ORIGINAL ARTICLE

Development and Validation of the Muslim Prayer Ability Scale (MPAS) Among Patients' With Diabetic Foot Problem

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ABSTRACT

Introduction: The available tools to assess the ability of Muslim patients to pray were develop by the rehabilitation therapist to assist Muslim patients in performing prayer and only focussing physical domain. It was not design to be used by the treating doctors as a method to decide and monitor progress of disease and treatment. The objective of this study is to design and validate a more holistic scale that can measure Muslim ability to perform their daily prayer **Method:** For scale construction, five experts from back grounds of orthopaedic, psychiatry, Islamic knowledge and Islamic philosophy of science were gathered to construct the domains and items for the new scale. The preliminary of 23 item-scale was then administered to 212 individuals (87 among patients with diabetic foot problem and 125 from the control group) in 2 public hospitals in Kuantan using cross-sectional study method. Reliability is measured using Cronbach's alpha and the construct validity is measured using the exploratory factor analysis. Statistical analysis is done using SPSS version 24. **Results:** The Muslim prayer ability scale (MPAS) has a good reliability with Cronbach's alpha value of 0.79. Based on Construct validation analyses and factor loadings, we established a 19-item scale to measure the ability of Muslim with three items in each domain. All of the items showed good factor loadings of more than 0.5. The 5 identified domains are namely Preparation of praying, Physical movement, Spirituality, Cognitive & *Tayammum* and Disturbance. The MPAS also has a good criterion validity with 85% sensitivity and 93% specificity in predicting the ability of patients with diabetic foot problem to perform prayer. **Conclusion:** This study proved that the new MPAS is valid and reliable to be used as tools to measure prayer ability in Muslim patients with diabetic foot problem.
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Keywords: Muslim prayer, Ability, Validity, Reliability, Factor analysis

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INTRODUCTION

The concept of *Ibadah* (worship) in Islam involves compliance and obedience to all that is prescribed by Allah through His messenger p.b.u.h. Prayer is one of the pillars of Islam and a fundamental component of *Ibadah*. Muslim prayer involves physical motions, recitations and meditation. (1) Muslims also are required to clean their body, perform ablution (wuduk) and cover certain part of their body (*aurah*) prior to the prayer. The physical movements in prayer include standing, bowing (*ruku'*), prostration (*sujud*) and sitting *(tahhiyyat*) requires strength, balance and good joint range of motion. (2) Prayer also involves concentration and recitation that can be difficult for patients who are having illness. (3) .

In medical practice, measurement scores were developed to measure how much the diseases have affected the patients function in their daily activity. These measurements are either measure general health status or specific to certain part of the body or on specific disease. (4,5) Most of the functional assessments scoring assess the patient's ability to perform the activity of daily living like standing, walking, sitting, squatting, jumping and running. Treatments such as total knee replacement surgery resulted in improvement in function but result in more disability in prayers which require the extreme knee and hip movement.

Margolis (2003) added 3 domains for Muslim patients in the Katz activity of daily living score. The additional domains were physical movement of prayer, content of prayer (recitation) and washing of prayer. The modification was developed to assess the ability of the patients to perform prayer by using 3 responses (1- independent, 2- requiring assistance, 3-totally dependent). (6) It was aim to assist healthcare personal managing the Muslim patients to perform their prayers. Similarly Ariff MS (2016) develop IIUM Ibadah Disability Score aim to provide assistance to the patients to perform prayer. It has 2 domains which are preparation and motion during prayer. The score identifies the patients into 5 categories, with 0 patient has no disability and requiring no assistance to 4 where the patients have severe disability and require full assistance. (7) Measurement to assess self-confidence of Muslim to pray was also developed for patients with low back pain. This measure is specific to back pain patients and does not measure disability. (3)

The available scales were design with the aim to decide what type of assistance the patients need by the supporting staff such as the nurses or the therapist. On the other hand, this scale is design for doctors to measure their patient's performance of prayers and monitor the progress of prayer performance as the disease progress or following the treatment. Furthermore, the available scale only focusses physical assessment whereas prayer is not limited to physical movement but include concentration which is affected by pain, environment and spirituality.

We have chosen patient with diabetic foot problems as the subject for this study because there has been some work on praying and patients with diabetic foot problem in the literature. Furthermore, the number of patients with diabetic foot problem has increase substantially for the past few decades. Muslim patients who suffered from severe diabetic foot problem such infection, foot gangrenous, joint instability and pain were not be able to perform their prayer. Nearly half of them was unable to clean or to perform ablution and prayers. (8) The factors that has been identify to be associated with it are type of illness, lack of knowledge on prayer for the sick, pain and poor mobility, lack of hospital support, lack of privacy and uncomfortable ward environment. (9,10) Unfortunately, most of the clinician did not aware of the patient's difficulty in performing prayer. Therefore, there is a need for a new scale to assist the clinician to quantify the ability of patients to perform prayers objectively.

