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Cross-cultural Adaption and Psychometric Properties Testing of The Arabic Anterior Knee Pain Scale

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Each person whose signature appears below certifies that this dissertation in his/her opinion is adequate, in scope and quality, as a dissertation for the degree Doctor of Science.

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LIST OF PUBLICATIONS

This present work is based on the following papers, which are referred to in the text by their roman numerals;

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ABBREVIATIONS

AKP	Anterior Knee Pain
AKPS	Anterior Knee Pain Scale
PFPS	Patellofemoral Pain Syndrome
SF-36	Short Form 36
RAND-36	RAND 36-items Health Survey
PCS	Physical Components
MCS	Mental Components
PH	Physical Functioning
RP	Role Physical
BP	Bodily Pain
GH	General Health
VI	Vitality
SF	Social Functioning
RE	Role Emotional
MH	Mental Health

ABSTRACT OF THE DISSERTATION

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by

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Patellofemoral pain syndrome (PFP) is a common condition affecting the musculoskeletal system and has a tendency of becoming chronic and is problematic in the affected people. It is the commonest cause of anterior knee pain. In over 2/3 of the patients affected it has been successfully treated through the use of rehabilitation protocols which are designed in pain reduction and returning the functionality to an individual. Many cases of patellofemoral pain syndrome can be avoided only if a clinician can make a pre-diagnosis. Preparation Screening Evaluation testing done by a certified athletic trainer can also help in prevention of this syndrome. The purpose of this topic is to be able to review the anatomy of the knee, the risk factors predisposing to patellofemoral pain syndrome, soft tissue, arterial system, innervation of the patellofemoral joint and strategies for rehabilitation. This will enable reviewing the anatomy of the knee, relationships between arterial collateralization, nerve supply and alignment of soft tissues in explaining the mechanisms that lead to this syndrome. By doing so, it will help in the future whereby using different treatments that will be aiming at the non-soft tissue that cause patellofemoral pain syndrome.

CHAPTER ONE

INTRODUCTION AND REVIEW OF THE LITERATURE

Patellofemoral Pain Syndrome refers to many anatomical abnormalities or pathologies that lead to anterior knee pain (Wolf, Andree, Andreas, Raymond, Ingo, Gerd-Peter & Christian, 2013). This syndrome has been associated with pain with the functionality of muscles being affected. To be able to understand the pathogenesis behind patellofemoral pain syndrome, knowing the anatomy of the patellofemoral joint is helpful. Through anatomy of the area, knowledge of the joints, bones, blood supply and nerve distribution is an important part in the diagnosis and management. There are various risk factors that have been associated with this syndrome. This includes shortened quadriceps muscle, alterations in vastus medialis obliquus reflex response to time, decreased explosive strength, hypermobile patellae and delayed onset of electromyographic activity of vastus lateralis (Al-Hakim, Jaiswal, Khan, & Johnstone, 2012). This characteristic pain has also been attributed to articulation stress caused by high levels of subcondral stress to the bone. This is has been shown in clinic visits secondary to sports injury by individuals who are physically active.

The pathology behind patellofemoral pain syndrome is due to the knee muscles overcompensating because of the lack of strength and/or hip stability. Most of the activities that have been linked to creation of this problem are running, squatting, kneeling, and getting in and out of a chair together with descending as well as ascending stairs. Prolonged periods of sitting which has been shown to cause hamstrings and hip flexor tightness (Woods, 2014). Various

physical trainings like cardiovascular, plyometric, sport cord drills and flexibility training system has been shown to significantly reduce injury to the lower body from 33.7% to 14.3% among the female soccer players on adolescence stage. When a person participates in such trainings when they have injuries predisposes them to having new injuries.one of the predisposing factors to patellofemoral osteoarthritis is the long lasting anterior knee pain. Anterior knee pain treatments by use of physical rehabilitation programs are highly reliable options that are non-operative. Prevention of anterior knee pain by use of pre-rehabilitation approach has been seen following successful rehabilitation secondary to cartilaginous injury or abnormalities due to anatomy (Wolf, Andree, Andreas, Raymond, Ingo, Gerd-Peter & Christian, 2013). Muscular dysfunction and malalignment constitutes patellafemoral pain syndrome. Through rehabilitation, it can be able to be correct distal realignment surgically with anatomical malalignment not being corrected. Due to overuse stress, the symptoms of anterior knee pain are brought about. With this condition being ideal for pre-habilitation, shapes and sizes of patella and trochlear groove act as limiting factors in rehabilitation program outcome.

Anatomy of the Patellofemoral Region

The patella has an important function of improving flexion efficiency and protecting tibiofemoral joint being the largest sesamoid bone. To be able to stabilize the patella, it involves a combination between the quadriceps tendon, medial retinaculum, lateral retinaculum and patella tendon. The arterial system

supplying the knee comprises of five major arteries that include superior medial, superior lateral, posterior, inferior medial and lateral genicular arteries. There is an anastomosis that occurs between anterior tibial recurrent artery and descending genicular arteries. Genicular arteries contribute to circumpatellar anastomosis except middle genicular artery (Collins, Bisset, Crossley, & Vicenzino, 2012). This circumpatellar anastomosis extends as far as the structures of the bone that are both superficial and deep, synovium, capsule, retinaculum and the subcutaneous fascia. The circumpatellar anastomosis provides the arterial. The medial superior genicular artery which lies on the anterior aspect of semimembranosus and semitendinosus muscles arises from the popliteal artery together with the lateral superior genicular artery anastomose with the descending branch of the lateral collateral femoral artery supplying the vastus lateralis, vastus intermedius and femoral branch nerve. Middle genicular artery supplies the anterior and posterior cruciate ligament by passing through the joint line into the posterior joint line. From the popliteal artery arise the medial inferior and lateral genicular arteries. This medial inferior genicular artery supplies the tibial (medial) collateral ligament anastomosing with the saphenous branch of descending genicular branch then anastomosing with the anterior tibial recurrent artery (Wilson, Mazahery, Koh, & Zhang, 2010).

The tibiofemoral joint has medial and lateral articulating surfaces with the femur having convex surfaces and tibia having concave surfaces. The femur has the following bony landmarks which include: linea aspera, lateral condyle, lateral epicondyle, medial condyle, popliteal fossa, inter-condylar notch and patellar

facet. The tibia on the other hand has the following bony landmarks: medial and lateral articulating surfaces, intercondylar eminence, intercondylar tubercles and tibial tuberosity. The anatomy of the patella comprises of the base, apex, lateral and medial borders, lateral and medial articulating surfaces. A small eminence on the anterior aspect of the lateral condyle of the tibia is called the gerdy's tubercle where insertion of IT band occurs. Pes Anserines is the point of insertion of the Sartorius, gracilis and semitendinosus. In this joint, there is instability of the bones and the most stability is provided by ligaments and cartilages (Collins et al., 2012). The presence of the menisci plays four main functions. It maintains congruence between the articular surfaces of the joint in all positions, acts as a shock absorber, maintains synovial fluid circulation through the articular cartilages and helps bringing about normal movement between articular surfaces.

The joint capsule is a common capsule for tibiofemoral and patellofemoral joints. The anterior part folds upward during extension and posterior part folding down during flexion. There are ligaments supporting it. Lateral collateral ligament is attached superiorly to the lateral epicondyle and inferiorly to the fibula head. The medial collateral ligament is attached superiorly to medial epicondyle and inferiorly to the medial aspect of tibia below condyle. Anterior cruciate ligament has a distal attachment to the posterior aspect of anterior condylar area of the tibia with a proximal attachment on posterior medial aspect of femoral condyle (Wilson et al., 2010). Through the help of ligaments, muscles and the bones the knee can undergo flexion, extension, medial rotation and lateral rotation through

forces acting on them. If the normal anatomies of these structures are tampered with as in the case of patellofemoral pain syndrome, then pain results in.

Physiology of the Knee Joint

The Posterior articular lateral articular medial articular intramuscular and muscle nerves are the sensory nerves that supply the knee joint majorly. Posterior articular nerve being a branch of tibia nerve supplies the posterior cruciate ligament, posterior oblique ligament, annular ligament insertion at the mediolateral menisci, posterior fat pad, posterior capsule, fibular collateral ligament and tibial collateral ligaments (Waryasz & McDermott, 2008). Lateral articular nerve being a branch of common peroneal nerve sends nerve supply to tibiofibular joint capsule and tissues of lateral knee. Medial articular nerve being a branch of the saphenous nerve innervates the anterior and medial capsule, medial meniscus, tibial collateral ligament, posterior capsule, patellar fat pad and patellar tendon. Golgi tendon organs and the muscle spindles that are supplied by the branches of femoral obturator or sciatic nerve depending on the myotome location are intramuscular and muscle nerves. The skin overlying the anterior knee region is innervated by the lateral and anterior cutaneous branches from the femoral nerve and infrapatellar branch of femoral nerve (Waryasz & McDermott, 2008). The posterior cutaneous nerve and cutaneous branch of obturator nerve innervate the anterior aspect of the knee.

Supports of soft tissue supporting the patella include the fat pad, retinaculum and periosteum contain substance p that is a nociceptive input

supplying the spinal cord and acts as a vasodilator that produces inflammation. These fibers have been found inside the cavity of patellar marrow in the degenerative knees (Cook, Mabry, Reiman, & Hegedus, 2012). Identification of nerve defects or when there is increased pain sensitivity could lead in alteration of treatment by including regional nerve injections of corticosteroid via the nerve to block pain.

Biomechanics of the Knee Joint

The knee joint is comprised of the patellofemoral joint and tibiofemoral joint. The patellofemoral joint is where the kneecap (patella) and thigh bone (femur) meet. The tibiofemoral joint is where the femur and tibia articulates. The tibiofemoral joint is the weight bearing joint. Transfer of forces in this joint is through compression of the surfaces of tibial and femoral against one another. It also contains menisci that increase the contact area and decreases contact stress. This joint being a load bearing joint, these loads are transferred via the following compression mechanisms: First, there is transfer of load directly via the femoral condyles to tibial plateaus by pressing and contacting directly. Secondly, there is indirect load transfer that arises from femoral condyles to tibial plateaus through menisci on being pressed. Thirdly, the femoral load transfers load indirectly to tibial head through intra-articular (synovial) fluid pressure (Hakkak, Rostami, & Parnianpour, 2012). The synovial fluid has been shown to be low in pressure. It has been shown to be below zero in healthy joints and from few mmHg to several hundreds in joints that are diseased, type of activity and

posture. Assuming the area of an adult tibial head is 21cm square and pressure of the fluid is 10mmHg this gives a compression force of 2.8 Newtons and compared to joint loads, this force is totally negligible. Using this basis, it is assumed normally that transfer of load directly via the femoral condyles to tibial plateaus by pressing and contacting directly and indirect load transfer which arises from femoral condyles to tibial plateaus through menisci on being pressed are the two principle compression-bearing mechanisms (Hakkak, Rostami, & Parnianpour, 2012). In conjunction with that, all compressive force that passes via the tibiofemoral joint is transferred with the help of the menisci as it reduces the contact area hence reducing contact stresses. This is achieved by transferring the forces through contact and pressing of the two bones together.

The patellofemoral joint-This is the point of articulation between the patella and the femur. The patella acts as a pulley for quadriceps muscle. In musculoskeletal system of human beings, this joint transmits highest loads. The loads for activities like climbing stairs and squatting that have been estimated as being 3.3 to 7.6 times the body weight. If such high loads are applied over a long time, patellofemoral tissue tolerance can be exceeded hence resulting to pain. When there is quadriceps tendon compression, this will lead to the shift of quadriceps tendon in their action line making the patella float above the trochlear groove (Waryasz & McDermott, 2008). This makes it engage with the groove at knee flexion angles that are small. The normal engagement of the groove with the patella involves pressure on the patella's lateral facet first since the lateral trochlear groove surface is more prominent. There is premature engagement by

the patella and the groove that leads to the medial surface being engaged earlier. This then produces a medial shift in the center of pressure. The area of contact between patella and femur starts from the patella distally migrating proximally when a knee is being flexed. It was found out that if the patella was divided into three regions namely the proximal, middle and distal, the thickest articular area is found in the middle region. Thinner cartilages come as a result of stress applied by the load. A 10 percent decrement in in the thickness of the cartilage leads to a peak hydrostatic pressure increment (Smith, McNamara, & Donell, 2013). The quadriceps muscles have been reported to generate about 647 N when a person is walking and about 1923 N when climbing stairs. It still remains uncertain if increasing load on quadriceps muscles would result in contact pressure increment in the patellofemoral joint.

Anterior Knee Pain Pathology and Risk Factors

The incidences of patellofemoral pain syndrome are on the rise with women being affected more than twice as men. The causes are due to many factors that include tendonitis; insertional tendinosis caused by overuse injuries to extensor apparatus, instability of the patella and osteochondral damage. Patellofemoral pain syndrome being a diagnosis of exclusion is a common cause of knee pain and affects young women who do not have any structural changes like increased q-angle or who have undergone articular cartilage due to pathology. It is also associated with crepitus and deficit in function. This can lead to the athletes limiting their sport activities and it has been linked to cause

osteoarthritis. The pathogenesis behind anterior knee pain is associated with many factors characterized by lower extremity functional disorders. Patella maltracking has been shown in playing a central role in the recent studies. This is because it was demonstrated that increased lateralization and lateral tilt by the patella through magnetic resonance imaging when the patients with this syndrome were squatting. Through skin marker and optoelectronic in examination of patella gliding in these patients by use of motion capture system (Piva, Gil, Moore, & Fitzgerald, 2009). This showed that lateral translation was increased (maltracking). This patella maltracking in this patients leads to delayed M.vastus medialis activation. It was also shown that there is imbalance in M.vastus medialis obliquus and M.vastus lateralis.

In patients with patellofemoral problems, the vastus medialis obliquus exhibited atrophy. This is because the M.vastus lateralis was activated than M.vastus medialis obliquus when upstairs and downstairs climbing was done in these patients with no change in the control group. There was also static or dynamic malalignment that also contributed to the pathology. The q-angle or static measure plays a major role as a predictor of the syndrome. It is reported that increment in this angle is an associated factor. The cross-country runners who had an increased q-angle by more than 20 degrees were more prone to knee injury than those with normal angles. But this is controversial since it has been opposed by other research. The hip stability and hip adductor strength also a contributing factor to the pathology. This is due to internal rotation by the femur that is caused by hip external rotators and adductors' weakness namely the

M.gluteus medius and minimus. Research has demonstrated that functional malalignment does not come from the knee joint. This is due to decreased strength of M gluteus medius and Maximus (Heintjes et al., 2003). This leads to an increment of knee valgus after a drop jump land. It was shown that females have a hip abduction strength that is decreased when comparing to males which has been demonstrated in patellofemoral pain syndrome patients. This is supported by the fact that females with this syndrome tend to have decrement in hip abduction, external rotation and extension strength as compared to healthy individuals.

Rear-foot eversion has also been shown in the pathology of this syndrome.it tends to cause internal tibia rotation. This foot mechanic disorders include reduced rear-foot eversion, increased rear-foot eversion at heel strike and delayed rear-foot eversion timing with all this showing strong relationship with the patellofemoral pain syndrome. The iliotibial tract through the dynamic valgus tends to influence the iliotibial tract length that also influences the patellar tracking. The anatomical explanation of this is due to Kaplan fibers that act as a connection between the patella and the iliotibial tract. Hamstring imbalance and tightness also contributes to the pathology (Heintjes et al., 2003). This was due to hamstrings contracting earlier than the medial hamstrings during isometric contractions. In a study carried out it showed that females had higher hamstring and gastrocnemius muscle force by about 30-50% during walking and running in comparison with men.

