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EFFECT OF PHYSICAL TRAINING IN OBESE PATIENTS WITH LOW BACK PAIN: A SYSTEMATIC REVIEW

EFEITO DO TREINAMENTO FÍSICO EM OBESOS COM LOMBALGIA: REVISÃO SISTEMÁTICA

EFECTO DEL ENTRENAMIENTO FÍSICO EN PACIENTES OBESOS CON DOLOR DE LA REGIÓN LUMBAR: REVISIÓN SISTEMÁTICA

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ABSTRACT

Objective: To understand the hypoalgesic effect of exercises in obese patients with low back pain. Methods: From the methodological point of view, this is a systematic review study supported by the PRISMA guidelines (2020). Only clinical trials with defined eligibility criteria were included and the methodological evaluation was carried out using the Risk of Bias 2.0 (RoB 2.0) tool. Results: Four clinical trials were found, which underwent an assessment of risk of bias and were mostly categorized as moderate risk of bias or with some concerns. Conclusions: Moderate-intensity interval training (MIIT), high-intensity interval training (HIIT), and total resistance or lumbar spine extension exercises were shown to be effective for pain control, quality of life, and functional performance in obese individuals. On the other hand, the exercises alone did not produce a decrease in body composition. ***Level of evidence I; Systematic review.***

Keywords: Low Back Pain; Obesity; Exercise.

RESUMO

Objetivo: Conhecer o efeito hipoalgésico dos exercícios em pessoas obesas com lombalgia. Métodos: Do ponto de vista metodológico, é um estudo de revisão sistemática amparado pelas diretrizes do PRISMA (2020). Foram incluídos apenas estudos clínicos com critérios de elegibilidade definidos e a avaliação metodológica foi realizada com a ferramenta Risk of Bias 2.0 (RoB 2.0). Resultados: Foram encontrados quatro estudos clínicos que passaram por avaliação de risco de viés, sendo a maior parte dos estudos categorizada como risco moderado de viés ou some concerns. Conclusões: Os exercícios do tipo moderate-intensity interval training (MIIT), high-intensity interval training (HIIT) e resistência total ou extensão de coluna lombar mostram eficácia no controle da dor, na qualidade de vida e no desempenho funcional de indivíduos obesos. Por outro lado, os exercícios de forma isolada não apresentaram diminuição da composição corporal. ***Nível de evidência I; Revisão sistemática.***

Descritores: *Dor Lombar; Obesidade; Exercício físico.*

RESUMEN

Objetivo: Conocer el efecto hipoalgésico de los ejercicios en pacientes obesos con dolor en la región lumbar. Métodos: Desde el punto de vista metodológico, se trata de un estudio de revisión sistemática respaldado por las directrices PRISMA (2020). Sólo se incluyeron ensayos clínicos con criterios de elegibilidad definidos y la evaluación metodológica se realizó con la herramienta Risk Of Bias 2.0 (RoB 2.0). Resultados: Se encontró que cuatro ensayos clínicos fueron sometidos a la evaluación de riesgo de sesgo, y la mayoría de los estudios fueron categorizados como de riesgo de sesgo moderado o some concerns. Conclusiones : Los ejercicios tipo moderate-intensity interval training (MIIT), high-intensity interval training (HIIT) y de resistencia total o de extensión de la columna lumbar muestran eficacia en el control del dolor, la calidad de vida y el desempeño funcional de individuos obesos. Por otro lado, los ejercicios aislados no mostraron una disminución en la composición corporal. ***Nivel de evidencia I; Revisión sistemática.***

Descriptores: *Dolor de la Región Lumbar; Obesidad; Ejercicio Físico.*

INTRODUCTION

The spine can support weight-bearing, however, it is susceptible to pain. "The World Health Organization estimates that 65 to 80% of the population has or someday will have a low back pain condition."[1-3] As a result, low back pain is classified as acute, subacute, and chronic. Acute low back pain presents as sudden events or episodes that can last for up to 6 weeks. Subacute pain usually persists for a period of 6 to 12 weeks and pain lasting for more than 12 weeks may be considered chronic.[4]

