



UNIVERSIDADE FEDERAL DE SANTA CATARINA

CURSO DE FISIOTERAPIA

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**ANÁLISE DOS EFEITOS CLÍNICOS E ELETROMIOGRÁFICOS DE UM
PROTOCOLO DE PILATES PARA INDIVÍDUOS COM DOR LOMBAR NÃO
ESPECÍFICA: *FOLLOW UP* DE SEIS MESES.**

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Artigo apresentado ao Curso de Graduação em Fisioterapia, da Universidade Federal de Santa Catarina, como requisito parcial da disciplina de Trabalho de Conclusão de Curso II.

Orientador: Prof. Dr. Alexandre Marcio Marcolino

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Este trabalho é dedicado a minha família,
amigos e professores.

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Esta é uma pesquisa que buscou verificar os padrões clínicos e eletromiográficos de um protocolo de Pilates em indivíduos com dor lombar não específica após um acompanhamento de seis meses. Apresenta-se em forma de artigo que será submetido à revista *Clinical Biomechanics* cujas normas estão no anexo A.

ANÁLISE DOS EFEITOS CLÍNICOS E ELETROMIOGRÁFICOS DE UM PROTOCOLO DE PILATES PARA INDIVÍDUOS COM DOR LOMBAR NÃO ESPECÍFICA APÓS UM ACOMPANHAMENTO DE SEIS MESES.

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RESUMO

Introdução: Geralmente ocasionada por uma série de fatores como por exemplo o desequilíbrio entre os músculos do tronco, estima-se que no mundo a prevalência da dor lombar seja de 9,4%. Estudos já mostraram que, por meio do método Pilates, é possível melhorar a força e a flexibilidade dos músculos do tronco e diminuir a dor. Sabe-se que na maioria dos casos a dor lombar configura-se como uma condição crônica; assim, acredita-se que seja importante verificar se os efeitos obtidos com o método Pilates persistem a longo prazo. **Métodos:** A amostra foi composta por 17 indivíduos, de ambos os sexos, idade média de 25,41±6,27 anos que finalizaram um protocolo de Pilates com duração de 8 semanas. Decorridos seis meses da finalização da intervenção, foram realizadas avaliações clínicas e eletromiográficas dos músculos multífidos lombares e transversos/ oblíquo interno do abdômen. As variáveis foram comparadas antes e após a intervenção e com o *follow up* de seis meses a fim de verificar se houve manutenção dos benefícios imediatos do Pilates. **Resultados:** Após seis meses de finalização do protocolo de Pilates, observou-se manutenção dos parâmetros clínicos e eletromiográficos: diminuição do valor da RMS de múltifido lombar (ML) melhora duradoura da dor, flexibilidade, resistência e força dos músculos do tronco em relação à avaliação inicial ($p<0,05$), que permaneceram semelhantes à avaliação imediatamente após o protocolo ($p<0,05$). **Conclusões:** Os resultados obtidos pelo programa de exercícios utilizando o Método Pilates durante oito semanas persistiram após seis meses da finalização do protocolo.

Palavras-chave: Dor lombar; Pilates; Eletromiografia.

ABSTRACT

Introduction: Generally caused by a number of factors such as imbalance between the trunk muscles, it is estimated that the prevalence of low back pain in the world is 9.4%. Studies have shown that using the Pilates method, it is possible to improve the strength and flexibility of the trunk muscles and decrease the pain. It is known that in most cases, low back pain is a chronic condition; thus, it is believed that it is important to verify that the effects obtained with the Pilates method persist in the long term.

Methods: The sample consisted of 17 individuals of both sexes, mean age of 25.41 ± 6.27 years who completed a Pilates protocol with duration of 8 weeks. Six months after the end of the intervention, clinical and electromyographic evaluations of the lumbar and transverse / oblique internal multifidus muscles of the abdomen were performed. The variables were compared before and after the intervention and with the six-month follow up to see if the immediate benefits of Pilates were maintained. **Results:** After six months of completion of the Pilates protocol, clinical and electromyographic parameters were maintained: a decrease in the value of LMS (LM), lasting improvement in pain, flexibility, strength and strength of the trunk muscles in relation to ($p < 0.05$), which remained similar to the assessment immediately after the protocol ($p < 0.05$).