Through these changes, high stress occurs on the patella together with its supporting structures contributing to the pathology behind patellofemoral pain syndrome. It was also found that psychological factors contribute to patellofemoral pain syndrome. This was shown that psychological factors could cause pain. This is due to mental distress in the patients with this syndrome. High similarities between the pain experience and coping pain of patellofemoral pain syndrome compared to chronic pain in other patients with higher scores found in Pain Catastrophizing Scale (Osteras, Osteras, & Torstensen, 2013). This pain was due to fearing physical activity hence demonstrating psychological distress like anxiety and depression, kinesophobia and pain catastrophisizing in patellofemoral pain syndrome patients.

This syndrome was also shown to have some triggers that include the following. First, if there is patellofemoral joint overload like in cases of high intensity training. The combination of this overload together with dynamic valgus and patella's functional lateralization can lead to patellofemoral joint structures overuse and due to this, anterior knee pain is experienced. The pain can also be predisposed by neurophysiological causes though the exact cause is unclear. Postulations suggest that the pain can be caused by extensor mechanism insertion or resulting from the subchondral bone. The presence of shortened quadriceps muscle has also shown to predispose to the pain. Alterations of the vastus medialis obliquus reflex response time being a risk factor to this pain. When a person has hypermobile patellae also is a great predisposing factor. Decreased explosive strength also is a risk factor. When there is delayed onset

of electromyographic activity of vastus lateralis has also been shown to predispose to the pain. Observations were made by high expression of neural markers like neurofilament protein, S-100 protein, neural growth factor and substance P (Osteras et al., 2013). This expression was seen in the lateral retinacula in patients who had patellofemoral maltracking. This clearly explains how the reticula innervation can lead to anterior knee pain.

Examination and Assessment

History Taking

To be able to make an accurate diagnosis, an accurate history and clinical assessment is fundamental. To be able to assess patellofemoral instability the patient should be asked to describe how dislocation occurred and should provide a convincing report. The patient can feel the patella propping out. When taking this history the patient should be asked if there is positive family history regarding patellar instability. If the family history turns out to be positive, this can be attributed to hypermobility syndrome or a trochlear dysplasia. This can be an important indicator of prognosis in some subsets of patients due to recurrent dislocation. When patients describe the history of anterior knee pain which is attributed to patellofemoral joint, they report retropatellar pain when they ascend or descend stairs, when they sit with knees at 90 degrees irrespective of the duration (Nunes, Stapait, Kirsten, de Noronha, & Santos, 2013). This can be during driving, squatting, at cinemas or theatre, jumping or running especially

from a flexed position. These patients can also describe their knee being unstable and giving way.

During history taking the clinician should ask for any possible previous dislocation episode. This is important due to the overlapping symptoms between anterior knee pain and patellofemoral instability patients. Aggravating factors should also be evaluated. This can be activities that require high energy like turning when playing football, shopping trolley pushing around a corner typically show patellofemoral instability (Nunes et al., 2013). The individuals who have severe instability can report that dislocation can be caused by putting tights or socks, turning especially in bed and over the shoulder look. Questioning on the previous episodes about the pain and instability can give clues on how the patients perceive their management.

Physical Examination

The physical examination is an important aspect as far as diagnosis is concerned. There are so many clinical tests that have been identified in assessment of the patellofemoral joint. The principal tests include: VMO capability test, hamstring, quadriceps and calf muscle length, patellar tilt and glide, apprehension tests, iliotibial band flexibility tests, Thomas test, hypermobility joint assessments, q-angle, patellar mobility, j-sign, foot arch position, tibial torsion, hip version, standing posture, patellar retinaculum pain on palpation, retropatellar surface pain on palpation, crepitus, Bassett's sign and clark's grind (Ismail MM, 2013). Other functional tests like squatting, hopping,

agility tests and joint position sense are also useful in the global capability evaluation among these patients. The apprehension test is the most accurate test in assessing chronic patellofemoral instability. Basset's sign is a specific test for patellar dislocation. Quadriceps femoris strength-This is measured by use of an isokinetic dynamometer with a subject seated and the knee to be tested is flexed to 75 degrees (Ismail MM, 2013). The patient then exerts force as much as possible by use of isometric contraction as he extends the knee against the arm of dynamometer that is force sensing.

Hip abduction strength-The hand holds the dynamometer while the subject is lying on side with the hip that is being tested positioned on the superior aspect of the non-tested hip. The patient then exerts an isometric contraction against resistance provided by dynamometer, which is positioned on the proximal aspect of the medial malleolus.

Hip external rotation strength-It is measured by use of dynamometer held by the hands. The patient lying in prone position with the knee being tested flexed to 90 degrees with the hip in neutral rotation. The patient then by use of external hip rotators, exerts isometric contraction with the dynamometer placed on the proximal aspect of the medial malleolus. Hamstrings length-This is determined by use of a straight leg raising test while the subject is lying supine. The lower spine is then passively lifted to the firm end feel. The angle of the straight leg is then measured with a gravity goniometer that is placed over the tibia. Quadriceps femoris length-This is measured by placing knee flexion

passively as the goniometer is placed over distal tibia while the subject being in prone position (Nunes et al., 2013).

Plantar flexors length-The patient is in prone position as the measurement is taken by a standard goniometer. The knee is flexed and extended at 90 degrees. The ankle joint dorsiflexion is then measured. To be able to account the gastrocnemius tightness influence, the ankle dorsiflexion is measured with the knee extended. In measuring ankle dorsiflexion, the knee should be bent hence detecting joint capsule tightness or the soleus muscle. ITB/TFL complex length-Ober test is used to determine it (Wilson et al., 2010). Over the distal portion of the ITB/TFL complex gravity goniometer is placed over it. The result of the test is measured as a continuous variable. Prior to measuring, gravity goniometer is then zeroed on a horizontal surface. If you get a negative value, it represents more tightness while the positive values that are below horizontal represents less tightness.

Lateral retinacular structures length-This is assessed by use of a patellar tilt test. The patella's lateral edge is lifted by the examiner from the lateral femoral condyle while the subject in in supine and the knees fully extended. If the patient cannot lift the patella's lateral border above the horizontal plane, then a positive test is indicated for tightness. The lateral retinacular length is then recorded as being either tight or normal. Foot pronation-This is measured by use of navicular drop test (Cook, Hegedus, Hawkins, Scovell, & Wyland, 2010). The measurement is taken by getting the difference in millimeters between the

navicular height at the subtalar joint neutral position and the one of relaxed stance position.

Q-angle is measured by use of a standard goniometer. The angle that is formed through the intersection of a line extending from the anterior superior iliac spine to the patella center and a line extending from the patella center to tibial tubercle while the knee is in full extension.

Tibial torsion-The patient is prone on a low table. The knees then bent at 90 degrees. An angle is then measured from the knee axis (which is an imaginary line extending from medial to lateral femoral epicondyles) and an imaginary line through malleoli. Femoral anteversion - this is measured by use of a Craig test. The patient is placed in prone position with 90-degree flexion of the knee. Anteversion degree is then estimated based on the lower leg angle with the vertical angle (Hakkak, Rostami, & Parnianpour, 2012). The greater trochanter's most prominent part tends to reach the lateral most position or horizontal plane.

Quality of movement-Measurements is taken by visual observation when carrying out lateral step down test. The patient is placed on a step approximately 20cm high. The examiner then kneels at 1m in front of the patient while observing the task. The knee being tested is then bent until the contralateral leg contracts the floor gently. The knee is re-extended to begin position for about 5 repetitions (Nunes et al., 2013). The examiner then scores the movement by use of the arm strategy. If the patient with an attempt to recover balance uses the arm strategy then 1 point is added. If the trunk leans to one side then 1 point is added (trunk movement). If the pelvis rotates or is elevated to one side in

comparison to the other, then 1 point is added (plane of pelvis),if the knee is deviated medially with tibial tuberosity crossing imaginary vertical line over the second toe then 1point is added. If the knee deviates medially with tibial tuberosity crossing an imaginary vertical line over the foot's medial border then 2 points are added (Nunes et al., 2013). If the patient steps down on the non-tested side (unilateral stance), or if he wavers on the tested area from side to side then 1 point is added. Total score of 0 or 1 is classified as being a good quality of movement. Score 2 or 3 is classified as being of medium quality and a score above 4 being poor quality of movement.

Outcomes Measurements of the Anterior Knee Pain

Numerous functional and patient self-reported outcomes measures have been applied in the assessment of the clinical outcome following patellar dislocation or Anterior Knee Pain (Wang, Jones, Khair, & Miniaci, 2010). It is important for the comprehensive assessment of knee conditions in both clinical and research usability. Most of those measurements were initially designed for people with joint disorders that are non-patellafemoral; Kujala Patellofemoral Disorder Score was particularly designed and developed for the assessment of patients having anterior knee pain as well as patellofemoral conditions (Kujala et al., 1993). This measurement of outcome was subsequently demonstrated to be reliable, valid, and responsive of the populations with Anterior Knee Pain and patellar instability (Paxton, Fithian, Stone, & Silva, 2003; Wang et al., 2010; Watson et al., 2005).

Short Form of 36 (SF-36)

The SF-36 Quality of Life Questionnaire is a short survey that was not only health related but also multipurpose with 36 questions. Eight different subscales (scored on a measurement instrument rating responses from 0-100) are utilized in the SF 36 instrument to measure various areas of function. The eight subscales are assessing the general health of a person, the physical function, role limits physical function, role limits emotional function, social functioning, mental health, bodily pain, and energy/fatigue. In this instrument, higher ratings indicate better health states and as well correlate with less pain The RAND version, which is in Arabic, is valid as well as reliable (Saud Abdulaziz Al Abdulmohsin, 1997).

The International Knee Documentation Committee (IKDC)

The International Knee Documentation Committee (IKDC) subjective knee evaluation form was developed with the principle purpose of detecting improvement, as well as deterioration in symptoms, functionality, and ability to engage in sports activities among people presenting with knee injuries (Irrgang et al., 2001). Some of the conditions that are evaluated using this form include meniscal and ligament injuries, Patellofemoral pain, and articular cartilage lesions among others (Irrgang et al., 2001). After its formation in 1987, the IKDC was mandated with the task of documenting all knee conditions. The committee designed the IKDC Standard Knee Evaluation Form for knee injuries. The form was published in 1993 (Hefti, Muller, Jakob, & Staubli, 1993).

The main components of the Form are the symptoms of knee injuries, which are described as stiffness, locking, swelling, and intense pain, the sports and daily activities and finally the knee functionality before injury and current knee function(Irrgang et al., 2001). Each of these categories has a number of items under them; symptoms have 7 items, daily activities have 9 items, whereas knee functionality has 1 item. Response scale was also developed for each item (Collins, Misra, Felson, Crossley, & Roos, 2011).

Scoring for response to each item was based on an ordinal method. Percentage calculation for the total score is done as follows: (sum of items)/ (maximum possible score)*100. However, it can be noted that the item referring to knee function before injury is not included in the total score. Scores interpretation ranges from 0-100, where 100 implies that an individual does not have the symptoms of the knee injury and his or her knee function is normal (Collins et al., 2011)

The Form takes 10 minutes to complete (Padua et al., 2004) and uses simple English that is easily understandable by patients. One of the major strengths of the IKDC Form is that it stands for the elements that are important to patients with knee problems. It also does not discriminate patients in accordance with some unnecessary aspects, but puts into consideration mixed groups of patients suffering from critical knee problems. The use of IKDC Form to assist in research for most knee conditions is supported by psychometric evaluation (Collins et al., 2011)

Knee Injury and Osteoarthritis Outcome Score (KOOS)

The main purpose of the Knee Injury and Osteoarthritis Outcome Score (KOOS) is to assess the opinions of patients in regards to their knee and other associated problems over a certain period ranging from one week to a decade (Collins et al., 2011). This scale contains five domains: the pain regularity and severity during physical activities, symptoms of knee injury such as grinding, selling, pain, motion restriction and catching among others, the difficulties experienced in day to day activities, challenges experienced during standard recreational activities, and finally knee-related quality of life (Roos, Roos, Lohmander, Ekdahl, & Beynnon, 1998). This scale has 42 items distributed across 5 subclasses. Rating for the response to these items is done on a 5-pointLikert scale (0-4). Scores are then transformed to percentages with 100 representing a condition where the person in question does not experience knee related problems. On the other hand, zero describes a condition where the patient is experiencing extreme knee related pain and difficulties in physical activities (Roos et al., 1998). The KOOS test takes at least 10 minutes to complete (Roos et al., 1998) and in a manner similar to other scales it uses simple language. The scale to a great extent reflects the signs and symptoms of knee conditions that affect a person's day-to-day activities. Data obtained from this scale is valid and satisfies the desired criteria for research outcomes (Collins et al., 2011).

Knee Injury and Osteoarthritis Outcome Score Physical Function Short Form (KOOS-PS)

The purpose of this scale is to generate a patient's opinion in reference to the difficulties he or she may be experiencing during physical activities as a result of knee related problem (Collins et al., 2011). This scale has 7 major components for measuring the physical function of a person in regards to day to day and sports activities. Patients are requested to rate the degree of challenges they may have experienced for a period of one week due to their knee problems with respect to rising from sitting, kneeling, rising from bed, twisting the injured knee, squatting, bending, and putting on socks. Response is rated on a 5-pointLikert scale (0-4). Scores are then transformed to percentage with 0 representing absence of difficulties (Perruccio et al., 2008). This scale takes a minimum of two minutes to complete and uses simple and understandable language. Data obtained from this scale is valid and is ideal for clinical application. This data can also be used as a representation of groups suffering from knee problems (Collins et al., 2011).

Knee Outcome Survey Activities of Daily Living Scale (KOS-ADL)

The purpose of the KOS-ADL is to assist in assessing symptoms and functional difficulties in day-to-day activities emanating from knee problems (Irrgang et al., 2001). This scale targets patients undergoing physical therapy for different knee pathologies including Patellofemoral pain, osteoarthritis, and meniscal injury (Irrgang et al., 2001; Marx, 2003; Piva et al., 2009). KOS-ADL is

a single index component with two segments pertaining to symptoms and functional limitations. Some of the functional limitations tested in this scale include inability to squat, bend, and rise from a sitting position among others (Irrgang et al., 2001). Patients give descriptive responses, as required in the 17-item questionnaire, which are then translated numerically for scoring (Irrgang et al., 2001). Calculation of the total score is done as a sum of response score to each of the items. The score is then calculated as a percentage in accordance with this formula: (score/maximum score)* 100. A 100% score is interpreted to mean that the patient in question does not present with knee problems and functional limitations. It takes about 5 minutes to complete the KOS-ADL questionnaire. Data obtained from this scale is clinically viable and can be used for measuring the effectiveness of surgical and non-surgical intervention to knee related problems (Collins et al., 2011).

Lysholm Knee Scoring Scale

The purpose of the Lysholm Knee Scoring Scale is to assess the results of knee ligament surgery (Lysholm & Gillquist, 1982). Evaluation on this scale is based on 8 items: limping, support, stair's climbing, walking, squatting, thigh atrophy, instability, and locking. Scores for every item are done differently (Tegner & Lysholm, 1985). Each response to the 8 items is assigned an arbitrary score. These scores are administered by clinicians in collaboration with the patient. Scores are assigned on an increasing scale from 0-100 with 100 being interpreted to mean no symptoms (Tegner & Lysholm, 1985). Percentage scores

are grouped into four major categories: below 64 poor, 65-85 fair, 845-94 good, and 95-100 excellent (Collins et al., 2011). Simple language is used in the questioning process. This scale is easy to administer since it does not have administrative and respondent burdens. It is also reliable for research and can be effectively used in tracking improvement and deterioration in patients presenting with knee problems (Collins et al., 2011)

Oxford Knee Score (OKS)

Oxford Knee Score is used to assess the benefits of treatment and knee related health status of patients who have undergone total knee replacement (TKR) (Dawson, Fitzpatrick, Murray, & Carr, 1998; Murray et al., 2007). This scale comprises of a single index regarding knee function and pain. The items that are assessed in this scale include: the severity of pain, kneeling, personal hygiene, sleeping and rising, mobility and sitting among others. There are five possible responses for every item with scores ranging from 1 to 5; a score of 1 stands for best outcomes while a score of 5 represents worst outcomes. In the modified version, scores range from 0-4 with 4 representing no problem and 0 representing extreme difficulties (Murray et al., 2007). This scale requires patients to complete a structured questionnaire. The entire process takes approximately 5 to 10 minutes. Psychometric tests suggest that Oxford Knee Score is valid and can be used in all individuals presenting with knee related problems. This scale provides a specific measure that is dependable, applicable, and responsive to change after total knee replacement (Collins et al., 2011).