Therefore, the causes of pain in the lumbar region can be divided into specific and nonspecific. The specific factors are defined as either intrinsic or extrinsic. The former are usually related

Study conducted at the Universidade do Estado do Rio Grande do Norte (UERN), Mossoró, RN, Brazil.
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to inflammatory, metabolic, and degenerative processes, while the latter to postural mechanics and weight bearing associated with the environment. Nonspecific factors, as the name suggests, have no apparent causes, and can be referred to as idiopathic.[5]

In addition, weight gain, which may have genetic and hereditary factors, as well as being related to dietary control, may progress clinically to obesity, which is a metabolic disease with severe bodily repercussions characterized by the accumulation of adipose tissue in the body.[6]

This pathology is clinically classified into grades I, II, and III, using body mass index (BMI) to diagnose this dysfunction. Thus, the first stage of obesity is defined as BMI between 30 and 34.9 kg/m^2, followed by the second stage with BMI between 35 and 39.9 kg/m^2, and the third stage with BMI $\geq$ 40 kg/m^2. According to this definition, Brazil has around 18 million individuals considered obese and, when overweight individuals are added to this number, the count rises to about 70 million.[6-8]

In recent decades, the scientific community has confirmed the association between low back pain and obesity, which is directly related to the increase in adipose tissue. In addition to the relationship between weight gain and the onset of pain, the acute production of inflammatory cytokines of adipose tissue in patients with low back pain is also studied.[9,10]

On the other hand, physical exercise is a non-pharmacological therapy with few collateral or adverse effects, consisting of activities of a systematic nature, with a sequence of movements that can include numerous activities or forms of aerobic, resistance, flexibility, strength, and speed exercises, among others, focused on the health of the individual.[11,12]

The goal of aerobic exercise is to incorporate low to moderate intensity activities of longer duration, involving the rhythmicity of muscle groups to promote abundant oxygen intake. The most common activities are running, walking, cycling, swimming, among others. In addition to the benefit of reducing adipose tissue, it promotes the improvement of the individual's overall health.[13]

This study addresses two disorders that are both epidemic and progressive in our population – recurrent low back pain and obesity. The main objective of the study was to understand the hypoalgesic benefits of physical exercise in obese individuals with low back pain.

METHODS

Type of study

This is a systematic review study, following PRISMA (2020) guidelines.[14] As the data used is public and open, the presentation of Institutional Review Board opinions was not required, however, the randomized clinical trials selected for the study complied with National Health Council (CNS) and CEP/CONEP Resolutions 466/2012 and 510/2016.

Research period and databases

The study was conducted between February and March 2021, in the Medline (PubMed), Embase (Elsevier), Cochrane Wiley, and Virtual Health Library (Biblioteca Virtual em Saúde – BVS) databases.

Search strategy

The key descriptors "lowbackpain" and "exercise" chosen for the search were selected from MeSH/DeCs and EMTREE. They were combined using the Boolean AND operator and a systematized search strategy of high sensitivity was implemented, as described in Appendix A. The PICOS clinical question was defined by P: obese or overweight individuals with low back pain; I: physical training program; C: no comparison; O: pain improvement; S: randomized clinical trials.

Eligibility criteria

Studies related to the topic proposed, which were randomized clinical trials (RCTs) with individuals between 18 and 59 years of age, who were obese, regardless of the grade, diagnosed with idiopathic low back pain, who had undergone exercise as therapeutic intervention, and whose primary outcome was pain improvement, were included. In turn, the exclusion criteria were course completion papers and expert opinions.

Article selection

Following the high-sensitivity database search, article selection was conducted using the Rayyan QCRI.[15] The technical article evaluation criteria were divided into two steps. The first step involved two evaluators and, when there was divergence between them, the article was passed to the senior expert evaluator, who, in the second step, made the final article selection decision.

Methodological quality assessment

The assessment screening was conducted using the Risk of Bias 2.0 (RoB 2.0), for assessing the methodological quality of randomized clinical trials developed by Stern et al.[16] The core RoB 2.0 evaluation criteria include randomization, intervention assignment, intervention adherence, missing outcome data, results measurement, reported results selection, and overall risk. These requirements are evaluated and classified as high risk of bias, identified visually as red, medium risk of bias or some methodological hastiness as yellow, or low risk of bias as green.