Conclusions: The results obtained by the exercise program using the Pilates Method for eight weeks persisted after six months of the end of the protocol.

Key words: Low back pain; Pilates; Electromyography

INTRODUÇÃO

A dor lombar é definida como dor ou desconforto que começa abaixo das escápulas e acima da região glútea, com ou sem irradiação para as extremidades inferiores, incluindo dor na raiz nervosa ou ciática¹. A dor lombar foi classificada globalmente como o maior contribuinte para a incapacidade² e é a principal causa de limitação de atividades e ausência de trabalho em grande parte do mundo³. A prevalência global padronizada de lombalgia em 2010 foi estimada em 9,4% da população². No Brasil, segundo a pesquisa nacional por amostra de domicílios (PNAD) do Instituto Brasileiro de Geografia e Estatística (IBGE), as dores da coluna (cervical, torácica, lombar e pélvica) são a segunda condição de saúde mais prevalente (13,5%). É estimado que entre 5 e 10% dos casos desenvolverão dor lombar crônica, que é responsável pelo alto custo do tratamento, licença médica e sofrimento individual⁴ além de causar enorme ônus econômico para indivíduos, famílias, comunidades, indústrias e governos⁵.

Com base na etiologia, a dor lombar é multifatorial e envolve algumas condições, como baixo nível socioeconômico, baixo nível de escolaridade, história prévia de dor lombar, fatores físicos, tais como levantamento de cargas pesadas, trabalho repetitivo, fatores psicossociais, como ansiedade, depressão, insatisfação no trabalho, estresse mental, horas de trabalho e obesidade⁶. Além disso está associada ao desequilíbrio e à falha de ativação dos músculos presentes no assoalho pélvico, coluna lombar e quadril, desenvolvendo distúrbios que afetam e incapacitam a estabilidade da coluna lombar⁷. O manejo para o tratamento da dor lombar compreende uma gama de diferentes estratégias de intervenção, tanto na avaliação como no tratamento desta condição. A eletromiografia de superfície (EMGs) é considerada uma importante ferramenta para a avaliação dos pacientes com dor lombar, pois seu uso pode fornecer informações acerca da quantidade de atividade muscular que algum exercício ou posicionamento requer, assim facilitando a escolha do tratamento mais adequado para cada indivíduo⁸. Além da eletromiografia, os indivíduos que apresentam dor lombar podem ser avaliados por testes clínicos para instabilidade, flexibilidade e resistência muscular⁹ e também com questionários específicos que mensuram os níveis de incapacidade¹⁰, qualidade de vida¹¹ e crenças/medos em relação ao trabalho e atividade física¹²⁻¹³.

Uma abordagem de tratamento a fim de classificar pacientes com lombalgia baseada em sinais e sintomas foi descrita primariamente por Delitto e colaboradores em 1995. A partir da história clínica e exame físico, os indivíduos são subclassificados em 1 de 4

categorias de classificação, como: manipulação, tração, estabilização e exercício específico (padrões em flexão, padrões em extensão e deslocamento lateral). Atualmente, o uso deste sistema de classificação da dor lombar, o *System of Treatment-based Classification* (TBC) é capaz de aumentar a eficácia das intervenções conservadoras¹³. Os exercícios terapêuticos ainda são considerados os recursos mais eficazes para tratar a dor lombar crônica, particularmente para a dor persistente (> 12 semanas de duração). Embora na prática clínica haja uma gama de exercícios aplicados¹⁴ e existam várias formas de exercício que possam ser prescritas, não se tem evidências mostrando que uma forma de exercício seja melhor do que outra; assim, as diretrizes recomendam programas de exercícios que levam em consideração as necessidades individuais, preferências e capacidades para decidir sobre o tipo de exercício terapêutico¹⁵.

