriers, and facilitators for the use of CPGs. Descriptive and logistic regression analysis were employed to analyze study data.

**RESULTS:** A total of 313 physical therapists completed the entire survey. In general, physical therapists were aligned with CPGs. Physical therapists advised their patients, utilized therapeutic exercises and manual therapy techniques, and used electrotherapy modalities despite being not recommended. Key challenges indicated by physical therapists for the use of CPGs include low patient adherence to therapists' instructions, lack of adequate knowledge, and limited clinical time.

**CONCLUSIONS:** Overall, physical therapists in Saudi Arabia followed the CPGs for treating SIS. Therapeutic exercises combined with manual therapy were the most common treatment options. However, further research should consider exploring adherence to such guidelines over time.

*Key Words:*

Physiotherapists, Shoulder impingement, Treatment, Practice guidelines, Adherence.

## Introduction

Shoulder pain is highly prevalent in the general population, with most people experiencing

it during their lifetime<sup>1-3</sup>. Shoulder pain accounts for the third most common musculoskeletal pain in primary care settings<sup>4,5</sup>. In particular, shoulder impingement syndrome (SIS) is one of the most common clinical presentations of shoulder pain in clinical practice<sup>6,7</sup>.

The SIS is a common term used to describe symptoms, such as pain and impairment of shoulder movements due to injury of structures, such as rotator cuff muscles and subacromial bursa at the subacromial space<sup>8,9</sup>. Multiple risk factors were associated with SIS, including aging, diabetes, work with shoulder above 90°, altered shoulder kinematics, and poor posture<sup>7,10</sup>. Thus, cost-effective treatment strategies for SIS are needed to reduce pain and associated disability<sup>11</sup>.

Clinical practice guidelines (CPGs)<sup>12</sup> provide high-quality medical services to society. CPGs recommend physiotherapy in the initial phase for the treatment of SIS, such as advice, exercise therapy, manual therapy adjacent to exercise, and multimodal therapy<sup>7,9,11,13-15</sup>. Adherence to the CPGs aims to optimize effective care for individuals with SIS<sup>6,16</sup> and to reduce the waste of healthcare resources and mimic inappropriate treatment, which currently lacks substantial evidence supporting their efficacy in treating SIS.

Evidence from different physiotherapy practices showed that physical therapists in the United Kingdom<sup>17</sup>, Belgium<sup>18</sup>, The Netherlands<sup>18</sup>, and Australia<sup>4</sup> aligned with recommended treatment for individuals with SIS. However, the practice of physical therapists in Saudi Arabia for the treatment of SIS has not been investigated yet. Identification of physiotherapists' practice reduces unnecessary treatment and improves patients' treatment outcomes, as well as assists knowledge translation of the evidence into practice. This study aims to investigate physical therapists' adherence to the CPGs for the treatment of SIS and to identify the barriers and facilitators for the use of such guidelines.

## Subjects and Methods

### Study Design

A cross-sectional online survey of physical therapy clinical practice for the treatment of SIS.

### Development of the Online Survey

The online survey was designed using Google Forms to collect participants' responses. The developed survey was adapted by the research team from previously validated questionnaires<sup>4,19-22</sup> to better accomplish the aims of the study. All participants consented to participate in the survey before answering survey questions. In addition, an information sheet was displayed before the first section of the online survey. The survey consisted of 36 closed-ended questions divided into five sections:

- Section 1: This section comprised three questions to determine the participant's eligibility to participate in the online survey.
- Section 2: This section contained six questions to identify participants' demographics, professional characteristics, and work-related information.
- Section 3: This section consisted of fifteen questions related to the participant's clinical practice for the treatment of SIS.
- Section 4: This section contained ten questions to identify the barriers and facilitators of using CPGs for the treatment of SIS.
- Section 5: This section contained two questions to identify the participant's willingness to attend evidence-based practice training for the treatment of SIS.

### Content Validity of the Online Survey

Two consultant orthopedic physical therapists evaluated the face validity and provided their feedback on the relevance, clarity, order, accuracy of the questions, and overall comprehensiveness of the survey. Following their consultation, the survey was amended as appropriate, considering their recommendations. No suggestions were made for any items to be added or omitted.

### Piloting of the Online Survey

The survey was pilot tested by five orthopedic physical therapists who were not involved as participants in the study. Participants rated the level of clearance, understandability of each question, and the approximate time to complete the entire survey (10-15) minutes.