Western Ontario and Mcmaster Universities Steoarthritis Index (WOMAC)

This scale is used in assessing the course of the disease or the response of patients presenting with knee osteoarthritis to a particular treatment modality (Bellamy, 1995, 2002). WOMAC comprises three subscales mainly: the severity of joint stiffness, difficulties in performing physical activities, and pain severity during movement. Evaluation of the responses is done on a 5-pointLikert scale (0-4). The scale relies on five responses: 0 none, 1 mild, 2 moderate, 3 severe, and 4 extreme (Bellamy, 1995, 2002). The scale is not complicated, and patients can conduct it easily because the interview questions are self-administered. The actual score for the subscales is the sum score for the responses to each item. They can be manually calculated, or calculated using a computer. Higher scores are used to represent deteriorated conditions characterized by intense pain, stiffness, and immobility (Bellamy, 1995, 2002). The test is simple and usually takes five to ten minutes to complete. The variability in administration techniques makes this scale a good choice for clinical application, especially when tackling communication difficulties portrayed by some patients. The pain and function subscales used in WOMAC can assess deterioration in knee problems over a specific period. Psychometric tests indicate that WOMAC can be validly used for research purposes (Collins et al., 2011).

Activity Rating Scale (ARS)

The activity rating scale was developed as a short, straightforward, knee-specific questionnaire to assess the level of activity by patients suffering from

different knee pathologies and take part in sports activities (Marx, Stump, Jones, Wickiewicz, & Warren, 2001). The principal purpose of this scale is to provide data in reference to an athlete's highest level of activity over a period of one year. Activity Rating Scale is a single matrix that assesses four major components including, pivoting, decelerating, running and cutting (Collins et al., 2011). Patients are required to complete questions in the form of a structured questionnaire. Scoring is rated from 0-4 where 0 represents less than one time a month, 1 represents one time in a month, 2 represents two times per week, 3 represents two or three times per week and 4 represents four or more times per week. The overall score is the summation of all scores obtained from responses to the four items (Marx et al., 2001). It is unfortunate that specific instructions have not been provided to guide in handling the missing values. Total possible scores range from 0-16 with 16 representing the most frequent participation. The test takes about one minute to complete. Data obtained from Activity Rating Scale cannot be used in research due to a lack of psychometric support (Collins et al., 2011).

Tegner Activity Score (TAS)

The Tegner Activity Score was developed to offer a standardized technique for rating work and sports activities (Tegner & Lysholm, 1985). It was aimed at complementing the Lysholm scale based on the fact that limitations in function scores may be hidden by an intense decrease in activity level (Tegner & Lysholm, 1985). This scale is comprised of a graduated list of day-to-day

activities, recreational and sports activities. The patient is given the freedom of choosing the level of involvement that describes their current level of activity. TAS is a clinician-administered tool that makes use of a structured questionnaire (Briggs et al., 2009; Frobell, Roos, Roos, Ranstam, & Lohmander, 2010). Rating is based on a score of 10 with higher scores representing the involvement in higher-level activities. TAS is reliable and can be used for different individuals by clinicians. However, its use for research purposes needs to look at cautiously (Frobell et al., 2010).

Musculoskeletal Function Assessment (MFA)

It is an acronym designating the Musculoskeletal Function Assessment, which measures the health status of patients who have sustained soft tissue injuries, repetitive motion disorders, arthritic conditions, and poor function in extremities. It is a two-part assessment outcomes measurement tool, which offers patients a 100-item questionnaire, with yes/no answers resulting in a total MFA score calculated based on responses to these 100 items. Additionally, the 100 questions offer 10 patient self-rated responses, which enable clinicians to determine a total Patient Rating Subscore, which, though part of the MFA score, assesses this category of response separately. Higher scores on the measurement outcome are indicative or more problematic disorders. The clinician may administer the MFA tool in approximately 10-15 minutes, and is useful in either single-time assessment or in conducting and monitoring pain and functionality over a period of time.

Kujala Scale (AKPS)

The Anterior Knee Pain Scale (AKPS), which is sometimes known as Kujala Scale (Kujala et al., 1993), is a self-report questionaire with 13 items that are knee-specific. It documents answers to 6 activities considered to be linked particularly with the Anterior Knee Pain Syndrome (when an individual walks, runs, jumps, climbs the stairs, squats and sits for a long period while the knees are bent). AKPS also documents presentations such as limping, inability to bear weight in the affected extremity, swelling, abnormal movement of the patellar, atrophy of the muscle, and limited flexion of the knees. The AKPS inquires about the duration of the presentations and the extremity (s) affected. One hundred are the maximum score and the lowest score is an indication of severe pain or disability. The scoring of the scale is hierarchical using categories such as "absence of difficulty – not able" or "absence of pain – presence of severe pain". Some sections include scoring of a distance that the patient can either walk or run without experiencing pain. It is easy to comprehend the AKPS and it takes a short time to complete it (Bennell, S., Crossley, & Green, 2000). The test-retest reliability of the AKPS is good. The authors of the scale have demonstrated its validity (Kujala et al., 1993) as well as (Timm, 1998). The sensitivity of AKPS has been examined by numerous authors (Bennell et al., 2000; K. M. Crossley, Bennell, Cowan, & Green, 2004; Watson et al., 2005).

Non-operative Treatment

In patients with patellofemoral pain, conservative management is mainstay

of treatment. It has been shown that even the patients who have significant malalignment or other pathologies tend to respond to conservative management. Resting, modification of activity and ice are usually very essential in the initial treatment. In the beginning for a few weeks provision of anti-inflammatory medication is often helpful as it helps to decrease inflammation, pain and also improving the ability of the patient to adapt with physical therapy (Al-Hakim, Jaiswal, Khan, & Johnstone, 2012). There are other nonsurgical interventions like off the shelf orthotics, patella-tapping technique in controlling subluxation and patellar tilt that helps in reduction of anterior knee pain. This method is less effective in those patients who have higher body mass index, lateral tilt that is of larger degree and small q-angle. If the patella tapping technique becomes positive, it can also show positivity with lateral batress knee brace. Sleeve braces can also reduce patella tracking with wrap-style braces reducing patellofemoral pressure by contact and pressure location change. Other essential elements of non- operative management are the physical therapy and strengthening. Physiotherapy- these are specific exercises which aim the knee like quadriceps straightening, flexibility of hamstring and quadriceps, manual strengthening of lateral retinacular in patellar tilt or when the lateral retinacula is tight (Al-Hakim et al., 2012). Quadriceps strengthening includes a number of techniques. This involves the concentric which is muscle shortening, eccentric meaning muscle lengthening, isotonic meaning constant strain with no muscle length change, isometric meaning constant knee position, isokinetic meaning constant contraction at constant velocity through a movement range and plyometric

meaning expulsive muscle contraction. These exercises can be further subdivided into closed chain and open chain. In closed chain, there is usually foot contact with other surfaces like the floor or bicycle pedal. In open chain the foot is usually free. Closed chain involving cycles, squats and step repetitions are types of eccentric exercises. Straight leg rising is an example of open chain exercise that is closed (Al-Hakim et al., 2012). The stretching exercised being an important component of physiotherapy whose focus is to loosen the anatomical structures that are tight which predispose to this pain. Orthotics-The use of orthotics in the management of pain has also been in use. For them to function properly, there is variability about the type of orthosis used and if they are used in combination with physiotherapy. Patella tapping helps correct maltracking and tilt of patellar. Through this, promotion of vastus medialis functionality has been enhanced via proprioceptive feedback and pain decrement though there is still controversy. Electrotherapy has also been used. This involves use of ultrasound laser, transcutaneous and interferential stimulation of the nerves (Al-Hakim et al., 2012). There is no evidence that has supported the use of this method as a single procedure but by combining it with other treatment has shown to be helpful. Bracing and splinting whose principle is centralizing the patella in reduction of abnormal tracking that occurs between femoral trochlea and retropatellar surface.

Hip stability and strengthening help to improve the pain and restores function. Use of localized medication is also a very important option. Those patients who have significant inflammation, which has, not responded to oral anti-

inflammatories, ice or rest then corticosteroid injections can be used. Hyaluronic acid injections can be used in the patients who have chondromalacia patella evidenced by radiography and are unresponsive to oral medications or physical therapy (Collins et al., 2012). For those patients who cannot tolerate non-steroidal anti-inflammatory drugs then topical ones like gels or patches can be effective.

The non-operative management should be done at least for 3 months till the clinician together with the patient feel that plateaus for pain and functions have been reached. In this case, though surgery is rarely preferred in treating patellofemoral pain considering the fact that the patient has been compliant and has not responded (Collins et al., 2012).

Operative / Surgical Management

There are various surgical interventions that can be used to the patients who have failed to respond to non-operative management. Various anatomical approaches that have been used include the following. Medial patellofemoral ligament repair-When there is patellar dislocation, the soft tissue on the medial aspect are torn or stretched in a way that makes them incompetent. This restricts the medial patellofemoral ligament. Repair of this ligament provides the best option other than reconstructing it. In children surgical and conservative management have no difference since the rate of recurrence is the same (Wolf, Andree, Andreas, Raymond, Ingo, Gerd-Peter, & Christian, 2013). In acute patellar dislocation among children and adults, surgical repair of medial

stabilizing soft tissues that are torn is not recommended. In adults there is decreased dislocation among patients undergoing medial patellofemoral ligament repair. When a patient sustains a patellar dislocation, disruption occurs at three areas. It disrupts the patella insertion, femoral insertion and ligament midsubstance. The rate of recurrence is related to the site of damage. For those patients who have sustained femoral insertion avulsion, nonsurgical interventions confer greater instability and functional score decrement as compared to when the avulsion has occurred from the patella or if the patient has got a midsubstance tear.

When the avulsion is noted, reattachment is done to its site of avulsion. This is done by the use of a suture anchor technique. This has been shown to be superior to conservative management as the rate of dislocation is low. The other surgical procedure done is Medial patellofemoral ligament reconstruction. This is based upon history, findings of clinical examination and imaging procedures. This reconstruction is recommended for those patients who have patellofemoral instability that has been recurrent. The instability is usually in the normal anatomy, mechanical alignment and medial patellar laxity (Smith, McNamara, & Donell, 2013). Graft materials have been used that include tendon of adductor Magnus, quadriceps tendon, and semitendinosus tendon and mesh-type artificial ligament. Tibial tubercle transfer-The tibial tubercle position in relative to trochlear groove and distance effect in relation of the patellofemoral joint has been on interest. The approach to medialise the tibial tubercle in an attempt to patella’s lateralising forces has been the approach. There will be improvement in

the stability of the patella with medialisation of the tibial tubercle. This works by decreasing the force that is required in resisting lateral subluxation. Total force applied by the patella's lateral facet that is induced by the increment in q angle reduced by medialising the tibial tubercle. Trochleoplasty can also be performed. It is characterized by a decrement in medial femoral condyle height, decreased trochlear depth, increased sulcus angle and shallow lateral trochlear or sometimes its dome shaped (Smith et al., 2013). This is seen radiologically. Tracheoplasty is indicated in those patients who have functional deficits that result from patellar instability and have trochlear dysplasia that is so severe after conservative management has failed. Removals of trochlea boss or bump in combination with groove deepening procedure are the surgical techniques employed. In this method, additional procedures like medial patellofemoral ligament reconstruction, tibial tubercle transfer and lateral release are simultaneously performed.

Physical Therapy Rehabilitation

The physical therapy rehabilitation program contains general dynamic warm up, stretching and isolation exercises which should be performed to each muscle group defined. Methods of stretching like dynamic and static methods can prevent injury. Dynamic warm-up performs the dynamic stretching. This involves controlled movements that increase the speed and motion range. It increases the muscle memory by mimicking athletic activity. This dynamic warm up can increase static stretching and Active Isolated Stretching (AIS) (Ismail MM,

2013). This then leads stretching of the hamstrings, quadriceps, hip adductors, hip external rotators, quadriceps, gastrocnemius/soleus and hip flexors.

This isolation exercises have the most effect on a single group of muscles with minimal effects on other muscle groups. There are other strengthening exercises that have been used and include the following: Quadriceps strengthening exercise. Quadriceps muscle contraction can be concentric, eccentric and isotonic. During concentric contractions, these muscles tend to shorten especially straight leg raising, extension of bent knee, squeezing of pillows in between legs (Al-Hakim et al., 2012). In eccentric contractions these muscles lengthen actively like when a straight leg is lowered slowly. In isotonic contractions, constant straining is required without undergoing muscle length change for example in wall squatting with flexion of the knees at 90 degrees with the back against the wall. Combination of quadriceps strengthening exercise with stretching exercise is performed to make tight structures become loose like hamstrings, iliotibial band and patellar retinaculum. To facilitate therapy, other additional like Coumans bandaging has been used to help in adjusting patellofemoral congruence angle hence relieving pain.

Application of isokinetic exercises by use of isokinetic dynamometer that controls the velocity at the knee via a motion range is vital in this situation. The velocity spectrum of this dynamometers lies between 0 and 360 degrees per second. Electro-stimulation that provides external stimuli for some muscles hence results in contraction enabling them to exercise (Crossley, Bennell, Green, & McConnell, 2001).

Summary

Patellofemoral pain syndrome refers to many anatomical abnormalities that lead to anterior knee pain. The knee joint is comprised of patellofemoral and tibiofemoral joints that are the weight bearing joints. This knee joint tends to undergo compressive forces but with the help of the meniscus, there is reduced contact stress. Pain in this joint has some predisposing factors that include shortened quadriceps muscle, decreased explosive strength, hypermobility of the patellae, delayed onset of electromyographic activity and alteration of vastus medialis obliquus reflex response time. The syndrome has been shown to affect more females than males due to higher gastrocnemius muscle force reported in women. Other than the predisposed factors mentioned above, it has factors that cause it. This includes patella maltracking, increment of the q-angle, and foot eversion among others. Through good history taking and physical examination and investigations, a diagnosis can be reached at. There are various treatment options that are available. Among these we have the operative and non-operative treatment.in non-operative treatment; conservative management is the mainstay of treatment. This can be by resting, activity modification, ice, and orthotics among others. Though this conservative management is less effective in those people with high body mass index. If conservative management is done for 3 months and the patient with the clinician feel that no much achievement is established then operative treatment is sought. The operative techniques like trochleoplasty, medial patellofemoral ligament reconstruction and ligament repair can be done. Rehabilitative techniques like stretching, isolation exercises and

general dynamic warm up can be done. By use of the above techniques pain in patients with patellofemoral pain syndrome has been able to be controlled and improving the quality of life.

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CHAPTER TWO

CROSS-CULTURAL ADAPTATION AND PSYCHOMETRIC PROPERTIES TESTING OF THE ARABIC ANTERIOR KNEE PAIN SCALE

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Abstract

OBJECTIVES: To translate, develop a cross-cultural adaptation, and perform psychometric properties testing of the Arabic version of Anterior Knee Pain Scale (AKPS) in patients with Patellofemoral Pain Syndrome (PFPS).

BACKGROUND: Patellofemoral Pain Syndrome (PFPS) is one of the most frequently occurring overuse injuries affecting the lower limbs. A variety of functional and self-reported outcomes measures have been used to assess clinical outcome of patient with PFPS. Only Anterior Knee Pain Scale (AKPS) has been designed for PFPS patients.

METHODS: We followed the international recommendations to perform cross-cultural adaptation. The Arabic Anterior Knee Pain Scale and the Arabic RAND 36-items Health Survey were administered to 40 patients who diagnosed as patellofemoral pain syndrome. Participants were assessed at baseline for both scales and after (2-3) days for Anterior Knee Pain scale only. The measurements were tested was reliability, validity, and feasibility).