Neste contexto, o método Pilates é um programa de exercícios que está frequentemente sendo prescrito para esses indivíduos, pois atua na ativação e fortalecimento dos músculos estabilizadores do tronco e foca na manutenção e estabilidade lombo pélvica, juntamente com os músculos transversos do abdômen, multífidos e musculatura abdominal combinada com a respiração controlada¹⁶. No entanto, estudos que demonstram a eficácia do pilates em indivíduos com dor lombar inespecífica e o quanto este método proporciona efeitos em longo prazo para os indivíduos em questão ainda são escassos na literatura. Dessa forma, vários autores sugerem novas pesquisas na área mas apenas dois estudos publicados realizaram uma análise a médio prazo¹⁷⁻¹⁸. Além disso, os efeitos a médio e longo prazo do Pilates no tratamento de pacientes com dor lombar inespecífica ainda não estão definidos. Levando-se em conta as incapacidades causadas pela dor lombar, a eficácia da eletromiografia em determinar padrões alterados de recrutamento motor e, que o exercício é a melhor conduta para estes pacientes, é que surge a importância de se verificar a efetividade do método Pilates a longo prazo. Assim, o objetivo da pesquisa foi verificar padrões clínicos e eletromiográficos de indivíduos com dor lombar não específica após seis meses da intervenção com o método Pilates.

MÉTODOS

Trata-se de um estudo prospectivo, aprovado pelo comitê de ética em pesquisa (parecer n. 2.376.975, CAAE n. 74646217.5.0000.0121) contendo um grupo de indivíduos com dor lombar já tratado com um protocolo de Pilates (registrado no Registro Brasileiro de Ensaios Clínicos - ReBEC - RBR-796fgc) e que foi acompanhado por um período de seis meses, quando foi avaliado novamente para verificar se houve manutenção dos benefícios atingidos a curto prazo. Qualquer intervenção ocorreu apenas após o entendimento livre consentimento dos voluntários. O fluxograma da figura 1 descreve as principais etapas metodológicas.

SUJEITOS

A amostra do estudo foi composta por 17 indivíduos com idade média de $25,41 \pm 6,27$ anos, $59,41 \pm 11,13$ kg, altura de $1,65 \pm 0,07$ m, de ambos os sexos que foram tratados com o protocolo do método Pilates entre o primeiro e o segundo semestre de 2017 e que retornaram para realizar as avaliações clínica e eletromiográfica após seis meses da intervenção. Para participar do estudo, os indivíduos deveriam apresentar dor lombar não específica, idade entre 18 e 40 anos e, no mínimo três de quatro critérios da classificação dos subgrupos: i) teste de Laségue negativo; ii) movimento aberrante presente – dor na realização da flexão do tronco ou no retorno; iii) *Fear Avoidance Beliefs Questionnaire-Work* (FABQ-W) <19 ; e iv) teste de instabilidade em prono positivo. Os critérios de exclusão determinados foram: dor lombar específica, má formação congênita ou doenças que impedissem a realização dos exercícios do protocolo

AVALIAÇÃO CLÍNICA

As avaliações clínicas ocorreram no Laboratório de Avaliação e Reabilitação do Aparelho Locomotor (LARAL). Foi realizada uma avaliação prévia a fim de subgrupar os indivíduos a partir dos critérios de inclusão citados anteriormente. Na avaliação *follow up* foram coletados novamente os dados sócios demográficos, anamnese e exame físico de cada voluntário além da aplicação dos testes e questionários específicos. Foram aplicados nos indivíduos os testes de instabilidade em prono, movimento aberrante, Laségue e teste de flexibilidade (3º dedo ao solo) para flexão anterior e inclinações laterais direita e esquerda da coluna^{12, 9}. Ainda, foi avaliada a resistência da musculatura extensora da coluna lombar pelo teste de Sorensen, e do quadrado lombar pelo teste de

ponte lateral direita e esquerda^{9,19,20}. Também foram aplicados os questionários relacionados aos medos e crenças em relação à atividade física e ao trabalho (*FABQF*: subescala de atividade física e *FABQW*: subescala de trabalho) e índice de Oswestry de incapacidade (ODI).