### Sampling Population

All physical therapists in Saudi Arabia work at hospitals or clinics, either governmental or private, where they routinely assess and treat patients with musculoskeletal pain.

### Sample Size

*A priori* sample size calculation was conducted to estimate the number of respondents required in the study and provide meaningful estimates of percentages. The number of physical therapists in Saudi Arabia is approximately 4,000, according to the World Physical Therapy Annual Membership Census (2020). To estimate percentages for this population with a 95% confidence interval, with a margin of error of 5%, the population proportion was set at 50%. Thus, 351 physical therapists were needed to participate in the online survey.

### Recruitment Strategies

Primarily, an invitation e-mail was sent through the Saudi Physical Therapy Association (SPTA) to all physical therapists who were registered and working as physical therapists at the moment of the study. A reminder e-mail was sent a week after the first email. Additionally, the survey was posted in the SPTA application on May the 19<sup>th</sup>, 2022, for a month. Furthermore, an invitation letter was sent by e-mail to heads of rehabilitation departments in each region of Saudi Arabia, seeking their willingness to distribute the survey link to all physical therapists. A reminder e-mail was sent a week after the initial invitation. Secondly, an invitation letter and a QR code for the online survey were shared through social media accounts and groups (Twitter and Facebook). The online survey was distributed between May and December 2022, for a total duration of seven months, and closed after this period.

Participants were informed that no material that could personally identify them was used in any reports in this study. Data were stored electronically in a password-secured computer with a secure server backup. In addition, data from this study were securely stored following the completion of the study.

### Statistical Analysis

The data were analyzed using SPSS 26 (IBM Corp., Armonk, NY, USA). Percentages and frequencies were used to describe the categorical data, such as sample age, gender, years of experience, qualifications, and workplace settings. Logistic regression was used to assess the associ-

**Table I.** Demographic characteristics of the participants (n=313).

Variable	Frequency (n)	Percentage (%)
<b>Gender</b>	Male	165 (52.7)
	Female	148 (47.3)
<b>Qualification</b>	Undergraduate	248 (79.2)
	Postgraduate	65 (20.8)
<b>Work sector</b>	Private	134 (42.8)
	Government	179 (57.2)
<b>Experience</b>	<10 years	258 (82.4)
	>10 years	55 (17.6)
<b>Age</b>	20-29	185 (59.1)
	30-39	105 (33.5)
	40-49	18 (5.8)
	50-65	5 (1.6)

ation between the dependent variable (adherence to the CPGs for the treatment of SIS) and the independent variables (gender, nationality, age range, highest level of education, workplace sector, and years of experience).

A univariate logistic regression analysis was used to assess the association between each independent variable and the dependent variable at a significance of  $p \leq 0.20^{22,23}$ . The  $p \leq 0.20$  was used to identify important variables at the initial building of the model<sup>23</sup>. The variables that were not found to be significant in the univariate analysis were excluded from the multivariate analysis.

A multivariate analysis was used to test the association between the independent and dependent variables that were found to have a  $p \leq 0.20$  in the univariate logistic regression. The significant level of association  $p < 0.05$  was used to assess the association between the independent and dependent variables in the multivariate logistic regression model.

## Results

### *Demographic Characteristics of the Participants*

A total of 313 physical therapists completed the entire online survey. The respondents' ages ranged from 22 to 55 years, and the majority of the respondents were males (52.7%). A total of 258 respondents (82.4%) had less than ten years of experience in physiotherapy practice. The majority of respondents (57.20%) worked in the government sector. A large number of participants (79.2%) had undergraduate qualifications (Table I).

### *Adherence to the CPGs*

#### *Use of therapeutic exercises*

Table II shows the proportion of physical therapists using therapeutic exercises with respect to gender, qualification, workplace, and experience.

