UNIVERSITI PUTRA MALAYSIA

EFFECTIVENESS OF GROUP COGNITIVE BEHAVIORAL-BASED THERAPY ON PAIN, FUNCTIONAL DISABILITY AND PSYCHOLOGICAL OUTCOMES AMONG KNEE OSTEOARTHRITIS PATIENTS IN MALAYSIAN GOVERNMENT HOSPITALS

FOO CHAI NIEN

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By

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Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia in Fulfilment of the Requirements for the Degree of Doctor Philosophy

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EFFECTIVENESS OF GROUP COGNITIVE BEHAVIORAL-BASED THERAPY ON PAIN, FUNCTIONAL DISABILITY AND PSYCHOLOGICAL OUTCOMES AMONG KNEE OSTEOARTHRITIS PATIENTS IN MALAYSIAN GOVERNMENT HOSPITALS

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March 2017

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Background: Knee osteoarthritis (OA) mainly causes pain, stiffness and muscle weakness. It also affects individual's physical functioning. It has great impact on individual's quality of life and wellbeing. Anti-inflammatory drugs and knee replacement are the mainstay methods in the management of knee OA in Malaysia. It is still noted that individuals with knee OA suffer from low quality of life. Non-pharmacological interventions are still a driving force in managing knee OA pain. Cognitive behavioral-based therapy is a first line psychosocial treatment which is more applied in chronic pain conditions. Evidence of effectiveness of cognitive behavioral-based therapy in treating OA knee pain is lacking.

Objective: This study aimed to develop, implement, and evaluate the effectiveness of a cognitive behavioral-based therapy module in treating knee pain, functional disability and psychological outcomes for patients with knee OA.

Methodology: A two arm parallel-group unblinded randomized controlled study design was used in this study. Three hundred patients aged 35 to 75 years diagnosed with knee OA (Kellgren grade ≥2 and visual analogue scale (VAS) score 40 or more) were recruited from Orthopaedics clinic of Hospital Putrajaya and Hospital Serdang, Malaysia. A cognitive behavioral-based therapy module was developed based on the cognitive-behavioral model. Eligible patients were randomized by applying independently operated computer- generated random sequence system with the block randomization of six (http://random-allocation-software.software.informer.com/2.0/). Participants in intervention group (n=150) received a three sessions of a group

cognitive behavioral intervention (two and a half hour for each session) in addition to standard routine care and participants in control group (n=150) received standard routine care. A set of self-administered validated and reliable structured questionnaire was used for data collection. Data was collected at baseline, immediate, one month and six months post treatment. Primary outcome measure was knee pain intensity. Secondary outcome measures included functional disability (daily living and sport), depression, anxiety, stress, fear-avoidance beliefs (physical activity and work), pain catastrophising and pain self-efficacy. Data collected was analyzed using SPSS software with the application of mixed design repeated measured analysis of variance.

Results: One hundred and nineteen (79%) participants in the intervention group and 111 (74%) participants in the control group were included in the analysis at six months. The Knee injury and Osteoarthritis Outcome Score (KOOS) knee pain scores improved substantially in the intervention group, but not in the control group. The mean change in the KOOS knee pain score was 8.9 points (95% CI -11.23 to -6.62, p=0.0001) higher (less knee pain intensity) in the intervention group. Functional disability in daily living, depression, anxiety, pain catastrophising, and pain self-efficacy level improved significantly in the intervention group ($p<0.05$). Functional disability in sport, stress, and fear-avoidance beliefs in physical activity and work did not differ significantly between groups ($p>0.05$).

Conclusion: The cognitive behavioral-based therapy module is effective in reducing knee pain intensity, functional disability in daily living, depression, anxiety, pain catastrophising, and improving pain self-efficacy level in this knee OA population.

