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LARISSA SIMÕES FREITAS

EXERCÍCIOS DOMICILIARES PARA ALÍVIO DA
DOR EM PACIENTES COM OSTEOARTRITE DE
JOELHO: REVISÃO SISTEMÁTICA

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JOELHO: REVISÃO SISTEMÁTICA

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Orientador (a): **Prof. Dr. Sérgio Ricardo
Thomaz**

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Dedicatória

Este trabalho é dedicado aos meus pais, familiares e amigos que com incentivo e apoio, não mediram esforços para que eu completasse esta etapa na minha vida.

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Epígrafe

“Não se preocupe com números. Ajude uma pessoa por vez e comece com quem estiver do seu lado.” (Santa Teresa de Calcutá)

RESUMO

Objetivo: A presente revisão tem como objetivo avaliar quais exercícios a nível domiciliar são eficazes para melhora da dor em pacientes com osteoartrite em joelho. **Metodologia:** As seguintes bases de dados bibliográficas eletrônicas (PEDro, PUBMED, EMBASE) foram sistematicamente pesquisadas no período de Agosto à Outubro de 2020. Ensaio clínico randomizado compararam intervenção de exercício terapêutico com grupo controle ou outra intervenção ativa sem exercício. A triagem dos artigos foi baseada na leitura dos títulos, seguido da análise dos resumos e em seguida dos textos completos. **Resultados:** No total, 9 estudos atenderam os critérios de inclusão e a qualidade metodológica foi avaliada segundo a Escala PEDro. Cinco artigos analisaram o alívio da dor como desfecho primário e em quatro demonstraram melhora estatisticamente significativa. Entre os estudos que não analisaram o alívio da dor como desfecho primário, em dois foram observadas diferenças significativas para alívio da dor e um não apresentou diferença significativa em relação ao outro grupo. **Conclusão:** Protocolo de exercícios em solo mais abrangentes de membros inferiores, envolvendo o fortalecimento muscular para joelho e quadril apresentaram benefícios em relação a redução dos sintomas nessa população, incluindo redução da dor e aumento da função física.

Palavras-chave: osteoartrite, joelho, exercícios, dor.

ABSTRACT

Objective: This review aims to assess which exercises at home are effective for improving pain in patients with knee osteoarthritis. **Methodology:** The following electronic bibliographic databases (PEDro, PUBMED, EMBASE) were systematically searched from August to October 2020. Randomized clinical trials compared therapeutic exercise intervention with control group or other active intervention without exercise. The screening of articles was based on reading the titles, followed by the analysis of abstracts and then the full texts. **Results:** In total, 9 studies met the inclusion criteria and the methodological quality was assessed according to the PEDro Scale. Five articles analyzed pain relief as the primary outcome and in four demonstrated a statistically significant improvement. Among the studies that did not analyze pain relief as a primary outcome, in two significant differences were observed for pain relief and one did not show any significant difference in relation to the other group. **Conclusion:** More comprehensive floor exercise protocol for lower limbs, involving muscle strengthening for the knee and hip showed benefits in terms of reducing symptoms in this population, including reducing pain and increasing physical function.

Keywords: osteoarthritis, knee, exercises, pain.

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LISTA DE ABREVIATURAS

ACR - American College of Rheumatology

ADM - amplitude de movimento

BMC - concentrado de medula óssea

EMBASE - Excerpta Medica Database

EULAR - European League Against Rheumatism

EVA - Escala Visual Analógica

NMES - Neuromuscular Electrical Stimulation

OA - Osteoartrite

PEDro - Physiotherapy Evidence Database

RCTs - Ensaios Clínicos Randomizados

TENS - Transcutaneous Electrical Nerve Stimulation

WOMAC - Western Ontario and McMaster Universities Osteoarthritis Index

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1. INTRODUÇÃO

A osteoartrite (OA) é a doença reumática mais prevalente, causando alterações degenerativas na cartilagem e na região periarticular das articulações sinoviais, sendo o joelho mais comumente afetado^{1,2}. O processo de adoecimento se desenvolve devido à relação entre fatores de risco sistêmicos e locais, sendo os sistêmicos raça, idade, sexo, fatores genéticos, hormonais, densidade óssea e nutricionais e os locais envolvem ganho de peso, condições traumáticas, ocupação, movimento funcional e fraqueza muscular³. Dentre todos os fatores de risco, obesidade, envelhecimento e sexo feminino parecem ser os mais significativos².

A OA sintomática do joelho é uma das principais causas de dor crônica e incapacidade funcional entre idosos em todo o mundo⁴. O sintoma mais proeminente da OA do joelho é a dor e rigidez articular, enquanto a redução da qualidade de vida, a perda da função física e a fraqueza muscular também estão frequentemente associadas, resultando em progressão da doença^{1,5}. A OA do joelho é responsável por dor e incapacidade funcional em 19,2–27,8% das pessoas com idade >45. Não há cura conhecida para OA e o manejo visa controlar a dor enquanto melhora a função e a qualidade de vida. As intervenções médicas mais comuns incluem agentes farmacológicos e cirurgia de substituição articular. Em contraste, outros tratamentos menos invasivos, como terapia manual direcionada e exercícios, são efetivos e podem ser administrados com segurança a pacientes mais idosos⁶.