**Table II.** The proportion of physical therapists using therapeutic exercises.

Category (n)	Stretching	ROM	Scapular stabilization	Resistance exercises	Proprioception exercises	Others
<b>Gender</b>						
Female (147)	117 (79.6)	119 (81)	107 (72.8)	114 (77.6)	43 (29.3)	6 (4.1)
Male (163)	116 (71.2)	138 (84.7)	109 (66.9)	129 (79.1)	73 (44.8)	10 (6.1)
<b>Qualification</b>						
Undergraduate (245)	182 (74.3)	202 (82.4)	165 (67.3)	197 (80.4)	80 (32.7)	8 (3.3)
Postgraduate (65)	51 (78.5)	55 (84.6)	51 (78.5)	46 (70.8)	36 (55.4)	8 (12.3)
<b>Workplace</b>						
Private (133)	102 (76.7)	111 (83.5)	100 (75.2)	107 (80.5)	58 (43.6)	7 (5.3)
Government (177)	131 (74)	146 (82.5)	116 (65.5)	136 (76.8)	58 (32.8)	9 (5.1)
<b>Experience</b>						
Less than 10 years (257)	195 (75.9)	209 (81.3)	175 (68.1)	206 (80.2)	90 (35)	12 (4.7)
More than 10 years (53)	38 (71.7)	48 (90.6)	41 (77.4)	37 (69.8)	26 (49.1)	4 (7.5)

Findings revealed that the majority of participants used therapeutic exercises. ROM exercises were the most preferred therapeutic exercise among males (138; 84.7%) and females (119; 81%). According to qualification, the undergraduates preferred ROM exercises (202; 82.4%) and resistance exercises (197; 80.4%). The postgraduates also preferred ROM exercises the most (84.6%); however, their second preference was scapular stabilization exercises and stretching (78.5%). Physical therapists with less than ten years of experience mostly preferred ROM exercises (81.3%) and resistance exercises (80.2%). However, physical therapists with more than ten years of experience preferred ROM (90.6%) and scapular stabilization (77.4%) exercises. The majority of physical therapists modify exercises when the patients show no improvement (**Supplementary Table I**).

*Use of electrotherapy modalities*

Findings showed that 67% of participants used electrotherapy. In consideration of gender, the majority of males (74.5%) and females (76.9%) preferred UST for treating SIS. Even according to qualification, both undergraduates (77%) and postgraduates (69.4%) preferred Ultrasonic Therapy for treating SIS. The same trend was shown among physical therapists with less than ten years of experience (76.4%) and more than ten years of experience (72.2%) (**Supplementary Table II**).

*Use of manual therapies*

Results showed that (82%) of physical therapists used manual therapy. The vast majority of physical therapists according to gender (male: 95.1%; female: 91.1%), qualification (undergraduate: 93.5%; postgraduate: 93%), workplace (private: 96.4%; government: 91%), and experience

(less than ten years: 93.3%; more than ten years: 93.5%) were using mobilization for the treatment of SIS (Table II).

***Educating the Patients with SIS***

Results illustrated that 95% of physical therapists educated their patients regarding the different physical therapy treatments and the pathology of the condition. Physical therapists who had undergraduate qualifications preferred advising on physical therapy treatments (83.3%) and modification of posture (71.8%). However, physical therapists with postgraduate qualifications preferred advising on the pathology of the condition (76.6%) as their second preference. According to the work experience, physical therapists who had less than 10 years of experience preferred advising on physical therapy treatments (86.9%), while those who had more than 10 years of experience preferred to describe the pathology of the condition (77.8%) and different treatment option in physical therapy (77.8%) (**Supplementary Table III**).

***Practicing and Learning CPGs for the Treatment of SIS***

The majority of physical therapists (95%) indicated the use of CPGs for the treatment of SIS. According to gender, the majority of the females learned about the CPGs through continuing professional education (e.g., courses, seminars, workshops; 62.2%). However, the males had learned through reading literature (59.3%) and continuing professional education (59.3%). According to the qualification, the majority of the undergraduates had learned through continuing professional education (64.1%). However, most postgraduates had learned through reading litera-

**Table III.** The proportion of physical therapists using manual therapies.

Category (n)	Mobilization	Neurodynamic	Manipulation	Massage	Others
<b>Gender</b>					
Female (112)	102 (91.1)	26 (23.2)	41 (36.3)	39 (34.8)	5 (4.5)
Male (144)	137 (95.1)	43 (29.9)	53 (36.8)	57 (39.6)	6 (4.2)
<b>Qualification</b>					
Undergraduate (199)	186 (93.5)	50 (25.1)	76 (38.2)	81 (40.7)	4 (2)
Postgraduate (57)	53 (93)	19 (33.3)	18 (31.6)	15 (26.3)	7 (12.3)
<b>Workplace</b>					
Private (112)	108 (96.4)	30 (26.8)	45 (40.2)	47 (42)	7 (6.3)
Government (144)	131 (91)	39 (27.1)	49 (34)	49 (34)	4 (2.8)
<b>Experience</b>					
Less than 10 years (210)	196 (93.3)	56 (26.7)	74 (35.2)	81 (38.6)	8 (3.8)
More than 10 years (46)	43 (93.5)	13 (28.3)	20 (43.5)	15 (32.6)	3 (6.5)

ture (84%). The same trend was shown regarding the mode of learning according to years of experience of PTs [ $<10$  years: continuing professional education (61%);  $>10$  years: reading literature (67.4%)] (Supplementary Table IV).