AValiação Eletromiográfica

Para a coleta do sinal eletromiográfico foram utilizados dois aparelhos da marca Miotec®, modelo Miotool 400, juntamente com o software para análise MiotecSuite 1.0. Para a captação da atividade elétrica dos multífidos e transverso, foram acoplados um par de eletrodos de superfície de Ag/AgCl (Kendall, Mansfield, MA, USA; modelo Medi-Trace) com 10 mm de diâmetro e distância inter eletrodo de 20 mm sobre cada músculo. Um par sobre o músculo multífido lombar direito (MLD), (2 centímetros a direita da vértebra L5) segundo as orientações da SENIAM (Surface Electromyography for the Non Invasive Assessment of Muscles) e um par sobre os músculos transverso do abdômen/oblíquo interno direito (TRA/OID), (2 cm medial e 2 cm caudal à espinha ilíaca ântero- superior direita)²¹⁻²³. O eletrodo de referência foi acoplado no processo estilóide da ulna a fim de eliminar possíveis interferências. Os parâmetros do eletromiógrafo foram ajustados com um ganho final de 1000 vezes, com filtro digital *butterworth* com frequências de corte entre 20 Hz e 500 Hz, frequência de aquisição de 4000 Hz, modo de rejeição comum (*CMRR - Common Mode Rejection Ratio*) maior que 80 dB e impedância de 1012 Ω . Um dinamômetro do tipo *strain gauge* foi acoplado ao eletromiógrafo a fim de mensurar a força de extensão de tronco durante a tração exercida pelo voluntário.

Os sinais EMG foram coletados em duas atividades: i) contração voluntária isométrica máxima (CVIM): voluntário posicionado conforme o teste de Sorensen, fixado à maca com auxílio de faixas, com o dinamômetro posicionado perpendicularmente ao tronco e preso ao chão por uma corrente inextensível; foi solicitado para que realizasse a CVIM dos músculos extensores da coluna enquanto tracionava o dinamômetro por 6 segundos (1 coleta); ii) extensão de tronco: indivíduo foi instruído a sair da posição de repouso, com os membros superiores cruzados no peito, realizar uma extensão de tronco até a máxima amplitude e retornar à posição inicial em velocidade auto controlada (3 coletas) (FIGURA 2). Entre cada coleta houve um intervalo de repouso de dois minutos a fim de evitar a fadiga dos músculos envolvidos.

PROTOCOLO DE INTERVENÇÃO

O protocolo de exercícios realizado pelos voluntários foi composto por exercícios baseados no método Pilates, executados no solo, para membros superiores, tronco e membros inferiores, com dificuldade crescente ao longo das semanas. O protocolo foi aplicado de maneira individual e presencial, duas vezes por semana, durante oito semanas, totalizando 16 sessões, com duração de 50 minutos, sendo que eram realizadas 10 repetições de cada exercício. O programa foi composto pelos exercícios: *spine stretch forward, saw, cat stretch, roll-up, single leg stretch, single straight stretch, chest lift with rotation, single-leg kick, double-leg kick, pelvic curl, one leg up and down, leg circles, side kicks, crisscross, hundred, spine twist supine, swimming, leg pull front, side kick kneeling, leg pull back, push up e side bend*. Todos os exercícios foram executados em uma única série de 10 repetições de acordo com os princípios do Pilates.

Ao término das oito semanas de acompanhamento realizando o método Pilates, as avaliações clínicas e eletromiográficas foram repetidas e os voluntários foram orientados a continuar suas atividades habituais; porém, a não realizar exercícios do método Pilates pelos próximos seis meses. Após este período, os indivíduos foram contatados por meio de ligações para a reavaliação dos parâmetros clínicos e eletromiográficos.

