EBP AND SOM IN SAUDI ARABIAN CLINICS

FOSTERING THE USE OF AN EVIDENCE-BASED APPROACH AND STANDARD OUTCOME MEASURES IN SAUDI ARABIAN CLINICS

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ABSTRACT

Monitoring results is the final step that determines the impact of an evidence-based practice (EBP) decision. A variety of health outcomes can be expected to change following rehabilitation; therefore, outcome measures (OMs) are a major focus of EBP in rehabilitation. For instance, in patients with hand injuries, physiotherapy (PT) services focus on enabling patients to improve their functional use of the traumatized hand. Examining current practice of physiotherapists (PTs) in Saudi Arabia with respect to use of EBP and OMs can serve as a basis for understanding any identified gaps in knowledge before the full effect of translation and adoption of new patient self-reported outcomes (PROs) instruments can be seen in clinical practice. Therefore, this thesis was designed in two phases, incorporating two papers, to address EBP and PROs and their adoption in the evolving PT practice in Saudi. The first paper is a survey that aimed to determine the current self-reported attitudes, skills, and knowledge of PTs in Saudi Arabia toward EBP and outcome measures, including PROs. The second paper describes the process of cross-cultural Arabic translation and adaptation of the Patient-Rated Wrist and Hand Evaluation (PRWHE) and reports estimates of the psychometrics properties of the translated measure. Finally, the thesis addresses overall areas of limitations and includes suggestions for future refinement and research in order to foster and facilitate EBP implementation in the cultural context of the evolving physiotherapy profession in the health systems of Saudi Arabia.

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LIST OF ABBREVIATION AND SYMBOLS

CA	Cronbach's Alpha
CI	Confidence Interval
DASH	Disability of the Arm, Shoulder and Hand
DASH-A	Arabic version of the Disability of the Arm, Shoulder and Hand
EBP	Evidence-based Practice
ICC	Intraclass Correlation Coefficient
KAU	King Abdul-Aziz University
KSU	King Saud University
MMT	Manual Muscle Testing
MOH	Minister of Health
OMs	Outcome Measures
OT	Occupational Therapy
PROs	Patient-reported Outcome Measures
PRWE	Patient-rated Wrist Evaluation
PRWHE	Patient-rated Wrist Hand Evaluation
PRWHE-A	Arabic version of Patient-Rated Wrist and Hand Evaluation
PT	Physiotherapy
PTs	Physiotherapists
ROM	Range of Motion
SD	Standard Deviation
SPTA	Saudi Physical Therapy Association

χ^2	Chi-square test
r	Pearson Correlation Coefficient

Declaration of Academic Achievement

This thesis is dedicated to my father, mother, brothers, sisters, and husband, who always support and stand by me throughout my life, thank you for believing in me.

Contributors: This dissertation follows a sandwich thesis format. FH is the primary investigator. Study design, data collection, analysis and interpretation was initially undertaken by FH and checked by JM. The two paper was drafted by FH and revised multiple times by JM, AT and MK. All authors revised the manuscript for intellectual content and approved the final version of the thesis project.

Thesis Introduction

A variety of health outcomes can be expected to change following rehabilitation; therefore, outcome measures (OMs) are a major focus of evidence-based practice (EBP) in rehabilitation. To evaluate such outcomes, a clinician should decide on the attributes of clinical interest and select from the relevant outcome measures using an evidence-based approach. Most clinicians want to provide the best possible care for their patients; however, if clinicians are unaware of current best-practices, they may find it hard to comprehend or accept that their practice falls outside of these guidelines, or that different outcomes are possible.

Most health status measures were developed in English-speaking countries[1]; therefore, in most cases clinicians and researchers may not include immigrant populations when developing such measures. This may result in systematic bias in studies of health care use or quality of life, especially in terms of excluding those who speak a language other than the source language.[1-2] However, since it is time consuming and very expensive to develop new instruments, less suitable alternative measures are often utilized for populations where English or the tool source language is not the first language. Consequently, the cross-cultural adaptation of patient-reported outcome measures (PROs) for use in a new country, culture, or language is needed. Such studies should consider using standardized methods to reach equivalence between the original source and target versions of the new instrument.[3]

For illustration, a number of valid outcome measures have been developed in the field of hand therapy to help clinicians in physiotherapy practice assess pain and disability from the patient perspective. The Patient-Rated Wrist and Hand Evaluation (PRWHE)[4] is a joint-specific tool developed to measure wrist/hand pain and disability

and made freely available in the public domain: researchers have found this measure to be reliable and valid.[5-7] Although alternate language versions of the PRWHE are available, an Arabic one does not exist, thus, the potential use with persons impacted by hand disabilities is limited in the 24 countries where Arabic is the primary language. The Kingdom of Saudi Arabia is one such country. (See Figure 1)

Physiotherapy Programs in Saudi Arabia

FIGURE 1. *Map of Saudi Arabia (Grolier Interactive Inc.)*

Saudi Arabia is the largest state in the Middle East, located in the South-Eastern part of the Asian continent. The country occupies four-fifths of the Arabian Peninsula (i.e. about 850,000 square miles).[8] Geographically, Saudi Arabia is divided into four major regions or chapters. The first is the Central region, the heart of the Kingdom; secondly, there is the Western region, which lies along the Red Sea coast. The Southern region, it is in the southern of the Red Sea. Fourthly, there is the Eastern region, the richest of all the regions in petroleum.

The welfare of the country is based on oil economies, which have enabled the Kingdom to join the ranks of the top 25 market countries. The government of Saudi

Arabia has created a Ministry of Health that is responsible for both the public and private health sectors, and citizens have the right to free healthcare services.[9] The significant investments in health have resulted in an expansion of healthcare facilities, which need additional staff and medical practitioners.[10] Consequently, about two-thirds of the health care workforce were international workers. In 2003, the Saudi Labour Force Council developed strategies to increase the domestic health care workforce.[11]

One strategy included increasing the number of medical and allied health science schools across the Kingdom. For instance, over the past decade, universities and physiotherapy (PT) academic programs have evolved to include both sexes in Saudi Arabia. Specifically, these programs expanded from King Saud University in Riyadh City, the primary one in the central region, to 12 different bachelor's programs located in the four geographical regions of the country.

The entry-level program is 4 years long and requires the completion of a mandatory full year clinical internship in either the government or private sectors.[12] Graduate PTs are not required to sit for a licensing examination before they join the workforce because the internship is considered sufficient for registration with the Saudi Commission for Health Specialties, a national licensing agency for all health professionals in the Kingdom.[13]

Interest in applying evidence has increased in the rehabilitation field over the past decade.[14] The previous literature suggest that although PTs possess a positive attitude toward EBP and consider it fundamental to their practice, several barriers obstruct its implementation. However, the majority of these studies [15-19] come from

the North American or European contexts, which may not necessarily, apply to the Saudi context, where the length of the professional training is relatively short.

Nonetheless, Bindawas et al. [20] evaluated the performance of PT interns, which was the first study of its kind in Saudi Arabia. The findings highlighted areas that need refocusing and updating in PT education materials, particularly with the internship programs because PT is moving toward a doctoral entry-level degree.[21] Bindawas et al. suggested a need for further improvements in certain competencies and practical skills, including clinical examination, evaluation, diagnosis and prognosis, and intervention.

We hypothesized that examining current practice of PTs in Saudi Arabia with respect to use of EBP and PROs can serve as a basis for understanding any identified gaps in knowledge before the full effect of translation and adoption of new PROs instruments can be seen in clinical practice. Therefore, this thesis was designed in two phases, incorporating two papers, to address EBP and PROs and their adoption in the evolving physiotherapy practice in Saudi. The first paper is a survey that aimed to determine the current self-reported attitudes, skills, and knowledge of PTs in Saudi Arabia toward EBP and outcome measures, including PROs. The second paper describes the process of cross-cultural Arabic translation and adaptation of the PRWHE and reports estimates of the psychometrics properties of the translated measure.

CHAPTER ONE

Physical Therapists' Attitudes, Confidence, and Knowledge Toward Evidence-based Practice and Outcome Measurements in Saudi Arabia

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Abstract:

Background: Evidence-based practice (EBP) is a critical foundation to encourage health care providers to apply the best evidence in everyday clinical practice to optimize patient care. The concept of EBP is relatively new in Saudi Arabia; however work has been undertaken to shift practice from reliance on professional opinion to research evidence. To date, little is known about current attitudes, and adoption of EBP among physiotherapists (PTs) in Saudi. Thus, this study undertook the primary objective of determining attitudes, confidence, and knowledge about EBP and its adoption among a sample of physiotherapists in Saudi Arabia. The secondary objectives were to a) estimate the relationship between PTs' attitudes, confidence, and knowledge of EBP and their professional degrees, ages, years since licensure, places of training, and memberships in professional organizations; b) explore the attitudes and confidence about patient-reported outcome measures (PROs) utilization; c) measure the self-reported use of outcome measures (OMs), particularly in hand clinics; and d) identify the barriers to implementing EBP in workplace.

Methods: A cross-sectional study with a survey was used, distributed both in paper and electronic formats. Survey items were developed by the first authors (JM&FH) to create an English self-report questionnaire comprised of 28 items incorporating elements previously used. Pilot testing was conducted with 9 experienced PTs from Canada and Saudi Arabia to evaluate content validity and clarity. Internal consistency reliability scores were assessed for the designated subscales using Cronbach's alpha (CA). Invitations to participate in the study were issued from December 2013 to March 2014. For the paper surveys, a convenience sample from 5 public hospitals in Jeddah City was used, while the electronic format was distributed through social

media. The survey included three sections, and was designed to be completed in 15-20 minutes. The first section was designed to address the PTs' perceptions regarding EBP and OMs. The second section explored PTs' caseload and utility of hand outcome measurements. The third section included demographic questions. Data analysis was descriptive, depicted in frequency tables and illustrative charts. To determine the impact of respondents' professional degrees, ages, years since licensure, places of training and memberships in professional organizations, the Chi-square association test was used.

Results: Reliability scores of the pilot survey yielded values of CA= 0.5 (attitude), 0.7 (confidence and perceived skills), 0.7 (knowledge), and 1 (hand outcome measures). The response rate of the paper format was 37% while the completion rate of the web format was 72%. Sixty-four therapists (30 female and 34 male) participated in the study. Most respondents 66% (n=42) fell in the 20-29 year old age group. Survey respondents indicated that EBP (n=29, 45%) and research findings (n=33, 52%) were seen as necessary for clinical practice. However, only a few reported that they adopted evidence in their daily practice (n=7, 11%) or regularly (n=10, 16%). Some of the beliefs, skills, and knowledge were related to our samples' years since licensure, highest degree, place of training and membership in a PT organization. Those respondents who were active members in a PT organization, and had higher than a baccalaureate degree, tended to express more positive attitudes (75% and 36%, respectively) and higher levels of knowledge concerning research terms and EBP skills, whereas respondents who were licensed more than 5 years stated that they had more confidence in their abilities to make clinical decision for individual patients

(90% compared with 59% with <5 years experience). Lack of time was the main barrier to the use of EBP 55% (n=36).

Conclusion: Our study in Saudi Arabia indicated that self-reported EBP has not been widely implemented, despite the generally welcoming attitude toward its usage among PTs practicing in the kingdom. More efforts are recommended to strengthen the skills and foster the use of EBP among all PT practitioners, particularly those recently licensed.

Key words: Evidence-based Practice, Outcome Measures, EBP barriers, attitudes, confidence, EBP terminology.

Level of Evidence: N/A.

J HAND THER

1.1. INTRODUCTION

Evidence-Based Practice Background

Health care providers are required to update their knowledge and skills based on the constant evolution of evaluation and treatment tools, techniques, and modalities for providing optimal patient care. Evidence-based practice (EBP) is a critical foundation to encourage health care providers to apply the best evidence in everyday clinical practice to achieve optimal patient care. EBP is defined as health care professionals integrating the best current evidence with clinical expertise and patient values in making decisions about the care of individual patients.[1] The concept of EBP was introduced into medical practice in the late 1970s in the Internal Medicine Residency Program at McMaster University, Canada,[2] and has been widely incorporated into clinical practice of other health care professions, including physiotherapy (PT). The EBP process consists of five steps [2] as shown in Figure 1. A brief overview of the EBP process is as follows:

FIGURE 1: *The five steps of an EBP approach*

I. **Ask a question**. Step 1 involves seeking answers to practice questions that may be related to specific clinical contexts such as intervention effectiveness, complication rates, or factors associated with recovery (prognosis). Specific clinical contexts consider patient and practitioner characteristics and other environmental variables.[3]

II. **Find the best evidence**. Step 2 refers to searching the literature to find the best answers to questions asked. Different resources of evidence exist, including EBP resources, databases, electronic textbooks, and libraries.

III. **Critically appraise the evidence**. Step 3 involves analyzing existing evidence for its potential to answer clinical questions. Analyzing individual studies involves understanding the research design and methodology and using these concepts to classify studies according to a system or level of evidence to ensure that the best quality studies are emphasized when making clinical decisions.[3-4]

IV. **Integrate appraisal results with clinical expertise and patient values**. Step 4 refers to finding the best way to adapt extant literature into the work context.[3] Contextual variables that are integrated into final clinical decisions include a variety of factors that affect patient preferences, such as cultural differences, income level, and family situation.

V. **Evaluate the outcome**. Step 5 involves monitoring results to determine the influence of EBP decisions.[3] Evaluation of change in relation to

new forms of treatment or care in terms of patient outcomes is important in clinical setting.

Evaluating the Outcomes in Hand Rehabilitation

Monitoring results is the final step that determines the impact of an EBP decision. A variety of health outcomes can be expected to change following rehabilitation; therefore, outcome measures (OMs) are a major focus of EBP in rehabilitation. In patients with hand injuries, physiotherapy services focus on enabling the patients to improve their functional use of the traumatized hand.

PTs use impairment-based outcomes to examine whether interventions have the physiological/ psychological changes. PTs also measure patient's ability to perform tasks of daily life, or ability to return to their previous societal roles. In accordance with this, a wide range of patient-reported outcome measures (PROs) have been proposed for upper limb musculoskeletal disorders. Some of these OMs are generic instruments that may assess the impact of the problem on the overall health and well being of patients, such as the Short Form-36.[5] However, more specific outcome instruments have been designed to evaluate a specific joint, including those for the evaluation of wrist and hand function such as the Patient-rated Wrist Hand Evaluation score (PRWHE),[6] or a specific problem, such as carpal tunnel syndrome.[7]

Hand grip strength and range of motion (ROM) are examples of impairment-based outcomes. They are commonly used methods for evaluating wrist and hand function following an intervention. Both measures provide a reliable and objective analysis of outcome but it does not measure other aspects of health that might be affected and are important to a patient, such as the ability to carry out a task of daily life (or function). Therefore, reliable and validated OMs which take into account all

aspects of patient life that are affected following hand rehabilitation are required.[8] In addition, understanding both the impairment and the disability of patients provides a greater foundation for problem solving in hand rehabilitation.

Studies that surveyed practice patterns of hand therapists in North America [9-11] and in the Middle East (Egypt)[12] have reported that fewer therapists use PROs, while impairment measures, such as Numeric Pain Rating Scale, grip strength, Manual Muscle Testing (MMT), and goniometry for ROM, are more common.[10-12] It would seem that this is a notable gap between evidence and practice where therapists tend to rely on impairment-based measures and use standardized activity-based measures less often. Previous research has found that PROs are a better predictor of prognosis for return to work than impairment-based measures in hand rehabilitation.[13]

Evidence-Based Practice in Rehabilitation

Interest in applying evidence has increased in the rehabilitation field over the past decade.[14] The ultimate goal of EBP is to facilitate better clinical decision making and patient care [15]; therefore, EBP training has become common across a range of health care professionals and organizations.[16] Understanding how EBP is implemented across health care professionals can identify the gaps in current practice and direct professional development at an individual or group level. Consequently, understanding professionals' perceptions of EBP and the extent to which they have endorsed the use of EBP in their daily practice can be useful in assessing the extent to which EBP has infiltrated practice and in determining where additional efforts are needed. Most research regarding EBP has focused on nurses and physicians as a study population,[17] and few studies have examined physiotherapists' uses of EBP.[18-22]

Overall, the previous studies suggest physiotherapists (PTs) have positive attitudes concerning EBP.[12,18-22] The majority of these studies come from the North American or European contexts. Research has reported that younger, less experienced PTs are more likely to perceive EBP as necessary compared to their older, more experienced counterparts.[20-21] This finding suggests a more recent focus on EBP topics during PT training. However, younger PTs are less confident in their clinical skills than are those with graduate or higher degrees.[20] Research has shown that PTs continue to base practice decisions largely on knowledge acquired during their training in institutions or from low-evidence trials.[19-20,22-23] Whether these findings also apply to the Saudi context is not yet known.

Studies have found numerous factors limit the use of EBP in PTs' everyday clinical practice, including time,[20-22,24] skills, and knowledge for retrieving and appraising evidence.[20,22] PTs frequently report low levels of confidence in their skills of appraising evidence.[19-20,22,25] Research terms such as confidence intervals and publication bias are better understood by respondents who have graduate level training.[20,22] Additional barriers to EBP have been determined in other health professionals include perceived conflict with patient preference [26] and economic pressures.[27] A limited access to relevant information (e.g., journals and systematic reviews) is also a problem.[28]

A variety of methods can be used to assess EBP beliefs and behaviours, including qualitative and quantitative approaches. Previous studies,[12,19-21,28-30] based on self-reported questionnaires on EBP, suggest that evaluation of EBP could be divided into the following themes:

1. Attitudes toward EBP. This theme refers to clinicians' perceptions of EBP and is reflected by the likelihood to look up evidence in daily practice.[20]
2. Knowledge about EBP. This theme refers to clinicians' abilities to search the literature and recognize the terminology and concepts related to the quality of the study or level of evidence.[2,28]
3. Skills of EBP. This theme refers to the ability to *ask* answerable research questions; *acquire* the best evidence that answers those questions; critically *appraise* the evidence for its internal and external validity, influence, and the applicability of the finding with individual patients; and *apply* the best interventions for specific clinical scenarios.[2,16]
4. EBP behaviours. This theme refers to the actual performance of EBP steps in practice and patient-level outcomes (i.e., the implementation of evidence to the specific clinical scenarios).[2]

Physiotherapy Programs in Saudi Arabia

Programs for PT education in Saudi are quite new, with the first program starting in 1980 at King Saud University (KSU); Saudi Arabia's first university.[30] The University of Dammam (in the Eastern region) was the second PT program to be established in the country. In 2000, it was opened for male students and in 2006 began accepting female students. Over the past decade, significant developments have occurred at a number of universities and PT academic programs in Saudi Arabia. Such programs have expanded from KSU in Riyadh City to 12 different programs located in the five geographical regions of the country. Therefore, the development of EBP skills, such as accessing, appraising, interpreting, and using medical literature [31] in the entry-level education programs is still evolving.

Although the concept of EBP is relatively new in Saudi Arabia,[32] work has already been undertaken to shift practice from a reliance on professional opinion to utilization of research evidence. The Minister of Health (MOH) has supported the national EBP advisory board committee whose main objective is to promote implementation of EBP in Saudi Arabia.[31] Central and peripheral chapters in the country have also engaged in activities, including establishing a reference library and training for EBP that includes workshops and courses.[33]

Study Objectives and Hypotheses

To date, little is known about current practice and attitudes, perceived skills and confidence, and knowledge of PTs in Saudi. Thus, this study undertook a number of objectives. The primary objective was to determine attitudes, confidence, and knowledge about EBP and its adoption among a sample of PTs in Saudi Arabia. We expected positive attitudes concerning EBP due to ongoing EBP activities in the Kingdom. This study also included the following secondary objectives:

1. The relationship between therapists' attitudes, confidence, and knowledge of EBP and their ages, years since licensure, educational level (degree), places of training, and memberships in professional organizations.
    a. We expected an association between these attributes and variables related to professional degrees, experience (more training) and age.
    b. We hypothesised a difference between those who received their training aboard and those who trained in Saudi with the expectation that greater exposure to EBP in training occurred abroad.
    c. We hypothesised a difference between therapists who belong to PT organizations and who did not.