A total of 2,753 articles were found when the systematic search was performed according to Appendix A. Subsequently, the Rayyan program was run against that number and identified 866 duplicates, thus leaving a total of 1,877. One thousand eight hundred and forty-five (1,845) studies were excluded for not meeting the minimum eligibility criteria proposed for the research, leaving 42 studies to be screened by RoB 2.0. Thirty-eight (38) of these were excluded for not meeting the minimum criteria for Risk of Bias 2.0 evaluation, leaving a total of 4 studies to be included, as shown in the following flowchart (Figure 1).

RESULTS

The articles were analyzed and distributed by title, year, author, location, objective, methodology, RoB 2.0 methodological assessment, and key considerations.

Four articles, published between 2011 and 2019 were selected. Thus, there was a concentration of time lapse over the last 10 years. The studies took place in clinics or university hospitals in Australia, Canada, and the United States of America, and all were in English. The main situation of each of the articles selected was an exercise program for obese individuals with low back pain. Regarding the type of study category, they were clinical studies of the randomized clinical trial type with the main purpose of understanding the effect of a technique, of objects, or of other clinical, functional, psychological, and pharmacological situations. Among the instruments used in these studies, we highlight the visual analog scale for pain (VAS), Roland Morris Questionnaire, the Oswestry Disability Index focused on low back pain functional disability, evaluation of the body mass index (BMI), and the SF-36 to assess quality of life.

Overall, the studies presented a considerable number of participants, with a mean/standard deviation of 76$\pm$48. As for the risk of bias, most of them fell into the moderate risk of bias or "some concerns" category.

Study 1 evaluated whether the aerobic exercise program would be effective for pain control, quality of life, and reduction of body mass in 160 participants of both sexes and different ages, divided equally between two groups, called intervention and control. It was clear that the exercise program implemented had a positive influence on improved quality of life, but from the pain and body mass reduction perspectives there was not in fact a statistically significant decrease.[17]

The objective of Study 2 was to compare the effects of resistance and aerobic exercise protocols in obese subjects with low back pain. The 49 participants were elderly, ranging from 60 to 85 years of age, and were divided into three exercise groups, resistance in