A terapia por exercício, um tratamento não farmacológico, é o primeiro passo no pacote de recomendações da European League Against Rheumatism (EULAR) e do American College of Rheumatology (ACR) sobre o tratamento da OA do joelho. As diretrizes internacionais atuais recomendam a terapia com exercícios para aumentar a mobilidade e participação em atividades físicas³. Alguns ensaios clínicos de tratamentos para osteoartrite do joelho sugeriram que a fisioterapia confere alívio dos sintomas a curto e longo prazo, melhora funcional e uma menor necessidade de medicamentos para a dor, incluindo opioides⁷.

Os efeitos benéficos do exercício na dor e na função da OA do joelho podem ser alcançados por ganho da força muscular, melhora da amplitude de movimento (ADM) do joelho ou melhorias na propriocepção. Os músculos são o tecido primário afetado pela maioria dos tipos de exercícios; portanto, espera-se que quaisquer alterações fisiológicas causadas pelo exercício sejam refletidas nos músculos⁸.

Os tipos de regimes de exercícios considerados eficazes no controle da dor e na manutenção da função na OA do joelho incluem exercícios aeróbicos e treinamento de força. O fortalecimento do quadríceps e isquiotibiais ajudam, além de manter e aumentar a força, melhorar a estabilidade e mobilidade articular, permitindo melhor ADM em movimentos de flexão e extensão e melhor tolerância à dor⁹. O aumento da força muscular pode modificar a biomecânica, resultando em uma redução da taxa de carga articular ou estresse localizado na cartilagem articular, desempenhando assim um papel importante no objetivo de retardar o início do desgaste articular e evitar a progressão da OA do joelho¹⁰.

2. OBJETIVO

Apesar de existirem muitos ensaios clínicos na literatura comparando os efeitos de programas de exercícios, ainda existe uma lacuna sobre quais são mais adequados para melhora da dor em pessoas com OA. Dessa forma, a presente revisão tem como objetivo avaliar quais exercícios no cenário domiciliar são eficazes para melhora da dor em pacientes com osteoartrite em joelho em comparação a grupos que não realizaram exercícios.

3. METODOLOGIA

A estratégia de busca identificou os artigos publicados, sendo ensaios clínicos randomizados (RCTs), em língua inglesa, nos últimos 10 anos, que compararam uma intervenção de exercício terapêutico em solo com um grupo controle, recebendo alguma intervenção ativa ou sem atenção.

As seguintes bases de dados bibliográficas eletrônicas foram sistematicamente pesquisadas no período de Agosto à Outubro de 2020: Physiotherapy Evidence Database (PEDro), PubMed e Excerpta Medica Database (EMBASE). A busca foi definida por meio do acrônimo PICO (Paciente, Intervenção, Comparação e “Outcomes” - Resultados), que incluíram os seguintes componentes: Pacientes com osteoartrose; Intervenção com exercícios; Comparação com nenhum exercício; Resultado de alívio de dor. A seleção dos descritores utilizados no processo de revisão foi efetuada mediante consulta ao MeSH (Medical Subject Heading), assim, os seguintes descritores, em língua inglesa, foram considerados: Knee Osteoarthritis, Pain, Exercise Therapy, Rehabilitation, Physical and Rehabilitation Medicine, Physiotherapies Techniques. Recorreu-se aos operadores booleanos “AND” e “OR” para combinação dos descritores utilizados para rastreamento das publicações. A estratégia de busca seguiu o seguinte exemplo: “Knee Osteoarthritis” AND Pain AND “Exercise Therapy”

OR Rehabilitation OR “Physical and Rehabilitation Medicine” OR “Physiotherapies Techniques”.

Além de cumprir os critérios de pesquisa mencionados acima, foram incluídos estudos com participantes que receberam diagnóstico clínico de OA de joelho de acordo com os critérios clínicos do ACR ou de acordo com critérios clínicos autorrelatados sugestivos de AO de joelho (com ou sem confirmação por radiografia) nos quais receberam intervenções com todos os regimes de exercícios terapêuticos em solo com objetivo de melhora dos sintomas relacionados a OA, incluindo alívio da dor e/ou melhora da função física, independentemente do conteúdo, duração, frequência ou intensidade. O grupo para fins de comparação incluiu participantes sem tratamento ou um grupo com qualquer intervenção sem exercícios.

Foram excluídos os estudos que abordavam intervenções pós operatórias de artroplastia total de joelho (apesar da substituição da articulação ter tido como causa a osteoartrite), estudos em que não haviam participantes realizando qualquer modalidade de exercício terapêutico ou em que todos participantes realizassem exercício, além disso, estudos que usassem outras intervenções (laser, ultrassom, corrente interferencial, ondas curtas, bolsa com água quente ou fria, infravermelho, transcutaneous electrical nerve stimulation – TENS e Neuromuscular Electrical Stimulation - NMES) como terapia adicional ao grupo de tratamento com exercícios não entraram na análise desta revisão.