RESULTS: The Arabic AKPS showed high reliability for both temporal stability internal consistency (Cronbach's alpha was 0.809 for the first assessment and 0.748 for second) and excellent reliability (Intraclass Correlation Coefficients ICC = 0.96; 95% CI: 0.93, 0.98). It has very good agreement (Standard Error of Measurement SEM=1.8%). The AKPS was significantly correlated with physical components of RAND 36-Item (Spearman rho = 0.69: P< .05). No ceiling or floor effects were observed.

Conclusion: The Arabic AKPS showed that a valid and reliable properties and comparable to the original English version and other translated versions.

KEY WORDS: Anterior Knee Pain, Patellofemoral Pain Syndrome, Anterior Knee Pain Scale, RAND 36-items Health Survey, Arabic version, Validation study, Outcomes measures.

Introduction

Patellofemoral Pain Syndrome (PFPS) is one of the most frequently occurring overuse injuries affecting the lower limbs,(Thijs, Van Tiggelen, Roosen, De Clercq, & Witvrouw, 2007) and is especially prevalent in people who are active physically.(Osteras, Osteras, & Torsensen, 2013) It manifests by either retropatellar or peripatellar pain or both as a result of activities that involve loading of the lower extremity when an individual walks, runs, jumps, climbs the stairs, and sits or kneels for a prolonged time.(Cook, Hegedus, Hawkins, Scovell, & Wyland, 2010) The disease affects more women than men.(Boling et al., 2010) The major symptom of patellofemoral pain syndrome is pain and the disease usually progresses to impairment of function. Based on the fundamental theoretical frameworks and existing research, a number of factors such as weakness of the muscles, structural as well as biochemical alterations of lower limbs, the way an individual moves, and cognitive factors contribute to the development of PFPS.

There are numerous etiologies responsible for either AKP or PFPS with different patients displaying different underlying pathology.(Smith, McNamara, & Donell, 2013) Some individuals can have poor patella tracking due to underlying biomechanical etiology. On the other hand, some individuals can have a normal profile of the femoral or the tibial and manifest with tibiofemoral-patellofemoral joint anatomical features. Anterior knee pain is linked with patella tracking that occur laterally in the femoral trochlea.(Harman, Dogan, Arslan, Ipeksoy, & Vural, 2002) As with any musculoskeletal assessment, a comprehensive history of the

patient as well as clinical assessment are the fundamentals to accurate diagnosis.

Numerous functional and patient self-reported outcomes (PRO) measures had been applied in the assessment of the clinical outcome following patellar dislocation or Anterior Knee Pain.(Wang, Jones, Khair, & Miniaci, 2010) Most of those measurements were initially designed for people with joint disorders that are non-patellafemoral; Kujala Patellofemoral Disorder Score was particularly designed and developed for the assessment of patients having anterior knee pain as well as patellofemoral conditions.(Kujala et al., 1993) This measurement of outcome was subsequently demonstrated to be reliable, valid, and responsive of the populations with anterior knee pain and patellar instability.(Paxton, Fithian, Stone, & Silva, 2003; Wang et al., 2010; Watson et al., 2005) Direct translation of a questionnaire from one language to another may not scientifically sound. Hence, for clinical and research purposes, the standard AKPS must be validated and adapted for use in an Arabic speaking population. This can be achieved by translating the Patient Report Outcomes (PRO) measures in Arabic, following which the psychometric properties of the new version are correlated against those of the original version.(Celik, Coskunsu, KiliCoglu, Ergonul, & Irrgang, 2014) The standard AKPS is widely used globally, and has shown strong representation of psychometric and normative data patterns seen in English speaking populations.(Kujala et al., 1993) It has been translated to different cultural settings and into many languages, including Turkish,(Kuru, Dereli, & Yaliman, 2010) Persian,(Negahban et al., 2012) Chinese,(Cheung, Ngai, Lam,

Chiu, & Fung, 2012) Dutch,(Kievit et al., 2013) and Brazilian-Portuguese,(da Cunha et al., 2013) Data compiled from questionnaires targeting different cultures are useful in establishing a better understanding of the instrument's strengths and limitations. The aim of this study was to translate, develop a cross-cultural adaptation, and perform psychometric properties testing of the Arabic version of Anterior Knee Pain Scale (AKPS) in patients with Patellofemoral Pain Syndrome (PFPS).

Methods

Cross-*cultural* Adaptation

The cross-cultural adaptation was conducted in two major stages: the translation and cross-cultural adaptation and assessment of psychometric properties. The first stage was performed according to the guidelines published for the translation and the cross-cultural adaptations of the questionnaires that are related to health(Dorcas E. Beaton & Francis Guillemin, 2000; Guillemin, Bombardier, & Beaton, 1993) and adopted by American Orthopedics Surgeons Association (AOSA). The second stage employed the use of quality criteria for the assessment of the properties of the questionnaire.(Terwee et al., 2007) It included the following steps: (1) translation, (2) synthesis, (3) back –translation, (4) expert committee review, (5) pretesting, and (6) validation.

(1) The Initial Translation

The initial stage in the adaptation was forward translation. Two

independent Arabic speakers who were native and also spoke fluent English translated the AKPS which was in English into Arabic. One translator was aware that the questionnaire measures pain and function while the other was not. That strategy utilized version T1 which was the conceptual translation of outcome being measured and version T2 that was a reflection of the linguistic practice which was not only standard but also without a scholarly influence.(Dorcas E. Beaton & Francis Guillemin, 2000)

(2) The Synthesis

The authors of this study and the two translators were compared and synthesized the version T1 and the T2 of the instrument and then produced Arabic versions of each measurement and the initial consensual of the Arabic Language Version developed as T12.(Dorcas E. Beaton & Francis Guillemin, 2000)

(3) The Backward Translation

Two professional translators, who spoke both Arabic and English and were not aware about what the instrument measured, translated the version T12 into English. The instrument that has been translated back into English were known as version B1 and B2 and compared with the initial English versions.(Dorcas E. Beaton & Francis Guillemin, 2000)

(4) Expert Committee Review

A committee of three rehabilitation specialists who were bilingual was established. All the translators assisted them whenever a need arose. Each of the members of the committee independently evaluated the semantic, the idiomatic, the experiential, and the conceptual equivalence of each item on the questionnaire. During that analysis process, the members of the committee had original English version, the Arabic version that was forward translated and the English version that was backward translated. When a nonequivalent item was identified, the committee reviewed it until a conclusion was made and the final version of the instrument was adapted by Arabic people culture.(Dorcas E. Beaton & Francis Guillemin, 2000)

(5) The Pretesting

The adapted Arabic version of the instrument tested for the cultural equivalence. In that stage, an option labeled as “not applicable” was included in every item of the Arabic version of the measuring scale in order to recognize questions that the Arabs would not understand or activities that they would not perform often.(Heintjes et al., 2003) The option “not applicable” was used in pretesting and was absent in the final version of the instrument. After that fifteen patients diagnosed with PFPS who were receiving physical therapy tratment in Prince Sultan Medical City completed the questionnaire.

After the questionnaire was completed, the fifteen patients were questioned about any difficulties that they encountered while completing the questionnaire as

well as a discussion about the questions that were not answered and “not applicable” items. To develop the final Arabic version of AKPS, a 15% upper limit for questions that the patients left unanswered and those that were indicated as “not applicable” was acceptable.(Dorcas E. Beaton & Francis Guillemin, 2000)

(6) Validation

The assessment of the psychometric properties was based on the quality criteria for the assessment of the properties of the questionnaire.(Terwee et al., 2007) The details and results of the validation study of the Arabic version AKPS are provided below.

Patients

Forty native Arabic speakers with PFPS were recruited from the Prince Sultan Military Medical City in Riyadh and Prince Faisal Bin Fahad Hospital in Riyadh. All patients were diagnosed by either genral practitioners or an orthopedics based on clinical and radiological findings. Inclusion criteria were as following: age between 18 and 50 years old with untreated PFPS and symptoms longer than two months. A range of ages was chosen to avoid difficulties in differentiating between PFPS, late symptoms of apophysitis (Osgood-Sclatter’s disease), and early symptoms of osteoarthritis, anterior or retropatellar pain from at least two of the following activities: prolonged sitting, stair climbing, squatting, running, kneeling, and hopping/jumping, insidious onset of symptoms unrelated to a traumatic incident, and presence of pain on palpation of the patellar facets or

positive physical tests on patellar grind test (Clarke's sign) or Waldron's test. We excluded patients with other knee injuries or pathology, such as knee osteoarthritis/arthritis, previous knee injury or knee operation, patellar tendinopathy, and Osgood-Sclatter's disease.

Instruments

The AKPS that is sometimes known as Kujala Scale,(Kujala et al., 1993) is a self-report questionaire with 13 items that are knee-specific. It documents answers to 6 activities considered to be linked particularly with the Anterior Knee Pain Syndrome (when an individual walks, runs, jumps, climbs the stairs, squats and sits for a long period while the knees are bent). The AKPS also documents presentations such as limping, inability to bear weight in the affected extremity, swelling, abnormal movement of the patellar, atrophy of the muscle, and limited flexion of the knees. The AKPS inquires about the duration of the presentations and the extremity (s) affected. A score between zero and One hundred and the lowest score is an indication of severe pain or disability. The scoring of the scale is hierarchical using categories such as "absence of difficulty – not able" or "absence of pain – presence of severe pain". Some sections include scoring of a distance that the patient can either walk or run without experiencing pain. It is easy to comprehend the AKPS and it takes a short time to complete it.(Bennell, S., Crossley, & Green, 2000) The test-retest reliability of the AKPS is good.(Kujala et al., 1993),(Timm, 1998) The authors of the scale have demonstrated its validity.(Kujala et al., 1993),(Timm, 1998) The sensitivity of

AKPS had been examined by numerous authors.(Bennell et al., 2000; Crossley, Bennell, Cowan, & Green, 2004; Watson et al., 2005) **(APPENDIX A and B)**

Another scale that used in this study was the Arabic RAND 36-Item Health Survey. It is a short survey that is not only health related but also multipurpose with 36 questions. The instrument has eight subscales for assessing the physical and mental health of the person. The physical component (PCS) includes: physical functioning, physical role functioning, bodily pain, and general health. The mental component (MCS) includes: vitality, social functioning, emotional role, and mental health. The score of this scale range from 0 to 100 (higher scores indicating better health status). It has been validated in Arabic.(Saud Abdulaziz Al Abdulmohsin, 1997) **(APPENDIX C and D)**

Procedures

Patients participating in this study signed the consent form and were briefed about the study procedures at every stage. The study was approved by the Institutional Review Board (IRB) of Loma Linda University and the Ethical committee of Prince Sultan Miritary Medical City in Riyadh, Saudi Arabia. The first session involved completing the Arabic version of both the AKPS and RAND 36-Item Health Survey. In the event that a patient had PFPS on both limbs, the patient completed the questionnaires for the more symptomatic side.(Bennell et al., 2000; Watson et al., 2005) The Arabic AKPS was given again 48 to 72 hours after the initial session to assess for test-retest reliability.(Binkley, Stratford, Lott, & Riddle, 1999; Watson et al., 2005) This time interval is not long enough for

altered the health status of the patients but long enough for the participants not to remember the earlier responses of the initial session.(Bennell et al., 2000; Watson et al., 2005) For convergent validity we hypothesized a strong and moderate correlation between the both Arabic AKPS and the physical components of the RAND 36-Item (physical functioning, role- physical, bodily pain, and general health).(Terwee et al., 2007) To assess the divergent validity we hypothesized a weak correlation between the both Arabic AKPS and the mental components of the RAND 36-Item (vitality, social functioning, role emotion, and mental health) because those are expected to measure different constructs. Finally to assess the feasibility, the ceiling and floor effects were measured.(Terwee et al., 2007) The questionnaires were considered to have ceiling and floor effects if 15% of the participant had the theoretical maximum or minimum total scores.(Denegar, Vela, & Evans, 2008)

Statistical Analyses

Data analysis was conducted using the Statistical Package for the Social Sciences (SPSS). Based on sample size calculation, a sample size of 40 subjects was required for a power of 80% and an alpha of 0.5 to carry out this study. The characteristics of the participants and the measurments were summarized using mean ± standard deviation (SD) for the quantitative variables and frequencies and relative frequencies for qualitative variables. The normality of score from the different instruments was examined using One Sample Kolmogrove-Smirnov test. The two scales used in the study were examined for

internal consistency, test-retest reliability, construct validity, and feasibility. Using the Cronbach's alpha index, we were able to assess the internal consistency of the Arabic AKPS with values of 0.70 to 0.90 being considered adequate.(Terwee et al., 2007) For test-retest reliability, interclass correlational coefficient (ICCs) and corresponding 95% confidence intervals (CIs) were calculated. ICCs that were less than 0.40 were considered poor, 0.4-0.7 considered moderate, 0.7 to 0.9 considered substantial, while values above 0.9 were regarded as being excellent.(Terwee et al., 2007) Agreement was obtained by computing the standard error of measurement (SEM) from baseline assessment data and the assessment taken 48 to 72 hours later and expressed in similar units as the instrument used.(Binkley et al., 1999; Watson et al., 2005) The SEM as a percentage of the total score provides a relatively good measure of agreement and is considered very good if it is ≤ 5%; good if it is > 5% and ≤ 10%; doubtful if > 10% and ≤ 20%; or negative if > 20%.(Ostelo, de Vet, Knol, & van den Brandt, 2004) Taking the standard deviation of differences between the scores from the two testing sessions and dividing by square root of 2 yielded the SEM.(de Vet, Terwee, Knol, & Bouter, 2006) To obtain construct validity, the level of association was calculated using the Spearman *rho* correlation between both Arabic AKPS and RAND 36-Item subscales at baseline. Correlation coefficients of ≥ 0.7are recommended for same-construct instruments while moderate correlations of ≥0.4 to ≤0.70 are acceptable.(Terwee et al., 2007)

We examined the ceiling and floor effects by calculating the percentage of participants who reached the highest or lowest possible scores in any

instrument.(Terwee et al., 2007) Ceiling and floor effects were confirmed to have occurred when more that 15% of all respondent obtained the lowest or highest possible score.(Terwee et al., 2007) The level of significance was set at $p \leq 0.05$.

Results

Translation and Cross-cultural Adaptation

In the process of translating the AKPS into Arabic, we did not find any linguistic, semantic, or cultural difference. As a matter of fact, all inconsistencies were well illustrated and resolved amicably by the expert committee. During the pretests all questions and options on cultural equivalence were well understood and answered satisfactorily by all 15 participants. Based on the results of our pilot study, the question on “Abnormal painful kneecap (patellar) movements” was not clear to all participants. We used a more usable term between parentheses ( ) in slang Arabic rather than the classical Arabic to make it more clear and understandable. Another question had the terms “Stairs” and “Squatting”. It was necessary to add another word in slang Arabic between parentheses ( ) to make it more clear and usable to the participants.

Measurements Properties Testing

Forty volunteers completed both Arabic versions of AKPS and RAND 36-Item Health Survey at baseline and 48 to 72 hours later for Arabic AKPS only. The mean ± SD age of the participants was 34.7 ± 9.31 years. The majority of participants were males (65%, n = 26), and (67.5%, n = 27) reported that they

had pain in the right knee. The demographic characteristics of the participants and mean ± SD of total scores on the instruments at baseline and 48 to 72 hours later are provided in **TABLE 1.**

Internal Consistency

Results showed that he internal consistency of the Arabic version of AKPS the Cronbach α was 0.81 at baseline and 0.75 after 48 to 72 hours later. Deleting an item from the construct did not significantly change the alpha level. Values ranged from 0.75 to 0.83 when an item was deleted at baseline. The results of the internal consistency assessments for the Arabic AKPS are reported in **TABLE 2.**

Table 1: Summary characteristics of the participants and instruments.