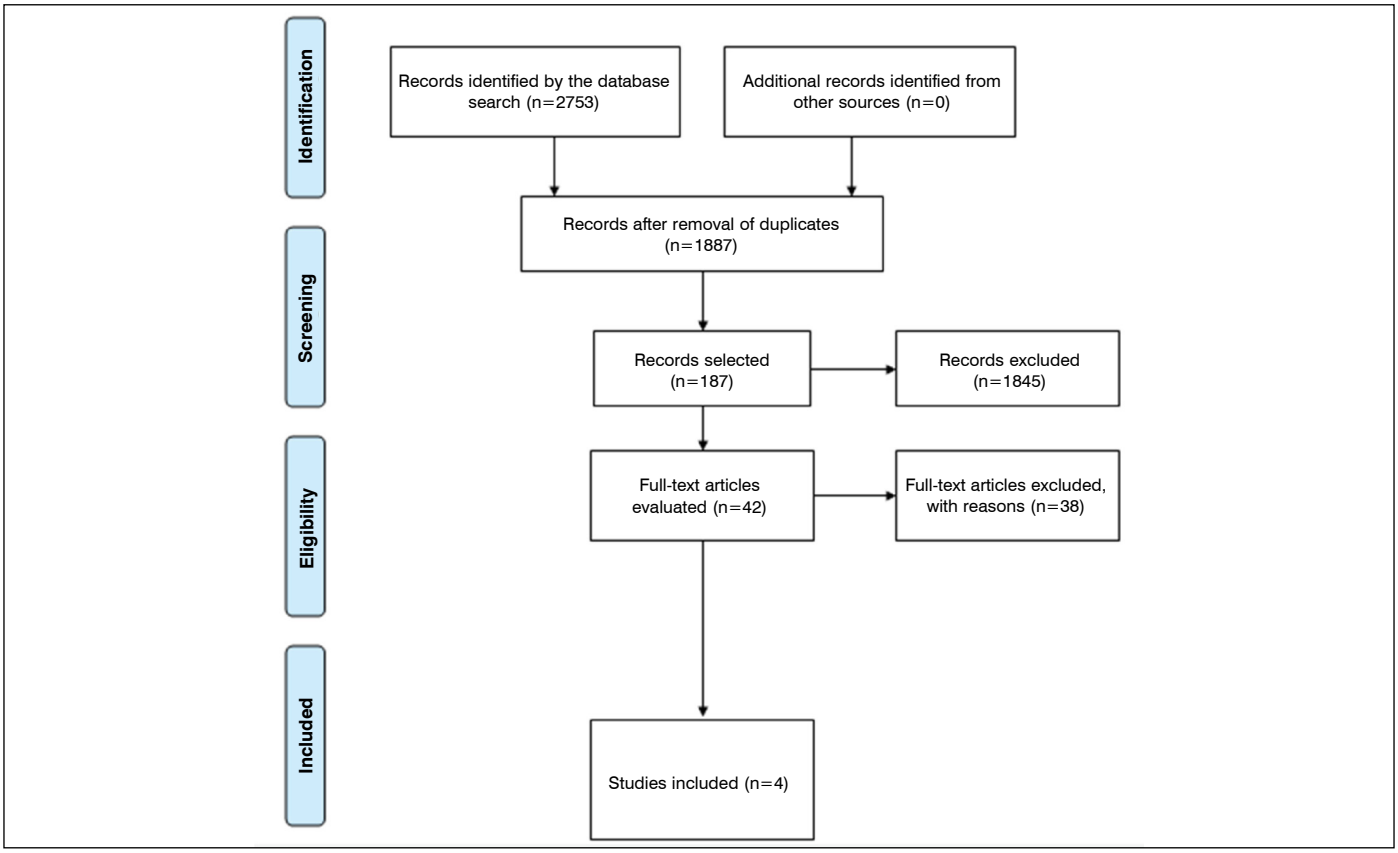

Figure 1. Studies included in the research, Prisma (2020).

extension, resistance in flexion, and control, with 17, 18, and 14 participants, respectively. Pain, beliefs, fears, body mass, quality of life, and functional capacity were evaluated. It was noteworthy that all the study exercise groups presented significant degrees of improvement, but the resistance in extension group had greater improvement in functional capacity markers, while in the flexion group the most marked improvement was observed in the pain variable. Neither training protocol was effective in reducing body mass.[18]

Study 3, the main objective of which was to evaluate the effectiveness of a pilot, multidisciplinary, supervised, and non-surgical program, had a sample of 46 obese adults who underwent an exercise program associated with a diet. It was observed that the participants in the program succeeded in improving pain and reducing body mass and explicitly noted that these outcomes can only occur when combining the exercise program with diet.[19]

Study 4 in our research compared the effects of four months of isolated lumbar resistance exercises and total body resistance exercises on walking performance in a sample of 46 obese elderly participants of both sexes, aged between 60 and 85 years, with chronic low back pain. Statistically significant improvements in functional performance, pain, and loss of body mass were observed in the individuals in both groups as compared to the control group (Table 1).[20]

The articles were evaluated for methodological quality using RoB 2.0, as shown in Figure 2 below:

DISCUSSION

The randomized clinical trial conducted by Willians et al.[17] had a sample of 160 obese individuals between 18 and 50 years of age with idiopathic low back pain. The participants were divided evenly into an intervention and a control group. The moderate-intensity interval training (MIIT) intervention consisted of aerobic exercises lasting up to 35 minutes with 20-minute intervals, with a cycle performed daily for a period of 2 months. We must emphasize that the individuals could stop participating in the activity proposed in the study whenever they wished, as well as return within the aforementioned time period. The variables were pain level (VAS), functional performance (Roland Morris), body mass (BMI), and quality of life (SF-36). The variables were analyzed both before and after the intervention, even in the control group, which did not participate in any of the activities systematized by the study. In the findings from the intervention proposed for the study, a significant improvement in the quality of life of the participants was observed, while there were no significant effects on either pain or body mass.