PROCESSAMENTO DOS DADOS E ANÁLISE ESTATÍSTICA

Para a análise dos dados EMG, os sinais coletados foram processados por meio de algoritmos desenvolvidos no *software* MatLab® seguindo a seguinte ordem de condução das análises: i) filtro digital butterworth passa banda com frequência de corte de 20 a 500 Hz; ii) determinação da força de extensão de tronco durante a realização da CVIM; iii) normalização do sinal do multífido lombar direito durante o teste de extensão pelo sinal obtido no teste de CVIM do respectivo músculo, sendo utilizados os dois segundos de maior estabilidade do sinal da CVIM; iv) normalização do sinal do transverso/oblíquo interno direito do abdômen pelo pico do sinal v) determinação do valor de *Root Mean Square* (RMS) normalizada dos músculos multífidos lombares direito e transverso/oblíquo interno direito do abdômen durante o teste de extensão de tronco. Os dados das variáveis de desfecho foram submetidos a uma análise estatística e utilizados os valores de média, erro padrão da média e desvio padrão. Após a

verificação da normalidade pelo teste de Shapiro Wilk, os valores de RMS, força e os dados das avaliações clínicas obtidos nas avaliações inicial, final e *follow up* de seis meses foram comparados por meio do teste ANOVA com pós teste de Tukey. Para todas as análises foi considerado significativo um valor de $p < 0,05$.

RESULTADOS

Os resultados obtidos estão dispostos nas tabelas 1 e 2. Os desfechos correspondentes à melhora clínica apontaram predominância para a redução da dor, da positividade no teste de instabilidade em prono, bem como do movimento aberrante durante a flexão do tronco, que se mantiveram após seis meses. Ao analisar o nível de dor na avaliação antes e após a intervenção com a utilização da escala visual analógica (EVA), observou-se importante diminuição ($p=0,00$) da média de 3,83 (0,66) para 0,52 (0,34) e, após seis meses, não houve aumento significativo da dor ($p>0,05$), que apresentou média de 1,41 (0,58) segundo a EVA. Em relação ao teste de instabilidade em prono, 84,21% dos indivíduos apresentavam o teste positivo antes da intervenção e reduziram para 27,77% após; depois de seis meses, apenas 23,52% dos indivíduos continuaram positivos; no teste de flexão do tronco 57,89% possuíam dor e, após o Pilates, somente 11,11% apresentaram o teste positivo; após seis meses, 17,54% dos indivíduos permaneceram com esta condição. Observou-se melhora significativa também da flexibilidade e resistência dos músculos do tronco após o protocolo de Pilates verificadas pelos testes de ponte lateral, Sorensen e inclinações laterais e anterior de tronco. Ainda, houve melhora nos escores dos questionários aplicados sobre os medos e crenças relacionados à dor lombar e no nível de incapacidade, sendo que estes benefícios se mantiveram após seis meses de intervenção (tabela 1).

Quanto à ativação muscular de múltiplos lombares, houve uma diminuição significativa no valor de RMS normalizada de MLD ($p=0,01$) entre pré e pós-intervenção e esse resultado estendeu-se por seis meses não havendo diferença significativa entre pós-intervenção e *follow up*. Já em relação ao TRA/OID o RMS manteve-se constante da pré-intervenção ao *follow up* de seis meses, não havendo diferenças entre eles. Além disso, houve aumento da força dos extensores do tronco durante a execução da CVIM após o protocolo de Pilates ($p<0,05$), mantendo esta condição de ganho de força após seis meses da intervenção ($p>0,05$) (tabela 2).

DISCUSSÃO

O objetivo desta pesquisa foi verificar a influência de um protocolo de exercícios de Pilates, os efeitos clínicos e padrões eletromiográficos na ativação muscular de multífidos e transverso do abdômen/oblíquo interno em indivíduos com dor lombar não específica após *follow up* de seis meses. Após *follow up* de seis meses, observou-se manutenção dos parâmetros de dor, incapacidade e medos e crenças relacionados à dor lombar, flexibilidade, controle motor, força de extensão de tronco e resistência dos estabilizadores do tronco. Sabe-se que o método Pilates é efetivo para a diminuição da dor e incapacidades em indivíduos com dor lombar não específica^{24-30,17} porém, ainda não há uma definição clara do que representa uma redução clinicamente importante na dor lombar³¹.