	Study Sample
	N=40
Gender*	
Male	26 (65%)
Female	14 (35%)
Age (Years)	34.7 ± 9.3
Knee*†	
Right	27(67.5%)
Left	13(32.5%)
Duration (Months)	7.9 ± 6.1
AKPS (0-100)	59.3 ± 17.2
RAND 36-Item	
PCS (0-100)	58.0 ± 16.9
MCS (0-100)	76.7 ± 12.6

Abbreviations: AKPS, Anterior Knee Pain Scale; RAND 36-Item, RAND 36-Item Health Survey; PCS, Physical Components (physical functioning, role physical, bodily pain, and general health); MCS, Mental Components (vitality, social functioning, role emotion, and mental health).
**Values represented as n (%).*
†Bilateral affected sides we ask the patient to complete the questionnaires for more symptomatic side.

Table 2: Internal Consistency of Arabic Version of Anterior Knee Pain Scale (n=40)

	Cronbach's Alpha if Item Deleted (Baseline)	Cronbach's Alpha if Item Deleted (48 to 72 Hours)
Q1	0.79	0.72
Q2	0.80	0.73
Q3	0.80	0.74
Q4	0.80	0.73
Q5	0.79	0.72
Q6	0.75	0.67
Q7	0.79	0.69
Q8	0.78	0.69
Q9	0.79	0.74
Q10	0.79	0.72
Q11	0.83	0.78
Q12	0.83	0.76
Q13	0.80	0.74
Overall Cronbach’s Alpha	0.81	0.75

Abbreviations: AKPS, Anterior Knee Pain Scale; Q, Question.

Reliability

From test-retest reliability analysis, the Arabic AKPS showed excellent reliability (ICC = 0.96: 95% CI: 0.93, 0.98). Also, analysis of individual ICC values ranged between 0.59 and 0.97. The percentage of the SEM to the total score was classified as very good. **TABLE 3** describes the details of the test-retest reliability of the Arabic AKPS.

Table 3: Test-Retest of Arabic Version of Anterior Knee Pain Scale (n=40)

	ICC	Lower 95% CI	Upper 95% CI
Q1	0.96	0.93	0.98
Q2	0.95	0.91	0.97
Q3	0.60	0.36	0.77
Q4	0.71	0.51	0.83
Q5	0.79	0.64	0.88
Q6	0.86	0.75	0.92
Q7	0.92	0.86	0.96
Q8	0.78	0.62	0.88
Q9	0.62	0.39	0.78
Q10	0.97	0.95	0.99
Q11	0.74	0.57	0.86
Q12	0.85	0.73	0.92
Q13	0.59	0.35	0.76
Overall AKPS	0.96	0.93	0.98

Abbreviations: AKPS, Anterior Knee Pain Scale; Q, Question; ICC, Intra Class Correlation.

Construct Validity

The Arabic AKPS was significantly correlated with physical components of RAND-36 Item (*rho*=0.69, p< .001) and RAND 36-Item subscales: physical functioning (*rho*=0.63), role physical (*rho*=0.57), and bodily pain (*rho*=0.49) except general health subscale that was weak (rho=0.24). For divergent validity, the correlation with mental components of RAND-36 was not significant (*rho*=0.31, p= .055). It shows a non-significant correlation with social functioning subscales (*rho*=0.22), role emotional (*rho*=0.34) and mental health (*rho*=0.42) while a good correlation with vitality subscales (*rho*=0.53). Details of Spearman correlations were documented in (**TABLE 4) and (FIGURE 1 & 2)**

Table 4: Spearman correlations between Arabic Version of Anterior Knee Pain Scale and RAND 36-Items subscales (n=40)

	AKPS	RAND 36-Item PCS	RAND 36-Item MCS
Physical Functioning	0.63	0.83	0.36†
Role-Physical	0.57	0.77	0.42
Bodily Pain	0.49	0.66	0.41
General Health	0.24†	0.53	0.27†
Vitality	0.53	0.42	0.57
Social Functioning	0.22†	0.57	0.52
Role-Emotional	0.34†	0.45	0.54
Mental Health	0.01†	0.26†	0.78

Abbreviations: AKPS, Anterior Knee Pain Scale; RAND 36-Item, RAND 36-Item Health Survey; PCS, Physical Components (physical functioning, role-physical, bodily pain, and general health); MCS, Mental Components (vitality, social functioning, role-emotion, and mental health).
† Not significant at an alpha of 0.01 level of significance.

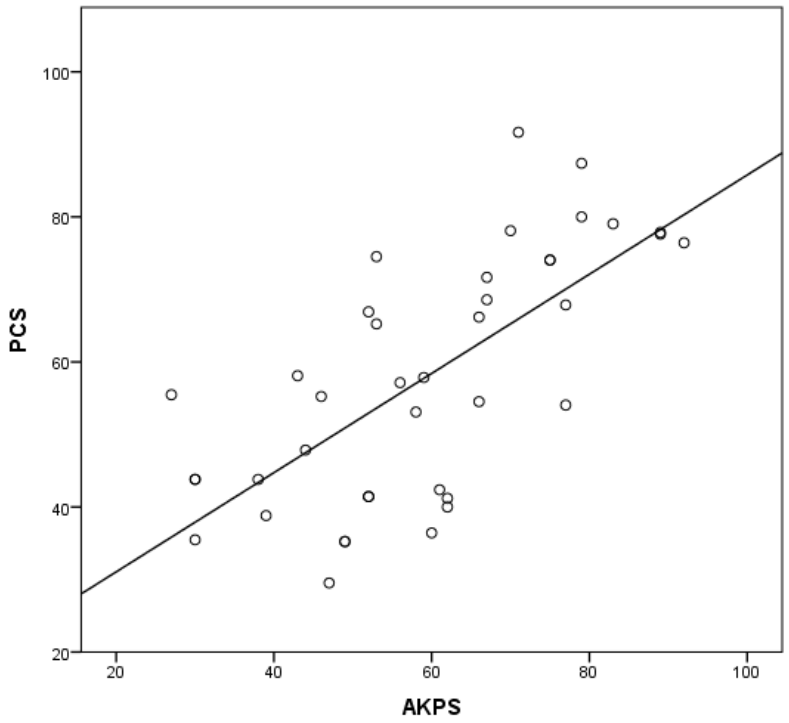

Figure 1: Spearman correlations between Arabic AKPS and Physical Component Subscales of RAND 36-Items

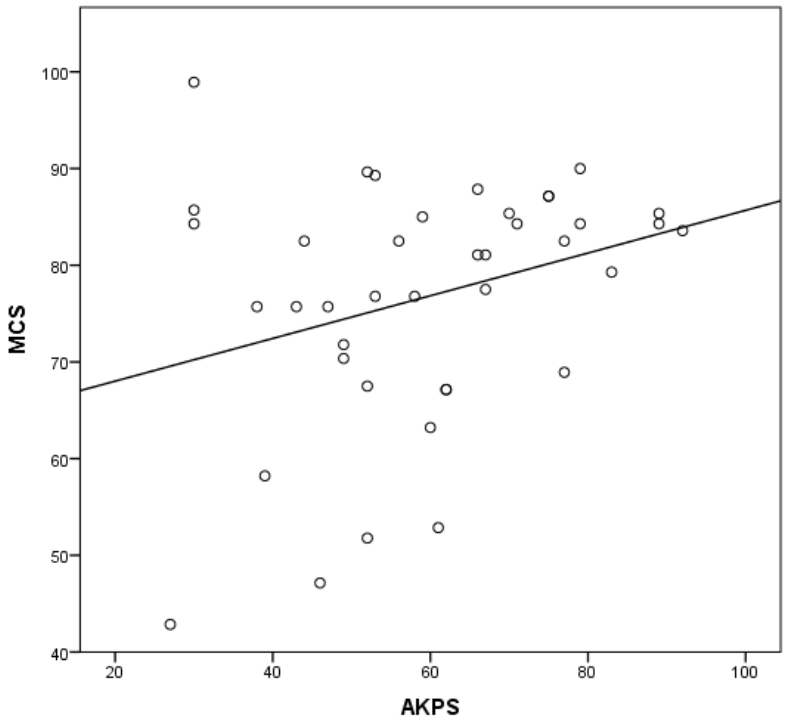

Figure 2: Spearman correlations between Arabic AKPS and Mental Component Subscales of RAND 36-Items

Ceiling and Floor Effects

For this analysis, responses from participants at baseline and at 42 and 72 hours after baseline were used. None of the participants obtained the highest or lowest possible score on Arabic AKPS. Therefore, no ceiling or floor effects were observed at any of assessment times. Regarding the RAND 36-Item, we observed a ceiling and floor effect in role-physical, while a floor effect only in vitality, and role-emotional. **TABLE 5.**

Table 5: Ceiling and Flooring effects of Arabic Version of Anterior Knee Pain Scale and RAND 36-Items subscales (n=40)

	Ceiling Effect (%)	Flooring Effect (%)
AKPS	0	0
RAND 36-Item Summary		
Physical	0	0
Mental	0	0
RAND 36-Item Subscales		
Physical Functioning	0	0
Role-Physical	22.5*	37.5*
Bodily Pain	2.5	0
General Health	0	0
Vitality	2.5	2.5
Social Functioning	25*	0
Role-Emotional	70*	10
Mental Health	5	0

Abbreviations: AKPS, Anterior Knee Pain Scale; RAND 36-Item, RAND 36-Item Health Survey; PCS, Physical Components (physical functioning, role physical, bodily pain, and general health); MCS, Mental Components (vitality, social functioning, role emotion, and mental health).

** Ceiling and flooring effects by more than 15% of the participants*

Discussion

With the world becoming more interconnected, research is expanding to include individuals from other cultures from around the globe. For this reason, there is need to adopt health assessment measures suited for different cultures and languages. The purpose of this study was to translate, modify, and adapt the Anterior Knee Pain Scale (AKPS) to culturally suit the Arab population.

Translation Process

The study was conducted using a sample of Arab-speaking patients with anterior knee pain. Results of this study showed that the Arabic version of the AKPS exhibited tolerable levels for reliability, validity, and feasibility, and could be used as a subjective and functional assessment tool for Arab-speaking individuals presenting with AKP or PFPS.

The literature suggests that, if possible, it is preferable to use a scale developed in another language, which had its reliability previously tested, than to create a new instrument and the results can be compared with other studies.(Dorcas E. Beaton & Francis Guillemin, 2000) Therefore, we chose to perform the cultural adaptation and validation of the Arabic AKPS in patients with patellofemoral pain syndrome or anterior knee pain, in Saudi Arabia, instead of creating a new questionnaire. There is consensus in the literature that a direct translation of a questionnaire into another language is erroneous. So that, we chose the appropriate protocol for maximum attainment of semantic, idiomatic,

experiential, and conceptual correspondence between the original and the translated questionnaire

Selecting the best guidelines may be difficult and includes an element of subjectivity. The process of translating and customizing a questionnaire to a different cultural group is not an easy one. It requires time, knowledge, skill, and experience. Grave translational problems may arise which in turn adversely affect study findings, even when a professional translator is involved.(Brislin R, 1973) Certain conversational terms, idiomatic expressions, and emotional expressive terms may be rather challenging to handle. Whereas reviews of literature and expert opinions are needed when formulating such tools, the importance of focus groups and patient involvement in the process of cultural adaptation of PRO cannot be underestimated.(Breugelmans, 2009) In this study, We followed the guidelines of cross-cultural adaptations reported by Beaton et al,(Dorcas E. Beaton & Francis Guillemin, 2000) and psychometric properties testing reported by Terwee et al.(Terwee et al., 2007) Translation and cross-cutural adaptaion of AKPS was performed in 5 stages: Translation, synthesis, backward transaltion, expert committee review, and pretesting. The role of the expert committee was crucial to review all the translations, make critical decisions, reach a consensus on any discrepancy, and put together the different versions of the questionnaire.

The new tool was reviewed and modified each time by the investigators and subjected to an additional review by the committee members to guarantee the quality of the final translation. The Arabic version did not need a major or

specific modifications and changes because the signs, symptoms, and activities evaluated by the scale are common in both English and Arabic populations. Also, the translation was made into simple everyday words commonly used in Arabic. Even so, it remains challenging to align literal terms with dialectic ones. We observed that in the question on “Abnormal painful kneecap (patellar) movements” which was not clear to all participants, so that we used a more usable term between parentheses ( ) in Arabic slang rather than the classical Arabic to more clear and understandable. Another question “Stairs” and “Squatting” we found necessary to add another meaning in Arabic slang and was worded in simple between parentheses ( ) to be more clear and usable to participant. After the cross-cultural adaptation phase had been completed, the questionnaire was not yet ready for use. Further tests should be conducted on the psychometric properties of the adapted questionnaire.

It is important to consider that even when the cultural adaptation process is well established and a reliable and valid patient self reported instrument is obtained, it cannot be taken for sure that the same scores obtained in different cultural groups have the same psychological meaning; there might be individual differences in subjective idea of well being. The linguistic and cultural adaptation might be particularly hard in countries that people share many socioeconomic and ethnic characteristics such as the Arabic population.

The most important findings of our this study was that the Arabic AKPS demonstrated an excellent internal consistency, reliability, acceptable construct validity, and no ceiling or floor effects were observed in patients with anterior

knee pain. Furthemore, this is the first study to translate the AKPS to Arabic and valdiate it for use in patients with anterior knee pain.

Reliability

The Arabic AKPS had good internal consistency (α=0.81) and similar to other versions findings,(Kuru et al., 2010)-(da Cunha et al., 2013) while it was not been studied in the original Kujala scale. Reliability testing is one of the most important and psychometric properties of an outcome measurement.(Watson et al., 2005) When we examined the reliability, we used 48 to 72 hours time intervals between baseline session and second session in order for patients to forget their initial responses and for symptoms not to vary substantially.(Binkley et al., 1999; Watson et al., 2005) The Arabic version of AKPS showed an excellent reliability and very good agreement (ICC=0.96, 95% CI=0.93-0.98). This findings is in line with those obtained by other versions studies,(Kuru et al., 2010)-(Cheung et al., 2012),(da Cunha et al., 2013) and other studies conducted by Bennell et al. (ICC=0.96),(Bennell et al., 2000) Crossley et al,(Crossley et al., 2004) and Watson et al. (ICC=0.95)(Watson et al., 2005) when they studied the AKPS on patients with Patellofemoral Pain Syndrome. The original Kujala scale and Dutch version did not study the test-retest reliability. The variation in reliability observed among different studies may be alluded to time of interval, population differences, and the kind of stitistical analysis approach used. Nevertheless, our findings were similar to those reported in previous literature.(Bennell et al., 2000; Cheung et al., 2012; Crossley et al., 2004; da

Cunha et al., 2013; Kuru et al., 2010; Negahban et al., 2012; Watson et al., 2005) The agreement assessed by the percentage of the SEM in relation to total score range was rated as very good and was in agreement with findings from previous studies that used the AKPS.(Bennell et al., 2000; Crossley et al., 2004; da Cunha et al., 2013) **TABLE 6**

Table 6: Overview of different reliability and validity tests that have reported in the different language versions of AKPS.