O desfecho primário analisado foi dor e o desfecho secundário foi a função física. Se mais de uma escala foi relatada para um resultado, selecionamos a escala que foi relatada de forma mais abrangente e mais alta na ordem de classificação proposta anteriormente^{11,12}. Essa hierarquia foi seguida para resultados relacionados a dor e função.

A triagem dos artigos foi realizada por um revisor, devido as limitações de tempo, baseada na leitura dos títulos, seguido da análise dos resumos e posterior apreciação dos textos completos dos artigos. As principais informações dos estudos incluídos foram resumidas de forma padronizada. Estas informações foram organizadas nos tópicos: autor e ano, desfechos avaliados, protocolo do programa de exercícios, resultados encontrados. A qualidade metodológica dos estudos foi avaliada utilizando-se a escala PEDro. Idealizada por Maher¹³, essa escala é amplamente utilizada na área da reabilitação. Ela é composta de 11 itens, e a cada um dos itens presentes no estudo é somado um ponto (com exceção do item 1, que não é pontuado). Assim, o escore máximo é dez pontos e o mínimo zero, sendo que escores ≥ 5 são considerados de alta qualidade.

3. RESULTADOS

Através da estratégia de busca, foram identificados inicialmente 178 publicações e 6 artigos identificados de forma secundária. Em seguida foram excluídos 51 artigos que estavam duplicados nas bases de dados. Posteriormente a exclusão dos artigos duplicados, 133 referências foram selecionadas para a avaliação a partir da leitura dos títulos e resumos. Depois dessa avaliação, 123 artigos foram excluídos por não contemplarem os critérios de inclusão desta revisão. Após supressão dos artigos cuja temática não contemplava as intervenções e desfechos buscados neste estudo, 9 artigos atenderam os critérios de inclusão. Todos os artigos incluídos nessa revisão obtiveram escores ≥ 5 na escala PEDro, considerados de alta qualidade.

A seguir, um fluxograma sintetiza a busca dos artigos que compuseram a amostra final desta revisão (Figura 1).

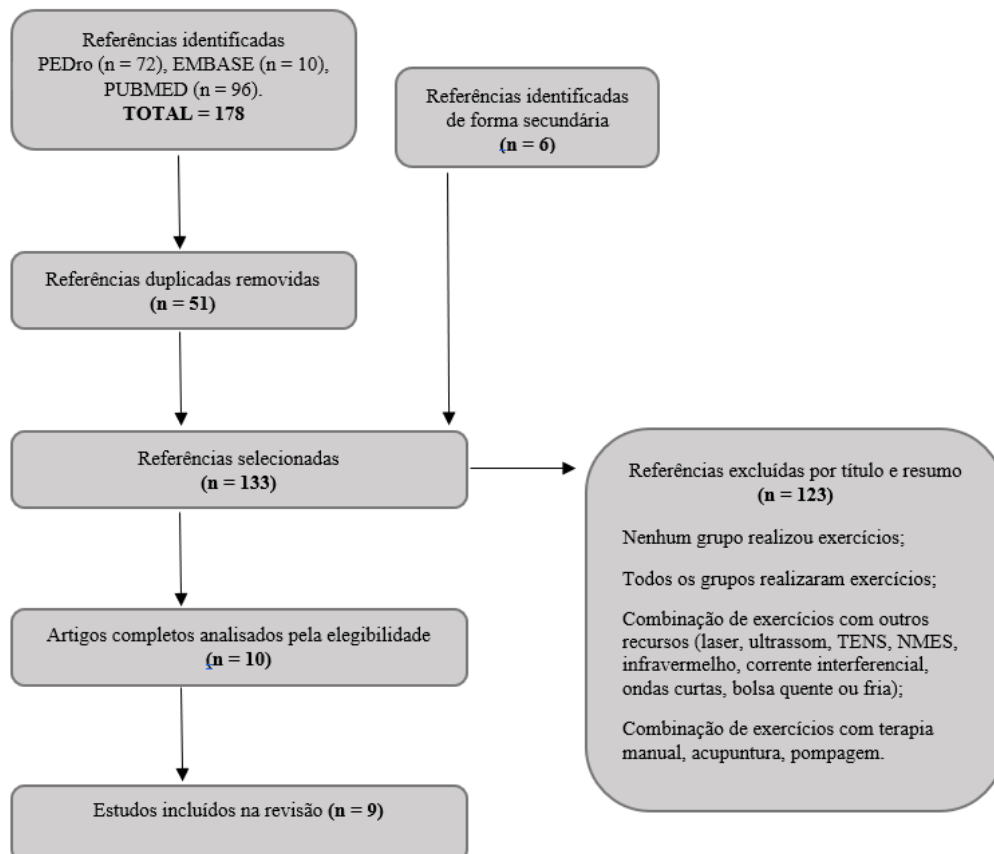


Figura 1. Fluxograma PRISMA.