O estudo de Miyamoto et al. (2013), que aplicou o método Pilates modificado com sessão de uma hora, duas vezes por semana, durante seis semanas comparando à intervenção mínima em pacientes com dor lombar crônica, demonstrou redução na intensidade da dor e incapacidade a curto prazo em indivíduos que receberam exercício de Pilates, porém essas melhorias não foram sustentadas após seis meses¹⁷. Em contrapartida, nossos resultados demonstraram manutenção da redução de dor e incapacidade após seis meses. Isso pode ser explicado pelo fato de que o protocolo de exercícios do método Pilates do nosso estudo foi bem delineado para dor lombar não específica, pois foram realizadas duas sessões na semana durante um período de 8 semanas com progressão do nível dos exercícios e os indivíduos foram orientados individualmente. Outro estudo, que avaliou a dor e incapacidade em longo prazo após exercícios do Pilates comparados a exercícios gerais, demonstrou melhorias significativas em ambos os grupos e os resultados permaneceram após 12 e 24 semanas¹⁸.

O medo é um fator limitante para a prática de atividade física em indivíduos com dor lombar³². Nosso estudo mostrou que indivíduos com dor lombar não específica diminuíram os escores do FABQ e ODI imediatamente após a intervenção do método Pilates, permanecendo após seis meses, sugerindo que a longo prazo indivíduos com dor lombar não específica após serem tratados pelo protocolo de Pilates, permaneceram sem medo e crenças relacionados à atividade física como também o nível de incapacidade, mantendo desta forma a sua funcionalidade no período de seis meses.

O estudo de Kloubec (2010), que avaliou os efeitos do exercício de Pilates na resistência abdominal, flexibilidade dos isquiotibiais, postura e equilíbrio, demonstrou que a exposição ao exercício de Pilates por 12 semanas foi suficiente para aumentar a resistência abdominal e flexibilidade dos músculos isquiotibiais³³. Resultados similares foram encontrados no presente estudo, visto que a resistência dos músculos do tronco avaliada por meio do teste de Sorensen e ponte lateral, melhoraram significativamente após a intervenção ($p < 0,05$), perdurando este achado depois de seis meses ($p > 0,05$). Isso sugere que os indivíduos melhoraram a estabilidade lombar e geraram aprendizagem motora a uma resposta fisiológica frente ao exercício, da mesma forma foi verificado aumento significativo da flexibilidade dos músculos posteriores do tronco e membros inferiores após a intervenção, permanecendo constantes a longo prazo. Outro estudo que avaliou a flexibilidade lombo-pélvica de indivíduos saudáveis antes e após um programa de Pilates verificou que houve aumento desses parâmetros após a intervenção³⁴, corroborando com o presente estudo.

Os achados deste estudo demonstraram que os indivíduos passaram a apresentar menor ativação muscular de multífidos e maior força de extensão de tronco. Houve redução significativa da RMS_{un} de MLD após intervenção e manutenção desta a longo prazo, do mesmo modo no estudo de Machado et al. (2018), sugerindo melhora do controle motor e além disso, menor propensão a fadiga, visto que houve a necessidade de se recrutar menos unidades motoras para realizar maior força³⁵. Isso elucida o aumento de resistência que foi permanente após seis meses da intervenção, referindo-se que o protocolo de exercício proposto foi efetivo a longo prazo. Sabemos que dois meses de exercício não são suficientes para adquirir força muscular, apenas consciência corporal e aprendizado motor. Ressalta-se que o nosso protocolo foi individualizado e terapeuta orientando a contração muscular durante os exercícios, promovendo feedback proprioceptivo, possivelmente os indivíduos adquiriram aprendizagem motora e consciência corporal frente ao exercício, promovendo manutenção a longo prazo de diminuição da dor, melhora do controle motor, resistência e força muscular.