Keywords: cognitive behavioral, knee pain, functional disability, psychological outcomes, randomized controlled trial

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Doktor Falsafah

KEBERKESANAN KOGNITIF TINGKAHLAKU TERAPI SECARA BERKUMPULAN PADA SAKIT, KEMUDARATAN DAN KECACATAN DAN PSIKOLOGI ANTARA PESAKIT-PESAKIT OSTEOARTRITIS LUTUT YANG DIJUMPAI DI HOSPITAL KERAJAAN MALAYSIA

Oleh

FOO CHAI NIEN

Mac 2017

Pengerusi : Profesor Manohar a/l Arumugam, MS
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Latar belakang: Osteoartritis (OA) lutut akan menyebabkan kesakitan, kekejangan dan melemahkan otot. Ia turut menjejaskan fungsi fizikal dan menyebabkan kesan negatif kepada kualiti hidup dan kesejahteraan seseorang individu. Penggunaan ubat anti-keradangan dan pembedahan ganti lutut merupakan salah satu kaedah konvensional dalam menangani masalah OA lutut di Malaysia. Akan tetapi seseorang individu yang dijangkiti OA lutut masih akan mengalami kualiti hidup yang rendah. Oleh itu, penglibatan intervensi selain daripada farmakologi adalah amat diperlukan dalam pengurusan kesakitan OA lutut. Kognitif terapi tingkahlaku adalah salah satu amalan terbaik dan berkesan dalam menangani pelbagai keadaan sakit kronik. Walau bagaimanapun, masih kekurangan bukti penggunaannya dan amalan dalam merawat OA lutut.

Objektif: Kajian ini bertujuan untuk membangunkan, melaksanakan, dan menilai keberkesanan modul kognitif terapi tingkahlaku dalam mengurangkan kesakitan lutut, meningkatkan fungsi kecacatan dan aspek psikologi untuk pesakit OA lutut.

Metodologi: Kajian ini menggunakan percubaan klinikal rabun satu pihak rawak dua kumpulan. Seramai 300 pesakit yang berumur 35 hingga 75 tahun dengan didiagnosis OA lutut (Kellgren gred ≥2 dan skala analog visual (VAS) yang melebihi 40) dari klinik ortopedik Hospital Putrajaya dan Hospital Serdang, Malaysia. Satu modul kognitif terapi tingkahlaku telah dibangunkan berdasarkan model kognitif tingkahlaku. Peserta di kumpulan intervensi (n=150) menerima tiga sesi kognitif terapi tingkahlaku serta peserta di

kumpulan kawalan (n=150) hanya menerima penjagaan rutin standard sahaja. Satu set soal selidik yang berstruktur serta telah diuji dengan kebolehpercayaan dan keesahan akan diedarkan untuk pengumpulan data. Soal selidik akan diedar pada semasa permulaan, selepas program, selepas sebulan selepas program dan selepas enam bulan selepas program. Hasil kajian primer yang difokuskan adalah intensiti kesakitan lutut manakala hasil sekunder adalah kecacatan fungsi dalam aktiviti harian hidup, kemurungan, kebimbangan, *catastrophising* sakit, dan sakit tahap keberkesanan diri. Data dikumpulkan dan dianalisis dengan aplikasi SPSS.

Hasil kajian: Seratus dan sembilan belas (79%) orang peserta dalam kumpulan intervensi dan 111 (74%) orang peserta dalam kumpulan kawalan yang memenuhi syarat telah digolongkan dalam analisis pada bulan ke-enam. Purata skor KOOS sakit lutut telah meningkat sebanyak 8.9 (sakit lutut dikurangkan) (95% CI -11,23 hingga -6,62, p=0.0001) dalam kumpulan intervensi, tetapi tiada peningkatan signifikasi dalam kumpulan kawalan. Kecacatan fungsi dalam aktiviti harian hidup, kemurungan, kebimbangan, *catastrophising* sakit, dan sakit tahap keberkesanan diri telah meningkat secara ketara dalam kumpulan intervensi, tetapi tidak dalam kumpulan kawalan. Manakala kecacatan fungsi dalam sukan, tekanan dan kepercayaan takut elak tidak terdapat perbezaan yang signifikasi antara kedua-dua kumpulan berkenaan (p>0.05).

Kesimpulan: Kognitif tingkahlaku intervensi adalah efektif dalam mengurangkan intensiti kesakitan lutut, kecacatan fungsi dalam aktiviti harian hidup, kemurungan, kebimbangan, *catastrophising* sakit, dan sakit tahap keberkesanan diri di kalangan pesakit OA lutut.