A tabela contempla os nove artigos selecionados por esta pesquisa contendo a nota alcançada da qualidade metodológica dada pela escala PEDro (Tabela 1).

Tabela 1. Classificação metodológica avaliada pela Escala PEDro.

Autor (ano)	BANDAK E. et al. (2019) ⁸	HENRIKSEN, M. et al. (2014) ¹⁴	ARMAGAN, O. et al. (2015) ¹⁵	DA SILVA, F. S. et al. (2015) ¹⁶	CENTENO, C. et al. (2018) ¹⁷	BRUCE-BRAND, R. A. et al. (2012) ¹⁸	TAKACS, J. et al. (2017) ¹⁹	MECKLENBURG, G. et al. (2018) ²⁰	HUANG, L. et al. (2018) ²¹
Escala PEDro	6	6	7	6	5	5	5	7	5

Essa revisão sistemática mostra uma escassez de RCTs comparando os tipos de exercícios físicos com grupos sem tratamento ou com apenas uma intervenção ativa. Isso ocorre pelo fato de que muitos estudos associam o exercício físico a técnicas de terapia manual ou a recursos, como infravermelho, ultrassom, TENS ou bolsa de água quente.

Em 33% dos estudos foram recrutados entre 50 e 70 participantes^{8,14,15}. No entanto, quatro estudos recrutaram menos de 45 participantes^{16,17,18,19}. Dois estudos recrutaram mais de 160 participantes^{20,21}. A média de idade dos participantes que receberam intervenção com exercícios terapêuticos ficou em 60,57, já no grupo controle ficou em 60,01.

Entre os estudos analisados, três compararam um grupo sem intervenção com exercícios terapêuticos^{8,14,19}. Dois artigos compararam a intervenção de exercícios com programas de educação do paciente, que incluíam informações a respeito da doença, medidas de como melhorar a qualidade de vida e função, autocuidado e como lidar com contratempas devido as dores no joelho^{16,20}. Três artigos compararam exercício com outras intervenções, sendo essas, injeção percutânea de concentrado de medula óssea (BMC) combinado com produto de plaquetas, tratamento oral com sulfato de glucosamina e fisioterapia (aleatoriamente conforme necessário) com o medicamento celecoxibe por recomendação do médico^{15,17,21}. Além disso, um estudo comparou a intervenção de exercícios com um programa de NMES e de educação do paciente¹⁸.

Dos artigos selecionados, cinco (55%)^{14,15,16,20,21} analisaram o alívio da dor como desfecho primário. Os resultados combinados de quatro desses estudos demonstram melhora estatisticamente significativa do exercício sobre a dor^{14,16,20,21}. Em um estudo não houve diferença significativa entre o grupo que recebeu intervenção com exercício comparado ao tratamento oral com sulfato de glucosamina¹⁵. Entre os estudos que não analisaram o alívio da dor como desfecho primário, em dois foram relatados diferença estatisticamente significativa

a favor do grupo que recebeu intervenção com exercício em comparação ao grupo controle sem atenção^{8,19}. Nos outros artigos^{17,18} não houve diferenças estatísticas significantes em comparação a intervenção com injeção percutânea de combinação BMC com produto de plaquetas e NMES.

Em 33% dos artigos que apresentaram melhora da dor com diferenças estatisticamente significantes, a intervenção abordada com os participantes dos estudos foi um protocolo de exercícios com duração média de 10,6 semanas, sendo um programa que consiste em aquecimento e treinamento de força para membros inferiores, além de exercícios para estabilidade do core. O aquecimento foi realizado em bicicleta ergométrica. Para o fortalecimento da musculatura da coxa foram realizados exercícios de extensão e flexão do joelho, agachamento com ou sem uso da bola suíça apoiada nas costas. Além de exercícios para estabilidade do joelho, afundo e controle da extensão final do joelho, feita de maneira rápida. No protocolo de exercícios desses estudos também foram enfatizadas a estabilidade e fortalecimento do quadril, com exercícios de abdução e adução do quadril, rotação externa de quadril em decúbito lateral; exercício de elevação pélvica, podendo sofrer variações com o uso da bola suíça e com a execução sendo unilateral. Exercícios para estabilidade do core também foram realizados^{8,14,16}.

Em outros três estudos, protocolos diferentes de exercícios foram executados, porém todos abordavam o fortalecimento da musculatura da coxa, sendo por meio da contração isotônica ou isométrica^{19,20,21}. Os protocolos dos estudos em geral tinham como objetivo um programa de exercícios mais abrangente, que não fossem focados apenas em fortalecimento muscular, mas também em exercícios funcionais e de equilíbrio^{8,14,15,16,17,19}.