2. Explore the attitudes and confidence about PROs utilization.
3. Identify the current self-reported OMs used in hand clinics.
4. Identify the barriers to implementing EBP in the workplace.

1.2. MATERIAL AND METHODS

Phase 1— Survey Development

A survey was used to conduct a cross-sectional study. Prior to item generation, we examined previous surveys that explored physiotherapy practice and therapists' attitudes and knowledge toward EBP.[12,19-21,25, 28-30] Survey items were then developed by the authors (JM&FH) to create an English self-report questionnaire comprised of 28 items incorporating elements previously used by McColl et al.[28] to survey general practitioners perception of EBP and Jette et al.[20] in a study of American PTs.

Pilot testing was conducted to evaluate content validity and to investigate and address any potential issues regarding readability, clarity, and grammatical structure of items. A draft of the pre-final questionnaire, 3rd version, was presented in June 2013 to a purposive sample of 9 experienced PTs from Canada (n=2) and Saudi Arabia (n=7). Individuals involved in the pilot testing were therapists representing a broad spectrum of practice areas, including pediatrics (n=1), orthopedics (n=1), in-patient care (n=1), out-patient clinic (n=2), academics (n=3), and hand therapy (n=1).

Modifications were made to the layout, wording and redundancy based on pilot participant feedback. Internal consistency reliability scores were assessed for the designated subscales using Cronbach's alpha. The cut-off values we used for internal consistency for attitude and perceived skills scale was 0.5. The resulting survey tool is shown in Table 1. For more information about the survey design, see Appendix A.

The final draft of the survey is provided in Appendix B. It was formatted as both a paper-based and an electronic version on the LimeSurvey platform (painplussurveys.mcmaster.ca/index.php?sid=25744). The survey included three sections and was designed to be completed in 15-20 minutes. The first section measured PTs' responses with respect to EBP and OMs. The second section explored caseloads and reported use of standard hand outcome measurements. The third section included demographic questions. Data included in the questionnaire were based on the following items:

TABLE 1. **Survey content**

Variables	***Survey Items***	***Total number***
EBP/OMs Section		
Attitudes and beliefs of EBP	Item 1 (a,b subscales)	2
Attitudes and beliefs of OMs	Item 1 (c,d subscales)	2
Perceived skills and confidence of EBP	Items 2 (a,b subscales),8	3
Perceived skills and confidence of OMs	Items 2 (c,d subscales)	2
Adoption of EBP	Items 3-6	4
Knowledge about EBP terminology	Item 7	1
Perceived barriers for using evidence in practice and work limitation	Item 9,13	2
Respondents' caseload	Items 10-12,14	4
Standardized Hand OMs Section		
Respondents' application of hand OMs	Items 15-17	14
Demographics Section		
Respondents' characteristics	Items 18-28	11
Total	28 items	45 questions

EBP= evidence-based practice; OMs= outcome measures

1. **Attitudes and beliefs about EBP and OMs** was measured in survey item 1. This scale was designed to explore the extent to which PTs

believed the usefulness of certain statements in their practice, including the application of EBP in practice setting, research findings, PROs, and physical examinations and measurements. These items were rated using a 5-point Likert scale with "very useful," "somewhat useful," "no opinion," "not very useful," and "not useful at all" as anchors.

2. **Perceived skills and confidence of EBP and OMs** was measured in survey item 2. The purpose of is scale was to measure the PTs' confidence in their abilities to apply EBP, engage in clinical decision making, perform physical assessments, and administer PROs. Responses to these scales were rated using a 5-point Likert scale with "completely," "a lot," "moderately," "somewhat," "a little," and "not at all" as anchors. Item number 8 was designed to explore respondents' opinions toward EBP integration in academic preparation.
3. **Adoption of EBP in daily clinical practice** was measured in survey items 3-6. Survey item 3 measured the average number of courses and workshops that respondents attended per year to update themselves in their field. This item required ratio options. Item 4 measured the availability of online access to research evidence at their workplaces. It required "yes/no" responses to answer. Item 5 measured the frequency with which PTs accessed journals, relevant databases, textbooks, and the Internet. The frequency item related to evidence accessibility required a 5-point frequency response ("everyday," "every other day," "weekly," "monthly," and "never"); an "Other" option was also provided. Item 6 measured the extent to which evidence may result in

changing one's practice. Adoption of new evidence required a 6-point frequency response ("all the time," "regularly," "frequently," "occasionally," "almost never" and "never").

4. **Knowledge about EBP terminology** was designed to measure respondents' understanding of technical terms used in EBP, including relative risk, systematic review, confidence interval, and publication bias. Terms were listed in the table (item 7), and respondents were asked use a 3-point Likert scale with "understand completely," "somewhat understand," and "do not understand" as anchors.
5. **Perceived barriers for using evidence in practice** were measured in survey item 9. It required respondents to choose from text options (close-ended question). Whereas survey item 11 (open-ended question) measured the limitations in their productivity.
6. **Respondents' caseload was** an item designed to explore PTs practice routines using interval options.
7. **Respondents' application of hand self-reported measurements** was designed to explore the current practice of using PROs in hand therapy that was rated using a 4-point Likert scale with "never" and "always" used as anchors. These items used an adaptive questioning method in the electronic survey format (i.e. items number 16 and 17, only conditionally displayed based on responses to item number 16) to reduce the number and complexity of the survey questions.

8. **Respondents' characteristics** data were collected from survey items 18-26 and included gender, age, nationality, city of practice, educational background, practice setting, and others.

A space for free text specification was included to allow further details for items number 13,16 and most demographic items. These statements were coded by the author (FH) according to the content and then clustered into thematic groups.

Phase 2— Survey Testing

The study was approved by the Hamilton Integrated Research Ethics Board at McMaster University, Canada.

Participants

The participants of were recruited using a convenience sample of PTs working in different settings in Saudi Arabia. According to the World Confederation for Physical Therapy [33], there is an estimated 2,517 practicing PTs in Saudi Arabia (2012). The updated total number of PTs was not available at the time of this study. However, because the availability of PT educational program in Saudi Arabia is relatively recent, in most geographical regions, we expected most respondents would be from a younger age group (i.e., 30 years old or younger) or recently employed clinicians.

Survey Administration

Invitations to participate in the study were issued from December 2013 to March 2014. As the margin of error of 5% and confidence level of 95% for PTs' perception of EBP were chosen, there were 1000 invitations recommended for our sample (300 target respondents ÷ 0.30 response rate = 1000 invitations).

Paper survey format version

The paper survey format used a convenience sample from five public hospitals in Jeddah City, as the primary research originated in Jeddah. Sufficient copies of surveys were given to senior therapists at each hospital to distribute to staff PTs. These hospital senior therapists generated lists of random names, to minimize the selection bias, from their pool of staff therapists (70% of total staff) and sent them the paper surveys from December 2013 to January 2014. Each survey included a cover letter with comprehensive information about the study objectives and description along with the PI's contact information (See Appendix C). Respondents were informed that the survey will have an electronic format, and they should not respond to it if they already completed the paper format.

A follow-up reminder was made personally with all senior therapists the following week, regardless of whether the questionnaires were completed. The completed surveys were returned to hospital senior therapists in an envelope, who subsequently delivered them to the first author (FH). The paper format consisted of 7 single sided pages. The cover letter and consent form for the study were attached (2 pages) to the survey.

Electronic survey format version

The online format of the survey was launched on the LimeSurvey platform from January 2014 to March 2014. It was a voluntary survey that was available to every visitor to the LimeSurvey platform. Survey questions were presented in 4 screens including the consent page and each survey section being presented individual screens. Participants were able to resume and return to the survey anytime in order to

give a flexible time to answer. However, they were unable to change their answers (e.g. through a BACK button) for technical reasons.

Initial contact with the potential participants was not made before the study invitation was distributed through social media (Facebook and Twitter). The social media campaign targeted PTs in the five geographical regions in Saudi Arabia, including the Saudi Physical Therapy Association (SPTA) [34] at (http://www.spta.org.sa and @Spta_Media). The SPTA was established in 1981, but the first fundamental activities began in 2001. The SPTA is a non-profit association created to develop the profession of physical therapy and rehabilitation in Saudi Arabia.[34] There is an estimated 462 active PT members (2012).[33]

The study invitation was posted along with the survey link. Written instructions about the two formats of the survey was given to ensure that therapists who completed the paper surveys distributed in Jeddah City should not respond to the link to the electronic survey. Log-file analysis techniques, such as Cookies or IP address, were not used to identify potential duplicate entries from the same user. The e-survey announcement is provided in Appendix D.

Additionally, a number of techniques recommended by Edwards and colleagues [35] to increase response to postal questionnaires were used. These techniques included using follow-up contact, McMaster University logo, SPTA contacted media to advertise since questionnaires originating from an organization were more likely to be returned. Also, the demographics section was placed after the generic questions to decrease the potential anxiety associated with stereotypes threat.

Data Analysis

Data from the paper and web surveys were transferred to Excel spreadsheets. The two formats of the survey were combined into one database, where the rows represented each respondent and the columns represented the different variables of interest collected from each respondent. Coding of all responses was completed to enable analysis. Quality checking was performed by visually inspecting data and creating frequency tables for all items. The data were then imported to IBM SPSS version 22 for statistical analysis. A significance level of 0.05 was used for association analyses.

To meet our objectives, the descriptive results of 1) respondents' characteristics and caseloads; and 2) attitudes, confidence, and knowledge toward EBP and its adoption were presented as frequencies and percentages. Second, associations between PTs responses with respect to proportions of their demographic characteristics (i.e., age, years since licensure, education level, place of clinical training, and professional membership) were tested using Chi-square tests (χ^2). Third, responses to items that measured attitudes and confidence of OMs utilization, use of PROs in hand therapy, and barriers to implementing EBP in workplace, were depicted in frequency tables and illustrative charts.

The summary of response frequencies is provided here, and more detailed information is provided in Appendix E, while the proportions of therapists' attitudes, self-confidence and knowledge toward EBP were given in tables. After exploring the response frequencies and before examining the associations between variables, some items in the demographic were collapsed into broader categories to facilitate the comparison with adequate sample size (i.e., meet the statistical assumptions). Age was

divided into two groups: younger than 30 years and 30 years and older while years of license also collapsed into two groups: five years and less and more than five. The highest degree earned was also categorized into two categories: 1) Diploma and Bachelors (undergraduate level) and 2) Master and Doctorate (graduate level).

For items evaluated using a 5-point Likert scale (e.g., attitude response set), the categories "Not very useful," "Not useful at all," and "no opinion," were combined into a category "not useful." Items using a 6-point Likert scale for the confidence response sets were collapsed to the final three categories, "a lot," "moderate," and "not much." The "completely" and "a lot" categories were combined, as were "moderately" and "somewhat." In addition, "a little" and "not at all" were combined.

From the SPSS Missing Value Analysis package, the expectation maximization [36] imputation method was used to substitute the mean of observed values for missing values.[37] This method relies on an iterative process in which parameter estimates lead to imputed values, which, in turn change the parameter estimates.[38] The expectation maximization imputation method was used for all missing variables to allow further analysis.

1.3. RESULTS

A) Survey Development

Internal consistency reliability scores of the survey yielded values of 0.5 (attitude), 0.7 (confidence and perceived skills), 0.7 (knowledge), and 1 (hand outcome measures). Item 1 (d) "to what extent the physical examination and measurement is useful in your practice" did not fit with the items 1 (a-c) about EBP. Therefore, physical examination and PROs questions was removed from the analyses

of attitudes and perceived skills of EBP scales and combined under clinical outcomes assessment subscale for more feasibility.

B) Survey Testing Results

Our total study sample consisted of a convenience sample of 64 PTs from different chapters in Saudi Arabia who were national and international practitioners in Saudi Arabian clinics. Of the 129 therapists who received paper surveys, 46 returned the completed surveys. The completion rate was 100%, calculated as the number of people returning the paper questionnaire, divided by the number of people who provided consent to participate (regardless of whether or not they left blanks). The initial paper survey response rate was 29% and increased to 37% after the follow-up. Out of the 25 online responses, 18 contained completed surveys. The completion rate of the electronic survey was 72%, calculated as the number of people submitting the last questionnaire page, divided by the number of people who provided consent to participate in the study by clicking on the AGREE button (or submitted the first survey page). There was no follow up provided for those completing electronic surveys. Missing values accounted for 4% of the total survey questions. These data were missing completely at random, which means that missing was not dependent on either the observed or missing values.

After the paper surveys had been collected, a misconception was noted for question number 20,"Where do you live?" There were 6 out of 46 respondents interpreted this question as inquiring about their origin city, rather than their current location. The question was modified in the online version to "Where do you currently live?" However, response was re-coded (for the paper surveys) to where we distributed the survey.

Participants' characteristics and caseloads are described in Tables 2 and 3. The sample was 30 (47%) female, with the majority of respondents 81% (n=52) from Jeddah City. There were more Saudi respondents 73% (n=47) than international respondents 25% (n=16). The youngest age group (42, 66%) and bachelor degree holders (49, 77%) were the dominant demographics in this study. Sixty-three percent of the respondents practiced in government hospital settings. Half of the respondents were members of physiotherapy organizations. The majority (33, 52%) of participants worked between 1 to 5 years and had no licensed specialty. The majority of patients seen by respondents had musculoskeletal and neurological conditions. Almost half (n=30, 47%) of the respondents treated patients with hand conditions such as musculoskeletal injuries (fractures, muscle strain, and impingement), nerve and tendon problems (carpal tunnel syndrome, trigger finger, and De Quervain), arthritis (Osteoarthritis and Rheumatoid arthritis), and burns. Respondents' contributions are presented in this paper in the following themes: ***attitudes, confidence and perceived skills, knowledge, EBP adoption, hand outcome measurements, and perceived barriers.***

TABLE 2. **Characteristics of respondents**

Characteristic	***n***	***%***	***Total****
Gender			64
Male	34	53	
Female	30	47	
Age group			63
20–29 y	42	65.6	
30–39 y	17	26.6	
40–49 y	3	4.7	
≥ 50 y	1	1.6	
Missing	1	1.6	
Geographical area of practice			64
Jeddah (Western Chapter)	52	81	
Makkah (Western Chapter)	1	2	
Riyadh (North Chapter)	3	5	
Other	8	13	
Nationality			63
Saudi	47	73.4	
Non-Saudi	16	25	
Missing	1	1.6	
Current practice position			60
Senior	12	18.8	
Junior	30	46.9	
Intern	7	10.9	
Other	11	17.2	
Missing	4	6.3	
Highest professional degree			62
Diploma	5	7.8	
Bachelor	49	76.6	
Master’s	7	10.9	
Doctoral	1	1.6	

Post doctoral	0	0	
Missing	2	3.1	
Place of training			62
Saudi Arabia	45	70.3	
Abroad	17	26.6	
Missing	2	3.1	
Type of practical setting			63
Government hospital	40	62.5	
Private hospital	1	1.6	
University educational hospital	20	31.3	
Other	2	3.1	
Missing	1	1.6	
Years licensed			60
Less than a year	8	12.5	
1- 5 years	33	51.6	
6-10 years	12	18.8	
11 years and more	7	10.9	
Missing	4	6.3	
Clinical certified specialty			62
No	48	75	
Yes	14	21.9	
Missing	2	3.1	
Membership in professional organization			60
Yes	32	50	
No	28	43.8	
Missing	4	6.3	

*At least 1 missing value

TABLE 3. **Characteristics of respondents' practice and caseload**

Caseload	***n***	***%***	***Total****
Number of patients per day			64
≤ 5	8	13	
6-10	45	70	
11-15	10	16	
≥ 16	1	2	
Assessment session period			63
20-30 min	32	50	
31-45 min	12	18.8	
46-60 min	18	28.1	
> 60 min	1	1.6	
Missing	1	1.6	
Follow up session period			63
20-30 min	35	54.7	
31-45 min	25	39.1	
46-60 min	3	4.7	
> 60 min	0	0	
Missing	1	1.6	
Patients with Musculoskeletal conditions			62
0%	1	1.6	
≤ 20%	6	9.4	
21%-50%	22	34.4	
≥ 51	33	51.6	
Missing	2	3.1	
Patients with Cardiopulmonary conditions			57
0%	23	35.9	
≤ 20%	30	46.9	
21%-50%	2	3.1	
≥ 51	2	3.1	
Missing	7	10.9	

Patients with Pediatric conditions			58
0%	22	34.4	
≤ 20%	18	28.1	
21%-50%	13	20.3	
≥ 51	5	7.8	
Missing	6	9.4	
Patients with Neurological conditions			60
0%	7	10.9	
≤ 20%	15	23.4	
21%-50%	27	42.2	
≥ 51	11	17.2	
Missing	4	6.3	
Women's health conditions			
0%	42	65.6	55
≤ 20%	7	10.9	
21%-50%	3	4.7	
≥ 51	3	4.7	
Missing	9	14.1	
Patients with hand disability			61
Yes	30	46.9	
No	31	48.4	
Missing	3	4.7	

*At least 1 missing value

Attitudes and Beliefs

PTs who work in Saudi Arabia had a range of beliefs about EBP and PROs. Of respondents, 45% (n=29) believed that EBP was very useful, while 44% (n=28) believed that EBP was useful to some extent; 5% (n=3) reported that EBP was not very useful. There were 52% (n=33) respondents who reported that research findings

reflecting evidence was somewhat useful. For more information about the descriptive results, see Appendix E.

Demographic factors were not associated with respondents' attitudes toward EBP. A significant association was found in respondents' attitudes toward scientific research findings and their degrees, place of training and professional memberships. (See Table 4)

Table 4. **Proportions of therapists' attitudes toward EBP and research findings**

Factor		***EBP***			χ^2	***Literature findings***			χ^2
		Not very useful n (%)	**Some useful** n (%)	**Very useful** n (%)		**Not very useful** n (%)	**Some useful** n (%)	**Very useful** n (%)	
Age	< 30	3 (7)	22 (51)	18(42)	0.61	5(12)	27 (62)	11 (26)	0.17
	≥ 30	2 (10)	8 (38)	11(52)		4 (19)	8 (38)	9 (43)	
Years since licensure	≤ 5	4 (9)	22 (49)	19(42)	0.71	7 (16)	28 (62)	10 (22)	0.06
	> 5	1 (5)	8 (42)	10(53)		2 (11)	7 (37)	10 (52)	
Highest degree	Undergrad	5 (9)	28 (50)	23(41)	0.18	8 (14)	34 (61)	14 (25)	**0.01**
	Graduate	0 (0)	2 (25)	6 (75)		1 (13)	1 (12)	6 (75)	
Place of training	Saudi	5(11)	24 (49)	19 (40)	0.23	7 (15)	30 (64)	10(21)	**0.01**
	Abroad	0 (0)	7 (41)	10 (59)		2 (12)	5 (29)	10(59)	
Membership	Yes	1 (3)	20 (56)	15 (41)	0.12	1 (3)	22 (61)	13(36)	**0.01**
	No	4(14)	10 (36)	14(50)		8 (29)	13 (46)	7 (25)	

EBP= importance of evidence-based practice; Reports= importance of research findings, χ2= Chi-squared test; Some= somewhat

Notably, most respondents 81% (n=52) had strong beliefs about the importance of physical examinations and measurements, whereas attitudes toward PROs varied (See Table 5). Of respondents, only 38% agreed that PROs were very useful while the most common response (45%) agreed that PROs were useful to some extent.