Kata kunci: kognitif tingkahlaku terapi, sakit lutut, kecacatan fungsi, aspek psikologi, percubaan klinikal rabun

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I certify that a Thesis Examination Committee has met on 3 March 2017 to conduct the final examination of Foo Chai Nien on her thesis entitled "Effectiveness of Group Cognitive Behavioral-Based Therapy on Pain, Functional Disability and Psychological Outcomes among Knee Osteoarthritis Patients in Malaysian Government Hospitals" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Doctor of Philosophy.

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LIST OF ABBREVIATIONS

<	Less than
>	Greater than
≤	Less than or equals to
≥	Greater than or equals to
ACL	Anterior cruciate ligament
ACR	American Rheumatism Association
ANOVA	Analysis of variance
AVE	Average variance extracted
BMI	Body mass index
CBT	Cognitive behavioral therapy
CI	Confidence interval
COMP	Cartilage degradation oligomeric matrix protein
COPCORD	Community Oriented Programme for Control of Rheumatic Diseases
CR	Composite reliability
CTX-II	Collagen Type II telopeptides
DMOADs	Disease-modifying osteoarthritis drugs
ESCEO	European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis European Union
FET	Fisher's exact test
FTO	Fat-mass and obesity-associated
HA	Hyaluronan
HR	Hazards ratio
JSN	Joint space narrowing
JSW	Joint space width
K-L	Kellgren-Lawrence

M	Mean
MD	Mean difference
MRI	Magnetic resonance imaging
NSAIDs	Non-steroidal anti-inflammatory drugs
OA	Osteoarthritis
OAI	Osteoarthritis Initiative
OARSI	Osteoarthritis Research Society International
OR	Odds ratio
partial η^2	Partial eta-square
PPT	Pain pressure threshold
RR	Risk ratio
SD	Standard deviation
SNPs	Single-nucleotide polymorphisms
SYSADOAs	Symptomatic slow-acting drugs for osteoarthritis
TKA	Total knee arthroplasty
uCTX-II	Urinary C-terminal telopeptide
UK	United Kingdom
US	United States
WHO	World Health Organization
WOMAC	Western Ontario and McMaster Universities Arthritis Index
χ^2	Chi square test
YLDs	Years lived with disability

CHAPTER 1

INTRODUCTION

1.1 Background

Osteoarthritis (OA) is recognized as a major challenge among the arthritis disease to public health. It is well known to be the most prevalent chronic joint disease globally. Nonetheless, it is not a solitary infection substance, but considered as a typical end stage phenotype of a wide range of disease processes which affects all joint tissues (Arden & Leyland, 2013). Hence, it is a joint degenerative disease where it has the characteristics of breakdown the articular cartilage, osteophyte formation, joint swelling, stiffness and pain. The disease progresses from an initial hypertrophy of the articular cartilage to degeneration of the cartilage and underlying bone. Osteophytes also grow throughout the affected joint. OA is a severe, agonizing and possibly life-changing joint disease and most likely affects hands, knees and hips. Pain and functional disability are the core clinical characteristics that need treatment, including non-pharmacological, pharmacological, and surgical methodologies (Bijlsma, Berenbaum, & Lafeber, 2011). However there is also possibility other indications of symptoms of OA, including local signs of inflammation. Moreover, it is not an immaculate degenerative tissue disorder but rather a dynamic marvel since it indicates characteristics of both devastation and repair.

In a recent Global Burden Disease survey, an estimated 251 million people are known to be living with knee OA globally. Musculoskeletal diseases which included OA is the second most prominent reason for functional disable as measured by years lived with disability (Vos et al., 2012).

The effect of obesity (Zeggini et al., 2012) and ageing population increased the incidence and prevalence of OA. In addition, knee OA usually affects persons aged 40 years and above (National Center for Chronic Disease Prevention and Health Promotion, 2011). It is supported by Guillemin and colleagues where they found that prevalence of knee OA was influenced by age and was more common among women aged 50 and above (Guillemin et al., 2011). In 2010, World Health Organization (WHO) assessed that 524 million people were 65 years old and above and this number is estimated to triple which represents 16% of the world's population by 2050 (National Institute of Health, 2011). Recently, there is a population-based survey on the prevalence of symptomatic hip and knee OA. It was performed in a multiregional population in France. Results found that 756 subjects had symptomatic knee OA, and 317 subjects had symptomatic hip OA, indicating the estimation of the prevalence of symptomatic knee and hip OA in France population. Besides, a recent prevalence study of knee OA was done among

696 elderly Korean population aged 65 years old and above revealed that overall prevalence of knee OA was 38.1% for radiographic OA, 26.4% for severe radiographic OA, and 6.5% for advanced OA that needed surgery treatment (Cho et al., 2011). The Community Oriented Programme for Control of Rheumatic Diseases (COPCORD) study in Malaysia demonstrated that 9.3% of Adult Malaysians had knee pain problem, where their knee pain level increased to 23% in those over 55 years old, and 39% in those 65 years old (Veerapen, Wigley, & Valkenburg, 2007).