Os resultados combinados de quatro estudos demonstraram benefícios estatisticamente significativos na função física nos pacientes que receberam intervenção com exercício terapêutico^{16,19,20,21}. Em contrapartida, os resultados de quatro estudos demonstraram que não houve diferença estatisticamente significativa entre os grupos, nos quais a intervenção com exercício terapêutico foi comparada a participantes sem atenção, tratamento oral com sulfato de glucosamina e injeção percutânea de combinação BMC com produto de plaquetas^{8,14,15,17}. Em um estudo, a intervenção com NMES obteve mudanças intragrupo significativas relacionada a função, porém os dados não compararam essas melhorias alcançadas com grupo exercício¹⁸.

A tabela a seguir resume as características gerais dos artigos selecionados nesta revisão (Tabela 2).

Tabela 2. Características gerais dos artigos.

Autor (ano)	Objetivos	Amostra	Período de intervenção	Medidas de desfecho	Intervenção (protocolo de exercícios)
BANDAK E. et al. (2019)⁸	Avaliar os efeitos de um programa de exercícios terapêuticos na perfusão muscular dos músculos peri-articulares do joelho e a associação entre alterações na perfusão muscular com alterações na dor, função física e desempenho em pacientes com OA de joelho.	60 participantes: 31 no grupo exercício e 29 no grupo controle sem intervenção.	12 semanas.	DCE-MRI, KOOS, força muscular dos extensores e flexores do joelho, TC6.	Aquecimento em bicicleta ergométrica. Estabilidade do core (ativação do transverso do abdômen em DD e prancha). Estabilidade da pelve e quadril (levantamento pélvico – elevando nível de dificuldade). Fortalecimento do glúteo médio (rotação externa – elevando nível de dificuldade, abdução + extensão do quadril). Controle e estabilidade do joelho (controle do final da extensão em pé, afundo). Fortalecimento muscular para joelho (leg press ou extensão de joelho com uso de bola entre a região poplíteia e a parede, subida em step com faixa elástica) Exercícios funcionais (caminhada e descida de degraus).
HENRIKSEN, M. et al. (2014)¹⁴	Investigar os efeitos de um programa de exercícios terapêuticos sobre a sensibilidade à dor em pacientes com OA de joelho que aderem ao protocolo de exercícios.	60 participantes: 31 no grupo exercício e 29 no grupo controle sem intervenção.	12 semanas.	PPTs, TS, KOOS.	Aquecimento em bicicleta ergométrica. Estabilidade do core (ativação do transverso do abdômen em DD e prancha). Estabilidade da pelve e quadril (levantamento pélvico – elevando nível de dificuldade). Fortalecimento do glúteo médio (rotação externa – elevando nível de dificuldade, abdução + extensão do quadril). Controle e estabilidade do joelho (controle do final da extensão em pé, afundo). Fortalecimento muscular para joelho (leg press ou extensão de joelho com uso de bola entre a região poplíteia e a parede, subida em step com faixa elástica) Exercícios funcionais (caminhada e descida de degraus).
ARMAGAN, O. et al. (2015)¹⁵	Avaliar os efeitos sintomáticos do sulfato de glucosamina em comparação à terapia com exercícios, bem como os efeitos nos achados de imagem de ressonância magnética de perda de cartilagem em pacientes com OA.	70 participantes: 40 no grupo sulfato de glucosamina e 30 no grupo exercício.	24 semanas.	VAS, WOMAC, RM.	Exercícios para fortalecimento do quadriceps e isquiotibiais. Exercícios dinâmicos de degrau. Protocolo de exercícios domiciliares.
DA SILVA, F. S. et al. (2015)¹⁶	Hipótese de que um programa de reabilitação de grupo integrado limitaria a dor, melhoraria a qualidade de vida e a função em pacientes com AO de joelho.	41 participantes: 19 no grupo exercício e 22 no grupo controle com informações educacionais.	8 semanas.	Índice algofuncional de Lequesne, SF-36, Testes de sentar-levantar, sentar e alcançar, TUG e TC6.	Aquecimento em bicicleta ergométrica e alongamento. Exercícios de força para MMII e MMSS: mini agachamento, extensão e flexão do joelho, abdução e adução de quadril, flexão plantar e dorsal do tornozelo, exercício de elevação pélvica, abdominal, fortalecimento para MMSS. Exercícios funcionais: step, circuito de caminhada, step, balanço unipodal, transferência corporal, desenho com ponta do dedo do pé, levantar e sentar na cadeira, atividade dinâmicas em grupo.
CENTENO, C. et al. (2018)¹⁷	Hipótese de que um protocolo específico de BMC e produtos plaquetários melhoraria os resultados clínicos mais do que a terapia com exercícios.	48 participantes: 26 no grupo tratamento com BMC e produtos plaquetários e 22 no grupo exercício	12 semanas.	KSS, VAS, SF-12, ADM, LEAS.	Fortalecimento funcional. Treinamento de resistência e alinhamento do core, pelve e MMII. Treinamento de equilíbrio. Atividade aeróbica, conforme disponibilidade (caminhada, bicicleta ergométrica). Protocolo de exercícios domiciliares.
BRUCE-BRAND, R. A. et al. (2012)¹⁸	Hipótese de que um programa de NMES domiciliar proporcionaria benefícios semelhantes a um programa de exercícios em pacientes com AO.	41 participantes: 14 no grupo exercício, 14 no grupo NMES e 13 no grupo controle com informações educacionais	6 semanas.	T25m, teste repetido de levantar da cadeira e um teste de subida de escada, pico de torque isométrico e isocinético do quadriceps, CSA do quadriceps, WOMAC, SF-36.	Exercícios para MMII: flexão de joelho, extensão de joelho, levantamento da perna estendida, agachamento na parede e isometria de quadriceps em decúbito dorsal. Protocolo de exercícios domiciliares.
TAKACS, J. et al. (2017)¹⁹	Investigar o efeito de um programa de treinamento de equilíbrio dinâmico no equilíbrio dinâmico e na função física geral em pessoas com OA de joelho.	40 participantes: 20 no grupo exercício e 20 no grupo controle sem intervenção	10 semanas.	CB&M, WOMAC, NRS, BFMS, LES.	Controle dinâmico do equilíbrio, força muscular excêntrica dos MMII e estabilidade do core: abdominal com rotação de tronco (sentado, em pé, com passos), agachamento com uso de cadeira, flexão plantar, marcha lateral com joelho semi-flexionado, afundo, elevação da pelve no step, mini saltos, padrão de passos com fita ou cones no chão. Protocolo de exercícios domiciliares (85%).
MECKLENBURG, G. et al. (2018)²⁰	Avaliar a eficácia de curto prazo do DCP Hinge Health na melhora da dor e da incapacidade no joelho em pacientes com dor crônica no joelho.	162 participantes: 101 no grupo exercício com programa de atendimento digital e 61 no grupo controle com informações educacionais.	12 semanas.	KOOS, KOOS-PS, VAS, intenção de cirurgia.	Alongamentos de quadriceps e isquiotibiais. Exercícios de força para MMII: agachamento em menor amplitude, afundo, extensão de quadril segurando em uma cadeira, extensão de joelho. Protocolo de exercícios domiciliares.
HUANG, L. et al. (2018)²¹	Investigar os efeitos do tratamento clínico de curto prazo do exercício de contração isométrica do quadriceps em pacientes com OA.	250 participantes: 128 no grupo exercício e 122 no grupo controle com uso do medicamento celecoxibe.	Não informado.	VAS, WOMAC.	Exercícios de contração isométrica: elevação da perna estendida em DD e abdução da perna em DL – elevação de 10cm, além de apertar a bola entre os joelhos flexionados com o paciente sentado. Protocolo de exercícios domiciliares.