TABLE 5. **PT self-reported attitudes and beliefs toward outcome measures**

Attitude	***Parameter,*** *frequency (%)*	
	PROs	***Physical examination and measurements***
Very useful	24(37.5)	52(81.3)
Somewhat useful	29(45.3)	8(12.5)
No opinion	6(9.4)	1(1.6)
Not very useful	4(6.3)	2(3.1)
Not useful at all	0	0
Missing value	1 (1.6)	1 (1.6)
*Total	63	63

PROs= patient-reported outcome measures
*At least 1 missing value

Confidence and Perceived Skills

Items that measured confidence yielded a range of responses. In general, respondents had moderate confidence in their decision making (16, 25%) and EBP (19, 30%) skills that they are using in their daily practice. Twenty percent (n=13) of PTs were completely confident about their skills using EBP in their daily practice, and 6% (n=4) of PTs reported having little confidence in their skills applying evidence. Respondents who earned advanced academic degree other than the bachelors reported higher confident in their EBP skills. Further, 27% (n=17) of PTs were completely confident about their abilities to make clinical decisions; no one reported low confidence. This finding associated with their years of experience. Respondents who had more than 5 years since licensure were more confident in their abilities to make clinical decisions (See Table 6).

TABLE 6. **Proportions of therapists' perceived skills and confidence with EBP and clinical decision-making skills**

Factor		***EBP***			χ^2	***Decision-making***			χ^2
		Not much n (%)	**Moderate** n (%)	**High** n (%)		**Not much** n (%)	**Moderate** n (%)	**High** n (%)	
Age	< 30	4 (9)	17(40)	22 (51)	0.16	0 (0)	16 (37)	27 (63)	0.06
	≥ 30	1 (5)	4 (19)	16 (76)		0 (0)	3 (14)	18 (86)	
Years since licensure	≤ 5	5 (11)	16 (36)	24 (53)	0.18	0 (0)	17 (38)	28 (62)	**0.02**
	> 5	0 (0)	5 (26)	14 (74)		0 (0)	2 (10)	17 (90)	
Highest degree	Undergrad	5 (9)	21 (37)	30 (54)	**0.04**	1 (2)	18 (32)	38 (68)	0.25
	Graduate	0 (0)	0 (0)	8 (100)		0 (0)	1 (12)	7 (88)	
Place of training	Saudi	5 (11)	16 (34)	26 (55)	0.30	0 (0)	16 (34)	31 (66)	0.21
	Abroad	0 (0)	5 (29)	12 (71)		0 (0)	3 (18)	14 (82)	
Membership	Yes	2 (5)	10 (28)	24 (67)	0.38	0 (0)	10 (28)	26 (72)	0.71
	No	3 (11)	11(39)	14 (50)		0 (0)	9 (32)	19 (68)	

EBP= evidence-based practice; χ2= Chi-squared test

Sixty-five percent (n=42) of survey respondents indicated that they were highly confident (completely or had a lot of confidence) in their assessment skills, whereas only 36% (n=23) of PTs were highly confident in their abilities to administer PROs. Further, 13% (n=8) of respondents reported low confidence (a little and not at all confident) in their skills (See Table 7). Responses differed toward the foundation of acquiring sufficient EBP training during school. Only (6, 9%) of the respondents reported that they had completely or somewhat learned about EBP in their foundational training, while (9, 14%) had learned a little (See Figure 2).

TABLE 7. **PT self-reported confidence toward using outcome measures**

Confidence	***Parameter,*** *frequency (%)*	
	Administer PROs	***Perform physical examination***
Completely	5(7.8)	17(26.6)
A lot	18(28.1)	25(39.1)
Moderately	24(37.5)	18(28.1)
Somewhat	8(12.5)	3(4.7)
A little	5(7.8)	0
Not at all	3(4.7)	0
Missing value	1 (1.6)	1 (1.6)
*Total	63	63

PROs= patient-reported outcome measures
*At least 1 missing value

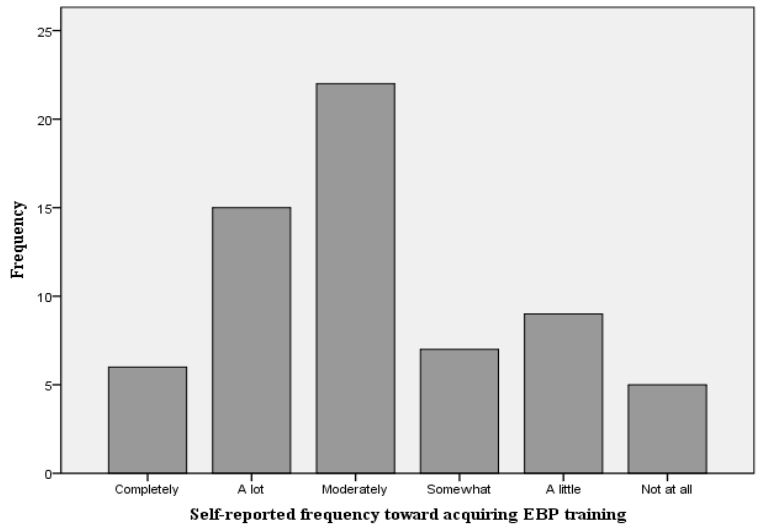

FIGURE 2. *The frequency of respondents' exposed to EBP in the foundational training*

Knowledge

Fewer than half (29, 45%) of the respondents self-reported that they completely understood both the terms relative risk and systematic review, and a nearly similar percentage partially understood these terms. Understanding of confidence interval and publication bias had even lower positive responses; 30% and 41%, respectively, did not understand the meaning of the terms. A significant association was found in respondents' knowledge towards most terms and their degrees or

professional memberships. (See Tables 8 & 9). For illustration, confidence interval and publication bias understood were better among those with advanced degrees than those with bachelor degrees, while all terms except publication bias were understood better among those who were members of PT organizations than who do not.

TABLE 8. **Proportions of self-reported knowledge of EBP terms (Confidence Interval and Publication Bias)**

Factor		***Confidence Interval***			***χ2***	***Publication Bias***			***χ2***
		Some n (%)	**NO** n (%)	**YES** n (%)		**Some** n (%)	**NO** n (%)	**YES** n (%)	
Age	< 30	24 (57)	13(31)	5(12)	0.52	17 (40)	18 (43)	7 (17)	0.88
	≥ 30	11(50)	6 (27)	5 (23)		10 (46)	8 (36)	4 (18)	
Years since licensure	≤ 5	23(52)	15 (34)	6(14)	0.49	16 (36)	22 (50)	6 (14)	0.07
	> 5	12 (60)	4 (20)	4 (20)		11 (55)	4 (20)	5 (25)	
Highest degree	Undergrad	32 (58)	18 (33)	5 (9)	**0.00**	25 (45)	25 (46)	5 (9)	**0.00**
	Graduate	3 (33)	1 (11)	5 (56)		2 (22)	1 (11)	6 (67)	
Place of training	Saudi	26 (57)	14 (30)	6 (13)	0.66	20 (43)	21 (46)	5 (11)	0.08
	Abroad	9 (50)	5 (28)	4 (22)		7 (39)	5 (28)	6 (33)	
Membership	Yes	15 (46)	9 (27)	9 (27)	**0.02**	12 (37)	14 (42)	7 (21)	0.53
	No	20 (65)	10 (32)	1(3)		15 (48)	12 (39)	4 (13)	

χ2= Chi-squared test; NO= did not understand; YES= completely understand; Some= somewhat

TABLE 9. **Proportions of self-reported knowledge of EBP terms (Relative Risk and Systematic Review)**

Factor		***Relative Risk***			***χ2***	***Systematic Review***			***χ2***
		Some n (%)	**NO** n (%)	**YES** n (%)		**Some** n (%)	**NO** n (%)	**YES** n (%)	
Age	< 30	20 (47)	4 (10)	18 (43)	0.66	18(42)	7 (17)	17 (41)	0.50
	≥ 30	8 (36)	3 (14)	11 (50)		8 (36)	2 (9)	12 (55)	
Years since licensure	≤ 5	19 (43)	6 (14)	19 (43)	0.58	17 (39)	80 (18)	19 (43)	0.37
	> 5	9 (45)	1 (5)	10 (50)		9 (45)	1 (5)	10 (50)	
Highest degree	Undergrad	25(45)	7 (13)	23 (42)	0.29	24 (44)	9 (16)	22 (40)	0.09
	Graduate	3 (33)	0 (0)	6 (67)		2 (22)	0 (0)	7 (78)	
Place of training	Saudi	19 (41)	6 (13)	21 (46)	0.64	9 (50)	8 (17)	21 (46)	0.40
	Abroad	9 (50)	1 (6)	8 (44)		17 (37)	1 (6)	8 (44)	
Membership	Yes	13 (39)	1 (3)	19 (58)	0.04	11(33)	2 (6)	20 (61)	0.02
	No	15 (49)	6 (19)	10 (32)		15 (48)	7 (23)	9 (29)	

χ^2= Chi-squared test; NO= did not understand; YES= completely understand; Some= somewhat

EBP Adoption

Few respondents reported that they adopted evidence in their practice: 11% daily and 16% regularly (Figure 3). The average frequency reported for of reading scientific articles or looking for evidence ranged from 3% who seek this out on a daily basis, to 34% on a weekly basis, to 33% on a monthly basis (Figure 4). The majority of respondents reported attending few courses or workshops per year (≤ 3) (61%), while 32% attended four to six courses annually (Figure 5). Approximately 48% of the respondents had access to the internet in their workplaces, but only 38% used it to access scientific evidence. In contrast, 39% of the respondents reported that they did not have access at their workplaces, but they did a search for evidence at home (Figure 6).

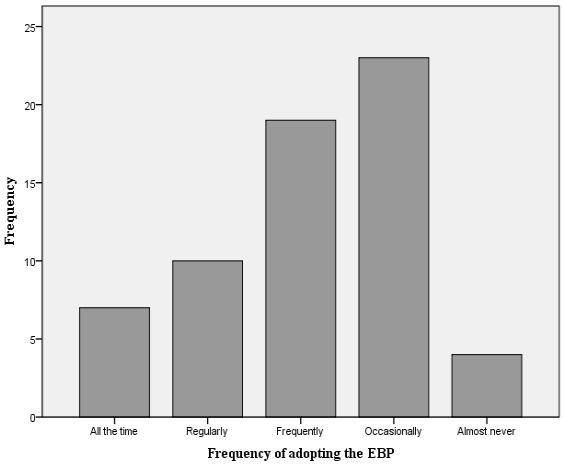

FIGURE 3. *Frequency of adopting EBP in practice.* The distribution of frequency in which PTs apply evidence in their daily practice

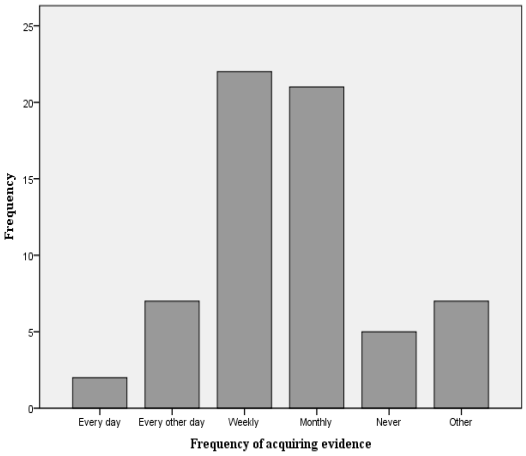

FIGURE 4. *Frequency of acquiring evidence.* The distribution of frequency in which PTs access scientific evidence in their daily practice

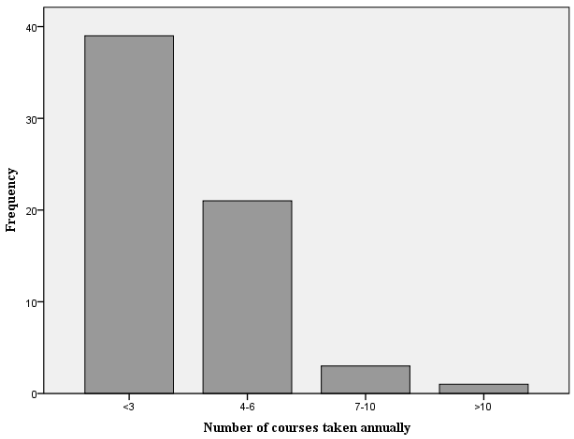

FIGURE 5. *The frequency of respondents who take professional development courses annually*

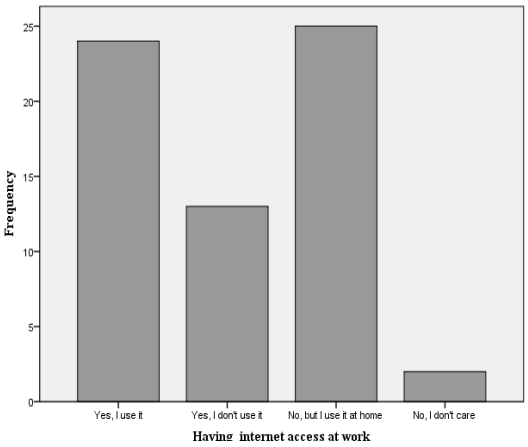

FIGURE 6. *The frequency of respondents who have internet access at work.* Where, **Yes, I use it**= they have access at work and they use it; **Yes, I don't use it**= they have access at work but they don't use it; **No, but I use it at home** = they don't have access at work but they use the home internet instead; **No, I don't care**= they don't have access at work and they are not interesting to search

Hand Outcome Measurements

In this study, few OMs were used routinely used to assess patients with hand disabilities. The nature of our survey did not allow us to explore reasons why people chose one measure over another. Goniometry, MMT, and pain were the top three outcome measures that most respondents used with hand rehabilitation (See Table 10).

TABLE 10. **The frequency of self-reported utilization of hand outcome measurements**

Measurement	*Never*	*Sometimes*	*Most of the time*	*Always*	*Total* §*
MMT	1 (3)	2 (7)	6 (20)	20 (67)	29
Pain	0 (0)	5 (17)	7 (23)	17 (57)	29
ROM	2 (7)	2 (7)	9 (30)	16 (53)	29
Work status	2 (7)	5 (17)	7 (23)	15 (50)	29
Grip	3 (10)	5(17)	7(23)	14(47)	29
Pinch	6 (20)	9 (30)	7 (23.3)	7 (23.3)	29
Swelling	5 (17)	8 (26.6)	8 (26.6)	7 (23)	28
Muscle dynamometer	16 (53)	6 (20)	1 (3)	5 (17)	28
Sensibility	13 (44)	9 (30)	3 (10)	4 (13)	29
Disability	19 (63.3)	3 (10)	2 (7)	4 (13)	28
QOL	19 (63.3)	4 (13)	1 (3)	4 (13)	28
Movement	15 (50)	5 (17)	4 (13)	4 (13)	28

ROM= range of motion; MMT= manual muscle test; QOL= quality of life
§total 30 of the respondents treated patients with hand conditions
*At least 1 missing value

Perceived Barriers to EBP Adoption

Most barriers to applying EBP were ranked from highest to lowest as follows: insufficient time (36, 55%), lack of research skills (33, 50%), lack of information resources (31, 48%), inability to apply research findings to individual patients with unique characteristics (30, 46%), lack of understanding of statistical analysis (27, 42%), lack of collective support among colleagues at facility (19, 29%), lack of generalizability of the literature findings to patient population (16, 25%), poor ability to critically appraise the literature (15, 23%), and lack of interest (11, 17%). Additionally, 8% (n=5) selected the option "other," but offered no justification. The rate exceeded 100% since more than one choice was permitted in this item.

Further to our findings, approximately half of the respondents (33, 52%) reported that they had some limitations in their workplace that inhibited their

productivity. Most reasons were related to the work environment (11, 17%), lack of support from the department (e.g., motivations to change, resources, and policies and regulations, including supervisory duties and duration of the follow-up appointments), lack of availability of required tools (6, 9%) for assessment and treatment sessions, and workload (4, 6%) or the high frequency of patients or staffing shortages. Personal factors included language (3, 5%) and confidence regarding the ability to apply the EBP (2, 3%). These responses were classified under organizational-related factors. A patient-related factor was patients' beliefs (2, 3%), which affected their adherence and performance in their sessions (i.e., they did not believe that PT treatment would be beneficial). Five respondents (8%) did not specify their reasons.

1.4. DISCUSSION

The results of our study chart the current self-reported attitudes and utilizations of EBP and OMs. There was a positive attitude toward EBP usage among PTs practicing in Saudi Arabia; there were more positive attitude toward impairment based measures as compared to PROs. Respondents who were active members of PT organizations and had higher than baccalaureate degrees tended to express more positive attitudes, confidence and higher levels of knowledge concerning EBP than did others. Respondents who had been licensed for more than 5 years reported higher levels of self-confidence in their abilities to undertake clinical decision-making.

There is a lack of research in the disability field in Saudi Arabia.[39] To date, no survey has compared the change in PTs' practice over a 5-year period. The majority of EBP studies among PTs have been conducted in Western countries.[18-25] Few comprehensive studies on this topic could be found in the Middle East, an area of the

world exhibiting a unique work culture and environment. The areas covered by this study included the attitudes and beliefs, skills and knowledge of PTs toward EBP; EBP and PROs utility; barriers preventing PTs from adopting evidence. Understanding the current practice with respect to use of EBP and OM can serve as a basis for understanding any identified gaps in knowledge that might drive future entry level to practice or post-professional training and knowledge translation.

The response rate for paper surveys was 37%. Incomplete online surveys (7 out of 25 started but not completed) compounded the lower response rate in this study. Low response rates for surveys of PTs are not unusual, where the trends in response rates in previous self-reported practice and knowledge of EBP ranged from 37% to 74%.[12,20-22] All studies used paper/mail survey as a delivery method. Nevertheless, different recruitment methods yielded different response rates.

For illustration, Iles and Davidson examined Australian PTs' self-reported practice and knowledge of EBP, with a response rate of 53.9%. They used telephone invitation as a recruitment method. The generalizability of their findings is limited because they recruited a convenience sample of four hospitals in greater Melbourne; a single large urban state.[22] Likewise, Jette et al.[20] and Akinbo et al. [21] investigated knowledge, attitudes, and behaviours toward EBP of PTs, who was members of PT organization. Attitudes toward EBP of non-member PTs are not known. Akinbo et al. achieved the highest response rate of 74% because they distributed their questionnaire in two phases. The first phase included PTs during an Annual Scientific Conference, and the second phase involved a physical visitation by the author to various physiotherapy departments.[21]

Attitudes and Beliefs

Our findings suggested that practicing PTs in Saudi Arabia have positive attitudes toward EBP and are interested in reading literature and researching the evidence. Demographic data showed no statistical difference among years of experience and age as related to attitudes toward EBP. This finding is in contrast to the previous study; Jette et al. [20] found that younger American PTs with fewer years of experience (i.e. less than 5 years) are more likely to report EBP as necessary. The absence of a statistically significant association for age in the present study could be attributed to the small sample size. Another potential reason for the lack of an age effect may have been because the length of career. The PT bachelor programs in most geographical regions of the country are quite new [30] (i.e., the expansion of bachelor programs started in 2003) and most respondents were relatively young (in their 20s).