### Factors Affecting Practicing Guidelines for SIS

The Univariate Logistic Regression Identified that postgraduate qualification (OR=3.83,  $p=0.19$ , 95% CI=0.49-29.67) was the only significant factor affecting the use of SIS guidelines among physical therapists compared to undergraduates. However, the physical therapists with more than 10 years of experience had an OR=3.1 when compared to physical therapists with less than 10 years of experience for the use of CPGs. In addition, physical therapists working in the government sector had an OR=1.56 compared to those working in the private sector. Postgraduate qualification was the only significant factor affecting the use of CPGs for the treatment of SIS among physical therapists at the level of  $p \leq 0.20$ ; therefore, a multivariate analysis was not conducted (Table IV).

### Barriers and Facilitators of Using Clinical Practice Guidelines

A total of 214 (68.4%) physical therapists agreed on the usefulness of the CPGs for treating SIS. In addition, physical therapists agreed that CPGs improve the prognosis of patients with SIS (70.9%). Most physical therapists (70.6%) agreed that CPGs facilitate the choice of treatment interventions. More than half of surveyed physical therapists (54%) agreed that their managers supported the use of the CPGs.

Results indicated that 49% of physical therapists agreed that the use of the CPGs requires high patient compliance. Additionally, 55.3% of physical therapists were interested in using the CPGs in treating patients with SIS. However, 38.7% of physical therapists had time to apply the CPGs (Figure 1). The majority of surveyed physical therapists ( $n=295$ ) were willing to attend a course about the CPGs for the treatment of SIS, and 86% of those physical therapists would have been confident in treating patients with SIS after attending the course.