OA: osteoartrite; DCE-MRI: Dynamic Contrast Enhanced Magnetic Resonance Imaging; KOOS: Knee Injury and Osteoarthritis Outcome Score; TC6: Teste de Caminhada de 6 minutos; DD: decúbito dorsal; PPTs: Pressure-Pain Thresholds; TS: Indices of Temporal Summation of Pain Upon Sustained Noxious Pressure Stimulation Using Cuff Pressure Algometry; VAS: Visual Analogue Scale; WOMAC: Western Ontario e McMaster Universities Osteoarthritis Index; RM: Ressonância Magnética; SF-36: Short Form Health Survey-36; TUG: Timed Up and Go; MMII: membros inferiores; MMSS: membros superiores; BMC: bone marrow concentrate; KSS: Knee Society Score; SF-12: Short Form-12; ADM: amplitude de movimento; LEAS: Lower Extremity Activity Scale; NMES: Neuromuscular Electrical Stimulation; T25: 25m Walk Test; CSA: Cross-Sectional Area; CB&M: Community Balance and Mobility Scale; NRS: Numerical Rating Scale; BFMS: Brief

Fear of Movement Scale; LES: Lower Extremity Strength; KOOS-PS: KOOS Physical Function Shortform; DL: decúbito lateral.

4. DISCUSSÃO

Esta revisão confirmou os achados de revisões sistemáticas anteriores, de que programas de exercícios terapêuticos apresentam benefícios significativos em relação a redução da dor e melhora na função física em pacientes com AO de joelho^{10,22}. A análise dos estudos revelou que a maioria dos protocolos de exercícios terapêuticos foram realizados em casa, demonstrando que um programa com exercícios bem orientados e com variedade no conteúdo é capaz de produzir redução dos sintomas relacionados à OA, como melhora da dor e da função física, mesmo que sejam realizados em domicílio.

Destaca-se que o tempo de intervenção dos estudos que apresentaram melhora significativa da dor variou entre 8 a 12 semanas. Estes estudos mostraram variedade de conteúdo dos programas de exercícios, com protocolos de fortalecimento muscular, aquecimento, funcionais, equilíbrio e também alongamentos. Esses tipos de exercícios foram combinados entre si e as intervenções foram mais abrangentes com relação aos grupos musculares recrutados^{8,14,16,19,20}.