On the other hand, our results suggested that PTs with graduate academic degree tended to have more positive attitudes regarding the importance of scientific literature, and they viewed it as helpful for their practice. Also, they were more likely to have confidence in EBP skills than those with certificate or baccalaureate degree as their highest degree. This difference, we believed, reflect the degree of emphasis on scholarship and research skills in programs offering advanced degrees compared to undergraduate-level training.[20] These findings support that EBP education and training have the greatest influence on improving EBP attitudes and skills.[22,24] Other studies have highlighted the positive attitudes regarding the importance of literature among PTs,[12,20] physicians,[26] and nurses,[40] as they believed that research added value to their practice.

PTs who trained outside the country reported more positive attitude toward the importance of scientific research. Lack of research in the disability field in Saudi Arabia [39] may decrease the likelihood of being able to see the value of literature. Moreover, therapists who had a membership in PT organizations reported more positive attitudes regarding the importance of scientific literature, and they viewed it as helpful compared to those who do not belong to PT associations. This finding supported that the continuous education (i.e., involvement in professional associations) is essential to improving skills, knowledge, and behaviors.[20] Involvement in professional organizations may be associated with more dissemination of information about EBP, professional meetings that promote EBP or access to journals that would affect their knowledge and attitudes. Conversely, people who join a professional association may be more likely to value EBP and the association is one reflection of positive professional behaviors. Probably these concepts are also related to Knowledge. In our study, therapists who belonged to PT organizations showed greater frequency of positive responses of knowledge of most EBP terms.

Although there were fewer positive responses about PROs versus EBP, almost half of the respondents believed in the necessity of EBP had positive attitudes toward PROs (44%). This finding is considered a welcoming attitude and suggests the need to have cross-cultural validations of Standard OMs to facilitate implementation in Saudi Arabia. These outcome measures would allow therapists to identify the typical experiences of their patients by comparing their findings with patient responses to the data that had been reported for particular conditions. Moreover, it would encourage communication among international researchers.

Confidence and perceived skills

Researchers believe that clinical decision-making is influenced by knowledge and experience.[2,41] More experience has been shown to enhance quicker decisions [42] and foster pattern recognition of information.[43-44] Those with more than 5 years since licensure reported higher confidence in decision making supports our results that clinical decision-making improves with practice.

Additionally, researchers shows that most PTs base their clinical decisions on knowledge they acquired during their entry-level training.[19-20,22] In the current study, respondents were diverse in expressing whether they had completed training sessions about EBP in their foundation programs. Only 9% reported having engaged completely in such sessions during training. The majority (34%) reported moderate training engagement in EBP. Respondents with graduate level degrees were less likely to claim to have less training in EBP than those with undergraduate level degrees. Although clinical decision-making improves with practice, time alone does not ensure experiential learning. The combination of experience and skills such as critical thinking, communication with patients is required for effective clinical decisions.

Furthermore, respondents showed more confidence in their abilities to perform physical examinations, which are not necessarily evidence-based, rather than administering and scoring relevant measures. This finding reveals positive attitudes toward objective, impairment-based, outcome measures.

Knowledge

Studies have found that technical terms used in the literature are often challenging to understand.[20,22,28] Respondents' self-reported knowledge of EBP terms such as 'confidence interval' and 'publication bias' were most often related to the

highest degree of education; respondents with graduate-level education were more confident (reported completely understand) compared to those with undergraduate level education (reported somewhat and not able to understand). This finding supports previous research; specifically, individuals with graduate training are expected to be more open to research and technical terms used the field.[20,26]

EBP Adoption

The current study had a promising finding; most respondents had accessed evidence-based research weekly or monthly, and those respondents with access to the Internet at home and at work comprised of 77% of the PTs. An unexpected association was also found between accesses to the Internet at home or work and the place of training/nationalities. International PTs used the Internet at work (7, 44%) to access evidence more than the domestic PT (17, 35%), although the former mostly used the home Internet (24, 50%). The data did not allow us to determine the reasons for these differences; however, potential reasons might be related to economic issues (e.g., most non-Saudi therapists live in compounds where Internet access is expensive), cultural issues (e.g., patients beliefs or language barriers), or the amount of information for each patient. Further studies are needed to discuss the limitations and influences of the Internet in the workplace.

It was believed that implementing EBP was the most challenging in clinical practice settings.[45-46] Although most respondents (57, 89%) had positive attitudes toward EBP and believed it was necessary, only a few reported that they adopted evidence in their daily practice (7, 11%) or regularly (10, 16%). This finding is consistent with other studies that have indicated that positive attitudes about EBP or PROs do not necessarily translate into implementation.[12,47]

Hand Outcome Measurements

In recent years, the emphasis has shifted toward PROs, such as patients' abilities to complete daily activities. PROs provide a standard approach to measuring health and disability associated with musculoskeletal disorders.[58] In the current study, the majority of patients seen by respondents had musculoskeletal conditions (52%). Consequently, it was not surprising that impairment measures were highly reported by therapists who treated hand disabilities. The use of OMs for patients with orthopedic conditions was fairly high in other studies.[12,20,49] Our findings for use of hand OMS by PTs in Saudi Arabia was similar to that of PTs' practicing in the Middle East (Egypt) and North America. For instance, ROM, MMT, and pain were the top three impairment measures that most therapists used in rehabilitation.[9-12] Although PTs commonly use ROM and MMT measurements and they are recognized as standard clinical OMs for reporting the success of treatment,[50] the lack of evidence-based information on the reliability, validity, and responsiveness of these measures has resulted in a great gap in practice, where these commonly used measures are primary components of the evaluation rather than the intervention process.[9]

Overall, our findings demonstrated that the reported number of PROs used routinely to assess patients with hand disabilities was limited. Reasons why people chose one measure over another were not identified. However, it may be that the lack of use of PROs with respect to hand rehabilitation is in part due to the lack of training about how to administer, score or interpret findings, and that clinicians might not have access to OMs due to lack of translated instruments i.e., the existing outcomes are not sensitive to the cultural concerns of many patients. This practice analysis suggests a

substantial need to foster the implementation of more consistent outcome measurements in practice.

Perceived Barriers to EBP Adoption

This study also explored the factors that were likely to hinder PTs in using EBP. The survey was conducted in Saudi Arabia, a developed Western Asian country, which provides a unique and interesting context, having both characteristics associated with the Western world and Asian values and work culture. Results pointed to three main barriers to EBP adoption: personal, organizational, and patient-related factors. The most significant barriers reported were lack of time, research skills, resources, and interpretation of research findings. Physicians and allied health professions worldwide report lack of time as a major barrier.[12,18,20-21,26] The current study showed that this is also the case among PTs in Saudi Arabia.

Lack of time is a complex factor because it can be a proxy for other barriers, such as lack of self-knowledge, skills, and resources. For instance, PTs with limited working knowledge of EBP terminology may need additional time to interpret or understand the language used in scientific articles. Likewise, PTs with inadequate search skills need more time to retrieve current, relevant information in order to apply it for the benefits of their patients. In their study of Australian general practitioners about beliefs and barriers of EBP, Young and colleagues found that participants reported a lack of time as a significant barrier to EBP use; however, when in-depth interviews were done as a complement to research surveys, other barriers such as lack of skills to apply evidence to individual patient care became more prominent.[51]

Lack of education about EBP and low self-efficacy are also important barriers to EBP utility.[4,12,20,52] A total of 17% respondents said that lack of interest, which can

be personal- or organizational-related factors, was the lowest rating barrier; nevertheless, this barrier cannot be neglected and should be considered when aiming for EBP. Additionally, the language barrier was given as a personal barrier for international PTs, where Arabic has many dialects between regions. Lack of Arabic language skills resulted in poor communication between them and their patients or colleagues. Domestic PTs reported that their low level of English proficiency skills affected their communication and critical appraisal; language barriers overcome by translators as needed and also by training for good communication.

Organizational-related factors refer to the work culture, which can be associated with EBP adoption.[53] Given the findings that the work environment was a major barrier, as reported by PTs in the current study barriers included a lack of support from the department (e.g., motivations, resources, policies, and regulations). Of note, lack of authority to change practice was a moderate to large barrier among Swedish nurses.[45]

Education is not enough to embed EBP into the work environment. Creating a culture that values EBP is a critical step in EBP implementation.[46] Healthcare practitioners need to see organizational leaders using evidence in their own practice and promoting the importance and value of EBP among their clinical staff. This is a motivational technique organization can do. For EBP to become predominant in an organization, full support from the organization itself is essential. Therefore, practitioners should be given the authority to change practice.[46] Champions of change, staff who promote EBP in their clinical areas, is a significant strategy in EBP implementation.

Practice Implications and Recommendations

This study was mainly descriptive, and it highlighted the overall attitudes toward EBP and areas of strength and weakness in the current knowledge and skills of PTs in Saudi Arabia. The survey was not tailored to measure actual clinical performance. This was an important distinction that must be clarified before providing our recommendations. We believe that this study can serve as a foundation for further EBP studies among PTs in the kingdom. Thus, our findings have clinical, academic, and research implications, which are likely to interact.

Our data suggests that newly licensed practitioners, unlike their senior counterparts, have come to the profession with the belief that they lack the skills needed to make clinical decisions. Further, only 10% of the respondents reported having completely or somewhat learned about EBP in their foundational training. This finding is crucial in that it calls for the education community to update the curriculum of the PT program to include topics such as EBP, standard OMs, and critical appraisal, which may transfer the EBP and standard OMs from belief to adoption in PT practice. Further, students should be encouraged to apply EBP during clinical practice.

Because time was the main perceived barrier to the implementation of EBP, continuing education at clinical sites or local practice should focus on improving practitioners' skills and efficiency in searching for resources.[26] Clinical administrators should be encouraged to increase the availability of computer access to research databases [54] and to provide time for practitioners to retrieve literature. Practitioners could increase the amount of communication about the research findings among their colleagues (e.g., assigning sessions for seminars or case studies).

Similarly, researchers need to make efforts to publish more literature related to the diagnostic and interventions tools used by PTs in rehabilitation. The findings need to be expressed in a manner that helps practitioners articulate and implement the evidence practically (e.g., evidence written in summary forms).[20,54] More in-depth knowledge concerning the lack of time is necessary to investigate ways to reduce the influence of time and, eventually, to smoothen EBP implementation.

Moreover, there were obstacles in work environmental such as lack of motivations to change and communication that should be discussed in depth and action should be taken to improve productivity in the workplace. Consequently, it is recommended that quality improvement projects be developed to discuss and facilitate the identified issues.[55] In addition, patient-related factors such as patients' beliefs comprise an area of research that should be explored further to enhance the EBP implementation.

Limitations

One limitation of our study was that the data were all self-report, and many concepts were subjected to personal bias. We were unable to reach the target of 300 respondents. We obtained a low response/ completion rate to the two types of survey (paper and web) used in this study, which may have been caused in part by the relatively short period of the study (3 months) or the length of the questionnaire (45 total questions). In addition, the response bias could not be assessed because data for non-respondents were not available; therefore, the generalizability of our findings is limited. We were unable to say whether non-responders differed systematically from the responders.

Although our survey findings appear to be fairly comparable to larger studies worldwide, the demographic characteristics of our respondents were skewed by a higher response rate from Jeddah City, those who were practiced public hospitals and interested in EBP (i.e., had positives attitude about EBP). Thus, a potential sampling bias exists because only therapists who practiced in Jeddah City were surveyed using the paper version as the primary research originated in Jeddah. This limitation, likely reflected our sampling approach, which was dependent on the researcher's (FH) network. The similarity between PTs working in governmental settings and those in private settings is unclear. While the current study does provide insight to perceptions of EBP among PTs across a broad range of sample i.e. new /experienced clinicians, members/non-members of PT professional associations, national/international clinicians. A comprehensive study involving a wider range of participants from different chapters, different age groups and other practical settings including private and specialized clinics could reveal data that are more conclusive.

The web survey method found to be more efficient at protecting data and more convenient for respondents than any other method.[54] In the current study, we relied on a web survey to collect data from most chapters in the Kingdom. Although several studies in Saudi Arabia have used web-based questionnaires, such as Survey Monkey [55] and Fluid Surveys,[17] this method is commonly used in Saudi Arabia but we were uncertain of the proportion of PTs who use the Internet for their routine communication activities. In addition, although respondents were informed that the survey have two formats, and they should respond to one or the other only, we cannot be assured that participant did not complete the survey twice.

A moderate to low internal consistency existed for some subscales of items of interest (EBP and physical examination), which suggests that they were not uniform concepts. In particular, the item about physical examination did not fit with the items about EBP. Alpha below 0.7 are often advised to be interpreted with caution. However, survey validity was supported by building items from previously established questionnaires, iterative reviews by investigators, and pilot investigations.

Another limitation resulted from our decision to dichotomize several independent and dependent variables for advanced statistics. Most of our decisions about where to dichotomize were based on an arbitrary choice. Information was lost when the data were reduced into simple categories of very useful/somewhat useful /not useful at al response or less/more than 5 years of licensure; however, studies have suggested that neutral categories reflect negative attitudes in Likert scales that have positive response sets.[20,56] For instance, items using a 5-point Likert scale, such as attitude response set (i.e., opinion on the statement about suggested usefulness of EBP application) included the categories “Not very useful,” “Not useful at all,” and “no opinion,” which were combined into the category “not useful.” We were not completely sure that the “no opinion” response reflected a negative attitude.

1.5. CONCLUSION

Our study in Saudi Arabia indicated that that self-reported EBP has not been widely implemented, despite the welcoming attitudes toward its use among PTs practicing in the Kingdom. EBP and research findings were seen as necessary for clinical practice, and previously findings of international studies have reported similar

results. More efforts are recommended to strengthen the skills and foster the use of EBP among all PT practitioners, particularly those recently licensed.

Some of the beliefs, skills, and knowledge we examined were related to years since the licensure, highest degree, place of training and membership in PT organizations. Respondents who were active members in PT organizations and had degrees higher than baccalaureate tended to express more positive attitudes and higher levels of EBP skills and knowledge concerning research terms, whereas respondents who were licensed for more than 5 years stated that they had more confidence related to clinical decision making.

Lack of time was the main barrier to using EBP, which is in concordance with previous findings among international PTs and other health professionals, including physicians and nurses. The current findings have implications for the clinical, education, and research communities. More collaborative strategies should be applied to make EBP more time-efficient, easier to access, and conducive to practitioners' productivity and flow of patients.

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Appendix A. Study methods chart

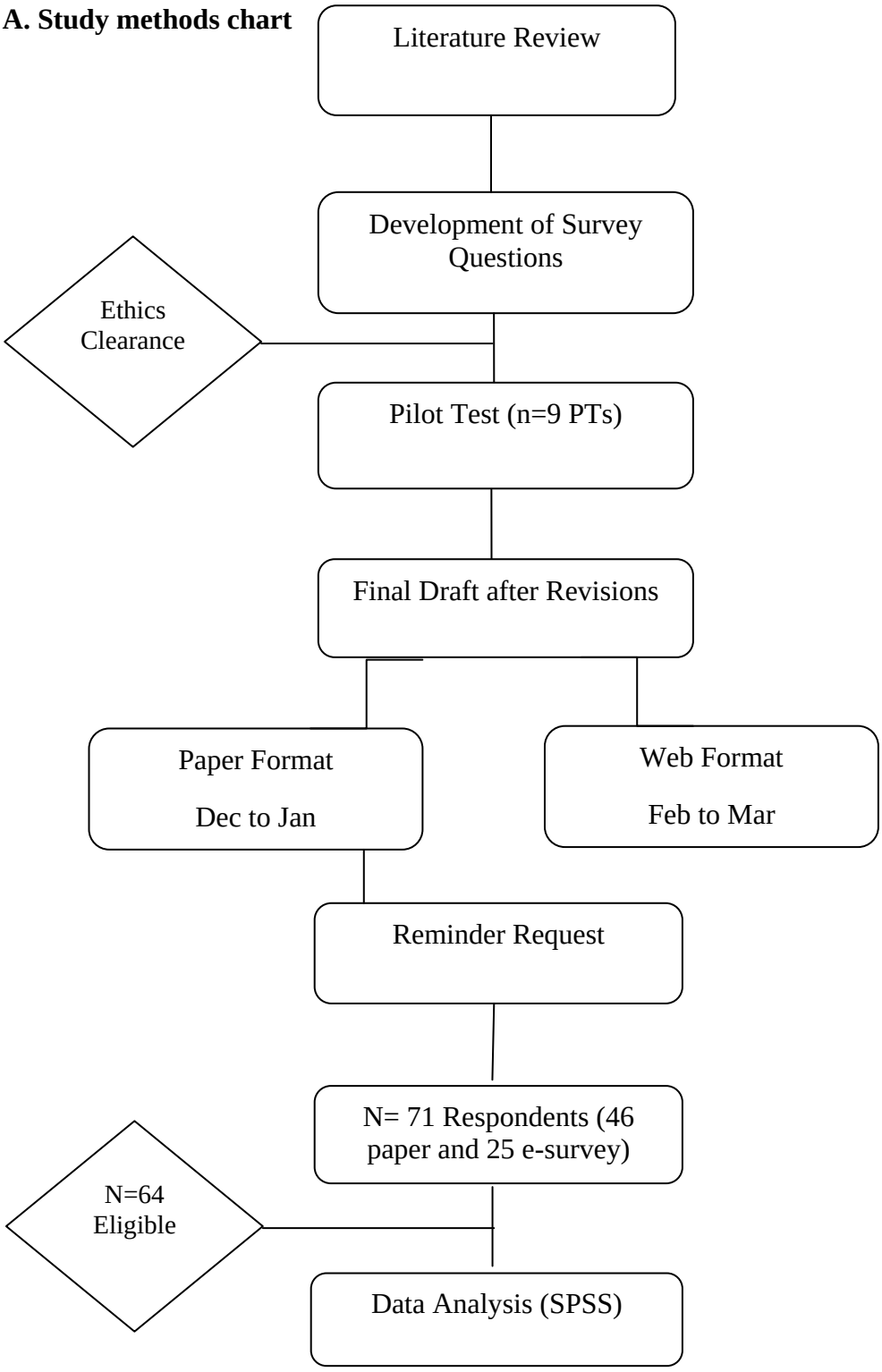

FIGURE 7. *Flow chart depicting the study methods*

Appendix B. A Sample of the survey

A survey of Physiotherapy practice in Saudi Arabian Clinics

This survey was designed to determine the beliefs, attitudes, and knowledge of physical therapist those are practicing in Saudi as they relate to evidence-based practice (EBP); it consist of three sections. It may take around 15-20 min to fill. Please answer truthfully (i.e. Do not tell us what you THINK we want to hear, rather tell us what YOU really believe) and complete all the questions. Before go through the survey, please provide you signature in consent form. Make sure that there are no foreseeable risks associated with this study. If you have any questions about the research, please contact: Fatmah Hasani, principal investigator at 905-920-3959 Thank you for your participation.

Evidence-based practice Section (I)

This section provides respondents' opinion toward EBP; place a mark √ in the appropriate box that indicates your response.

1. To what extent are the following useful in your practice?

	Very useful	Somewhat useful	No opinion	Not very useful	Not useful at all
Application of Evidence-based practice					
Findings reported studies					
Self reported outcome measures					
Physical therapists' examination and measurement					

2. To which extent you are confident in your ability in the following?

	Completely	A lot	Moderately	Somewhat	A little	Not at all
Use evidence-based practice						
Your clinical decision-making						
Performing physical assessments						
Administer self-reported questionnaires						

3.What is the average of the number of clinical courses or/and workshops that you are attending per year?

□ ≤ 3

□ 4-6

□ 7-10

□ ≥ 10

4.Do you have online accessibility to look up evidence at your work?

□ Yes, and I use it

□ Yes, but I don't use it

□ No, but I read at home

□ No, I don't care

5.How frequently do you access clinical research evidence related to your clinical practice (online website, database, textbook, papers, Journal?