In spite of the fact that cartilage substitution by bone marrow stem cells and implantation of autologous chondrocytes or bioengineered tissues are methods that may resolve all knee OA pain in the future, traditional treatment approaches still assume a noteworthy part in treating OA knee at present. The present treatment is educating the patient the way to control pain, expanding wellness and reinforcing muscles that can enhance joint versatility and reduce the functional disability (Ministry of Health Malaysia, 2002). The standard treatments for knee OA are non-pharmacological management, pharmacological management and surgery. According to the guidelines developed by American Rheumatism Association (ACR) for the patients with knee OA in the area of non-pharmacological management included average wedge insoles for valgus knee OA, subtalar strapped horizontal insoles for varus knee OA, medially coordinated patellar taping, manual treatment, walking aids, warm agents, tai chi, self-management programs, and psychosocial therapies. In addition, pharmacologic modalities restrictively prescribed for the underlying administration of patients with knee OA included acetaminophen, oral and topical NSAIDs, tramadol, and intraarticular corticosteroid infusions; However, intraarticular hyaluronate infusions, duloxetine, and opioids are restrictively suggested in patients who had a low reaction to starting treatment. Opioid analgesics are unequivocally suggested in patients who are either not willing to experience or had contraindications for knee surgery if failed in medicinal treatment (Hochberg et al., 2012).

The significance of cognitive behavioral therapy (CBT) has turned into a first-line psychosocial treatment for people with chronic pain, including younger age kids and elderly in the course of recent decades (Ehde, Dillworth, & Turner, 2014). Advancements in CBT conveyance formats (e.g., web-based, phone conveyed) and treatment in view of CBT rule that are conveyed by the health-alliance professionals besides psychologists indicated guarantee result for chronic pain issues (Cajanding, 2016; Ehde et al., 2014; Tyrer et al., 2014). Indeed, CBT is currently a treatment that conducted alone or in conjunction with therapeutic or interdisciplinary rehabilitation therapies. The efficacy of CBT for people with chronic pain has been assessed in numerous clinical trials for more than three decades, principally in studies of chronic back pain, cerebral pain, orofacial pain, or joint inflammation related pain (Ehde et al., 2014; Helminen, Sinikallio, Valjakka, Väisänen-Rouvali, & Arokoski, 2013; Jungquist et al., 2010; Lamb et al., 2010; Shahni, Shairi, AsghariMoghaddam, & Zarnaghash, 2013; Smith et al., 2015; Thorn et al., 2011).

1.2 Statement of the problem

The point prevalence of knee OA in Malaysia today assessed and estimated to be 10–20% of the aggregate adult or elderly population (Ministry of Health Malaysia, 2010). This knee pain problem in Malaysia was more common in adults aged 40 years and above, and it affected Indian ethnicity the most. In year 2007, it was accounted for 64.8% of all complaints related to joints. Over half of those suffering knee pains had clinical evidence of OA. Besides, there were 23% of patients aged 55 years and above who grumbled in pain, and it expanded to 39% in those more than 65 years old (Veerapen et al., 2007).

The burden of OA was 6th in East Asia and high-income East Pacific countries, 10th in North America, 7th in Eastern Europe but 13th in Western Europe (Vos et al., 2012). From a recent population-based study in the estimation of current and future impact of OA on health care, there were no less than an extra 26,000 people for each one million population aged 45 years and above who were assessed to have seek for advice for OA in a peripheral joint, as compared to year 2012 (Turkiewicz et al., 2014).

Knee OA patients with cardiovascular disease were at greater risk of all-cause mortality, as compared to the general population (Palazzo, Nguyen, Lefevre-Colau, Rannou, & Poiraudeau, 2016). A study done on the cause and disease specific mortality among 1163 patients aged 35 years and above with symptomatic and radiologic evidence based knee or hip OA patients. Results found that patients with OA showed higher risk of death compared with healthy individuals. Furthermore, higher mortality rate also found in knee OA patients with severe disable (Nuesch et al., 2011).