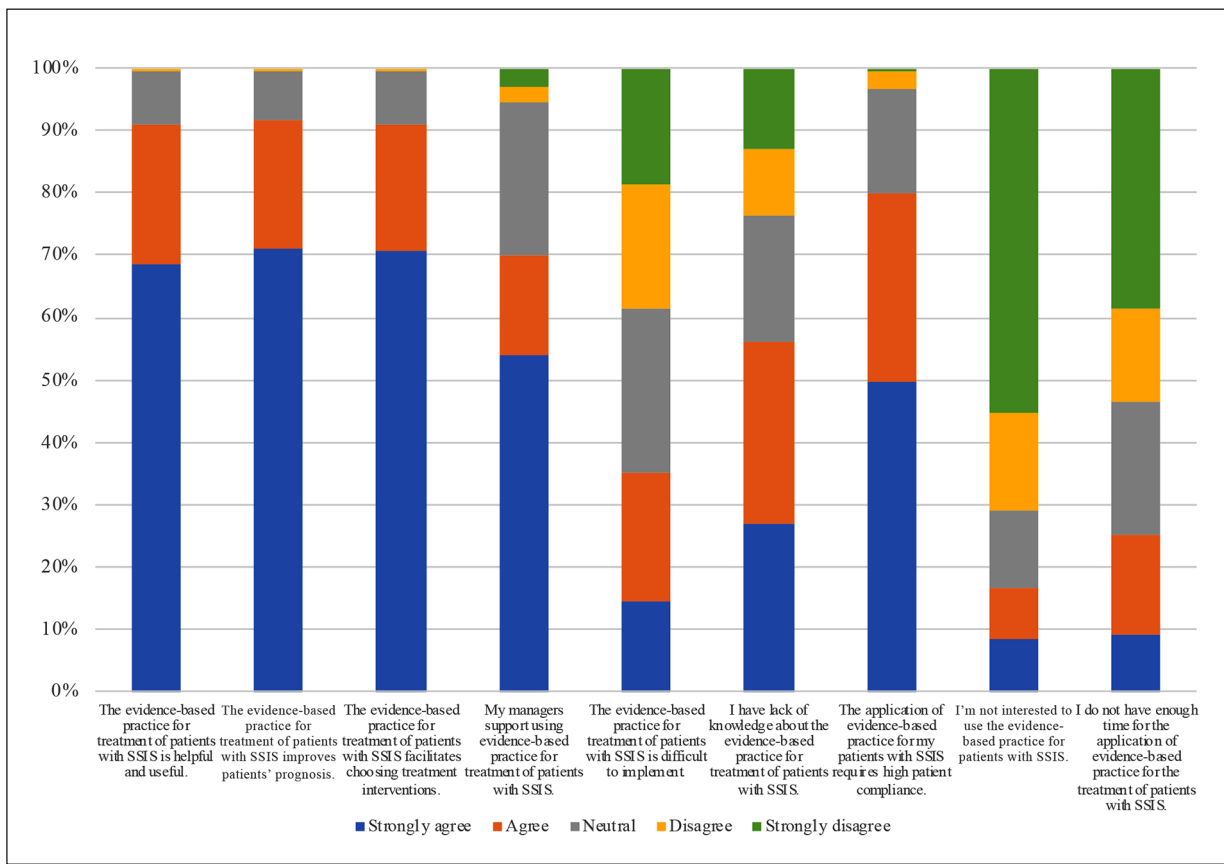
## Discussion

This study investigated physical therapists' adherence to the CPGs for the treatment of SIS and identified the barriers and facilitators for the use of such guidelines. The majority of sampled physical therapists indicated the use of CPGs for the treatment of SIS. However, a broad variation was observed among physical therapists for the treatment strategies of SIS. Physical therapists used therapeutic exercises, in particular, ROM and resistance exercises. Additionally, the majority of physical therapists educated and advised their patients using verbal instructions or printed information related to exercises. In addition, 82% of physical therapists used manual therapy techniques, particularly mobilization, whereas 67% of physical therapists used electrotherapy, such as ultrasound and shockwave therapy.

The CPGs recommended exercise therapy, manual therapy adjacent to exercise, and multimodal therapy for the treatment of SIS<sup>7,9,11,13,14</sup>. Findings from this study revealed that the majority of sur-

**Table IV.** Logistic regression to find the factors that influence practicing guidelines for SIS.

Variable	B	95% CI for B		SE B	$\beta$	p-value	
		LL	UL				
Gender	Constant	2.97		0.36			
	Female	0.03	0.36	2.90	0.53	1.03	0.96
	Male	Reference					
Qualification	Constant	2.82		1.04			
	Postgraduate	1.34	0.49	29.67	0.27	3.83	0.19
	Undergraduate	Reference					
Workplace	Constant	2.75		0.36			
	Government	0.46	0.55	4.41	0.53	1.56	0.40
	Private	Reference					
Experience	Constant	2.86		0.27			
	$>10$ years	1.13	0.40	24.07	1.05	3.10	0.28
	$<10$ years	Reference					



**Figure 1.** Barriers and facilitators for practicing guidelines for SIS.

veyed physical therapists used therapeutic exercises, particularly ROM and resistance exercises. This choice of treatment is aligned with the CPGs, where the therapeutic exercise is considered the key to the treatment of SIS<sup>17,18</sup>. Previous guidelines<sup>6,24</sup> did not recommend specific exercises over others. However, specific exercise therapy, such as strengthening exercises, had significant outcomes compared to other exercises, such as scapula setting exercises<sup>6</sup>. The recommendation from some guidelines illustrated that 6-12 weeks is the cut-off point for better clinical outcomes<sup>24</sup>. Whereas, Clausen et al<sup>6</sup> found that the duration of exercise therapy did not affect patients' improvement. The diversity of approaches in describing specific exercise therapy time-based cut-points needs further research to inform clinical practice regarding such parameters (type and dose).