Biering Sorensen (1983), afirmou que o fortalecimento de todos os músculos do corpo e a manutenção do equilíbrio podem prevenir a recorrência da dor lombar⁶. Visto que em nosso estudo os indivíduos aumentaram significativamente a força de extensão do tronco promovido por aprendizagem motora após intervenção, permanecendo com

esta condição após o acompanhamento de seis meses. Outrossim, o estudo de Lima et al. (2011), que avaliou a força do core durante o exercício de estabilização através de *biofeedback* de pressão e EMG, demonstrou aumento significativo da força de glúteo médio, oblíquo interno do abdômen e diminuição da atividade do quadrado lombar, causando diminuição da inclinação pélvica³⁶. O mesmo é visto no estudo de Bhadauria e Gurudut (2017), que mostrou melhora significativa da força de core e recrutamento muscular após o exercício de Pilates³⁸.

Neste contexto, o protocolo de Pilates proposto pelo nosso estudo foi capaz de diminuir a dor em pacientes com dor lombar não específica e aumentar flexibilidade, resistência e força dos músculos do tronco. Além disto, foi eficaz na melhora do comportamento e aprendizado motor. Da mesma forma, o protocolo de Pilates foi benéfico a longo prazo, visto que os pacientes permaneceram com a mesma condição após seis meses.

Destaca-se o não cegamento dos avaliadores como uma limitação metodológica importante deste estudo.

CONCLUSÃO

A partir dos resultados obtidos é possível concluir que os indivíduos tratados com os exercícios do protocolo de Pilates apresentaram diminuição da dor, medo e crenças relacionados à dor na prática de atividade física, aumento da flexibilidade, resistência e força muscular. Além disso, houve melhora do comportamento motor dos músculos do tronco e os resultados perduraram a longo prazo. Conclui-se então que o protocolo de exercícios de Pilates proposto por essa pesquisa foi eficaz para o manejo clínico de indivíduos com dor lombar não específica em curto prazo e estes efeitos perduraram após acompanhamento de seis meses.

TABELAS

Tabela 1 - Comparação dos valores de média (erro padrão da média) das variáveis clínicas e questionários entre as avaliações.

	PRÉ	PÓS	FOLLOW UP
Resistencia			
Ponte lateral direita (s)	23,62 (4,44) ^A	37,77 (5,00) ^A	44,20 (4,33)
Ponte lateral esquerda (s)	23,07 (5,03) ^B	36,64 (4,23) ^B	46,60(5,04)
Teste de Sorensen (s)	44,46 (6,11) ^C	87,64 (8,29) ^C	82,20(7,03)
Flexibilidade			
Inclinação anterior do tronco (cm)	14,52 (5,22) ^D	5,22 (1,25) ^D	9,76 (5,82)
Inclinação de tronco direita (cm)	43,63 (0,97) ^E	41,69 (1,02) ^E	44,00 (4,04)
Inclinação de tronco esquerda (cm)	46,33 (0,81) ^F	42,75 (0,91) ^F	44,82 (3,81)
EVA	3,83 (0,66) ^{G,H}	0,52 (0,34) ^G	1,41 (0,58) ^H
Questionários			
FABQ-F	6,05(1,36) ^I	1,88 (0,75) ^I	2,29 (1,73)
FABQ-W	8,89 (1,36)	8,33 (1,70)	7,58 (1,92)
ODI	7,21 (0,73) ^J	3,94 (0,62) ^J	3,76 (2,86)

Fonte: do autor. Legenda: segundos (s); centímetros (cm); *fear avoidance beliefs questionnaire* –subescala atividade física (FABQ-F); *fear avoidance beliefs questionnaire* – subescala trabalho (FABQ-W); índice de incapacidade *Oswestry* (ODI). Diferenças estatisticamente significativas: ^{A, B}(p=0,04), ^{C, D, F, G, I, J}(p<0,00), ^{E, H}(p=0,01).

Tabela 2 - Valores de média (erro padrão da média) da comparação pré, pós-intervenção e *follow up* de seis meses da RMS dos músculos MLD e TrA/OID. Valores de média (erro padrão da média) de força durante a execução da CVIM.