Knee OA mainly affects individual's physical functioning, especially walking and social participation. According to WHO Global Burden of Disease study, OA ranked 11th cause of disability globally (Vos et al., 2012). Symptomatic knee OA ranked 4th leading cause of disability globally, with an estimated prevalence of 70-80% in the population aged 55 years and above (Fransen et al., 2011). In a recent French ''Disability-health survey'', individuals with knee OA compared to the non-knee OA individuals had an almost doubled higher limitation in walking and carrying objects. Results also found that knee OA mainly affected walking (22%), carrying objects (18.6%), and dressing (12.8%) (Palazzo, Ravaud, Papelard, Ravaud, & Poiraudeau, 2014). Knee OA also affects individual's independency and psychosocial functioning besides than pain and functional disability. This may prompt changes in a person's life and the result of negative consequences on individuals' quality of life and wellbeing (Ridder, Geenen, Kuijer, & Middendorp, 2008).

Anti-inflammatory drugs are the mainstay of treatment for the symptoms of mild to moderate OA and are associated with various side-effects. Knee replacement is also one of the most common indication for the patients whom these drugs do not lead to an adequate response, and is increasingly recommended for patients younger than 55 years (Carr et al., 2012). However, a study of patients' inclinations and treatment given to 415 severe knee pain patients observed that generally 81% would not acknowledge surgery if offered because patients perceived pain which was not sufficient serious to consider for knee surgery (Mitchell & Hurley, 2008). Besides, in a recent qualitative interview study on patients' and practitioners' opinions on the management of knee OA, the researchers found that pharmacological treatments are effective for immediate relief of pain symptoms but it would evoke fear and avoidance to the patients. Furthermore, patients expressed concerns about the lack of information on knee surgery and they perceived the post-surgery period was long and painful that caused them felt fear. Those who experienced knee surgery felt disappointed and the knee pain remained after the surgery (Alami et al., 2011).

Evidence suggested that cognitive behavioral model, which perceives the potential inclusion of psychological elements is essential for patients' conformity in treating OA knee pain. The efficacy of CBT interventions in treating OA pain supported that clinical trial studies in giving support to the viability of psychosocial interventions. It has extended past the original focus on pain management and that valuable impacts over varies of arthritis outcomes were found, including decreased psychological distress, enhanced marital adjustments and reduced fatigue (Keefe & Somers, 2010).

The efficacy of cognitive behavioral interventions for knee OA pain management has been documented. A recent randomized controlled trial study on the effectiveness of group CBT on knee OA pain for the duration of 12 months follow up has addressed the importance of CBT intervention to the current conservative treatment care for knee OA related pain (Helminen et al., 2013). In addition, Coleman and other researchers have shown evidence that self-management education program based on social cognitive theory and CBT has significant improvement in knee pain at eight weeks and six months follow up among knee OA patients (Coleman et al., 2012). In Malaysia, CBT was evaluated for its effectiveness for the treatment of type 2 diabetes (Alvani, Mohd Zaharim, & Kimura, 2015), depression (Mukhtar, Oei, Jamil, & Yaacob, 2011) and chronic pain (Cardosa et al., 2012). Despite this evidence of the importance of CBT in chronic pain, there has been very little research evaluating psychosocial interventions for knee OA patients. In fact, there are no psychosocial interventions for patients with OA of the knee with the primary focus of reducing pain and improving physical and psychological functioning which has not been previously studied in Malaysia.

Though anti-inflammatory drugs and knee replacement are the mainstay and conventional treatments in the management of knee OA in Malaysia, individuals with knee OA suffering low quality of life is still noted (Zakaria, Bakar, Hasmoni, Rani, & Kadir, 2009). Thus, non-pharmacological interventions are still a driving force in managing knee OA pain (Ehde et al., 2014). Therefore, our aim is to develop, implement and evaluate the effectiveness of a cognitive behavioral-based therapy module among knee OA patients that would reduce knee pain intensity, functional disability (daily living and sport), psychological distress (depression, anxiety and stress), pain catastrophising, fear-avoidance believes (physical activity and work), and improve pain self-efficacy level. The key features of cognitive behavioral intervention are the purpose of increasing patients' involvement and control in their life and its impact on their lives.