The objectives of this study are to construct a more comprehensive scale that measures the ability of Muslim patients to pray, and to validate and determine the scale reliability.

MATERIALS AND METHODS

This is a cross sectional study done in the Diabetic Foot Clinic Department of Orthopaedic IIUM Medical Centre (IIUMMC) and Hospital Tengku Ampuan Afzan (HTAA), Kuantan from May 2018 till June 2019. Following approval from ethical committee.

The subjects were recruited by stratified quota sampling. The inclusion criteria are Muslim patients who are able to communicate and literate in *Bahasa Malaysia*, able to give written consent independently, and performing obligation of prayer. Those subjects whom unable to understand the questionnaires or had not perform or don't know how to perform the obligation prayer were excluded from the study.

Sample Size

The number of sample size will depend on the number of items in the questionnaire and composition of population (10 time the number of items). We estimate that there will be 4 domains with 5 items for each domain. Hence the estimated acceptable sample size is; 20 items times 10, therefore, we estimated minimum of 200 subjects required for validation purpose. Therefore, the total number of subjects calculated needed for this study was 220 subjects (10% drop out rate). 110 patients with disability (diabetic foot problem) and 110 participants without disability (control group).

The demographic data that were recorded include age, gender, race, level of education and duration of having diabetes. The development of the questionnaire was divided into 5 stages and is summarized by the flowchart. (Figure 1)

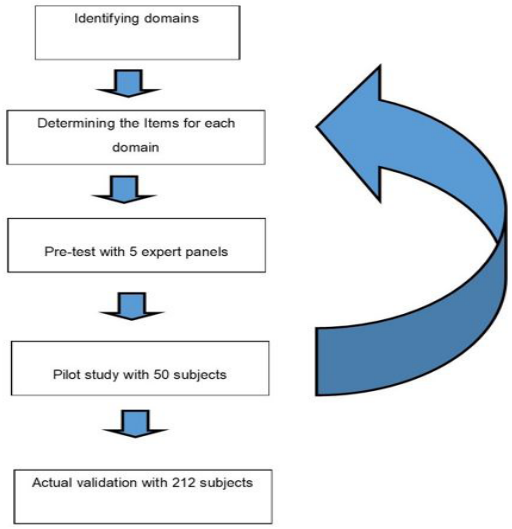

Figure 1. Flow chart of questionnaire development

Table I. Descriptive statistic of socio-demographic characteristics of 212 participants

Variables	N(%)	Mean (SD)
Participants		
- Healthy	125 (59)	
- Diabetic foot problem	87 (41)	
Gender		
- Male	108 (50.9)	
- Female	104 (49.1)	
Age		37.4 (15.17)
Level of education		
- Primary school	18 (8.5)	
- Secondary school	100 (47.2)	
- Diploma / STPM / A-level	53 (25)	
- Degree	40 (18.9)	
- Postgraduate	1 (0.5)	
Duration of diabetes		
- < 5 years	33 (38)	
- 5-10 years	23 (26.4)	
- > 10 years	31 (35.6)	

STAGE 1:
This stage aimed to gather global themes or subscales on the aspect of prayer disability. The scale was developed base on the discussion among the authors based on the analysis of the available scales that were used by the rehabilitation to help Muslim patients to perform their prayer and measurement that measures how the disease affect the patients' daily function. (3,4,5,6,7)

STAGE 2
The proposed or possible domains were;
1. Prayer preparation
2. Prayer physical task
3. Prayer verbal task,
4. Cognitive ability such as orientation and concentration (*Khusyuk*)

The weight of each domain was analysed and recorded as above. Finally the suggested items will be decided by a group of experts which are orthopaedic surgeons, psychiatrist and religious scholar from the Islamic Revealed Knowledge and Human Science, International Islamic University of Malaysia.

STAGE 3
This stage will focus on pre-test of pre-final product. This aim of this stage was to look at any ambiguous terms and sentence structures of pre-final questionnaire before researchers embark on a pilot study. Pre-test ensured the items were well understood, jargon-free and unambiguous. Pre-test were done on small group of volunteer university students. Sentence by sentence review was done to 5 students with different backgrounds to find out whether the sentences and words used are easily understood. If there was any ambiguous or difficult word, the alternative word was suggested. To motivate the subjects, they were given tokens as an appreciation.