	PRÉ	PÓS	FOLLOW UP
RMS (un)			
MLD	0,622 (0,040) ^{A,B}	0,501 (0,022) ^A	0,493 (0,021) ^B
TrA/OID	0,122 (0,006)	0,119 (0,006)	0,124 (0,006)
Força (kg.F)	14,195 (3,283) ^C	24,501 (2,829) ^C	20,158 (2,084)

Fonte: do autor. Legenda: multífido lombar direito (MLD); transverso do abdômen/oblíquo interno direito (TrA/OID); segundos (s); *root mean square* (RMS); unidade normalizada (un); quilograma força (kg.F). Diferenças estatisticamente significativas: ^A(p=0,01), ^B(p<0,00), ^C(p=0,03).

FIGURAS

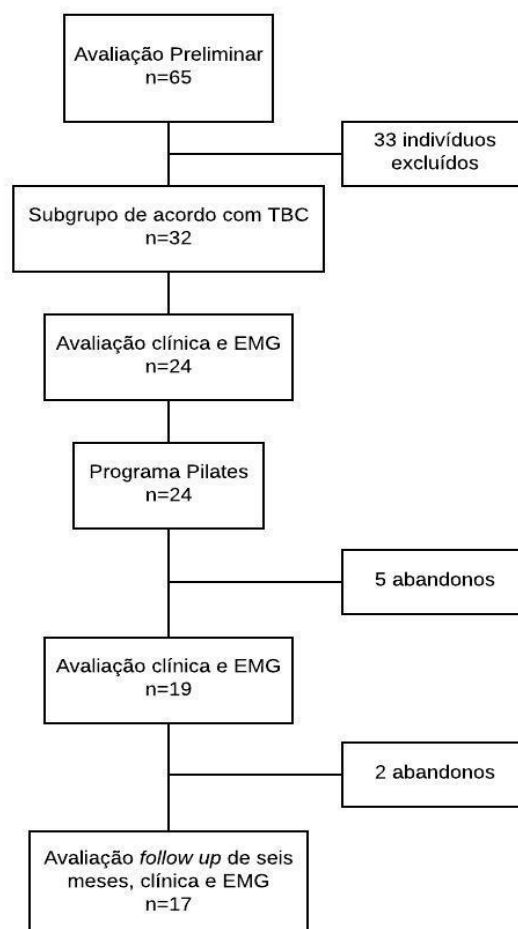


Figura 1 – Fluxograma das etapas da pesquisa e amostra.

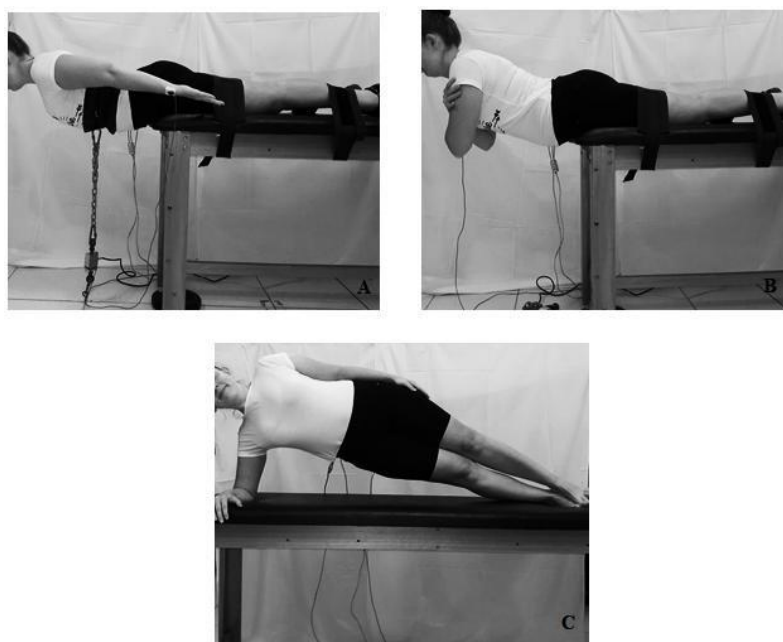


Figura 2 – Posicionamento dos testes para a coleta dos dados
(A) Contração voluntária isométrica máxima; (B) teste de extensão do tronco; (C) teste de ponte lateral.

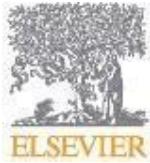
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ANEXO A



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