1.3 Significance of the study

The study may contribute to better care for patients with recent onset chronic knee pain to improve self-management skills in managing pain. It may heightened the potential importance of cognitive behavioral intervention aiming to reduce levels of pain, functional disability, depressive and anxiety severity symptoms, pain catastrophising, fear-avoidance beliefs and increase levels of pain self-efficacy in the management of chronic knee pain patients. The study described in this study will determine comparative efficacy of these programs and the results will assist healthcare providers who are responsible to deliver non-pharmacological interventions, investigators in the field of OA, authorities in human services administration and policy makers in planning for future arthritis education and self-management strategies, in order to effectively reduce health and economic burden of knee OA.

1.4 Research questions

Research questions to be addressed in this study are described as below:

1. Is a cognitive behavioural-based therapy module based on cognitive behavioural model effective in reducing knee pain intensity level among knee OA patients?
2. Is a cognitive behavioural-based therapy module based on cognitive behavioural model effective in reducing functional disability level among knee OA patients?
3. Is a cognitive behavioural-based therapy module based on cognitive behavioural model effective in reducing psychological distress level among knee OA patients?
4. Is a cognitive behavioural-based therapy module based on cognitive behavioural model effective in reducing fear-avoidance beliefs level among knee OA patients?

5. Is a cognitive behavioural-based therapy module based on cognitive behavioural model effective in reducing pain catastrophising level among knee OA patients?
6. Is a cognitive behavioural-based therapy module based on cognitive behavioural model effective on improving pain self-efficacy level among knee OA patients?

1.5 General objective

The general objective of this study is to develop and implement a cognitive behavioural-based therapy module based on cognitive behavioural model related to knee OA, and to evaluate its effectiveness in reducing knee pain intensity, functional disability level, and psychological outcomes among knee OA patients in Hospital Putrajaya and Hospital Serdang, Malaysia.

1.6 Specific objectives

The specific objectives of the study are:

1. To determine the socio-demographic (age, gender, ethnicity, education level, marital status, type of cohabitation, occupational, and monthly income) and clinical characteristics (pre-existing comorbidities, affected knee OA, duration of knee pain symptoms, pain intensity level, body mass index (BMI), and Kellgren-Lawrence (K-L) grade of knee OA) of knee OA patients.
2. To determine the baseline level of knee pain intensity, functional disability (daily living and sport), psychological distress (depression, anxiety and stress), fear-avoidance beliefs (physical activity and work), pain catastrophising and pain self-efficacy of knee OA patients.
3. To develop and implement a cognitive behavioural-based therapy module for knee OA patients.
4. To evaluate the effectiveness of a cognitive behavioural-based therapy module in reducing knee pain intensity, functional disability (daily living and sport), psychological distress (depression, anxiety and stress), fear-avoidance beliefs (physical activity and work) and pain catastrophising level among knee OA patients at immediate, one month and six months after intervention.
5. To evaluate the effectiveness of a cognitive behavioural-based therapy module on improving pain self-efficacy level among knee OA patients at immediate, one month and six months after intervention.

1.7 Research hypothesis

H1: The cognitive behavioural-based therapy module is effective in reducing knee pain intensity level among knee OA patients.
H2: The cognitive behavioural-based therapy module is effective in reducing functional disability (daily living) level among knee OA patients.
H3: The cognitive behavioural-based therapy module is effective in reducing functional disability (sport) level among knee OA patients.
H4: The cognitive behavioural-based therapy module is effective in reducing depression level among knee OA patients.
H5: The cognitive behavioural-based therapy module is effective in reducing anxiety level among knee OA patients.
H6: The cognitive behavioural-based therapy module is effective in reducing stress level among knee OA patients.
H7: The cognitive behavioural-based therapy module is effective in reducing fear-avoidance beliefs (physical activity) level among knee OA patients.
H8: The cognitive behavioural-based therapy module is effective in reducing fear-avoidance beliefs (work) level among knee OA patients.
H9: The cognitive behavioural-based therapy module is effective in reducing pain catastrophising level among knee OA patients.
H10: The cognitive behavioural-based therapy module is effective in improving pain self-efficacy level among knee OA patients.

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