□ Every day

□ Every other day

□ Weekly

□ Monthly

□ Never

□ other, (specify) _____

6.How often does new research evidence result in a change in your practice?

□ All the time

□ Regularly

□ Frequently

□ Occasionally

□ Almost Never

□ Never

7. Indicate the extent of your understanding of the following terms:

Term	Understand Completely	Understand Somewhat	Do Not Understand
Relative risk			
Systematic review			
Confidence interval			
Publication bias			

8.To what extend have you learned the foundation of EBP as a part of your academic preparation?

□ Completely

□ A lot

□ Moderately

□ Somewhat

□ A little

□ Not at al

9.From the list below, choose the top 3 most important reason(s) why you might not use evidence-based practice?

□ Insufficient time

□ Lack of information resources

□ Lack of research skills

□ Poor ability to critically appraise the literature

□ Lack of generalizability of the literature findings to my patient population

□ Inability to apply research findings to individual patients with unique characteristics

□ Lack of understanding of statistical analysis

□ Lack of collective support among my colleagues in my facility

□ Lack of interest

□ I don't use evidence-based practice for another reason, (**specify)_____**

Practical Section (II)

This section provides specifications for physiotherapy clinical practices and caseload, place a mark √ in the appropriate box that indicates your response.

10. What is average number of patients that you treat during a typical day?

□ ≤5

□ 6–10

□ 11–15

□ ≥16

11. On average, how many minutes do you have to assess a new patient?

□ 20–30

□ 31–45

□ 46-60

□ > 60

12. How many minutes do you spend with each patient for a follow up visit?

□ 20–30

□ 31–45

□ 46-60

□ > 60

13. Do you have specific limitations that inhibit your productivity? If yes, please specify what are those limitations

□ Yes, (specify) _____

□ No

14. How often do you see the following types of patients of your caseload?

	0%	**≤ 20%**	**Between 21% and 50%**	**≥ 51**
Musculoskeletal				
Cardiopulmonary				
Pediatrics				
Neurology				
Women health				

15. Do you treat patients with wrist/hand disability due to musculoskeletal conditions? If your answer is no go to the next section (III).

□ Yes

□ No

16. What is the most common wrist/hand condition describes the majority of patients you treat?

a) _____ , b) _____, c) _____

17. How often do you use the following in evaluation patients with hand conditions?

	Never	**Sometimes**	**Most of the Time**	**Always**
Grip strength				
Pinch strength				
Range of motion (ROM) goniometry				
Manual muscle test (MMT)				
Muscle dynamometry				
Sensibility testing using instruments, e.g. Semmes-				

Weinstein 10-g monofilament (SWMF), Two-point discrimination				
Hand Function and disability outcome measures e.g. Michigan hand outcome questionnaire (MHQ), Patient-rated wrist and hand evaluation (PRWHE/ PRWE), Disabilities of the arm, shoulder and hand (DASH/ QuickDASH)				
Quality of life or health status scales, e.g. World Health Organization Disability Assessment Schedule (WHODAS), Short Form Health Survey (SF-36 or SF-12)				
Functional movement tests, e.g. Purdue pegboard, 9-hole Peg Test				
Hand swelling ,e.g. volumetric or tape measure				
Pain scale, e.g. visual analogue scale or others				
Work status, e.g. able to do normal work				

Demographic Section (III)

This section provides characteristics of respondents' practice; place a mark √ in the appropriate box that indicates your response.

18. What is your gender?

□ Male

□ Female

19. What is your age group?

□ 20–29 y

□ 30–39 y

□ 40–49 y

□ ≥ 50 y

20. Where do you currently live?

□ Jeddah

□ Makkah

□ Riyadh

□ other, (**specify)_____**

21. What is your nationality?

□ Saudi

□ No-Saudi

22. What is your current practice position?

□ Senior

□ Junior

□ Intern

□ others, (**specify)_____**

23. What is your highest degree in physiotherapy?

□ Diploma

□ Bachelor

□ Master

□ Doctor

□ Post doctoral

24. Where did you complete your physiotherapy training?

□Saudi Arabia

□Abroad

25. What is your type of practical setting?

□ Government hospital

□ Private hospital

□ University educational hospital

□ others, (**specify)_____**

26. For how many years have you been licensed to practice physiotherapy?

□ Less than a year

□ 1- 5 years

□ 6-10 years

□ 11 years and more

27. Do you have a specific clinical certified specialty? If so, in which area?

□ I don't have specialty

□ Yes, (**specify**) _____

28. Do you belong to one or more professional practice-oriented organizations (eg, SPTA)? If yes, please specify.

□ Yes, (**specify)_____**

□ No

Appendix C. The cover letter of the survey and consent

PARTICIPANT INFORMATION SHEET

Title of Study: Survey of Physiotherapy Practice in Saudi Arabian Clinics

Principal Investigator: Fatmah Hasani, MSc, McMaster University

You are being invited to participate in a research study conducted by **Fatmah Hasani**. In order to decide whether or not you want to be a part of this research study, you should understand what is involved. This form gives detailed information about the research study. Please take your time to make your decision.

WHY IS THIS RESEARCH BEING DONE?

Since evidence-based practice (EBP) is an integral part of education and communication, topics related to EBP are started in North America and UK and disseminated worldwide; many studies of uptake in EBP on these contexts but not yet studied in Saudi Arabia.

WHAT IS THE PURPOSES OF THIS STUDY?

The purposes of this study are to determine the beliefs, attitudes, and knowledge of physical therapist those are practicing in Saudi as they relate EBP; to estimate the factors associated with beliefs, attitudes, and knowledge toward EBP; to define the current clinical practice of the physical therapist particularly in wrist/hand management in Saudi clinics; and to determine to which extend the internship students are expose to EBP.

WHAT WILL MY RESPONSIBILITIES BE IF I TAKE PART IN THE STUDY?

If you volunteer to participate, you will be asked to answer the English survey. It will take approximately- 20 15minutes to complete.

WHAT ARE THE POSSIBLE RISKS AND DISCOMFORTS?

There are no foreseeable risks associated with this study. You may feel worried about your responses. There are no right or wrong answers and your responses will be kept confidential so you should feel comfort and not worry at all.

HOW MANY PEOPLE WILL BE IN THIS STUDY?

There will be at least 100 participants in the study.

WHAT ARE THE POSSIBLE BENEFITS FOR ME AND/OR FOR SOCIETY?

We cannot promise any personal benefits to you from your participation in this study. However, the results of this study may benefit the scientific community by providing an overview of physios' beliefs, attitude and knowledge about evidence-based practice and standard outcome measures and barriers. The physical therapists in Saudi Arabia will be more aware about their current practice. In addition, it will help the academia and supervisors to focus on the limitation at the working setting

WHAT INFORMATION WILL BE KEPT PRIVATE?

Your data will not be shared with anyone except with your consent or as required by law. If the results of the study are published, your name will not be used and no information that exposes your identity will be released or published without your specific consent to the disclosure.

WILL THERE BE ANY COSTS?

There are no costs associated with this study.

IF I HAVE ANY QUESTIONS OR PROBLEMS, WHOM CAN I CALL?

If you have any questions about the research now or later, please contact: **Fatmah Hasani**, principal investigator at 905-920-3959

This study has been reviewed by the Hamilton Integrated Research Ethics Board (HIREB). The HIREB is responsible for ensuring that participants are informed of the risks associated with the research, and that participants are free to decide if participation is right for them. If you have any questions about your rights as a research participant, please call the Office of the Chair, Hamilton Integrated Research Ethics Board at 905.521.2100 x 42013.

I understand the terms of participation as outlined above and by clicking on the Agree button below I am giving my consent to participate in the study.

[Include an Agree and Sign immediately following this statement]

Appendix D. Study notifications

Long version:

Call for physiotherapists (both Saudis and Internationals) working in clinics in the kingdom of Saudi Arabia to be participant in a THESIS study – Please answer the English survey which was designed to determine the beliefs, attitudes, and knowledge related to evidence-based practice (EBP). It consists of three sections, and it may take around 15-20 minutes to fill up the questionnaire. Check the link below:

http://painplussurveys.mcmaster.ca/index.php?sid=25744&newtest=Y&lang=en This study reviewed and approved by the Hamilton Integrated Research Ethics Board in Canada. If you have any questions regarding the study, please feel free to contact Fatmah Hasani, Masters (candidate), at 905-920-3959 or hasanf@mcmaster.ca

Thank you for your support in this research! Note: If you have already answered the paper form of this survey, you are expecting not to respond to this invitation.

Short version:

Call for physiotherapists (both Saudis and Internationals) working in clinics in the kingdom of Saudi Arabia to be a participant in a THESIS study – Check the link below:

http://painplussurveys.mcmaster.ca/index.php?sid=25744&newtest=Y&lang=en

Note: If you have already answered the paper form of this survey, you are expecting not to respond to this invitation. Please pass this message to your colleagues either if they are interns, technicians, and therapists.

Appendix E. Descriptive statistics

TABLE 11. Self-reported attitudes and beliefs toward EBP and research findings

		EBP		Research Findings	
		Frequency	Percent	Frequency	Percent
Valid	very useful	29	45.3	20	31.3
	somewhat useful	28	43.8	33	51.6
	no opinion	2	3.1	4	6.3
	not useful	3	4.7	5	7.8
	Total	62	96.9	62	96.9
Missing	System	2	3.1	2	3.1
Total		64	100	64	100

TABLE 12. Self-reported confidence toward using EBP and taking a clinical decision

		Use EBP		Clinical Decision Making	
		Frequency	Percent	Frequency	Percent
Valid	completely	13	20.3	17	26.6
	a lot	24	37.5	27	42.2
	moderately	19	29.7	16	25.0
	somewhat	2	3.1	3	4.7
	a little	4	6.3	0	0
	not at all	1	1.6	0	0
	Total	63	98.4	63	98.4
Missing	System	1	1.6	1	1.6
Total		64	100	64	100

TABLE 13. The frequency of respondents' exposed to EBP in the foundational training

		Frequency	Percent
Valid	completely	6	9.4
	a lot	15	23.4
	moderately	22	34.4
	somewhat	7	10.9
	a little	9	14.1
	not at all	5	7.8
	Total	64	100

TABLE 14. Knowledge of EBP terminology

	Relative Risk		Systematic Review		Confidence Interval		Bias	
	n	%	*n*	%	*n*	%	*n*	%
Understand completely	29	45.3	29	45.3	10	15.6	11	17.2
Understand somewhat	28	42.2	26	40.6	35	54.7	27	42.2
Do not understand	7	10.9	8	12.5	19	29.7	26	40.6
Missing	1	1.6	1	1.6	0	0	0	0
Total	63	100	63	100	64	100	64	100

TABLE 15. Descriptive statistic for courses number

		Frequency	Percent
Valid	<3	39	60.9
	4-6	21	32.8
	7-10	3	4.7
	>10	1	1.6
	Total	64	100

TABLE 16. Descriptive statistic for availability of online access at work

		Frequency	Percent
Valid	Yes, I use it	24	37.5
	Yes, I don't use it	13	20.3
	No, but I use it at home	25	39.1
	No, I don't care	2	3.1
	Total	64	100

Where, **Yes, I use it**= they have access at work and they use it; **Yes, I don't use it**= they have access at work but they don't use it; **No, but I use it at home** = they don't have access at work but they use the home internet instead; **No, I don't care**= they don't have access at work and they are not interesting to search

TABLE 17. Frequency of reading articles

		Frequency	Percent
Valid	every day	2	3.1
	every other day	7	10.9
	weekly	22	34.4
	monthly	21	32.8
	never	5	7.8
	other	7	10.9
	Total	64	100

TABLE 18. **Frequency of EBP Adoption**

		Frequency	Percent
Valid	all the time	7	10.9
	regularly	10	15.6
	frequently	19	29.7
	occasionally	23	35.9
	almost never	4	6.3
	Total	63	98.4
Missing	System	1	1.6
Total		64	100

TABLE 19. **Proportions of availability of online access at work and place of training**

			Online access				χ^2
			Yes, use it n (%)	Yes, not use n (%)	No, use @ home n (%)	No, not care n (%)	
training	Saudi	Count	16(34.8)	6(13)	22(47.8)	2(4.3)	***.001***
	Abroad	Count	8(44.4)	7(38.9)	3(16.7)	0(0)	

χ^2= Chi-squared test

CHAPTER TWO

Cross-cultural Adaptation and Psychometric Testing of the Arabic Version of the Patient-Rated Wrist Hand Evaluation (PRWHE-A) in Saudi Arabia

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Note: *this manuscript is formatted for submission to Journal of Hand Therapy*

Abstract:

Background: The Patient-Rated Wrist and Hand Evaluation (PRWHE) is a joint-specific tool developed to measure wrist/hand pain and function. The measure was found to be reliable and valid. Although alternate language versions of the PRWHE are available, there is no Arabic one; thus the potential application to a large population (there are at least 24 Arabic-speaking countries) is limited.

Purposes: The purposes of this study was to 1) perform a cross-cultural Arabic translation for the PRWHE using standardized guidelines and, 2) to test the psychometrics properties of the translated measure: the Arabic version of Patient-Rated Wrist and Hand Evaluation (PRWHE-A).

Methods: A total of 48 patients with variety of hand disabilities, a mean age of 47±16 years were recruited and assessed two times (before their treatment session, and after their session to one day later). The Intraclass Correlation Coefficient (ICC) was used for assessing test-retest reliability of the PRWHE-A and its subscales while Cronbach's Alpha (CA) was used for assessing the internal consistency. Construct validity was assessed by examining the strength of the correlation between the PRWHE-A and the Arabic version of the Disability of the Arm, Shoulder and Hand (DASH-A).

Results: The PRWHE-A demonstrated excellent test-retest reliability and internal consistency at ICC=0.97(95% confidence interval, 0.95-0.98), and CA=0.96, respectively. The DASH-A demonstrated moderately to low correlation ($r=0.64$; $P < 0.001$) with the PRWHE-A.

Conclusion: The results of this study indicated that PRWHE-A is a reliable and valid assessment tool and can be used in patients with different wrist/hand disabilities whose primary language is Arabic.

Level of Evidence: N/A.

J HAND THER.

Key words: The Patient-Rated Wrist and Hand Evaluation, the Disability of the Arm, Shoulder and Hand, PRWHE, DASH, Arabic translation, cross-cultural adaptation, cross-cultural comparison, outcome assessment, Self-report, Wrist, Hand

2.1. INTRODUCTION

With a growing emphasis on patient-centered care, patients' self-reported outcome measures (PROs) provide a standard approach to measuring health and disability associated with musculoskeletal disorders.[1] The usability and practicality of PROs in hand clinics are recognized and appreciated.[2-5] First, this method uses a patient-centered care approach by engaging the patients in the clinical decision-making process. Second, PROs determine the condition of patients at the time of assessment and track their progress over time. Third, it enables hand therapists to ensure that a change in a patient's status is attributed to the effectiveness of their intervention.[6] Finally, PROs are designed to be easily administered and time efficient. PROs can be joint-specific, condition-specific or generic measures of a parson's function and disability. In clinical practice, selection of such an outcome measure within a particular context is based on the intention of the measurement such as symptoms and functional status, as well as the measurement properties of the tool itself.

Different outcome measures have been developed to help clinicians assess hand pain and disability from the perspective of their patients. The Disability of the Arm, Shoulder and Hand (DASH)[7] questionnaire is a regional outcome measure introduced by the American Academy of Orthopedic Surgeons in collaboration with the Institute for Work & Health.[8] The DASH contains 30 items designed to assess the symptoms and function of the upper extremity at the person level. It takes the patient about 10–15 minutes to complete.[9] The DASH questionnaire is proven to be the most clinically used outcome measures due to its reliability, validity and responsiveness

among numbers of upper extremities pathologies.[7-8] It has been adapted and validated for use in Arabic language as well as others.

Subsequently, the Patient-Rated Wrist and Hand Evaluation (PRWHE)[10-13] is one option that has shown excellent reliability and validity across different clinical conditions.[12] It is designed to measure pain and function of wrist/hand joints. It takes on average 6 minutes to complete. It has been suggested that the PRWHE should be preferred over the DASH when assessing wrist function since it is a joint-specific tool.[12] Furthermore, the PRWHE is shorter than the DASH and is more quick and easy to fill out.[14] Although alternate language versions of the PRWHE are available, there is no Arabic version of the PRWHE.

The results of this study may benefit Arabic-speaking countries that are just starting hand therapy services by providing scientific evidence of a valid and reliable tool that can help health care providers improve their care of patients with hand pain and disability. Simultaneous development of hand therapy specialization, which incorporates greater focus on patient-reported outcomes, might facilitate better management of hand injuries in Saudi Arabia in the future. The aim of this study was to perform a cross-cultural translation of the PRWHE using standard translation procedures and to test the psychometrics properties of the translated measure.

Study Objectives:

1. To cross-culturally translate the PRWHE into Arabic.
2. To test the clinical measurement properties of the translated version to ensure it retains expected measurement properties.

Hypotheses:

1. Since the English version of the PRWE has high reliability and internal consistency,[13] we anticipated that the Patient-Rated Wrist and Hand Evaluation-Arabic (PRWHE-A) and its subscales would also have high reliability and internal consistency as demonstrated by the The Intraclass Correlation Coefficient (ICC) and Cronbach's Alpha (CA), respectively. The value of CA $\geq$ 0.7 is considered to indicate satisfactory internal consistency [14] and reliability.[15]
2. The PRWHE-A would demonstrate moderate concordance (r value between 0.5 and 0.8) with the Disability of the Arm, Shoulder and Hand-Arabic (DASH-A).

2.2. MATERIAL AND METHODS

Phase 1— Translation of PRWHE-A Questionnaire

The five-step cultural translation guidelines proposed by Beaton et al.[16-18] were followed in adapting and translating the standard version of the PRWHE into Arabic. Per these guidelines, the following steps to translation were taken as shown in Figure 1. Two independent bilingual physiotherapists, who were fluent in Arabic, produced the initial translations (FT1, FT2). Neither of these two were professional translators nor were they language specialists. Only one translator was aware of the concepts being examined in the original questionnaire.

The two translated versions were compared for discrepancies by one of the authors (FH). These were discussed with the developer (JM) and synthesized into one version (FT_12) by a third independent translator, who had no clinical background, to

detect any interpretation issues for patients. The synthesized version was back-translated independently (BT1, BT2) by two bilingual linguistics experts who live in Saudi Arabia, Jeddah and operated certified translation services for more than 15 years.

An expert committee, which consisted of the forwards and back translators (n=3), physiotherapists (n=3), linguistic experts (n=2), and the developer (n=1), reviewed the synthesized translated version and the back-translated version. Item numbers 6, 7, 10, and 11 were modified in order to improve the practical equivalence of the translated questionnaire. The committee evaluated consolidated versions and approved the pre-final version of the questionnaire for clinical testing.

A sample of 6 patients (3 female and 3 male) with different hand conditions tested the pre-final version using a cognitive interview process.[19-20] The cognitive interviewing process is a method for evaluating self-report survey questionnaires. It was developed to collect additional information about the questionnaire responses to determine whether the questions address what the questionnaire intended to measure.

Therefore, this step was done to test whether respondents understood the items, how they determined their responses, and whether items were acceptable given the values, beliefs and characteristics of the target population.[18] Each subject was asked to answer the questionnaire and then discuss their response (i.e., how they interpreted each item on the questionnaire) with the interviewer. For more information about the process see Appendices A-E.