Questionnaire Design and Structure:
Based on these domains we aimed to use 5 items for each domain (theme). Therefore there was a total of 35 items for this new scale. Each item would have 5-scale scoring (Likert scale). We also incorporated the idea of using 5 levels of abilities in this questionnaire. 1= very difficult or unable, 2= difficult, 3= moderate level of difficulty, 4 = mild difficulty and 5= not difficult at all.

STAGE 4
Stage 4 was the pilot study that was conducted on 50 public subjects at an orthopaedic clinic. If the result was favourable, we then engaged on the real field study on validation (stage 5) with a bigger number of subjects.

STAGE 5
The aim of this stage was to validate the final version of Prayer ability scale. A total of 212 subjects were recruited among patients with diabetic foot problem and normal person with no medical problems as the control group. The subjects were from different educational backgrounds to represent Malaysian Muslim population.

Study population
This study involved participants who were divided into two groups; those with diabetic foot problem and those without diabetic foot problem. From a total of 250 questionnaires were distributed, 212 questionnaires were completely filled up to be included in this study. A total of 87 (41%) participants were from the case group while in the other and 125 (59%) were from control group. In the case group, participants are known to have diabetic foot problem. All were Muslim, actively practicing the Islamic faith and able to understand Malay language.

Statistical analysis
Statistical analysis of both participating groups was compared and analysed using SPSS software version 24. Reliability is the degree to which the results of measurement are consistent, in control group who has no orthopaedic problem and those who suffered from diabetic foot problem, across repeated measurement. Reliability in this study is determined by good Chronbach's alpha values. Cronbach's alpha is used in this study to measure the internal consistency on this newly developed scale.

Construct validity is determined by good (exploratory) factor analysis of all 19 items in the questionnaire. Factor loadings of 0.4 or more were considered good. The criterion validity is done by testing this scale against

the clinical judgment as the gold standard. The subjects were classified as a normal group (without any foot problem) and patients with diabetic foot deformities as an abnormal group. The sensitivity and specificity is determine Based on this analysis of ROC curve.

RESULT

Factor Analysis

The Kaiser-Meyer-Olkin (KMO) value was 0.72 and Bartlett's test of sphericity was statistically significant p=0.001. Both of these results indicated the sample of 212 was adequate.

Reliability

Based on analysis of 23 initial items, most of the items had good Cronbach's alpha values. The lowest Cronbach's value of initial 23 items is 0.74. Based on exploratory factor analysis with Varimax rotation on initial 23 items, 4 items which had poor factor loadings, reason of redundancy, poor outcome based on feedbacks during pre-test and other statistical analyses were removed. The next analysis is based on 19 finalized items. Cronbach's alpha values on finalized 19 items was 0.79 which signify good scale reliability. The Cronbach's alpha for each domain was 0.83 for factor 1, 0.903 for factor 2, 0.773 for factor 3, 0.699 for factor 4 and 0.76 for factor 5.

Construct Validity

The construct validity was evaluated by using confirmatory factor analysis. Based on the table II, the analysis has been done with Varimax rotation without force, we obtained good results with good Cronbach's alpha values and good factor loadings. We identified 19 items with 5 domains with minimal 3 items in each domain. The 19 analysed items were having good factor loadings as displayed in table 2. The factor loadings were nicely fit into their respective domains. The 5 identified domains are namely Preparation of praying (factor 1), Physical movement (factor 2), Spirituality (factor 3), Cognitive & *Tayammum* (factor 4) and Disturbance (factor 5). (Table II)

Table II. Factor loading of each item based on Exploratory Factor Analysis

Item	Preparation	Physical movement	cognitive & Tayamum	Spirituality	Disturbance
Q1 Berdiri ketika solat		**0.85**			
Q2 Melakukan rukuk dalam solat		**0.85**			
Q3 Melafazkan bacaan rukun dalam solat	0.71		**0.30**		
Q4 Khusyuk dan fokus dalam solat	0.42		**0.52**		
Q5 Menutup aurat seperti yang sepatutnya ketika solat	**0.83**				
Q6 Mendapat tempat yang sesuai untuk solat	**0.83**				
Q7 Membersihkan najis yang ada pada badan dan pakaian saya dengan sempurna	0.52	**0.60**	0.43		
Q8 Membersihkan diri daripada hadas besar	**0.60**	0.51	0.40		
Q9 Mendapatkan air untuk berwuduk	**0.82**				
Q10 Berwuduk dengan menggunakan air	**0.90**				
Q11 Mendapatkan debu untuk bertayamum			0.89		
Q12 Melakukan tayamum			0.86		
Q13 Saya rasa bersalah jika tidak mendirikan solat				**0.51**	
Q14 Solat menginsafkan saya sebagai makhluk yang lemah di sisi Allah				**0.63**	
Q15 Saya berasa tenang selepas bersolat				**0.86**	
Q16 Solat memberi kesan positif dalam kehidupan saya				**0.81**	
Q17 Sakit mengganggu pergerakan saya dalam solat					**0.84**
Q18 Sakit mengganggu fokus saya dalam solat					**0.91**
Q19 Persekitaran saya mengganggu kekhusyukan saya ketika solat		0.51			**0.68**

Criterion validity

In terms of criterion validity, we tested the scale against the clinical judgment as our gold standard. Healthy participants without any diabetes foot problem were used as our normal subjects. Those who scored high total prayer ability score (PAS) were considered as having normal praying ability.