Os estudos Bandak e Henriksen^{8,14} apresentaram o mesmo protocolo de exercícios feito em anos diferentes, ambos fizeram treinamento para estabilidade do core, quadril e joelho, fortalecimento dos abdutores de quadril e extensores do joelho. Os participantes obtiveram melhora estatisticamente significativa na dor, porém não obteve os mesmos resultados para função física.

Nos estudos de Armagan, Centeno, Bruce-Brand^{15,17,18} os pacientes que realizaram exercícios não obtiveram diferença significativa no alívio da dor e melhora da função em relação aos que utilizaram outras técnicas. Os exercícios de fortalecimento muscular tiveram maior foco nos extensores e flexores de joelho, além disso nesses estudos os objetivos eram a avaliação de outras técnicas para sintomas da OA, sendo o grupo de exercícios apenas para controle.

Da Silva, Takacs, Mecklenburg, Huang^{16,19,20,21} alcançaram resultados significativos para melhora da dor e da função física em pacientes com OA. Nos protocolos de Da Silva¹⁶ e Takacs¹⁹ foram realizados exercícios de fortalecimento para abdutores de quadril, extensores e flexores de joelho, flexores plantares e abdominais. Em Mecklenburg²⁰ os exercícios

enfatazaram fortalecimento de extensores e flexores de joelho e extensores de quadril e Huang²¹ fortalecimento do quadríceps com exercícios isométricos.

Em um ensaio randomizado controlado compararam se a adição de treinamento do abdutor de quadril ao treinamento de quadríceps resultaria em melhor desempenho, maior função autorreferida e alívio da dor em mulheres com OA. Os resultados mostraram que os participantes que realizaram exercícios de força para quadríceps combinados aos de abdutor de quadril atingiram diferenças significativas nas subescalas de dor e função WOMAC e na Visual Analogue Scale (VAS). Alcançaram melhorias mais significativas na tarefa de subir/descer escadas e no teste de caminhada. Sugerindo que a adição de exercícios para abdutores de quadril podem aumentar a eficácia da terapia de fortalecimento do quadríceps para melhorar as atividades funcionais e aliviar a dor em mulheres com OA de joelho²³.

O estudo de Suzuki²⁴ também investigou a eficácia da terapia de exercícios em casa comparando um grupo que recebeu treinamento para quadril e joelho com treinamento apenas de quadríceps. Assim, o grupo que treinou músculos das duas articulações mostrou melhora significativa na dor avaliada pela VAS e na Japanese Knee Osteoarthritis Measure (JKOM) para dor e rigidez.

6. CONCLUSÃO

Protocolo de exercícios em solo mais abrangentes de membros inferiores, envolvendo o fortalecimento muscular para joelho e quadril apresentaram benefícios em relação a redução dos sintomas nessa população, incluindo redução da dor e aumento da função física. O aumento da força muscular proporciona maior estabilidade das articulações, favorecendo o desempenho e as atividades funcionais.

6.1. LIMITAÇÕES

Algumas limitações foram identificadas nesta revisão. Embora a pesquisa nas bases de dados tenha fornecido um número considerável de evidências, não foi possível incluí-las na análise por não contemplarem os critérios de inclusão. Além disso, a eficácia do exercício foi analisada apenas para dor e função física, porém alguns estudos demonstraram benefícios no desempenho e capacidade funcional de pacientes com OA.

6.2 IMPLICAÇÕES PARA A CLÍNICA

O tratamento com programa de exercícios para osteoartrite é fortemente recomendado para a prática clínica uma vez que proporciona melhora da dor e função física, desde que tenha boa adesão do paciente e seja realizado regularmente, além disso possui baixos custos e pode ser adaptado para o ambiente domiciliar.

REFERÊNCIAS

1. LU, M. et al. Effectiveness of aquatic exercise for treatment of knee osteoarthritis Systematic review and meta-analysis. **Zeitschrift fur Rheumatologie**, v. 74, n. 6, p.543–552, 2015.
2. DU, C. et al. Blueberries improve pain, gait performance, and inflammation in individuals with symptomatic knee osteoarthritis. **Nutrients**, v. 11, n. 2, 2019.
3. YILMAZ, M.; SAHIN, M.; ALGUN, C. Comparison of effectiveness of the home exercise program and the home exercise program taught by physiotherapist in knee osteoarthritis. **Journal of back and musculoskeletal rehabilitation**, v. 32, n. 1, p. 161-169, 2019.
4. LEE, A. C. et al. Pain and functional trajectories in symptomatic knee osteoarthritis over up to 12 weeks of exercise exposure. **Osteoarthritis and Cartilage**, v. 26, n. 4, p. 501–512, 2018.
5. ANWER, S.; ALGHADIR, A.; BRISMEÉ, J. M. Effect of Home Exercise Program in Patients with Knee Osteoarthritis: A Systematic Review and Meta analysis. **Journal of Geriatric Physical Therapy**, v. 39, n. 1, p. 38–48, 2016.
6. ALKHAWAJAH, H. A.; ALSHAMI, A. M. The effect of mobilization with movement on pain and function in patients with knee osteoarthritis: A randomized double-blind controlled trial. **BMC Musculoskeletal Disorders**, v. 20, n. 1, p. 1–9, 2019.
7. DEYLE, G. D. et al. Physical therapy versus glucocorticoid injection for osteoarthritis of the knee. **New England Journal of Medicine**, v. 382, n. 15, p. 1420–1429, 2020.
8. BANDAK E. et al. Exercise-induced pain changes associate with changes in muscle perfusion in knee osteoarthritis: exploratory outcome analyses of a randomised controlled trial. **BMC Musculoskelet Disord**, v. 20, n. 1, p. 491-, 2019.
9. COUDEYRE, E. et al. Isokinetic muscle strengthening for knee osteoarthritis: A systematic review of randomized controlled trials with meta-analysis. **Annals of Physical and Rehabilitation Medicine**, v. 59, n. 3, p. 207–215, 2016.
10. FRANSEN, M. et al. Cochrane Review - Exercise for osteoarthritis of the knee.