Evidence from the CPGs supports the use of manual therapy, mobilization, and massage for the treatment of SIS<sup>13,24</sup> or when combined with exercise therapy for an additional benefit in pain reduction<sup>25</sup>. Moreover, a systematic review and

meta-analysis<sup>26</sup> of 12 high-quality studies supports another form of manual therapy, such as the use of massage therapy for the short-term effect in pain reduction, but the functional status was not significantly improved by such therapy. This current study found that most of the surveyed physical therapists utilized mobilization (76%) and massage (31%) for the treatment of SIS. Similarly, surveyed Australian<sup>4</sup> physical therapists chose massage (62.5%, 314/502) and mobilization (47%). Moreover, 37.8% of the physical therapists from Belgium and the Netherlands<sup>18</sup> used mobilization, while 27% used massage for the treatment of SIS. Additionally, most of the surveyed Dutch physical therapists used mobilization (94%, 79/119) as a major part of their treatment choices<sup>27</sup>. While manual therapy showed promising effects for the treatment of SIS, this form of therapy should be used in conjunction with exercise therapy.

Advice/education has been recommended<sup>3,13,15</sup> at the first-line care alongside exercise therapy for the treatment of SIS. In this study, the

majority of surveyed physical therapists (95%) indicated the use of education as part of their treatment strategies for SIS. About half of physical therapists provided education regarding the pathology, risk factors, activity modification, and recommended physiotherapy choices of treatment. These forms of education were used by Belgian and Dutch<sup>18</sup> physical therapists, as well as Australian<sup>4</sup> physical therapists. While education/advice is considered to be at the core of the CPGs for the treatment of SIS, physical therapists need to raise the focus on recommended education/advice, which is aligned with these guidelines.

Electrotherapy and heat/cold therapy have not been recommended for the treatment of SIS because of their limited effectiveness<sup>7,11</sup>. An umbrella review<sup>7</sup> of systematic reviews revealed moderate evidence of no effect for laser therapy, shockwave therapy, pulsed electromagnetic therapy, and ultrasound. Findings from our study indicated that 67% of surveyed physical therapists used electrotherapy, such as ultrasound, laser, and shockwave therapy. In addition, 45% of physical therapists used heat/cold therapy as part of their usual care for SIS. On the contrary, previous forms of treatment were less common in other physiotherapy practices<sup>3,18</sup>. Thus, physical therapists should avoid unproven choices of treatment if not supported with sufficient evidence.

Physical therapists in Saudi Arabia appear to have a positive attitude toward using CPGs for the treatment of SIS. The majority of surveyed physical therapists indicated that the guidelines are useful, facilitate the choice of targeted interventions, and improve outcomes for their patients. However, low patient adherence to therapists' instructions, lack of adequate knowledge, and limited clinical time were the common barriers to the use of such guidelines. Previously reported barriers by physical therapists are similar to the common barriers to the implementation of CPGs identified in a systematic meta-review of 25 systematic reviews<sup>28</sup>. In addition, barriers, including shortage time, lack of knowledge/skills, and patient compliance, have been highlighted by Danish physical therapists<sup>29</sup> as the main barriers to the use of the CPGs. Therefore, a multidisciplinary approach, including physical therapists, clinical managers, and health system decision-makers, can influence physical therapists' behavior for more adherence to the CPGs.

### **Strengths and Limitations**

This study was the first to highlight the current clinical practice of physical therapists for the treatment of SIS in Saudi Arabia. Despite the attempt to distribute the survey to all physical therapists using different strategies, a low response rate was obtained. This can be explained as the eligibility criteria being limited to physical therapists treating musculoskeletal disorders. On the other hand, this study provided valuable information about the clinical practice related to the treatment of SIS, which indicates the need for building the capacity of physical therapists in the treatment of SIS based on the current CPGs. Further qualitative research might be needed to explore the barriers and facilitators from physiotherapists' points of view for the use of such guidelines.

### **Conclusions**

In summary, most surveyed physical therapists in Saudi Arabia delivered evidence-based practice for the treatment of SIS. However, variations in using different treatment strategies were observed. A large number of physical therapists used electrotherapy, such as ultrasound and shockwave therapy, where these therapies lacked evidence of their effectiveness. Therefore, knowledge translation strategies for the dissemination of such CPGs would reduce unnecessary treatment and optimize patients' treatment outcomes.

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### **Conflict of Interest**

The authors declare that they have no known competing financial interests or personal relationships that could influence the work reported in this manuscript.

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### **Ethics Approval**

Ethical approval of this study was obtained from the Research Ethics Committee at the Faculty of Medical Rehabilitation Sciences at King Abdulaziz University, Jeddah, Saudi Arabia (Ref: FMRS-EC2021).

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### **Informed Consent**

Informed consent was obtained from all participants involved in the study.

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### Authors' Contributions

Both authors contributed equally to this work.

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### Data Availability

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

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