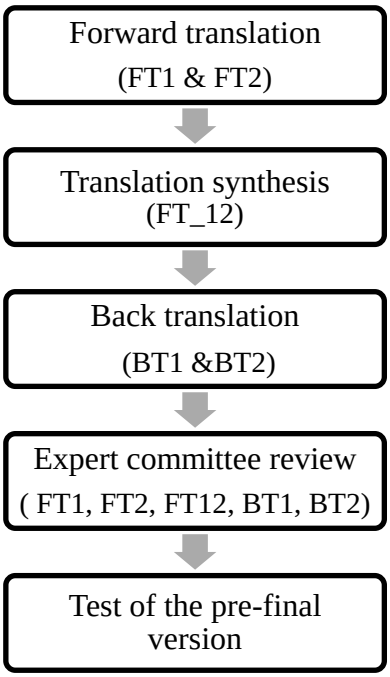

***FIGURE 1**: Cross-cultural adaptation process of the PRWHE-A*

Where, FT1= first initial translation version; FT2= second initial translation version; FT_12= synthesized initial translation version; BT1= first backward translation version; BT2= second backward translation version

Phase 2— Testing the Psychometric Properties of PRWHE-A Questionnaire

I. Study Design

This study had a cross-sectional design. The main purpose was to estimate the test–retest reliability, internal consistency and validity of the Arabic version of PRWHE and DASH. The study was conducted at King Abdul-Aziz University (KAU) educational hospital, a governmental setting in Saudi Arabia, where the national language is Arabic.

II. Patient- report Outcome Measures

The PRWHE questionnaire

The PRWHE is a 15-item questionnaire (5 ‘pain,’ 10 ‘function’ items), designed to measure pain and function of wrist and hand joints.[10,13] The PRWHE is an alternate version of PRWE that was described by MacDermid et al. in 1996.[13] The

term “wrist” was replaced with “wrist/hand” in the latest version.[12] Two optional questions about hand aesthetics have been added to PRWHE.[12] The PRWHE was re-validated in this format in 2004.[11] Items are scored on a 0-10 metric where 10 is the worst possible score. The total score is calculated by the sum of the pain items, plus the half of the sum of the function items. The maximum score is 100, with higher scores indicating maximal (sever) pain and function. The optional set of PRWHE questions are not included in the PRWHE total score,[11-12] and it was not used in this study.

The test-retest reliability for the total score of the PRWE was excellent over both the short-term (2-7 days) and long-term (1 year) (ICC >= 0.90, 0.91 respectively).[13] The PRWE moderately correlates with impairment measures (r = -0.52, -0.61), for radius and scaphoid groups, respectively.[13] The PRWE has been translated into multiple languages including Chinese (Hong Kong),[21] German,[22-23] Swedish,[15,24] Dutch,[25] Japanese,[26] Hindi,[27] Italian[28] and Korean.[29]

The DASH questionnaire

The DASH is a 30-item questionnaire designed to assess the symptoms and function of the upper extremity.[7-8] Twenty-one items inquire about the degree of difficulty while performing different physical activities using the arm, shoulder, or hand. There are five items that measure the severity of pain symptoms, tingling, weakness and stiffness, and four items address the impact of the disability on social activities, work, sleep, and self-image. Each item is scored from 0 to 5, where 0 represents no difficulty or no pain, and 5 represents the inability to perform the task or severe pain.[8] The final score, out of 100, can be calculated using the following formula:

DASH Score $=\{(\text{sum of n responses}) - 1\} \times 25$, where n refers to the number of completed responses.[6]

The DASH questionnaire is frequently used to measure outcome due to its reliability, validity and responsiveness across a number of hand pathologies.[30-31] It has been translated and adapted in several languages including French,[32] German,[33] Italian,[34] Spanish,[35] and Swedish.[36] In 2010, a cross-cultural study adapted the DASH into Arabic (DASH-A) and tested the Arabic version with 20 Arabic patients presenting different upper extremities conditions.[37] The translation of the Arabic version addressed language and cultural considerations, and found adequate face, content validity and high internal consistency at Cronbach's alpha = 0.96. The DASH-A license was issued and posted on the official DASH website: http://www.dash.iwh.on.ca/translate.htm.[7] Further evaluation of the psychometric properties of the DASH-A is required to support the utility of the Arabic version of the questionnaire as an upper extremity outcome measure.

III. Reliability

Test-retest reliability of the PRWHE-A requires testing of responses over a stable interval. Given the relatively acute nature of the hand conditions in our sample, participants were retested within 24 hours. Since there is no standard time interval recommended for retesting,[38] we made the decision to re-test at a stable interval [39] with minimal recall bias.[40] Consequently, the PRWHE-A was administered for the first time before the treatment session and was administered for a second time along with the DASH-A questionnaires after the session (re-test time ranged from 30 to 60 minutes to one day). We expected the same high reliability in this study to demonstrate that the PRWHE-A provides reliability consistent with the original

version. [14,23-24,26,28-29] The relative reliability sample size assumptions were as follows: we expected to obtain a test-retest reliability of 0.90; we desire a low 1-tailed 95% confidence interval width of 0.10. Anticipating that 80% of the sample will provide complete data, we will need to enter 57 patients into the study. (See Appendix F)

IV. Validity

Validity is the ability of whether an instrument can measure what it is designed to measure.[40] Construct validity is the most common type of validity reported in the previous cross-cultural validations of the PRWE.[13] Construct validity of a self-reported questionnaire is usually assessed by examining the strength of the relationship with other outcomes that measure similar constructs. In cross-cultural validation, it is expected not only that instruments demonstrate validity but that the performance should be consistent with the original version. In this study, construct validity was examined by assessing the relationships between the PRWHE-A with the DASH-A. (See Appendix G) Our hypothesis was that the PRWHE-A should correlate to the DASH-A to the same extent that has been reported in previous studies of the English versions of these questionnaires,[12] including the cross-cultural translation studies.[22-24,25-27,28-29]

V. Procedure

Prior to subject recruitment, ethics clearance was obtained from Hamilton Integrated Research Ethics Board and the Biomedical Ethical Research Committee of the Faculty of Medicine at KAU. Potential participants with a variety of wrist/hand conditions were recruited from physiotherapy (PT) and occupational therapy (OT) departments of KAU educational hospital, Jeddah City, Saudi Arabia. All patients were conservatively managed.

Study inclusion criteria were patients over the age of 18 with wrist/hand disability including musculoskeletal conditions such as direct trauma or injury (e.g., car accident, fall, sports injury); radiculopathy cases (i.e., radiated pain from neck or shoulder problems); pinched nerve (e.g. trigger finger and carpal tunnel syndrome); arthritis; muscle strain or ligamentous sprain or neurological cases such as functional disability after stroke; ability to speak Arabic fluently; and patients who had received PT or OT treatment sessions. Patients were required to have at least a primary school education (6 grades) to ensure they could explore the meaning of items and their responses adequately. We excluded patients if they had had cognitive, linguistic or vision impairment that limited their use of the questionnaire.

Therapists informed eligible patients about the study and asked them to participate when they presented at either PT or OT departments. Subsequently, either the first author (FH) or the research assistant approached each patient for further details and for consent. Patients read the patient information letter and signed a consent form before completing study forms or starting their sessions, which were either during their assessment session for new patients or treatment session for follow-up. This was considered the baseline of the study. Treatment sessions were customized to individual patients according to presenting diagnosis and were not dictated by this study.

Participants were recruited from April to May 2014 in two phases: phase I to test the pre-final version of PRWHEA, and phase II to test the psychometric properties of the final version of the translated questionnaire as well as to validate the DASH-A. Each participant in phase I was interviewed face-to-face by the same person (FH). In phase II, participants were asked to complete the PRWHE-A and DASH-A before

their treatment session and again within 30 minutes to 24 hours of its first completion. Before completing both questionnaires, the author or assistant asked participants to read the instructions carefully and verify their understanding of the items. Researchers asked patients to complete all questions of both questionnaires, and advised to answer all questions with the exception of item 21 (sexual activities) in the DASH-A, which is optional in the Arabic version due to cultural norm considerations. Questionnaires were considered valid if they reached adequate completion: no more than two missing values in the PRWHE-A pain subscale, no more than four missing values in the PRWHE-A function subscale [14] and no more than three for the DASH-A.[8]

Participants were encouraged to ask questions if they required assistance or clarifications. Participants' feedback was recorded during the data collection. The first author (FH) and a research assistant assisted as necessary (i.e., writing down patient responses if their injured hand was the dominant one). The research assistant was a skilled physiotherapist (more than 2 years work experience) who works in the PT department of the KAU hospital, where the study was conducted. A one-day workshop was held by the first author (FH) to train the research assistant to collect the data in order to minimize any potential error.

VI. Data Analysis

Questionnaire data was transformed from hard copy to an Excel spreadsheet, and then data was quality-checked with visual inspection and score calculation for random subjects. All statistics were conducted in IBM SPSS 22. All tests were two-sided, with α=0.05 and associated 95% confidence intervals were calculated.

Test-retest reliability of the PRWHE-A and its subscales were assessed by obtaining the ICC values.[41] The limit of agreement was determined as described by

Bland and Altman where the differences in scores on retest was plotted against the mean occasion scores,[42-45] homoscedasticity was determined and a histogram of differences was graphed. The CA was used to examine the internal consistency of the PRWHE-A and its subscales. Construct validity was examined by assessing the relationships between the PRWHE-A with the DASH-A. To determine the construct validity, Pearson correlations were conducted between the PRWHE-A and the DASH-A. The data for the first assessment session was used for assessing construct validity. For more information see Appendix H.

2.3. RESULTS

A) Cross-cultural Adaptation of PRWHE-A

Overall, the PRWHE is linguistically simple. There were no major differences between the forwards and back translations of the questionnaire. Only 4 items required discussion and modification by the committee as a result of notable deviations from the original. Consensus was always found within the committee regarding any changes. To the encountered language barriers, issues pertaining to cultural differences were identified and addressed. For example, since the lever arm door handle is the regular type of hardware in cultural context of Saudi Arabia, it was decided that for item 6, which mentions ‘‘Turn a door knob using my affected arm’’ that the phrase “door knob” should be replaced with the experiential equivalent of the same function. Since the purpose of the item was to test the ability to pronate and grip with fingers, the phrase “door knob” was replaced with “using a key to open a closed door.” A similar modification for this item occurred in both Swedish and Italian versions of PRWE.[24-25,29-30]

There was some concern related to item 7, “cut meat using my affected hand” since using the hand while eating meat is the culture norm in Saudi Arabia. To address this concern, we replaced “meat” with “fruit.” It was interesting to note that same item was also modified in the Hindi versions [27] of PRWE, where many Indian people are vegetarians. This item was also changed in the Korean version since Koreans rarely use a knife to cut meat (life habit).[29] Also, it would not have been easy for patients to estimate the weight of an object described in pounds as mentioned in question 10: ‘‘Carry a 10 lb object in my affected hand’’ since imperial measurements are not commonly used in Saudi Arabia. Therefore, we converted 10 lb to 5 kg to be in line with the common metric system of measurement. This item was similarly modified in the German, Hindi and Korean versions of PRWE.[22, 27,29] Moreover, question 11, ‘‘Use bathroom tissue with my affected hand’’ was modified since most people in Saudi Arabian culture are Muslim, and tissue is not the only cleaning method while using the bathroom within the cultural context. Therefore, it was decided to add ‘washer’ to the inherent variability in this practice. In the validation of Hindi version, this item was also problematic but they have chosen to do a literal translation.[27]

Following the committee review, the cognitive interviews were commenced. The time of the interview and the type of questions varied from one participant to another depending on their input. In general, the average time for the interviews was 20 minutes. The testing of the pre-final version of the translated questionnaire did not present any further changes to those items with the exception of item number 1 in the pain scale, ‘‘rate your pain at rest,’’ where most patients (4 out of 6) in the pilot test asked for clarification about the phrase “at rest.” After considerable discussion between the committee and authors, a consensus was arrived to capture the essence of

the phrase to refer to non-effort or, in lay language, 'doing nothing.' Due to these semantic concerns, we added 'spare time' in brackets to clarify the context. After the cognitive interview and based on the recommendations of the reviewers, we modified and finalized for the cross-culturally adapted the PRWHE-A as shown in Table 1. The final version of the PRWHE-A attached in Appendix E.

TABLE 1. **List of issues and decisions made in the PRWHE-A**

Items number	***The original items***	***Problems***	***Solutions***	***The final translated items***
1	At rest	Lack of clarity of phrase "at rest" in the pre-final test	Wordings were clarified by giving an example (spare time)	When you are in relaxing
6	Turn a door knob using my affected hand	Door knob is uncommon hardware in Saudi Arabia	Revised to functional equivalents (turn a key)	On using keys to open closed door using my affected hand
7	Cut meat using a knife in my affected hand	Cutting meat using knife is less relevant to the Arabic culture	Revised to functional equivalents (cutting fruits)	On using knife to cut foods by affected hand.
10	Carry a 10lb object in my affected hand	Imperial unit of weight (10 lb) is uncommon in Saudi Arabia	Revised to metric equivalents (5 kg)	On carrying heavy weight with affected hand reaching 5kg
11	Use bathroom tissue with my affected hand	Use tissue for hygiene was less relevant to the Arabic culture	The activity was adjusted by adding an example of functional equivalents (a washer)	On using bath tissues (or washer) with my affected hand

Where lb= libra/pound; kg= kilogram

B) Psychometric Tests PRWHE-A Questionnaire

The study consisted of 48 patients (33 female and 15 male) with a mean age of 47±16 years, with participants ranging from 18 to 68 years of age. The sample included a mix of acute and chronic cases. The majority of the sample had unilateral hand disability and were right-handed. The rates participants provided consent for participating was 96% (i.e., 48 out of 50 patients gave their consent). Out of the 48 patients, 23 had their non-dominant side on the affected side and 3 had both hands affected. The participants' completion rate was 96%; 46 patients were tested on two occasions. For unknown reasons, two patients didn't return for their second testing. Detailed patient information is in Table 2.

Nine patients (19%) left at least one item in the PRWHE unanswered. The missing values in the PRWHE-A mainly concerned the question about recreational activities. Furthermore, item 21 'sexual activity' was the most missed item in the DASH-A questionnaire, and that was because such activity was less appropriate to be discussed in public. Twenty-one women (43.75%) and 6 men (12.5%) left this item unanswered. They did so because they were unmarried, widowed, or felt it was inappropriate to discuss in public.

Missing values for the PRWHE-A questionnaire was replaced by the mean value of the responding items within each scale.[13] No patient was excluded from the analysis of the PRWHE-A and DASH-A questionnaires scores due to missing items since adequate completion rates were obtained.

TABLE 2. **Demographics of the patients**

Parameter	***Statistic*** % (n)
Total number of patients; [mean age ±SD]	48; [47 ±17]
Male; [mean age ±SD]	31.25 (15); [47 ±12.9]
Female; [mean age ±SD]	68.75 (33); [49.4 ± 11.7]
Onset (Acute/ Chronic)	Acute,45.8 (22) Chronic, 54.1(26)
Population:	
	Pinched nerve, 22.91 (11) Trauma, 22.91 (11) Neck problem,18.75 (9) Stroke, 14.58 (7) Arthritis, 8.33 (4) Muscle strain, 6.25 (3) Others, 6.25 (3)
Nationality:	
• National - • Arabic speaker immigrants -	Saudi, 47.9 (23) Yemini, 12.5 (6) Syrian, 8.33 (4) Jordanian, 6.25 (3) Egyptian, 6.25 (3) Sudanese, 4.16 (2) Palestinian, 2 (1) Ethiopian, 2 (1) * Pakistani, 2 (1) *
Type of employment:	
	Housewife, 43.75 (21) Office work, 16.6 (8) Retired, 12.5 (6) Student, 4.1 (2) Teacher, 4.1 (2) Driver, 2 (1) Plumber, 2 (1) Other, 4.1 (2)
Affected side (Right/Left/Both)	Right,48 (23) Left,42 (20) Both,10 (5)
Hand dominance (Right/Left)	Right,91.6 (44) Left, 8.33 (4)
Educational level:	
	Post secondary level, 41.6 (20) Secondary level and below, 58.3 (28)

SD= standard deviation
*The Arabic language is not the first official

Reliability of PRWHE-A

Descriptive statistics (mean ± standard deviation) of the PRWHE-A scores and its subscales across two occasions are shown in Table 3. Test-retest reliability and internal consistency as shown in Table 4 were excellent (≥0.89) for the PRWHE-A and its subscales and were consistent with our hypothesis. Figures 2 and 3 display the limit of agreement of the differences in scores on retest.

TABLE 3. **Descriptive statistics PRWHE-A, its subscales for two occasions**

	First occasion		***Second occasion***	
Variable	***Mean***	***SD***	***Mean***	***SD***
PRWHE-A pain subscale	25.76	15.53	24.67	15.37
PRWHE-A function subscale	24.55	13.29	24.95	13.40
PRWHE-A total	50.20	25.77	49.55	26.04

SD= standard deviation; PRWHE-A=patient-rated wrist hand evaluation-Arabic

TABLE 4. **Reliability and internal consistency of PRWHE-A and its subscales**

Outcome	***ICC (95% CI)***	***CA***	***MDC_{95}***	***MDC_{90}***	***SEM***
PRWHE-A pain subscale	0.93 (0.89, 0.97)	0.93	6.09	5.10	2.2
PRWHE-A function subscale	0.94 (0.89, 0.97)	0.94	5.26	4.4	1.9
PRWHE-A total	0.97(0.95, 0.98)	0.96	10.2	8.58	3.7

PRWHE-A=Patient-Rated Wrist Hand Evaluation-Arabic; ICC =intraclass correlation coefficient; CI= confidence interval; CA= Cronbach's alpha; MDC_{95}= minimum detectable change at 95%, MDC_{90}= minimum detectable change at 90%; SEM= standard error of measurement

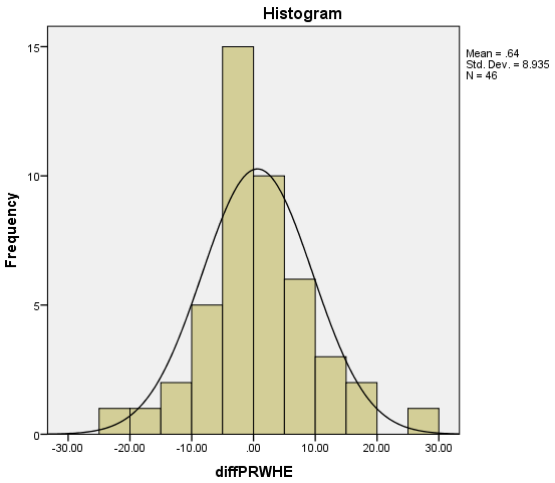

FIGURE 2. *PRWHE-A difference score.*

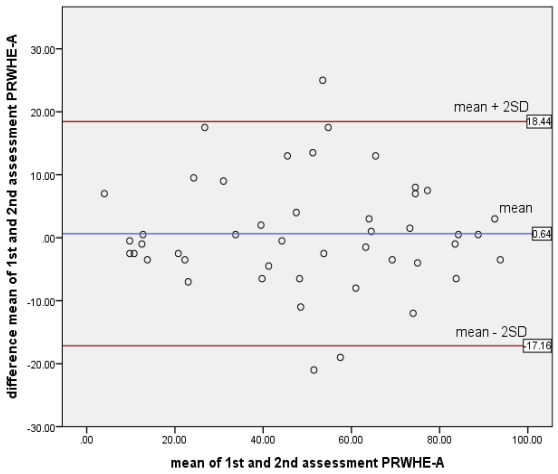

FIGURE 3. *The agreement between PRWHE-A score s on first and the second occasion.*

Construct Validity of PRWHE-A

Table 5 demonstrates the correlations between the PRWHE-A and DASH-A. The PRWHE-A showed moderate correlation with the DASH-A (r=0.6), which is consistent with our hypothesis.