Study	Language Version	Cronbach's Alpha Index	Test-retest Reliability	Time Interval
Present Study	Arabic	0.81	0.96*	2-3 days
Kujala et al(Kujala et al., 1993)	Original Kujala	Not tested	-	-
Kuru et al(Kuru et al., 2010)	Turkish	0.84	0.94†	2 weeks
Negahban(Negahban et al., 2012)	Persian	0.81	0.96*	2-3 days
Cheung(Cheung et al., 2012)	Chinese	0.81	0.96*	7 days
Kievit et al(Kievit et al., 2013)	Dutch	0.81	Not tested	-
da Cunha et al(da Cunha et al., 2013)	Brazilian-Portuguese	0.75	0.95*	2-3 days

** Intraclass Correlation Coefficient (ICC).*
† Spearman's correlation (rho)

Validity

To verify the validity of AKPS, we studied the content and construct validity. The construct validity was examined by convergent and divergent validity, and the content validity by ceiling and floor effects. We found a good correlation between Arabic AKPS and PCS of the RAND-36 Item subscales: physical functioning, role physical and bodily pain. A poor correlation was found with general health subscale. Divergent validity was expected and observed with MCS of RAND 36-Item. These findings support our hypothesis that AKPS and PCS measure the same construct while AKPS and MCS measure different construct.(Terwee et al., 2007) In this study, the correlation between the Arabic AKPS and RAND 36-Item subscales physical functioning, role-physical, and bodily pain were higher than that of the Persian,(Negahban et al., 2012) Chinese,(Cheung et al., 2012) and Dutch.(Kievit et al., 2013) The correlation between AKPS and the mental components of RAND 36-Item were similar to the results found with other translated versions.(Negahban et al., 2012)-(Kievit et al., 2013) **TABLE 7**.

Table 7: Overview of different Spearman rank correlation coefficients of the total score of AKPS scale and RAND 36-Item that have reported in the different language versions of AKPS.

	This Study	**Persian (Negahban et al., 2012)**	**Chinese (Cheung et al., 2012)**	**Dutch (Kievit et al., 2013)**
Physical Functioning	0.63	0.51	0.49	0.59
Role-Physical	0.57	0.44	0.41	0.54
Bodily Pain	0.49	0.47	0.14	0.22
General Health	0.24†	0.34	0.44	0.37
Vitality	0.53	0.33	0.29	0.27
Social Functioning	0.22†	0.37	0.22	0.46
Role-Emotional	0.34†	0.25	0.13	0.57
Mental Health	0.01†	0.35	0.16	0.33

Abbreviations: AKPS, Anterior Knee Pain Scale; RAND 36-Item, RAND 36-Item Health Survey; PCS, Physical Components (physical functioning, role physical, bodily pain, and general health); MCS, Mental Components (vitality, social functioning, role emotion, and mental health). †
Non-significant at an alpha of 0.05.

Feasibility

In this study, no ceiling and floor effect were seen for Arabic version of AKPS. Therefore, the Arabic AKPS has the ability to distinguish between different patients based on their signs and symptoms. This parameter supports the reliability and responsiveness of the scale.(Terwee et al., 2007) This findings is comparable to other translated versions(Cheung et al., 2012; da Cunha et al., 2013; Kievit et al., 2013; Kuru et al., 2010).

Findings from this study provide clinicians and researchers with evidence backing the use of an AKPS tool on Arabic speaking patients with PFPS by Arabic researchers in everyday clinical setting.(Bent, Wright, Rushton, & Batt, 2009) With current trends in globalisation, more research is being carried out in a collborative manner across different cultures and languages.(Hoksrud, Ohberg, Alfredson, & Bahr, 2006) Having reliable and standardized instruments can improve the quality of research findings and enhance scientific evidence since findings can be reported in a more unified way. This allows for standardized comparison of findings through systematic reviews and meta-analysis.(Reider, 2008) In addition, it enhances the quality of pooled data from various parts of the world with dissimilar cultures. Our study was concluded with future recommendation. Due to time restraints, we did not conduct the analysis of the responsiveness of AKPS. Responsiveness is defined as the ability of an instrument to detect important clinical changes through time.(Mokkink et al., 2010) Even though, we consider that the AKPS has measurement properties similar to the original version and the majority of the different versions available

in the literature. We understand that evaluating a cross-culturally adapted instrument is an ongoing procedure, and that the present study laid the cornerstone of that process. Based on this assumption, we suggest further studies on AKPS, with the purpose of increasing its coverage and evaluating the measurement properties yet unknown.

Conclusion

The Anterior Knee Pain Scale (AKPS) is not only short and easy to use; it is also easy to interpret and saves time for the clinician or researcher. From our findings, the Arabic version of AKPS is sufficiently reliable, valid, and appropriate for use as a PRO measure for Arabic speaking individuals with anterior knee pain and patellofemoral pain syndrome. The Arabic AKPS is also the first validated knee outcome measure in Arabic to assess the knee pathology

Key Points

Findings

The reliability of the Arabic AKPS is good. Its validity is comparable to those reported for the original English version AKPS and other translated versions.

Implications

The Arabic version of the AKPS can be used as subjective and functional assessment tool for Arabic-speaking individuals with Anterior Knee Pain and patellofemoral pain syndrome.

Cautions

More studies are required to assess sensitivity so as to determine the minimum clinically meaningful threshold for which the Arabic version of the AKPS for various knee conditions.

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CHAPTER THREE

DISCUSSION

Anterior Knee Pain (AKP) is one of the most frequently occurring overuse injuries affecting the lower limbs (Thijs, Van Tiggelen, Roosen, De Clercq, & Witvrouw, 2007). It is especially prevalent in people who are active physically (Osteras, Osteras, & Torsensen, 2013) affects more women than men (Boling et al., 2010). Numerous functional and patient self-reported outcomes (PRO) measures have been applied in the assessment of the clinical outcome following patellar dislocation or Anterior Knee Pain (Wang, Jones, Khair, & Miniaci, 2010). Kujala Patellofemoral Disorder Score was particularly designed and developed for the assessment of patients having anterior knee pain as well as patellofemoral conditions (Kujala et al., 1993). It has been found to be reliable, valid, and responsive of the populations with Anterior Knee Pain and patellar instability (Paxton, Fithian, Stone, & Silva, 2003; Wang et al., 2010; Watson et al., 2005).

The rate of global integration has rapidly risen over the past few decades. With increased interconnectedness, sharing of information has become much easier. The research front has continued to expand to include multi-cultural and cross-cultural settings with healthcare facilities increasingly serving the needs of patients from diverse cultural backgrounds. This necessitates that health assessment be carried out in a unified manner across different cultures and languages. We designed this study with the sole purpose of translating and modifying the English version of the Anterior Knee Pain Scale (AKPS) to suit

cultural needs of the Arab population. We used a convenient sample of Arab speaking patients presenting with anterior knee pain to refine and validate the Arabic version. The final tool (Arabic version) was found to be valid and adequately reliable and could be used as a practical tool for assessing anterior knee pain (patellofemoral pain syndrome) in Arab speaking patients. Previous investigators in this area of research have recommended using an existing scale which has had its reliability tested, rather than creating a new instrument. Besides allowing the CCAP to run faster, using an existing instrument allows for a platform for comparison with other studies (Dorcas E. Beaton & Francis Guillemin, 2000). There is consensus in the literature on the dangers of direct translation of a questionnaire into another language. For this reason, we chose to develop and validate a culturally sensitive and appropriate version of the Arabic AKPS in patients with patellofemoral pain syndrome or anterior knee pain. The new tool was developed based on the standard AKPS tool for English speaking patients. Based on a previous article (Guillemin, Bombardier, & Beaton, 1993), we examined the CCAP and the various ways of achieving a high correlation between the translated instrument and the original instrument. This process is particularly crucial in ensuring validity of the instrument. An instrument that is not subjected to this process may yield dubious results and contribute to flawed conclusions. For this reason, a protocol needs to be in place for maximum attainment of semantic, idiomatic, experiential, and conceptual correspondence between the original and the translated questionnaire. Translating and customizing a questionnaire to a different cultural group is quite a task. It requires

time, knowledge, skill, and experience. Serious translational problems may arise which in turn adversely affect study findings. This can happen even when a professional translator is involved (Brislin R, 1973). Certain conversational terms, idiomatic expressions, and emotional expressive terms may be rather difficult to synthesize. Whereas reviews of literature and expert opinions are needed when formulating such tools, the importance of focus groups and patient involvement in the process of cultural adaptation of PRO cannot be underestimated (Breugelmans, 2009). For our study, we embraced and adhered to guidelines of cross-cultural adaptations described by Beaton &(Dorcas E. Beaton & Francis Guillemin, 2000), and psychometric properties testing reported by Terwee et al. (2007). The process of translating and adapting the AKPS to Arabic culture was executed in five stages: translation, synthesis, backward transaltion, expert committee review, and pretesting. Also, an expert committee was tasked with reviewing the translations and establishing consensus on any discrepancies in addition to putting together the different versions of the questionnaire.

Unlike most recommendations, which usually place a unique committee meeting after the back-translation phase, the expert committee chipped in and contributed on several steps in this study. The new instrument was reviewed and modified each time by the investigators and subjected to additional reviews by the committee members to enhance the quality of the final product. The modifications were narrow and limited, since the Arabic version was in many ways similar to the English version as far as signs, symptoms, and activities evaluated by the scale, Also, the translation was made in simple everyday words

commonly used in Arabic. Even so, it remains challenging to align literal terms with dialectic ones. For example, we observed that participants had difficulty understanding the question on “Abnormal painful kneecap (patellar) movements”. Consequently, we added a commonly used rather than the typical Arabic term in parentheses ( ) for clarity and ease of comprehension. Similarly, for the terms “Stairs” and “Squatting” we included simple additional explanation in Arabic in parentheses to enhance understanding. Cross-cultural adaptation phase does not signify the completion of the questionnaire; instead, the tool has to undergo further tests on the psychometric properties.

Even so, however well this process is conducted, there is no guarantee that the newly validated and adapted PRO instrument can replicate results across various cultural groups. It is likely that differences will arise indicating the relativity of wellbeing across cultures hence making linguistic and cultural adaptation challenging. This is particularly true for the Arabic speaking population that has shared economic and ethnic characteristics. Perhaps the most meaningful finding from our study is that the Arabic AKPS showed impressive internal consistency, reliability, and sufficient construct validity. Furthermore, no additional ceiling or floor effects were observed in patients with anterior knee pain. It’s worth mentioning that this study, to the best of our knowledge, is the first to translate and validate the AKPS in Arabic patients with anterior knee pain. With an impressive internal consistency (α=0.809), our tool is well comparable to others such as the Turkish (α=0.84) (Kuru et al., 2010); Persian (α=0.81) (Negahban et al., 2012); Chinese (α=0.81) (Cheung et al., 2012); Dutch (α=0.81)

(Kievit et al., 2013); and Brazilian-Portuguese (α=0.75) (da Cunha et al., 2013).

Considering the importance of reliability testing in research (Watson et al., 2005), we undertook to test the reliabilty of our instrument using time interval between baseline and follow-up sessions (48 to 72 hours). This time limit is important for two reasons; first it allows the patients to forget the initial response, and secondly, it restricts substantial variation in symptoms (Binkley, Stratford, Lott, & Riddle, 1999; Watson et al., 2005). To this end, the Arabic version of AKPS demonstrated excellent reliability and a very good agreement (ICC=0.964, 95% CI=0.933-0.981). Again, these results are comparable to those obtained in the Turkish (Spearman's cprrelation=0.944)(Kuru et al., 2010); Persian (IC=0.96)(Negahban et al., 2012); Chinese (IC=0.96)(Cheung et al., 2012), Brazilian-Portuguese (ICC=0.95)(da Cunha et al., 2013). It also mirrors findings from similar studies conducted by: Bennell et al. (2000) (ICC=0.96), Crossley et al. (Crossley, Bennell, Cowan, & Green, 2004) and Watson et al. (ICC=0.95) (Watson et al., 2005). May be we should point out at this juncture that the original Kujala scale and Dutch version didn't study the test-retest reliability. The variation in reliability noted among different studies may be atrributed to time of interval, population differences, and the type of stitistical analysis approach used. Nonetheless, our findings were similar to those reported in other literature.(Bennell, S., Crossley, & Green, 2000; Cheung et al., 2012; Crossley et al., 2004; da Cunha et al., 2013; Kuru et al., 2010; Negahban et al., 2012; Watson et al., 2005). The agreement assessed by the percentage of the SEM in relation to total score range were rated as very good and were in harmony with

findings from earlier studies that used the AKPS. (Bennell et al., 2000; Crossley et al., 2004; da Cunha et al., 2013). To check for validity of the AKPS, we conducted a thorough review of the content and construct validity. We achieved this by examining convergent and divergent validity for construct, and ceiling and floor effects for content validity. In the case of convergent and divergent validity, we compared and analyzed the correspondence between the physical (PCS) and mental (MCS) componet subscales of the RAND 36-Item Health Survey. Since the AKPS and (PCS) measure the same construct, we put forth an hypothesis that these tools would have a good correlation. On the other hand, we postulated a non-corrlation between AKPS and (MCS) since they measure different construct (Terwee et al., 2007). Our findings showed a good correlation between AKPS and PCS (*rho*=0.691) and RAND 36-Item subscales: physical functioning (*rho*=0.630), role physical (*rho*=0.569), and bodily pain (*rho*=0.494). However, the general health subscale showed poor correlation (rho=0.237). As anticipated, the divergent validity was observed with mental components of RAND-36 (*rho*=0.306). Non-significant results were observed for social functioning subscales (*rho*=0.219) and mental health (*rho*=0.008). A weak correlation was noted for role emotional (*rho*=0.337) and satisfactory correlation was observed for vitality subscales. A measure of the correlation between AKPS and MCS showed a poor correlation as would be expected (*rho*=0.306); a non-significant correlation with social functioning subscales (*rho*=0.219); and mental health (*rho*=0.008) and a weak correlation with role emotional (*rho*=0.337). However, a good correlation with vitality subscales (*rho*=0.533) was observed. These findings

are in tangent with our hypothesis that AKPS and PCS measures the same construct while an AKPS and MCS measure a different construct. Additionally, we observed the following correlations between the Arabic version of AKPS and RAND 36-Item subscales: physical functioning (*rho*=o.630), role physical (*rho*=0.565), and bodily pain (*rho*=0.494) was greater than that of the Persian (Negahban et al., 2012) (PF: *rho*=0.51, RF: *rho*=0.44, BP: *rho*=0.47), Chinese (Cheung et al., 2012) (PF: *rho*=0.49, RF: *rho*=0.41, BP: *rho*=0.14), and Dutch (Kievit et al., 2013) (PF: *rho*=0.59, RF: *rho*=0.54, BP: *rho*=0.22).

We also observed a similarity in level of association between AKPS and the mental domains of the RAND 36-Item of the original and translated version. An instrument with good validity should have low ceiling and floor effects. To obtain ceiling and floor effects, we computed the proportion of patients who achieved highest or lowest scores of the instrument (Terwee et al., 2007). The percentages were derived from answers provided by all participants at baseline and 48-72 hours later. We did not observe ceiling or floor effects for the Arabic version of AKPS. We therefore concluded that the Arabic AKPS had the ability to discriminate patients based on their signs and symptoms which is itself indicative of the reliability and responsiveness of the scale (Terwee et al., 2007). Similar findings of this aspect of validation has been observed in other translated versions (Cheung et al., 2012; da Cunha et al., 2013; Kievit et al., 2013; Kuru et al., 2010).

This study has presented researchers with a tool that can be used by investigators to assess PFPS in an Arab speaking population. The tool is

adequate and practical enough for routine use in a clinical setting (Bent, Wright, Rushton, & Batt, 2009). As the demand for cross-cultural collaborative research increases, the demand for reliable standardized tools increases as well (Hoksrud, Ohberg, Alfredson, & Bahr, 2006). Such tools are inevitably useful in ensuring that findings derived from multicultural research can be pooled together and presented uniformly in systematic or meta-analytic studies.

Our study was limited in sample size since we only recruited a convenience sample. A larger and more representative sample size would have bolstered study power thus enhancing the strength of study findings. We were also constrained by time that prevented us from conducting the analysis of the responsiveness of AKPS. By definition, responsiveness is the ability of an instrument to detect important clinical changes over time (Mokkink et al., 2010). Despite the limitations, we consider that the AKPS tool we have developed is comparable to the original version and a host of other different versions available in the literature. We acknowledged that the instrument is not perfect, far from it, and will benefit from continuous improvement, but even so the present study lays the cornerstone of that process. For this reason, we recommend and welcome additional investigation on AKPS and hopefully this will gain more coverage and explore properties yet unidentified.