Cochrane Database of Systematic Reviews, n. 1, 2015.

11. GOH, S. L. et al. Efficacy and potential determinants of exercise therapy in knee and hip osteoarthritis: A systematic review and meta-analysis. **Annals of Physical and Rehabilitation Medicine**, v. 62, n. 5, p. 356–365, 2019.

12. M. FRANSEN, S. M. Exercise for osteoarthritis of the knee. **Cochrane Database Syst Rev**, n. 1, 2015.

13. MAHER, C.G.; SHERRINGTON, C.; HERBERT, R.D.; MOSELEY, A.M.; ELKINS, M. Reliability of the Pedro scale for rating quality of randomized controlled trials. **Phys Ther**, v. 83, n. 8, p. 713–721, 2003.

14. HENRIKSEN, M. et al. Association of exercise therapy and reduction of pain sensitivity in patients with knee osteoarthritis: A randomized controlled trial. **Arthritis Care and Research**, v. 66, n. 12, p. 1836–1843, dez. 2014.

15. ARMAGAN, O. et al. Comparison of the symptomatic and chondroprotective effects of glucosamine sulphate and exercise treatments in patients with knee osteoarthritis. **Journal of Back and Musculoskeletal Rehabilitation**, v. 28, n. 2, p. 287–293, 2015.

16. DA SILVA, F. S. et al. Efficacy of simple integrated group rehabilitation program for patients with knee osteoarthritis: Single-blind randomized controlled trial. **Journal of Rehabilitation Research and Development**, v. 52, n. 3, p. 309–322, 2015.

17. CENTENO, C. et al. A specific protocol of autologous bone marrow concentrate and platelet products versus exercise therapy for symptomatic knee osteoarthritis: A randomized controlled trial with 2 year follow-up. **Journal of Translational Medicine**, v. 16, n. 1, p. 1–10, dez. 2018.

18. BRUCE-BRAND, R. A. et al. Effects of home-based resistance training and neuromuscular electrical stimulation in knee osteoarthritis: A randomized controlled trial. **BMC Musculoskeletal Disorders**, v. 13, p. 118, jul. 2012.

19. TAKACS, J. et al. Dynamic Balance Training Improves Physical Function in Individuals With Knee Osteoarthritis: A Pilot Randomized Controlled Trial. **Archives of physical medicine and rehabilitation**, v. 98, n. 8, p. 1586–1593, ago. 2017.

20. MECKLENBURG, G. et al. Effects of a 12-week digital care program for chronic knee

pain on pain, mobility, and surgery risk: Randomized controlled trial. **Journal of Medical Internet Research**, v. 20, n. 4, p. e156, abr. 2018.

21. HUANG, L. et al. Effects of quadriceps functional exercise with isometric contraction in the treatment of knee osteoarthritis. **International Journal of Rheumatic Diseases**, v. 21, n. 5, p. 952–959, 2018.

22. GOH, S. L. et al. Efficacy and potential determinants of exercise therapy in knee and hip osteoarthritis: A systematic review and meta-analysis. **Annals of Physical and Rehabilitation Medicine**, v. 62, n. 5, p. 356–365, 2019.

23. WANG, J. et al. Hip abductor strength–based exercise therapy in treating women with moderate-to-severe knee osteoarthritis: a randomized controlled trial. **Clinical Rehabilitation**, v. 34, n. 2, p. 160–169, fev. 2020.

24. SUZUKI, Y. et al. Home exercise therapy to improve muscle strength and joint flexibility effectively treats pre-radiographic knee OA in community-dwelling elderly: a randomized controlled trial. **Clinical Rheumatology**, v. 38, n. 1, p. 133–141, jan. 2019.

ANEXOS

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Potential authors are encouraged to read the following tutorial, which contains the minimum requirements for publication of systematic reviews in the BJPT: Mancini MC, Cardoso JR, Sampaio RF, Costa LCM, Cabral CMN, Costa LOP. Tutorial for writing systematic reviews for the Brazilian Journal of Physical Therapy (BJPT). *Braz J Phys Ther.* 2014 Nov-Dec; 18(6):471-480.

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