TABLE 5. **Correlation between the measures**

Outcome		***DASH-A***	***P value***
PRWHE-A pain subscale	Pearson Correlation	0.44**	0.002
PRWHE-A function subscale	Pearson Correlation	0.66**	0.000
PRWHE-total	Pearson Correlation	0.64**	0.000

** Correlation is significant at the 0.01 level (2-tailed).
PRWHE-A= Patient-Rated Wrist Hand Evaluation-Arabic; DASH-A= Disability of the Arm, Shoulder and Hand- Arabic

2.4. DISCUSSION

This study provides an Arabic cross-culturally adapted version of the PRWHE that demonstrated strong clinical measurement properties including reliability, internal

consistency and validity of the PRWHE-A in patients with a variety of hand conditions; that is consistent with the measurement properties of the original version. The PRWHE-A will provide a promising useful tool for hand therapists while assessing Arabic-speaking patients in Saudi Arabia and worldwide.

The test-retest reliability of the PRWHE-A and its subscales was excellent with ICCs $_{2,1}$ ranging from 0.89 to 0.98 in our study, which was consistent with our predefined hypothesis of obtaining high reliability. One possible reason we achieved such a high magnitude of reliability is the heterogeneity of our sample that included patients ranging from mild to severe hand disability, resulting in a high variance in scores between patients.[39] The other potential is the short retest intervals (30 minutes to 24 hour) because the time frame of this study was short. Our ICC values were close to the reported values in previous studies that examined the reliability of the translated or original versions of the PRWE, where ICCs exceeded 0.90.[14,23-24,26,-28-29] High reliability for the PRWHE has now been reported in a variety of contexts, retest intervals and patient populations.[14,23-24,27,29-30]

Moreover, the values for the CA were comparable to previous studies that assessed the internal consistency of the translated versions.[19-24, 25-26,28-29] The CA for the PRWHE-A was 0.96 for a total score, and 0.93 and 0.94 for the pain and functions subscales, respectively. These values represented a high internal consistency (i.e., that all items are consistent to each other). Some might suggest that such high internal consistency would imply that some items could be deleted while retaining sufficient internal consistency, but since the PRWHE currently only takes 2 to 3 minutes to complete, this did not seem necessary. Further, the goal of cross-cultural translation is to provide a validated version of the original questionnaire, not to change it.[16]

Most of the studies were able to assess the relationship of the PRWE with a region-specific scale such as the DASH,[22-26,28-29] global health status measure such as the 36-item short form health survey,[21,23,28] and impairment outcomes such as visual analog scale,[26-27,29] range of motion [22,27,29] and grip strength.[29] Fortunately, our study was able to use the recently translated DASH-A as a comparator. We analyzed the DASH-A because it is an Arabic licensed instrument that could be applied to evaluate numerous upper extremity pathologies irrespective of the joint sites.[46] We hypothesized that the DASH and PRWHE would demonstrate moderate Pearson's correlation because they both address pain and function in the upper extremity. The reasons why this correlation should be less than perfect include that the disability is measured at a different level (the DASH at the person level and the PRWHE at the level of the injured hand), that the PRWHE focuses on the wrist and hand only, the PRHWE has a more explicit focus on pain. Our results are consistent with the a priori hypothesis, and agree with data reported in English version-based studies where the PRWE demonstrated moderate concordance ($r > 0.5$) with the DASH.

We obtained relatively low rates (2%) of missing data on questionnaire items other than the questions that we anticipated would be problematic, which confirms that the PRWHE is user-friendly. The missing values in the PRWHE-A mainly concerned the item of recreational activities (item number 15). Most of the respondents were women, and many were housewives with an average age of 49 years; it would be common for this subset of our sample to have a sedentary life in a Saudi population.[47] This may explain why the item regarding difficulty in doing recreational activities resulted in several missing values. Moreover, tendon-related disorders[51-55] were the most common etiology in our sample. These disorders can be

classified as work-related musculoskeletal disorders or repetitive strain injury, which is defined as a trauma resulting from repeated force on soft tissue over a prolonged period leading to inflammation and subsequently to the disorder. Tendon-related disorders included cases of trigger finger tenosynovitis, medial and lateral epicondylitis, shoulder tendonitis, and neck tension syndrome. Hence, the gender distribution in our sample may reflect differential rates of underlying musculoskeletal disorders. Representation of other pathologies would have improved the generalizability of our findings.

Since the use of PRO is not a common practice in physiotherapy in Saudi Arabia, many of the patients in our study needed greater explanation of the purpose of the questionnaire and how to the determine their responses, since they did not have a frame of reference for self-reporting. In contrast, in North America self-reporting is more common[2-3]; patients may fill out self-reports by mail or while sitting in the waiting area. This practice might not be appropriate in circumstances where patients have never been exposed to such a concept, and this would explain an issue that arose during the data collection of this study. We needed to ask the patients to fill in the questionnaire in our presence to ensure adherence and because patients needed more explanation. We believed that mailing questionnaires might have resulted in more missing values and greater misinterpretation of the questionnaire; hence, the mailing method is not advisable at present. Therefore, we chose to do an interviewer-administered questionnaire rather than a mailed questionnaire.

Despite the fact that the DASH-A had been previously validated in the Arabic population,[37] we did observe some difficulties with interpretation during the data collection in our study. The impact of handedness was unclear for some participants.

The DASH was designed to measure disability at the patient level, so injuries in non-dominant hands were expected to cause less disability.[48] The instruction sentence was rephrased in the DASH-A adaptation. The sentence was rephrased as ‘when answering the questionnaire items, it does not matter which hand or arm you use to perform the activity whether the injured or the uninjured one’.[37] However, some patients assumed that the questionnaire was about their injured hand. This may reflect the patient’s current focus on their injured hand since the instructions for the DASH-A are quite clear.

Item 4 in the DASH “prepare a meal," demonstrated some cultural issues. In our study, 7 out of 15 male patients indicated that the activity did not apply to them because they believed that this was a female activity. Although the intended interpretation was clearly grasped by those patients, they recommended adding the text of such activity example that captures the daily activities for men such as ‘prepare cup of tea or coffee.' However, in the validation paper of the DASH-A, it was clear that they did cognitive interviewing. Hence, it is necessary to point out that cognitive interviewing is a critical step in cross-cultural validation in order to pick up these sorts of cultural issues.

We contacted the author for more clarification regarding this item of gender role activities since household chores was modified, but making a meal was not noted in the adaptation paper. It was discovered that the issue of gender roles in item 4 was raised during the interview but it wasn’t significant enough to be changed.[49] A synonym for “prepare” was added in the DASH-A, and the intended interpretation was clearly explained to patients during the validation process by the interviewer. We hypothesized that the sample nationality in our study was the reason, since the

majority of the sample was from Saudi Arabia and Yemen and they might acknowledge the gender role more than others who were involved in the adaptation of the DASH-A.

The translation and adaptation of the PRWHE were carried out in cultural conditions that prevail in Saudi Arabia so the potential impact of this translation should be considered in this context. This could have resulted in bias in the study findings. Future studies should include a bigger sample size that represents a wider range of Arabic countries in order to compensate what, if anything, is missing in this study.

The Kingdom of Saudi Arabia is one of the most central cities on the Arabian Peninsula, with a heterogeneous population. In particular, the city of Jeddah is located on the east coast of the Red Sea. Its population is estimated around 3.4 million, and about 50% are immigrant.[50] Jeddah city is considered the second largest city after the capital, Riyadh, and a major sea port, which gives it major control of most of the economic activity. This is would explain the numbers of nationalities in the study, including the immigrants from non-Arabic speaking countries. Conservatively, we included two Arabic-speaking patients from Ethiopia and Pakistan although these are considered non-Arabic speaking countries. However, these individuals were born in Saudi Arabia, but were not eligible to be not involved in the Saudization program.

Although there are notable differences in “spoken” Arabic within the Arabic-speaking countries in both Asia and Africa, there are no grammatical or semantic differences in the use of the standard written language (Modern Standard Arabic). The PRWHE-A was tested on Arabic-speaking patients who represent 6 Arabic-speaking

countries other than Saudi Arabia. Thus, we believe that the PRWHE-A can be used with other Arabic-speaking populations.

Implications for hand therapy practice and research

PROs help identify the patients' needs and shift the practice to more patient-centered care. A recent survey in Saudi Arabia[56] indicated that 83% of physiotherapists agreed the PROs are useful. This suggests that it is an ideal time to ensure that cross-cultural validations of outcome measures are available to facilitate implementation in Saudi Arabia.

The use of the PRWHE-A will introduce and support a new area of research related to clients with hand conditions in Saudi Arabia. Clinicians will be able to compare their findings of patient responses to the data that was provided in this study and future studies in order to identify typical experiences of the patients. Also, this research might encourage communication among international hand therapy researchers.

Limitations

Despite our promising findings, we recognize there were some limitations in this study. The data collection of our study was limited to one geographical area, Jeddah city, in spite of the fact that we obtained results that were consistent with our hypotheses. We would have been able to establish more precise estimates had we measured a larger sample, and generalizability would have been improved if we included patients from the wider range of Arabic countries.

The short test-retest interval may have allowed for some recall bias where patients remembered their responses and overestimate reliability. However, since a substantial proportion of our patients had acute conditions, we felt the assessment over

several days was likely to introduce bias due to patient improvement. Since patients completed multiple questionnaires with a time lag of 30 to 60 minutes of distracting activity (treatment), we believe that recall bias was minimized.

Our sample was a convenience sample, and we cannot exclude the possibility of selection bias since the respondents represented patients who were willing to participate in our study. However, convenience sampling was performed in all studies of cross-cultural validation to which we compared our results. Finally, investigating the responsiveness of PRWHE-A questionnaire was not tested but may be an important area of focus for future research.

2.5. CONCLUSION

This study developed and validated the PRWHE for evaluation of patients whose primary language is Arabic. Some semantic and task changes were required to optimize application in a Saudi context; although an expert committee felt these changes have minimal impact on the nature of the items. The study determined that the PRWHE-A demonstrated measurement properties that support its use in practice and that are consistent with the original version.

Measuring the psychometric properties of the PRWHE-A and DASH-A outcome measures remains an ongoing field of study. Future work should be aimed at testing the responsiveness of the PRWHE-A across different hand conditions, testing its utility across different regions of Saudi Arabia, and testing in Arabic-speaking people living in other Asian and African countries.

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Appendix A. Summary of all phases of the process

Phase	**Documents**
I: Forward Translation (FT); Translation to target language	
FT1: Translation to Arabic (done by FH)	
FT2: Translation to Arabic (done by RH)	
FT1&FT2 agreed version (FT_12)	
II: Backward Translation (BT); blinded to the FT and the original questionnaire	
BT1 Translation from Arabic to English (done be AH)	
BT2 Translation from Arabic to English (done by OA)	
III: Expert review (the forwards and back translators, 3 physiotherapists, 2 linguistic experts, and the developer)	
Pre-Final translation	Appendix B (English version)
Ethics approval	
Patient information sheet	Appendix C
IV: pre-testing or cognitive interviewing (n= 6)	Appendix D
Report – personal contact with the reviewer and developer (JM)	
Final version of PRWHE-A questionnaire	Appendix E (Arabic version)
VII: Psychometric testing (n= 48)	
1. Internal consistency reliability	
2. Test-retest reliability	
3. Construct validity (with DASH-A)	Appendix F
Final psychometric testing report– personal contact with the co-authors	
VIII: Report and publication	Appendix G

Appendix B. The English back translation of the Pre-final (PRWHE-A)

Name : …….. Date : ……

Patient Self Assessment for Questionaire of Diagnosis of Case of Wrist and Hand (PRWHE-A)

The following questionnature help to know the difficulty of use of your hand/ wrist in the last week, please evaluate the rate of symptoms facing you or you feel with degree from 0 to 10, please answer all questions.

If the questions include any activity not done in the last week please estimate the amount of pain or difficulty facing you if you used your hand/ wrist to perform it. In case you never made the mentioned activity you could leave the paragraph without answer.

1/ Pain	
Give degree of pain you felt in your wrist or hand within the last week by putting circle on the number describing your status from 0 to 10 as 0 (zero) means there is no pain absolutely and 10 (ten) means severe pain during performance of this activity or inability to perform it from pain severity	
Amount of pain : Severe pain	No pain
When you are in relaxing	0-1-2-3-4-5-6-7-8-9-10
When you perform a movement that requries continuous movemnt of your wrist or hand	0-1-2-3-4-5-6-7-8-9-10
When you carry heavy object	0-1-2-3-4-5-6-7-8-9-10
When pain is severe in the worst condition, your estimation of pain is	0-1-2-3-4-5-6-7-8-9-10
Amount of pain in most of times is	Never Always 0-1-2-3-4-5-6-7-8-9-10

1- Motor or functional activity :	
a- Certain activities : Give the degree of difficulty or effort faced in your wrist or hand when performing any of the mnetioned below within the last week by putting circle arounf the number that show your state from 0 to 10 as 0 (zero) means there is no difficulty absolutely on performing the mentioned activity and 10 (ten) means that it is very difficult to perform the activity or you could not beat it.	
	No difficult I could not bear
On using keys to open closed door using my affected hand	0-1-2-3-4-5-6-7-8-9-10
On using knife to cut foods by affected hand.	0-1-2-3-4-5-6-7-8-9-10
On closing my chemise buttons	0-1-2-3-4-5-6-7-8-9-10
On support with the affected hand to stand from chair	0-1-2-3-4-5-6-7-8-9-10
On carrying heavy weight with affected hand reaching 5kg	0-1-2-3-4-5-6-7-8-9-10
On using bath tissues (or washer) with my affected hand	0-1-2-3-4-5-6-7-8-9-10
b- Daily activities : Give degree of difficulty faced in your hand or wrist when performing routine daily works you used to perform before your hand is affected within the last week by putting circle on the room that shows your state from 0 to 10 as 0 (zero) means there is no difficulty absolutely and 10 (ten) means maximum difficulty that does not enable you to perform any work.	
On personal hygiene (like washing- wearing clothes)	0-1-2-3-4-5-6-7-8-9-10
House works including cleaning and maintenance	0-1-2-3-4-5-6-7-8-9-10
In work or total daily activities	0-1-2-3-4-5-6-7-8-9-10
In entertainment activities	0-1-2-3-4-5-6-7-8-9-10
Hand look- optional What is the estimation of external look of your hand ? ☐ Very important ☐ To some extent ☐ Not important What is your satisfaction about the look of your hand during the last week? ☐ Satisfactory ☐ Unsatisfactory	
Do you want to add any comment ?	

Appendix C . Patient information sheet in Arabic

تفاصيل الدراسة للمشاركين

و التي بعنوان: PRWHE أو استبيان تقييم حالة المعصم واليد

ندعوك للمشاركة في دراسة تجريها الباحثة فاطمة الحسني. من أجل أن تقرر ما إذا كُنت ترغب في أن تكون جزءًا من هذه الدراسة, إليك هذا النموذج المزود بمعلومات مفصلة حول هذا البحث. و لك الحرية في مناقشة اصدقائك او افراد الأسرة.

ماهي فكرة هذا الاستبيان؟
الاستبيان عبارة عن تقييم المريض الذاتي لحالته , وهو من الطرق المهمة التي تساعد الأطباء في تقييم في أخذ القرار حول حالة المريض ورسم الخطة العلاجية لما يتطلبه . استبيان تقييم حالة المعصم واليد أو PRWHE متوفر بعدة لغات حول العالم إلا أنه ليس هناك نسخة عربية قد يستفيد منها المتحدثين باللغة العربية في البلاد العربية نفسها أو المهاجرين في أراضي أجنبية.

ما هو الغرض من هذه الدراسة ؟
استخدام النسخة العربية للاستبيان مع من يُعاني من أي مشكلة في الطرف العلوي بالجسم (اليد او المعصم) لتقييم نوعية الألم والمتاعب لدى المصاب.

ماهو دوري في الدراسة؟
إذا تطوعت بالمشاركة في هذه الدراسة سوف يتطلب منك أن تُجيب على استبيانات باللغة العربية مرتين إلى ثلاث مرات خلال زيارتك لجلسات العلاج الطبيعي . قد تستغرق حوالي 10 -15 دقيقة لتنهي الاسئلة.

ما هي المخاطر المحتملة؟
لا توجد أي مخاطر او مضرة مرتبطة بهذه الدراسة. ولا توجد إجابات صحيحة أو خاطئة في الاستبيان.
سيتم الاحتفاظ باجاباتكم بكل سرية لذلك نأمل أن تشعر بالراحة وعدم القلق على الإطلاق.

كم عدد المشاركين في هذه الدراسة؟
سيكون هناك قرابة 60 شخص(من كلا الجنسين اناث وذكور) مشارك في الدراسة. وسيكون عليك عند المشاركة التعهد بالالتزام بتعبئة الاستبيانات وبحضور جلسات العلاج الطبيعي المتطلبة منك

مالفائدة او المنفعة العامة من هذه الدراسة؟
لاتوجد منافع شخصية من مشاركتك في هذه الدراسة ولكن نتائج هذه الدراسة قد تعود بالفائدة على المجتمع والمجال العلمي من خلال توفير أداة تُمكِّن المنشئات الصحية في تحسين الرعاية المقدمة للمرضى الذين يعانون من اصابات في الاطراف العلوية.

الخصوصية في معلومات المشاركين بالدراسة ؟
لن يتم مشاركة البيانات الخاصة بك مع أي شخص إلا بموافقة شخصية منك أو كما هو مطلوب بموجب القانون.
ستتم إزالة كافة المعلومات الشخصية مثل الاسم ورقم الهاتف و عنوان البريد الإلكتروني من البيانات و سيتم استبداها برمز وسيتم تخزينها بشكل آمن حتى وقت نشر نتائج الدراسة وسيتم إتلافها بعد ذلك.

هل يمكنني الاسنسحاب من الدراسة في أي وقت؟
إذا تطوعت بالمشاركة في هذه الدراسة فإنه يمكنك الانسحاب تحت أي ظرف إلا أننا نأمل منك الجدية في المشاركة.

هل سيدفع لي أي مبلغ مالي للمشاركة في هذه الدراسة ؟
لايوجد اي مبلغ مالي.

هل سيتطلب مني أي تكاليف مالية للمشاركة في الدراسة ؟
لا توجد تكاليف مرتبطة بهذه الدراسة

• *استعرضت هذه الدراسة من قبل مجلس هاميلتون للأخلاقيات البحثية بكندا وهي مسؤولة عن ضمان أن يتم إعلام المشاركين بكل مايحول بالبحوث، و المشاركين بالبحث لهم الحرية التامة بأن يقرروا إذا لديهم الرغبة في المشاركة في الدراسة من عدمها. وإذا كان لديك أي أسئلة حول حقوقك كمشارك في البحوث، يرجى الاتصال بالمكتب الخاص في مدينة هاميلتون بكندا: وحدة الأخلاقيات البحثية علي هاتف: 905.521.2100 تحويلة 42013.*

• **لقد قرأت المعلومات الواردة في ورقة التفاصيل حول المشاركة في الدراسة التي أجرتها فاطمة الحسني. وقد أتيحت لي الفرصة لطرح الأسئلة حول مشاركتي في هذه الدراسة والحصول على تفاصيل إضافية عندما طلبت.**
وأنا مقر/ة أني وافقت على المشاركة في هذه الدراسة و لقد تم إعطائي نسخة موقعة من هذا النموذج.