Based on this analysis, we recommend the cut-off point of the total PAS score was to be 85. The maximum score for this 19 items scale is 95. With this cut off score, the

sensitivity of the scale was 85% and the specificity was 93%. In other words, with the cut-off point of 85 and below, the ability of the scale to detect true a person of having problem to perform prayer was 85% accuracy and the ability this scale to rule out normal cases is 93% (Figure 2).

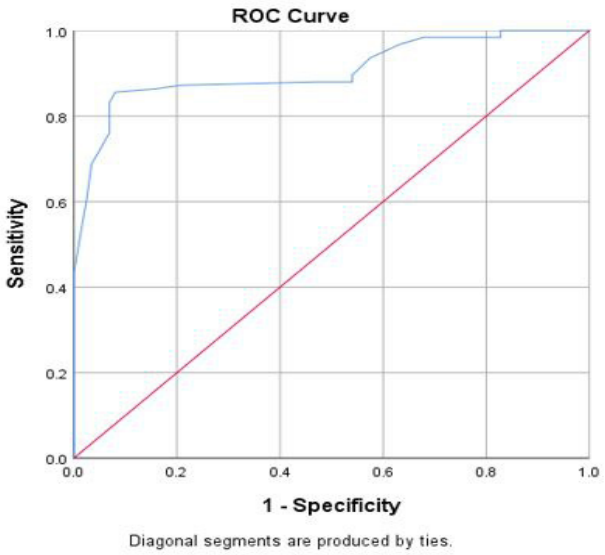

Figure 2. Receiver operating characteristic (ROC) curve

DISCUSSION

This study showed that the Muslim prayer ability score (MPAS) has excellent psychometric values (Cronbach's alpha, and factor loadings, sensitivity & specificity) in preparation, movement, cognitive, disturbance and spirituality domain. This is in contrast with other scoring system develop by Margolis (2003) and Ariff (2016) which have only preparation, movement recitation domain. The score is also an excellent tool to measure patients' prayer ability and difficulty and differentiate those who are able to pray with high accuracy (85% specificity and 93% specificity). (6,7)

Although the physical domain has good psychometric values, we feel it can be improved if we add the most difficult position during prayer like the sujud and *tahhiyyat* because it involves extreme joint movement. Difficult movement such as from standing to sujud or from sujud to standing may also be useful to assess muscle power.

The cognitive domain include item on recitation, focus in praying and performing tayammum. We are unable to separate cognitive during praying with *tayammum* because they are sharing the same factor. It is possible that knowledge and practice of tayammum is only among those who have more knowledgeable in the Islamic teaching

In the disturbance domain, pain is not the only factor that contribute to disturbance for praying. The surrounding condition during praying such as the ward environment could also affect Muslim to focus during praying.

The item on *solat Jumaat* (Friday prayer) was drop from the initial questionnaire because of poor reliability (low Cronbach alpha value). This question can be replaced with *Jemaah* (congregation) prayer. because the female patients didn't answer the question. This item is also important to assess the social function of patient that is closely related to prayer.

The limitation of this study is our study population is only Malay Muslim. Muslim does not belong to a certain races, it involve multicultural and multiracial believers. This study does not ideally representative of Malaysian population with respect to racial distribution.

This scale can also be test in different population such as among patient with joint disease to see whether the result that we got are replicable. Lastly, this scale can be tested by using different analysis which has better evidence such as confirmatory factor analysis (CFA). The current study is just expletory analysis (EFA)

Despite this limitation, the new scale has a good overall Cronbach's alpha value, The Kaiser-Meyer-Olkin (KMO) value was only 0.72 which is middling in term of sample adequacy. Therefore, further study with more sample size is needed to get a good KMO value.

This scoring system will be able to help health care professionals to measure objectively their patients' ability to perform prayers which is an important daily activity for Muslim patients. It can help the health professionals to decide on the treatment plan, comparing the outcome before and after the treatment or monitor the progress of their Muslim patient's.

CONCLUSION

This study has proved that the new Muslim Praying Ability Scale (MPAS) is valid and reliable to be used as tools to measure prayer ability in Muslim diabetic foot patient.

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