Conclusion

The Anterior Knee Pain Scale (AKPS) is short, easy to use, easy to interpret, and saves time for the clinician or researcher. We find that the Arabic

version of AKPS is sufficiently reliable, valid, and appropriate for use as a PRO measure for Arabic speaking individuals with anterior knee pain and patellofemoral pain syndrome. It is the first validated knee outcome measure in Arabic to assess the knee pathology in Arabic speaking population.

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APPENDIX A

ANTERIOR KNEE PAIN (English Version)

ANTERIOR KNEE PAIN (Sheet code: _____)

Name: _____ Date:

_____

Age: _____

Knee: L/R

Duration of symptoms: _____ years _____ months

For each question, circle the latest choice (letter), which corresponds to your knee symptoms.

1. Limp

(a) None (5)

(b) Slight or periodical (3)

(c) Constant (0)

2. Support

(a) Full support without pain (5)

(b) Painful (3)

(c) Weight bearing impossible (0)

3. Walking

(a) Unlimited (5)

(b) More than 2 km (3)

(c) 1-2 km (2)

(d) Unable (0)

4. Stairs

(a) No difficulty (10)

(b) Slight pain when descending (8)

(c) Pain both when descending and ascending (5)

(d) Unable (0)

5. Squatting

(a) No difficulty (5)

(b) Repeated squatting painful (4)

(c) Painful each time (3)

(d) Possible with partial weight bearing (2)

(e) Unable (0)

6. Running

(a) No difficulty (10)

(b) Pain after more than 2 km (8)

(c) Slight pain from start (6)

(d) Severe pain (3)

(e) Unable (0)

7. Jumping

(a) No difficulty (10)

(b) Slight difficulty (7)

(c) Constant pain (2)

(d) Unable (0)

8. Prolonged sitting with the knees flexed

(a) No difficulty (10)

(b) Pain after exercise (8)

(c) Constant pain (6)

(d) Pain forces to extend knees temporarily (4)

(e) Unable (0)

9. Pain

(a) None (10)

(b) Slight and occasional (8)

(c) Interferes with sleep (6)

(d) Occasionally severe (3)

(e) Constant and severe (0)

10. Swelling

(a) None (10)

(b) After severe exertion (8)

(c) After daily activities (6)

(d) Every evening (4)

(e) Constant (0)

11. Abnormal painful kneecap (patellar) movements (subluxations)

(a) None (10)

(b) Occasionally in sports activities (6)

(c) Occasionally in daily activities (4)

(d) At least one documented dislocation (2)

(e) More than two dislocations (0)

12. Atrophy of thigh

(a) None (5)

(b) Slight (3)

(c) Severe (0)

13. Flexion deficiency

(a) None (5)

(b) Slight (3)

(c) Severe (0)

APPENDIX B

ANTERIOR KNEE PAIN (ARABIC VERSION)

الاسم:..... .....العمر ..... بداية الاعراض ..... شهر / سنه

الزيارة: (١ - ٢) الركبة المصابة : اليمين / اليسار

(أختر إجابة واحدة وضع علامة

١) هل تمشي وانت تعرج (تضلع) ؟

- o لا يوجد
- o بصورة خفيفة أو أحياناً
- o باستمرار

٢) ما مدى تحمل ركبتك لوزن جسمك؟

- o تتحمل كل وزني
- o تتحمل لكن أشعر بألم
- o من المستحيل أن تتحمل وزني

٣) أثناء المشي

- o لا يوجد لدي حد للمشي
- o أمشي أكثر من ٢ كيلو متر
- o أمشي من ١ الي ٢ كيلو متر
- o لا أستطيع

٤) اثناء صعود او نزول الدرج (السلم)

- o لا أواجه أي صعوبة
- o أشعر بألم خفيف عند النزول
- o أشعر بألم خفيف عند الصعود والنزول
- o لا استطيع

٥) أثناء جلوسك القرفصه (القرفصاء)

- لا أواجه أي صعوبة
- أشعر بألم بعد تكرار القرفصه لعدة مرات
- أشعر بألم عند كل مره
- ممكن عند تحمل وزن جزئي
- لا أستطيع

٦) أثناء الجري

- لا أواجه أي صعوبة
- أشعر بألم بعد الجري لأكثرمن ٢ كيلومتر
- أشعر بألم خفيف منذ البداية
- أشعر بألم شديد
- لا أستطيع

٧) أثناء القفز

- لا أواجه أي صعوبة
- أواجه صعوبة خفيفة
- أشعر بألم مستمر
- لا أستطيع

٨) عند الجلوس وركبتك مثنية لفترة طويلة

- لا أواجه أي صعوبه
- أشعر بألم عند الجلوس بعد القيام بتمارين رياضية
- أشعر بألم مستمر
- أشعر بألم شديد

- لا أستطيع

٩) ألالم

- لا يوجد
- أشعر بألم خفيف بعض الأوقات
- أشعر بألم يزعجني أثناء النوم
- أشعر بألم شديد أحياناً
- أشعر بألم شديد و مستمر

١٠) التورم

- لا يوجد
- يوجد بعد جهد شديد
- يوجد بعد الأنشطة اليومية
- يوجد كل صباح
- مستمر

١١) حركات غير طبيعية وإجهاد لرضفة الركبة (صابونة الركبة)

- لا توجد
- أحياناً أثناء الأنشطة الرياضية
- أحياناً أثناء الأنشطة اليومية
- حدث لي خلع مرة واحدة على الأقل
- حدث لي خلع أكثر من مرتين

١٢) ضمور الفخذ (حجم الفخذ)

- لا يوجد
- ضموربسيط
- ضمورشديد

١٣) مدى تأثردرجة الثني في الركبة المصابة

- لا يوجد
- بسيط
- شديد

APPENDIX C

RAND 36-ITEM HEALTH SURVEY (ENGLISH VERSION)

Instructions for completing the questionnaire: Please answer every question. Some questions may look like others, but each one is different. Please take the time to read and answer each question carefully by filling in the bubble that best represents your response.

Patient Name:

_____

Date: _____

1. In general, would you say your health is:

- o Excellent
- o Very good
- o Good
- o Fair
- o Poor

2. Compared to one year ago, how would you rate your health in general now?

- o Much better now than a year ago
- o Somewhat better now than a year ago
- o About the same as one year ago
- o Somewhat worse now than one year ago
- o Much worse now than one year ago

3. The following items are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?

- Vigorous activities, such as running, lifting heavy objects, participating in strenuous sports.
- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

b. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

c. Lifting or carrying groceries.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

d. Climbing several flights of stairs.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

e. Climbing one flight of stairs.

- Yes, limited a lot.
- Yes, limited a little.

- No, not limited at all.

f. Bending, kneeling or stooping.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

g. Walking more than one mile.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

h. Walking several blocks.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

i. Walking one block.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

j. Bathing or dressing yourself.

- Yes, limited a lot.
- Yes, limited a little.
- No, not limited at all.

4. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?

a. Cut down the amount of time you spent on work or other activities?

- Yes
- No

b. Accomplished less than you would like?

- Yes
- No

c. Were limited in the kind of work or other activities

- Yes
- No

d. Had difficulty performing the work or other activities (for example, it took extra time)

- Yes
- No

5. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as aresult of any emotional problems (such as feeling depressed or anxious)?

a. Cut down the amount of time you spent on work or other activities?

- Yes
- No

b. Accomplished less than you would like

- Yes
- No

c. Didn't do work or other activities as carefully as usual

- Yes
- No

6. During the past 4 weeks, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbors, or groups?

- Not at all
- Slightly
- Moderately
- Quite a bit
- Extremely

7. How much bodily pain have you had during the past 4 weeks?

- Not at all
- Slightly
- Moderately
- Quite a bit
- Extremely

8. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

- Not at all
- Slightly
- Moderately

- Quite a bit
- Extremely

9. These questions are about how you feel and how things have been with you during the past 4 weeks. For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the past 4 weeks.

a. did you feel full of pep?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

b. Have you been a very nervous person?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

c. Have you felt so down in the dumps nothing could cheer you up?

- All of the time
- Most of the time

- A good bit of the time
- Some of the time
- A little of the time
- None of the time

d. Have you felt calm and peaceful?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

e. Did you have a lot of energy?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

f. Have you felt downhearted and blue?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time

- A little of the time
- None of the time

g. Did you feel worn out?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

h. Have you been a happy person?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

i. Did you feel tired?

- All of the time
- Most of the time
- A good bit of the time
- Some of the time
- A little of the time
- None of the time

10. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?

- All of the time
- Most of the time
- Some of the time
- A little of the time
- None of the time

11. How TRUE or FALSE is each of the following statements for you?

a. I seem to get sick a little easier than other people

- Definitely true
- Mostly true
- Don't know
- Mostly false
- Definitely false

b. I am as healthy as anybody I know

- Definitely true
- Mostly true
- Don't know
- Mostly false
- Definitely false

c. I expect my health to get worse

- Definitely true

- Mostly true
- Don't know
- Mostly false
- Definitely false

d. My health is excellent

- Definitely true
- Mostly true
- Don't know
- Mostly false
- Definitely false

APPENDIX D

RAND 36-ITEM HEALTH SURVEY (ARABIC VERSION)

استبيان صحي

الأسم: .....

الجنس ☐ ذكر

☐ انثى

العمر ..... سنة

المؤهل العلمي: ☐ ابتدائي

☐ إعدادي

☐ ثانوي

☐ بكالوريوس

☐ ماجستير

☐ دكتوراه

من فضلك، أجب على كل الأسئلة الموجودة في هذا الاستبيان، في حالة عدم وضوح أي سؤال،

أرجو اختيار أقرب إجابة لمفهومك

للسؤال.

١)-بصورة عامة، كيف ترى حالتك الصحية؟

) أمام الإجابة المناسبة)✓(أختر إجابة واحدة وضع علامة (

- ☐ ممتازة
- ☐ جيد جداً
- ☐ جيدة
- ☐ لا بأس بها
- ☐ سيئة

٢)-مقارنة بعام مضى، كيف تقيم حالتك الصحية الآن بصورة عامة؟

) أمام الإجابة المناسبة)✓(أختر إجابة واحدة وضع علامة (

- ☐ أفضل بكثير مما كانت عليه قبل عام
- ☐ أفضل نوع ما من العام الماضي
- ☐ تقريباً على ما هي عليه
- ☐ أسوأ نوعا ما من العام الماضي

☐ أسوأ بكثير مما كانت عليه قبل عام

- تتعلق البنود التالية بأنشطة يمكن أن تقوم بها خلال يومك العادي، في الوقت الحالي، إلى أي مدى تقيدك حالتك الصحية:	) تحت الإجابة ✓(أختر إجابة واحدة وضع علامة (المناسبة)		
	نعم تقيدني كثيراً	نعم تقيدني قليلاً	لا تقيدني اطلاقاً
٣) من ممارسة الأنشطة الشاقة مثل: الجري، حمل الأشياء الثقيلة أو مزاولة الأنشطة الرياضية المجهدة جداً؟	☐	☐	☐
٤)من ممارسة الأنشطة متوسطة الجهد،كتحريك الطاولة أو التنظيف باستخدام المكنسة الكهربائية أو تنظيف حديقة المنزل والعناية بها؟	☐	☐	☐
٥) من حمل المشتريات من البقالة أو السوق المركزي(السوبر ماركت)؟	☐	☐	☐
٦) من صعود الدرج لعدة أدوار؟	☐	☐	☐
٧) من صعود الدرج لدور واحد فقط؟	☐	☐	☐
٨) من الانحناء أو الركوع أو السجود؟	☐	☐	☐
٩) من المشي لأكثر من كيلو مت ونصف؟	☐	☐	☐

١٠) من المشي لمسافة نصف كيلو متر؟	☐	☐	☐
١١) من المشي لمسافة متر؟	☐	☐	☐
١٢) من الاستحمام أو ارتداء الملابس بنفسك؟	☐	☐	☐

-تتعلق البنود التالية(أ، ب، ج، د) بالمشاكل التي يمكن ان تواجهك خلال تأديتك لعملك أو للأنشطة اليومية المعتادة نتيجة لحالتك الصحية الجسمية . خلال الأسابيع الأربعة الماضية، هل تسببت حالتك الصحية الجسمية في:	) ✓(أختر إجابة واحدة وضع علامة (تحت الإجابة المناسبة)	
	نعم	لا
١٣) التقليل من الوقت الذي تقضيه في العمل أو أي أنشطة أخرى؟	☐	☐
١٤) التقليل مما تود انجازه من العمل أو أي أنشطة أخرى؟	☐	☐
١٥) تقييدك في أداء نوع معين من الأعمال أو أي أنشطة أخرى؟	☐	☐
١٦) أن تجد صعوبة في تأدية العمل أو أي أنشطة أخرى؟ (على سبيل المثال، احتجت إلى جهد إضافي لتأديتها)	☐	☐

تتعلق البنود التالية(أ، ب، ج) بالمشاكل التي يمكن أن تواجهك خلال تأديتك لعملك أو الأنشطة اليومية المعتادة كنتيجة لحالتك الصحية النفسية. (مثلاً الشعور بالاكتئاب أو القلق) خلال الأسابيع الأربعة الماضية، هل تسببت حالتك الصحية النفسية في:	) ✓(أختر إجابة واحدة وضع علامة (تحت الإجابة المناسبة)	
	نعم	لا
١٧) التقليل من الوقت الذي تقضيه في العمل أو أي أنشطة أخرى؟	☐	☐
١٨) التقليل مما تود انجازه من العمل أو أي أنشطة أخرى؟	☐	☐
١٩) عدم انجاز العمل أو أي أنشطة أخرى بالحرص المعتاد؟	☐	☐

الصحة الجسمية أو النفسية

٢٠)-خلال الأسابيع الأربعة الماضية، إلى أي مدى تعارضت صحتك الجسمية أو النفسية مع تأديتك لنشاطاتك الاجتماعية المعتادة مع عائلتك أو أصدقائك أو جيرانك أو أي من المناسبات الاجتماعية الأخرى؟

)أمام الإجابة الصحيحة)✓(اختر إجابة واحدة وضع علامة(

- ☐ لم يكن هناك أي تعارض إطلاقاً
- ☐ كان هناك تعارض قليلاً
- ☐ كان هناك تعارض متوسط
- ☐ كان هناك تعارض كبير
- ☐ كان هناك تعارض كبير جداً

شدة الألم

٢١)-ما شدة الألم الجسمي الذي عانيت منه خلال الأسابيع الأربعة الماضية؟

) أمام الإجابة المناسبة)✓(أختر إجابة واحدة وضع علامة (

- ☐ لم يكن هناك أي ألم
- ☐ كان هناك ألم خفيف جداً
- ☐ كان هناك ألم خيف
- ☐ كان هناك ألم متوسط
- ☐ كان هناك ألم شديد
- ☐ كان هناك ألم شديد جداً

٢٢)-خلال الأسابيع الأربعة الماضية، إلى أي مدى أدى الألم الجسمي إلى التعارض مع تأديتك لأعمالك المعتادة (سواء داخل المنزل أو خارجه)

(أختر إجابة واحدة وضع علامة ✓) أمام الإجابة المناسبة)

- ☐ لم يكن هناك أي تعرض
- ☐ كان هناك تعارض قليل جداً
- ☐ كان هناك تعارض متوسط
- ☐ كان هناك تعارض كبير
- ☐ كان هناك تعارض كبير جداً