_____	_____	_____
اسم المشارك	التوقيع	التاريخ

تعهد من المُعرِّف بالدراسة شخصيا:

_____	_____	_____
اسم الباحث	التوقيع	التاريخ

Appendix D . The cognitive interview

The cognitive interview questions in Arabic as following:

1. هل تعلميات الاستبيان واضحة ومفهمومة ؟
2. هل اسئلة الاستبيان واضحة ومفهمومة ؟
3. هل خيارات الاجابة واضحة ومفهمومة ؟
4. هل الاستبيان يتطلب منك وقت طويل او مجهود كبير؟
5. هل يوجد سؤال صعب لم يكن واضح لديك؟
6. هل كان هناك أي سؤال لا تعلق بحالتك الصحية؟
7. هل هناك أي سؤال تود أن تضيفه على اسئلة الاستبيان الحالي؟
8. هل عندك تفسير لماذا تركت بعض الاسئلة بدون اجابة؟ هل كان السؤال غير مفهوم ؟ او لا توجد لديك الاجابة عليه؟
9. هل ممكن ان تساعدنا بإعادة صياغة السؤال؟
10. هل عندك اي اقتراح من الممكن أن يحسن هذا الاستبيان والاسئلة المكتوبة؟
11. كان هناك فروقات عن النسخة الاجنبية. مارأيك فيها و هل تتوقع انها مهمة؟
12. هل توجد طريقة أفضل لكتابتها؟

The cognitive interview was semi-structured, in Arabic language, and questions addressed the following:

1) Patients' comprehension of the questionnaire instructions, each item and its response options; item clarity, difficulties in understanding and answering the PRWHE-A questions, length, and overall relevance of the questionnaire for their health problem;

2) Specific questions related to the reason any question was difficult to understand or to be answered;

3) Asking the participants for suggestions as to how to re-write the statements that are identified as unclear or not appropriate.

Appendix E. The Arabic version of PRWHE questionnaire

الاسم: ..... التاريخ: .....

تقييم المريض الذاتي لإستبيان تشخيص حالة المعصم واليد (PRWHE-A)

الإستبيان التالي سيساعدنا على معرفة مدى صعوبة إستخدامك ليدك/معصمك خلال الإسبوع الماضي. من فضلك قم بتقدير معدل الأعراض التي واجهتك أو شعرت بها وذلك بدرجه 0 الى 10. الرجاء الإجابة على جميع الأسئلة.

إذا كان من ضمن الأسئلة أي نشاط لم تعمله خلال الإسبوع الماضي فنرجو منك أن تقوم بتقدير حجم الألم أو الصعوبة التي قد تواجهها عند إستخدامك ليدك/معصمك فيما لو قمت بذلك. في حال أنه لم يسبق لك إطلاقا القيام بأي نشاط مذكور فإنه يمكنك ترك الفقرة بدون إجابة.

1. الألم	
أعطِ درجة لمقدار الألم الذي شعرت به في معصمك أو يدك خلال الاسبوع الماضي وذلك بوضع دائرة على الرقم الذي يصف حالتك من 0 الى 10 حيث 0 (صفر) يعني عدم وجود ألم مطلقا و 10 (عشرة) تعني ألم شديد جدا أثناء أدائك لذلك النشاط أو عدم مقدرتك على أدائه من شدة الألم	
مقدار الألم: لايوجد ألم	ألم شديد جدً
عندما تكون مسترخي (في وقت الفراغ مثلا)	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
عندما قيامك بحركة تتطلب حركة مستمرة لمعصمك او يدك	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
عند حملك لشيء ثقيل	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
عندما يشتدّ الألم في أسوء حالاته فإن تقديرك للألم حينها	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
مقدار الألم في أغلب الأوقات يكون	لايوجد مستمر 0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10

2. النشاط الحركي أو الوظيفي

أ. نشاطات معينة

أعطِ درجة لمقدار الصعوبة او المجهود الذي واجهته في معصمك او يدك عند قيامك بأي من المذكور ادناه خلال الاسبوع الماضي وذلك بوضع دائرة حول الرقم الذي يوضح حالتك جيدا من 0 الى 10 حيث 0 (صفر) يعني لاتوجد صعوبة على الاطلاق عند اداء النشاط المذكور و10 (عشرة) تعني أنه صعب جدًا القيام بالنشاط ولايمكنك تحمله

	غير صعب — لا أتحمله
عند استخدامي للمفاتيح لفتح باب مغلق بإستخدام يدي المصابة	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
عند استخدام السكين لتقطيع الطعام بيدي المصابة	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
عند إقفال أزارير قميصي	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
عند الاتكاء أوالاستناد على اليد المصابة للنهوض من الكرسي	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
عند حملي لوزن ثقيل بيدي المصابة يصل إلى 5 كجم	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
عند استعمالي لورق مناديل الحمام (أو الشطاف) بيدي المصابة	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10

ب. نشاطات يومية

أعطِ درجة الصعوبة التي تواجهك في معصمك او يدك عند قيامك بأعمالك الروتينية اليومية االتي اعتدت على القيام بها قبل أن تصاب يدك خلال الاسبوع الماضي وذلك بوضع دائرة على الرقم الذي يوضح حالتك جيدا من 0 الى 10 حيث 0 (صفر) يعني لاتوجد صعوبة على الاطلاق و 10(عشرة) تعني اقصى مراحل الصعوبة التي قد لايمكنك من القيام بأي عمل

عند العناية بالنظافة الشخصية (كالإستحمام- إرتداء الملابس)	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
أعمال المنزل من تنظيف و صيانة	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
في العمل أو نشاطك اليومي إجمالًا	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10
في النشاطات الترفيهية	0 -1 -2 -3 -4 -5 - 6- 7- 8 -9 -10

مظهر اليد- اختياري

ماهو مقدار ضرورة مظهر الشكل الخارجي ليدك؟ □ مهم جدا □ بعض الشيء □ لايهمني ابدا

ما مدى عدم رضائك عن مظهر يدك خلال الأسبوع الماضي؟ □ راضي □ غير راضي ابدا

هل تريد ان تضيف أي ملاحظة ؟

Appendix F . Relative Reliability Hypothesis Testing Sample Size Calculation

$$n = \frac{0.5\ k\ (Z_{\alpha} + Z_{\beta})^2}{\delta^2\ (k-1)} + 2$$

K is equal to the number of parallel assessments (i.e., occasions), Zα is the tabled Z-value associated with the α value of interest, Zβ is the Z-value associated with a Type II error, and δ is the difference between null hypothesis Z transformed R-value and the expected Z transformed R-value.

$$\delta = Z_{Rexpected} - Z_{Rnull}$$

$$Z_{Rexpected} = 0.5 naturallog \frac{1+(k-1)R_{expected}}{1-R_{expected}}$$

$$Z_{Rlowerlimit} = 0.5 naturallog \frac{1+(k-1)R_{lowerlimit}}{1-R_{lowerlimit}}$$

Number of occasion, k = 2

Z-Value (1 tailed) for α= 0.05 = 1.64

Z-value for β (for a Type II error probability of 0.20) = 0.84

$$Z_{Rexpected} = 0.5\ natural\ log \frac{1+(2-1)\ 0.90}{1-0.90} = 1.47$$

$$Z_{Rlowerlimit} = 0.5\ natural\ log \frac{1+(2-1)\ 0.80}{1-0.80} = 1.09$$

$\delta = 1.47 - 1 - 09 = 0.38$

δ2 = (0.38)2 = 0.14

$$n = \frac{0.5\ (2)\ (1.65+0.84)^2}{0.14(2-1)} + 2 = 45$$

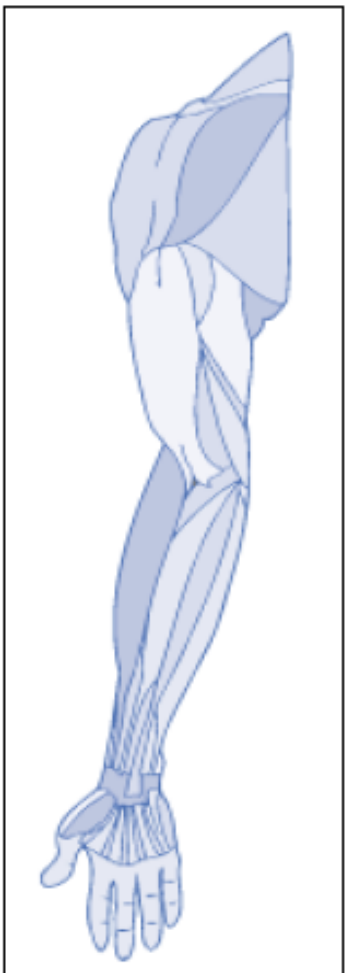
An estimate of 20% rate of anticipated drop out we are going add to the sample size:

$n = \frac{45}{0.80} = 56.25$ ➔ n = 57 participants

Appendix G . The DASH-A

[1]

إعاقات الذراع والكتف واليد



تعليمات

تستفسر هذه السلسلة من الأسئلة عن الحالات / الأعراض التي تحس بها في ذراعك، أو كتفك، أو يدك وعن مقدرتك على تأدية نشاطات معينة. الرجاء أن تجيب على *كل* سؤال، بناءً على حالتك خلال الأسبوع الماضي،
و ذلك بوضع دائرة حول الرقم المناسب.
إذا لم تسنح لك الفرصة لتأدية نشاط ما خلال الأسبوع الماضي، فالرجاء أن تقدّر بأفضل ما تستطيع لتختار الجواب الأقرب إلى الدقة. عند إجابتك علي الأسئلة، ليس مهماً أي يد أو ذراع تستخدم لتمارس نشاطك سواء كانت اليد المصابة أو السليمة.
الرجاء أن تجيب بناءً على مقدرتك بغض النظر عن الطريقة التي تؤدي بها العمل.

الرجاء أن تقيِّم قدرتك على فعل النشاطات التالية خلال الأسبوع الماضي، و ذلك بوضع دائرة حول الرقم الذي يقع تحت الجواب المناسب.

	بلا صعوبة	بصعوبة خفيفة	بصعوبة متوسطة	بصعوبة شديدة	غير قادر
1. ان تفتح علبة جديدة او مُحكمة الإغلاق.	1	2	3	4	5
2. ان تكتب.	1	2	3	4	5
3. ان تبرم/ تدير مفتاحا (مثل ان تدير مفتاح السيارة لتشغيلها).	1	2	3	4	5
4. ان تُحضّر/ تعد وجبة طعام.	1	2	3	4	5
5. ان تدفع لتفتح بابا ثقيلا.	1	2	3	4	5
6. ان تضع شيئا ما على رف فوق مستوى راسك.	1	2	3	4	5
7. ان تقوم باعمال المنزل الثقيلة (مثل غسل الحيطان او إزاحة الأثاث او سواها من الأشياء الثقيلة).	1	2	3	4	5
8. ان تعمل في الحديقة او في فناء الدار.	1	2	3	4	5
9. ان ترتب السرير.	1	2	3	4	5
10. ان تحمل كيس التسوق او حقيبة الوثائق.	1	2	3	4	5
11. ان تحمل غرضا ثقيلا (يزيد وزنه عن عشرة ارطال، او اربعة كيلوغرامات و نصف).	1	2	3	4	5
12. ان تغيّر لمبة المصباح من فوق راسك.	1	2	3	4	5
13. ان تغسل شعرك او تنشفه بالمجفف الهوائي.	1	2	3	4	5
14. ان تغسل ظهرك.	1	2	3	4	
15. ان تلبس كنزة/ثوب/بلوزه (سترة ذات اكمام طويلة).	1	2	3	4	5
16. ان تستخدم سكينا لتقطيع الطعام.	1	2	3	4	5
17. ان تقوم بنشاطات ترفيهية تتطلب جهدا خفيفا (مثل لعب الشطرنج او سواها من الألعاب الأخرى).	1	2	3	4	5
18. ان تقوم بنشاطات ترفيهية تبذل فيها بعض القوة او الدفع عبر ذراعك او كتفك او يدك (مثل لعب التنس أو سواها من الألعاب الأخرى).	1	2	3	4	5
19. ان تقوم بنشاطات ترفيهية تحرك فيها ذراعك بحرية (مثل لعب رمي القرص او الفريسبي أو سواهما من ألعاب مماثلة).	1	2	3	4	5
20. ان تنتقل بالمواصلات من مكان لآخر (ان تتنقل بمساعدة اعضاء جسدك العلويه كالإمساك بمقود السيارة).	1	2	3	4	5
21. النشاطات الجنسية. (الإجابه على هذا السؤال اختياري)	1	2	3	4	5

3

إعاقات الذراع والكتف واليد

	لا أبداً على الإطلاق	بشكل طفيف	بشكل متوسط	كثيراً	بشكل بالغ للغاية
22. خلال الأسبوع الماضي، هل أثرت المشكلة في ذراعك أو كتفك أو يدك بنشاطاتك الاجتماعية العادية مع عائلتك، أو أصدقائك، أو جيرانك، أو زملائك بالمهنة/النادي الاجتماعي؟ (ضع دائرة حول الرقم المناسب)	1	2	3	4	5

	غير محدود على الإطلاق	محدود بشكل طفيف	محدود بشكل متوسط	محدود جداً	غير قادر
23. خلال الأسبوع الماضي، هل أثرت المشكلة في ذراعك أو كتفك أو يدك بنشاط عملك أو أي نشاطات يومية اعتيادية أخرى؟ (ضع دائرة حول الرقم المناسب)	1	2	3	4	5

الرجاء تقدير شدة العوارض التالية التي أحسست بها خلال الأسبوع الماضي (ضع دائرة حول الرقم المناسب).

	لا يوجد	قليلاً	بشكل متوسط	بشدة	بشدة بالغة للغاية
24. وجع/ ألم/عوار في الذراع، أو الكتف، أو اليد.	1	2	3	4	5
25. وجع/ ألم/ عوار في الذراع، أو الكتف، أو اليد حينما أديت أي نشاط مُعيّن.	1	2	3	4	5
26. وخز (مثل وخز الدبابيس و الإبر) في ذراعك، أو كتفك، أو يدك.	1	2	3	4	5
27. ضعف في ذراعك، أو كتفك، أو يدك.	1	2	3	4	5
28. تيبّس/ تصلب في ذراعك، أو كتفك، أو يدك.	1	2	3	4	5

	لا صعوبة	صعوبة خفيفة	صعوبة متوسطة	صعوبة شديدة	صعوبة بالغة الشدة بحيث لا أقدر على النوم
29. خلال الأسبوع الماضي، كم كانت صعوبة نومك بسبب الوجع/ألم/عوار في ذراعك، أو كتفك، أو يدك؟ (ضع دائرة حول الرقم المناسب)	1	2	3	4	5

	لا أوافق بشدة	لا أوافق	لستُ موافقاً ولا مُعترضاً	أوافق	أوافق بشدة
30. أشعر بأني أقلّ ثقة بنفسي وذلك بسبب مشكلة ذراعي، أو كتفي، أو يدي (ضع دائرة حول الرقم المناسب).	1	2	3	4	5

Appendix H . The psychometric testing report

Sample description
Sample size: 48
Patients' condition(s): variety of hand disabilities
Age: (mean, std deviation) mean age of 47±16 years
Gender (M, F): both
Study description
Internal consistency The CA was used, The PRWHE-A demonstrated excellent internal consistency at CA=0.96
Test-retest reliability: Patients assessed two times (before their treatment session, and after their session to one day later). The ICC) was used for assessing test-retest reliability. The PRWHE-A demonstrated excellent test-retest reliability at ICC=0.97(95% confidence interval, 0.95-0.98).
Construct validity: Construct validity was assessed by examining the strength of the correlation between the PRWHE-A and DASH-A. The DASH-A demonstrated moderately to low correlation (r=0.64; P < 0.001) with the PRWHE-A
Overall results: The results of this study indicated that PRWHE-A is a reliable and valid assessment tool and can be used in patients with different wrist/hand disabilities whose primary language is Arabic.

Thesis Conclusion

Thesis summary

The findings of this thesis work, although important, do not fully capture the full spectrum of physiotherapists' attitudes and skills of using EBP and OMS in Saudi Arabia. However, this information will be helpful to policy makers in the health sector who would like to promote the use of EBP and OMs among clinicians working in Saudi Arabia. The PT profession should be working more toward developing evidence, and knowledge translation.

Chapter 1 reported the results of current PTs' perceptions of EBP and OMs survey, which indicated that in Saudi Arabia, 83% of PTs agreed that PROs was very useful or somewhat useful. This finding suggests the need for cross-cultural validations of more OMs into Arabic, with testing in representative clinical and cultural populations to facilitate implementation in Saudi Arabia. The details of this process, illustrated by the Arabic cross-culturally adapted version of the PRWHE, are described in chapter 2.

The encountered language barriers and issues pertaining to cultural differences were identified and addressed. The translated version of the PRWHE demonstrated strong clinical measurement properties, including test-retest reliability, internal consistency, and construct validity of the PRWHE-A among patients with a variety of hand conditions. This finding is consistent with the measurement properties of the original version. The PRWHE-A will provide a promising and useful tool for therapists while assessing Arabic-speaking patients in Saudi Arabia and worldwide. Furthermore, the translation and cultural adaptation of a PRO specific to the upper extremity may benefit other Arabic-speaking countries that are just beginning to offer

hand therapy services by providing evidence for a valid and reliable tool that can help health care providers improve their care of patients with hand pain and disability. In addition, the development of hand therapy specializations, which incorporate a greater focus on patient record outcomes, is needed in order to facilitate better management of hand injuries in Saudi Arabia in the future.

Thesis limitation and future research direction

Although the survey study was limited by sampling strategy and a modest response rate, it provides an important baseline estimate for current PTs' perceptions of EBP and the extent to which they have endorsed the use of EBP and PROs in their daily practice. It emphasizes the opportunity to improve the OMs use by the provision of reliable and culturally valid assessment tools to support PT practice.

The translation and cultural adaptation of the PRWHE into Arabic seek to take this first step in the area of hand rehabilitation. While the generalizability of the PRWHE-A is limited to one geographical area, and short test-retest interval may have allowed for some recall bias, this instrument will support the practicality of PROs in hand clinics. Since the PRWHE-A was tested on Arabic-speaking patients who represent 6 Arabic-speaking countries other than Saudi Arabia, we believe that the translated PROs can be used with other Arabic-speaking populations. It can determine the condition of patients at the time of assessment, and progress over time. Third, it enables therapists to ensure that a change in patient's status attributed to the effectiveness of their intervention.[22]

The overall limitation that an actual emphasis on clinicians' use of PROs and strategies to incorporate patients' values into their clinical decision making had not been provided to determine the full effect of the translation and adoption of PRWHE-

A instruments. Therefore, such work to initiate the use of PROs by clinicians is needed.

The work presented in this thesis will serve as a foundation upon which to build future psychometric evaluations of the PRWHE-A. For instance, the responsiveness of the PRWHE-A questionnaire was not tested, but will be an important area of focus for future research in order to enable examinations of progress over time,[23] and to compare the efficacy of different treatment techniques. Much work remains to foster and facilitate EBP implementation in the cultural context of the evolving physiotherapy profession in the health systems of Saudi Arabia.

Pre-contemplation actions will be taken

1. Opportunities exist to explore the barriers and facilitators using quantitative methods to capture broader geographic and demographic samples, and to drill deeper into the experiences of individual practitioners using qualitative methods. Therefore, data collection for the survey should be continued in order to get the bigger picture of the gaps.
2. Study findings should be discussed in different interactive educational meetings including conferences and small group discussions in order to tackle the need of change in behaviour.
3. Because our findings has clinical, educational and research implications, future research should appoint a team with relevant expertise (authority) to drive the implementation and dissemination process along to overcome barriers identified; and to determine target audience (e.g. stakeholders) for a dissemination and implementation strategy.

4. The author's next step is to take courses in knowledge translation in order to fill the lack of personal knowledge of strategies to implement EBP prior creating such team.

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