الأسئلة التالية تتعلق بكيفية شعورك وطبيعة سير الأمور معك خلال الأسابيع الأربعة الماضية، الرجاء اعطاء إجابة واحدة لكل سؤال بحيث تكون الإجابة هي الأقرب إلى الحالة التي كنت تشعر بها خلال الأسابيع الأربعة الماضية. كم من الوقت:	) تحت الإجابة المناسبة)✓(أختر إجابة واحدة وضع علامة (					
	في كل الأوقات	**في معظم الأوقات**	**في كثير من الأوقات**	**في بعض الأوقات**	**في قليل من الأوقات**	**لم أشعر في أي وقت من الأوقات**
٢٣) شعرت بأنك ملئ بالحيوية والنشاط؟	☐	☐	☐	☐	☐	☐
٢٤) كنت شخصاً عصبياً جداً؟	☐	☐	☐	☐	☐	☐
٢٥) شعرت بأنك في حالة اكتئاب إلى درجة لم يكن معها إدخال السرور إليك؟	☐	☐	☐	☐	☐	☐
٢٦) شعرت بالهدوء والطمأنينة؟	☐	☐	☐	☐	☐	☐
٢٧) كانت لديك طاقة كبيرة؟	☐	☐	☐	☐	☐	☐
٢٨) شعرت بالإحباط واليأس؟	☐	☐	☐	☐	☐	☐
٢٩) شعرت بأنك منهك(استُنفِدت قُواك)؟	☐	☐	☐	☐	☐	☐
٣٠) شعرت بأنك شخص سعيد؟	☐	☐	☐	☐	☐	☐

٣١) شعرت بأنك تعبان؟	☐	☐	☐	☐	☐	☐

٣٢)-خلال الأسابيع الأربعة الماضية، ما مقدار الوقت الذي تعارضت فيه صحتك الجسمية أو مشاكلك النفسية مع نشاطاتك الاجتماعية (مثل زيارة الأصدقاء والأقارب وغير ذلك)؟

(أختر إجابة واحدة وضع علامة ✓) أمام الإجابة المناسبة

- ☐ كان التعارض في كل الأوقات
- ☐ كان التعارض في معظم الأوقات
- ☐ كان التعارض في بعض الأوقات
- ☐ كان التعارض في قليل من الأوقات
- ☐ لم يكن هناك تعارض في أي وقت من الأوقات

	(أختر إجابة واحدة وضع علامة ✓) تحت الإجابة المناسبة				
ما مدى صحة أو خطأ كل من العبارات بالنسبة إلى حالتك الصحية؟	**صحيحة بلا شك**	**صحيحة غالباً**	**لا أعلم**	**خطأ غالباً**	**خطأ بلا شك**

٣٣) يبدو أنني أصاب بالمرض أسهل من الآخرين.	☐	☐	☐	☐	☐
٣٤) حالتي الصحية مساوية لأي شخص أعرفه.	☐	☐	☐	☐	☐
٣٥) أتوقع أن تسوء حالتي الصحية.	☐	☐	☐	☐	☐
٣٦) حالتي الصحية ممتازة.	☐	☐	☐	☐	☐

APPENDIX E

INFORMED CONSENT FORM (ENGLISH VERSION)

Cross-Cultural Adaptation and Psychometric Properties Testing of the Arabic Anterior Knee Pain Scale

INFORMED CONSENT

1. WHY IS THIS STUDY BEING DONE?

Anterior knee pain or Patellofemoral pain syndrome that frequently occurs in people who participate in active physical exercises involves the lower extremities. It is characterized by retropatellar or peripatellar pain. A variety of functional and patient-reported outcome measurements have been used to assess clinical outcomes following anterior knee pain. One of the measurements is Kujala Scale that was initially developed for assessing patients with patellofemoral pain and in English version. The purpose of this study is to validate the Arabic version of the Kujala Scale to be used in making of clinical decisions and research study in Arabic population. The study will be conducted in two stages. The first stage will be the translation and the adaptation of cross-cultural and the second stage will be validity and reliability assessment. You are invited to participate in this research study because you have been diagnosed with, or have symptoms of Anterior Knee Pain or Patellofemoral Pain Syndrome.

2. HOW MANY PEOPLE WILL TAKE PART IN THIS STUDY?

Approximately Forty (40) subjects will participate in this study at Prince Sultan Medical City in Riyadh. Saudi Arabia.

3. HOW LONG WILL THE STUDY GO ON?

Your participation in this study may last up to three (3) days.

4. HOW WILL I BE INVOLVED?

You must meet the following requirements to be in the study:

Inclusion Requirements

You can participate in this study if you are at least 18 years of age and not older than 50 years. You have to be diagnosed with general or orthopaedic doctor with Anterior Knee Pain and untreated before. You muse have the symptoms for more that two (2) months and not related to direct trauma. The investigator will examine to confirm the diagnosis and ensure if your case is eligible for the study. In the first test you will be asked to bent and extend your affected knee either while standing or lying down. In addition to that you will be undergo the second test and the investigator will ask you to lie down and will ask you to contact you knee and push it against the couch while applying a slight pressure against your patella. Both tests will document if you have a signs of pain and abnormal knee sound related to knee movement.

Exclusion Requirements

You cannot participate in this study if you have other knee problem related to degenerative joint disease, knee inflammation, patellar tendon inflammation, patellar tendon injury, or other knee problem related to knee ligaments or cartilages.

If you meet the screening requirements and you choose to take part in the study, then the following procedures will take place:

1. At Baseline (First visit):

- The investigator will first obtain background information about you such as age, sex, duration of symptoms, involved side (Right, Left), and current medications.

  (Will require about 5 minutes of your time).
- Then, the investigator will ask you to complete the Arabic Kujala Scale and Arabic RAND SF-36 Quality of life scale. The Kujala scale is a questionnaire with thirteen (13) items that are specific to the affected knee. Six (6) of the items are associated with knee activities such as jumping and squatting while the rest are other symptoms such as swelling and muscles atrophy. The Arabic SF-36 Quality of Life Questionnaire is a multi-purpose, short-form health survey with only 36 questions. It has eight scales profile for assessing the functional health and well-being scores as well as psychometrically based physical and mental health summary measures and a preference-based health utility index.

(Will require about 30 minutes of your time).

2. After 2 – 3 days (Second visit):

- The investigator will ask you again to complete only the Arabic Kujala Scale as you did last time.

  (Will require about 15 minutes of your time).
- After you finish both time administrations your physical therapy treatment will take place as the policy and procedures of the department in such cases.

(Baseline and the next time will take place at Physical Therapy Department, Prince Sultan Medical City, Riyadh, Saudi Arabia.)

5. WHAT ARE THE REASONABLY FORESEEABLE RISKS OR DISCOMFORTS I MIGHT HAVE?

The committee at Loma Linda University that reviews human studies (Institutional Review Board) has determined that participating in this study exposes you to No risks or discomforts are anticipated from taking part in this study. If you feel uncomfortable with a question, you can skip that question or withdraw from the study altogether. If you decide to quit at any time before you have finished the questionnaire, your answers will NOT be recorded.

6. WILL THERE BE ANY BENEFIT TO ME OR OTHERS?

Participation in this study may lead to developing the Arabic version of the Kujala Scale that could benefit future patients. However, these benefits cannot be guaranteed. After we have finished data collection, we also will provide you with more detailed information about the research findings. The results from the study will be presented in educational settings and at professional conferences, and the results might be published in a professional journal in the field of physical therapy.

7. WHAT ARE MY RIGHTS AS A SUBJECT?

Your participation is voluntary; you are free to withdraw your participation from this study at any time. If you do not want to continue, you can simply the investigator. If you do not complete the both surveys, your answers and participation will not be recorded. Your decision whether or not to participate or stop at any time will NOT affect your present or future relationship with those conducting the study at Loma Linda University Department of Physical Therapy or Physical Therapy Department at Prince Sultan Medical City and will not involve any penalty or loss of benefits to which you are otherwise entitled.
If you decide to withdraw from the study, you must notify the study staff immediately at 0500668805

8. WHAT HAPPENS IF I WANT TO STOP TAKING PART IN THIS STUDY?

You are free to withdraw from this study at any time. If you decide to withdraw

from this study you should notify the research team immediately. The research team may also end your participation in this study if you do not follow instructions, miss scheduled visits, or if your safety and welfare are at risk.

9. WILL I BE INFORMED OF SIGNIFICANT NEW FINDINGS?

You will be promptly notified if any new information emerges during the research phase of this study, which may cause you to change your mind about continuing your participation in the study.

10. WHAT OTHER CHOICES DO I HAVE?

The only alternative to participation in this study is not to participate.

11. HOW WILL INFORMATION ABOUT ME BE KEPT CONFIDENTIAL?

Efforts will be made to keep your personal information confidential. We cannot guarantee absolute confidentiality. Your personal information may be disclosed if required by law. To ensure that confidentiality of any information obtained about you during this research study is maintained, data associated with your participation in this study will be passcode protected. Your identity on these records will be indicated by a unique three-digit code assigned to your name. Information linking your code to your identity will be accessible only to the investigator and will be stored in separate file that will be passcode protected.

12. WHAT COSTS ARE INVOLVED?

There is no cost to you for participating in this study.

14. WILL STUDY STAFF RECEIVE PAYMENT?

No they didn't receive a payment for this study. It is student research to fulfillment the requirement of doctoral physical therapy degree.

15. WHO DO I CALL IF I AM INJURED AS A RESULT OF BEING IN THIS STUDY?

Your participation in this study will not subject you to any kind of risk or injury. However if you have medical problem or injury during the time of participation of the study a required medical support will be offered.

- If the situation is a medical emergency **call 988** or go to the nearest emergency room. Then, notify the study investigators as soon as you can.
- For a non-emergency injury or illness, notify your study investigators as soon as you can.
- To contact Dr. Nasser Almisfer OR Abdulmohsen Alghamdi during and after regular business hours, dial 0500668805

Appropriate medical treatment will be made available to you without cost. You do not give up any of your legal rights by participating in the study.

16. WHO DO I CALL IF I HAVE QUESTIONS?

If you wish to contact an impartial third party not associated with this study regarding any questions about your rights or to report a complaint you may have about the study, you may contact the Office of Patient Relations, Loma Linda

University Medical Center, Loma Linda, CA 92354, phone (909) 558-4647, e-mail patientrelations@llu.edu for information and assistance. And you can call the Office of Patient Affairs, Prince Sultan Medical City, Riyadh, +966 11 4777714 (26199)

17. SUBJECT'S STATEMENT OF CONSENT

- I have read the contents of this consent form, which is in Arabic, a language that I read and understand. I have listened to the verbal explanation given by the investigator.
- My questions concerning this study have been answered to my satisfaction.
- Signing this consent document does not waive my rights nor does it release the investigators or institution from their responsibilities.
- I may call Dr Nasser Almisfer OR Abdulmohsen Alghamdi during and after routine office hours at 0500668805 if I have additional questions or concerns.
- I hereby give voluntary consent to participate in this study.

I understand I will be given a copy of this consent form after signing it.

Signature of Subject	Printed Name of Subject

Date

15. INVESTIGATOR'S STATEMENT

I attest that the requirements for informed consent for the medical research project described in this form have been satisfied. I have discussed the research project with the subject and explained to him or her in non-technical terms all of the information contained in this informed consent form, including any risks and adverse reactions that may reasonably be expected to occur. I further certify that I encouraged the subject to ask questions and that all questions asked were answered.

Signature of Investigator	Printed Name of Investigator
	AM / PM
Date	

Study Flow Chart

Study Time Table:

VISIT	Visit 1 (Baseline)	Visit 2 (2 – 3 Days)

Complete Arabic AKPS	X	X
Complete Arabic RAND SF-36 Scale	X	

APPENDIX E

INFORMED CONSENT FORM (ARABIC VERSION)

دراسة الخصائص والدلالات الاحصائية لثبات ومصداقية النموذج العربي لتشخيص الام

مقدمة الركبة

لماذا تم عمل مثل هذه الدراسة ؟

آلام مقدمة الركبة منتشرة بين معظم الناس . ومن أهم أعراضها ألم في الركبة والأطراف السفلية . ولجزء من متطلبات بحث الدكتواره تم تصميم هذا الاستبيان باللغة العربية ودراسة مدى فعاليته في تحديد وتشخيص الأعراض التي تصيب مقدمة الركبة.

كم عدد المشاركين بالدراسة ؟

ثمانية وعشرين شخص من كلا الجنسين (ذكور وإناث)

كم مدة الدراسة ؟

مشاركتك بالدراسة لا تتجاوز ثلاثة أيام

كيف استطيع المشاركة ؟

لكي تشارك في هذه الدراسة يجب أن يكون عمرك بين 18 – 50 سنة وأن يكون تم تشخيصك بآلام مقدمة الركبة وأن تكون لديك أعراض لمدة شهرين على الأقل .

ثم بعد ذلك سيتم فحصك لتأكيد التشخيص ومعرفة مدى ملاءمتك للدراسة.

كما سيتم استبعادك من المشاركة في حالة كان لديك أي مشكلة غير ما ذكر أعلاه كجراحة والتهابات الركبة أو إصابات الأربطة والأوتار.

آلية عمل الدراسة :

الزيارة الأولى : سيطلب منك تعبئة استبيان . الأول لمعرفة بيانات عامة عنك والآخر تعيين أعراض الركبة المصابة.

الزيارة الثانية : سيطلب منك إعادة تعبئة الاستبيان الثاني بعد يومين أو ثلاثة أيام.

ما هي المخاطر المحتملة للمشاركة في الدراسة ؟

لا يوجد أي مخاطر من المشاركة في الدراسة . وفي حالة رغبتك عدم إكمال المشاركة تستطيع أن تترك المشاركة في أي وقت وجميع بياناتك لن يتم تدوينها في الدراسة .

ما هي الفوائد العائدة عليّ من الدراسة ؟

على المستوى الشخصي لا يوجد ولكن ستسهم نتائج الدراسة في تصميم نموذج باللغة العربية لدراسة وتشخيص آلام الركبة وستكون ذات فائدة للمرضى في المستقبل.

ما هي الحقوق التي أتمتع بها خلال الدراسة ؟

مشاركتك في الدراسة تطوعية وتستطيع متى ما رغبت التخلي عن المشاركة أن تبلغ الباحث بذلك ولن يترتب عليها أي التزام آخر ولن يتم تدوين بياناتك .

ماذا يحدث لو توقفت عن المشاركة في الدراسة ؟

تستطيع التخلي عن المشاركة أو إكمال الدراسة في أي وقت وكذلك للباحث الحق أن يوقف مشاركتك في حالة عدم امتثالك لتعليمات ومتطلبات الدراسة.

كيف أضمن سرية وخصوصية بياناتي ؟

نحن لا نضمن السرية الكاملة ولكن نسعى لكي نحتفظ جميع بياناتك أن تكون محفوظة ولا يمكن الاطلاع عليها إلا في حدود القانون كما أنه لن يتم التعرف عليك إلا عن طريق رقم سري لا يعرفه أحد وهو الوسيلة الوحيدة للتعرف على اسمك أو بياناتك .

هل سيتم تعويضي عن الدراسة ؟

المشاركة في الدراسة اختياري وبدون مقابل.

هل يتم تعويض أعضاء وفريق البحث مادياً ؟

لا وهذا البحث جزء من دراسة الدكتوراه بجامعة لوما ليندا

إذا كان لدي استفسار أو مساعدة . بمن استطيع الاتصال ؟

يمكنك التواصل مع الباحث الرئيسي أو قسم شئون المرضى بالمستشفى إذا رغبت.

- أقر أنني قرأت جميع ما ورد في هذه الموافقة بالمشاركة وفهمت جميع بنودها.
- تمت الإجابة على جميع أسئلتي بوضوح وتوقيعي عليها
- لازلت أحتفظ بجميع حقوقي القانونية تجاه البحث والمنظمة.
- إذا رغبت في الاستفسار والتواصل مع الباحث الرئيس استطيع الاتصال على الرقم **0500668805**
- أعطي الموافقة التطوعية بالمشاركة في الدراسة بعد توقيعي عليها وأخذ صورة من الموافقة .

اسم المريض : .....

توقيعـــــــــه : .....

التاريـــــــخ : / /

إقرار الباحث :

ناقشت جميع ما ورد في خطة البحث مع المريض وتمت الإجابة على جميع الأسئلة بلغة واضحة وسهلة . كما تم نصحه بإبداء أي استفسار أو سؤال دون تردد إذا احتاج ذلك .

اسم الباحث :

توقيعـــــــــه :