Contrary to the results of the study mentioned above, the studies by Vincent et al.[18] used a sample of 49 elderly subjects ranging in age from 65 to 80 years. They were randomly and evenly distributed into total resistance intervention (TRI), lumbar extension intervention (LET), and control (CG) groups. The TRI group had a resistance exercise program focused on the body segments, while the LET resistance exercise program was aimed only at extension of the lumbar spine, both conducted 3 times a week for up to 45 minutes of activity over 4 months. The control group did not participate in systematized study interventions. The variables observed were pain level (McGill Questionnaire), beliefs and fears (Driving Cognitions Questionnaire), body mass index (BMI), quality of life (WHOQOL-100), and functional performance (Roland Morris). The comparison of total resistance and lumbar extension exercise groups to the control group showed significant improvement in the pain and functional capacity in obese subjects with idiopathic low back pain. It is important to note that the total resistance exercises had a greater effect on pain level, functional performance, quality of life, and beliefs and fears. It is also noteworthy that this study presented a low risk of bias, while the previous study had a moderate risk of bias. In addition, neither study reported a statistically significant decrease in the body mass index. According to Jackicic and Daves,[21] the factors responsible for weight loss make up a complex set of bodily systems, which includes the hormonal system through ghrelin, leptin, and cortisol; the metabolic system through cellular respiration, nutrition, and their respective processes; as well as the musculoskeletal and nervous systems. Swift et al.,[22] in their study

Table 1. Compendium of selected articles, prepared by the author himself (2021).

1 – Title/Year	Causal mechanisms of a healthy lifestyle intervention for patients with musculoskeletal pain who are overweight or obese - 2019
Authors	Amanda Williams, Hopin Lee, Steven Kamper, Kate O'Brien, John Wiggers, Luke Wolfenden, Sze Yoong, Rebecca Hodder, Emma Robson, Robin Haskins, James McAuley, and Christopher Williams[17]
Study location	Obese patients with chronic, nonspecific low back pain at a clinic in Australia
Objective	To evaluate whether an exercise program can reduce pain, improve quality of life, and decrease body mass
Method	Randomized Clinical Trial
Risk of Bias Assessment (RoB 2.0)	Moderate risk of bias (some concerns)
Sample	160 obese people
Variables	Pain (VAS), Quality of Life (SF-36), Body Mass (BMI), and Functional Performance (Roland Morris)
Key findings	It was evident that the exercise program improved the condition of the quality of life, but the intervention proposed by the study did not present any significant improvements from the pain and body mass perspectives.
2 – Title/Year	Resistance Exercise, Disability, and Pain Catastrophizing in Obese Adults with Back Pain - 2014
Authors	Heather Vincent, Steven George, Amanda Seay, Kevin Vincent[18]
Study location	Gainesville and neighboring regions of the University of Florida, United States
Objective	To compare the effects of physical training protocols on low back pain in obese participants
Method	Randomized Clinical Trial
Risk of Bias Assessment (RoB 2.0)	Low risk of bias
Sample	49 obese people
Variables	Pain (McGill Questionnaire), Beliefs and Fears (Driving Cognitions Questionnaire), Body Mass (BMI), Quality of life (WHOQOL-100), Functional Performance (Roland Morris)
Key findings	It was evident that there was improvement in the markers related to pain, quality of life, and functional capacity of the participants.
3 – Title/Year	Pilot evaluation of a multidisciplinary, medically supervised, nonsurgical weight loss program on the severity of low back pain in obese adults - 2011
Authors	Darren Roffey, Lynn Ashdown, Holly Dornan, Michael Creech, Simon Dagenais, Robert Dent, Eugene Wai[19]
Study location	The University of Ottawa Hospital, Canada
Objective	To evaluate the effectiveness of a pilot, multidisciplinary, supervised, non-surgical program
Method	Randomized Clinical Trial
Risk of Bias Assessment (RoB 2.0)	Moderate risk of bias (some concerns)
Sample	46 obese individuals
Variables	Pain (VAS), Quality of Life (SF-36), Body Mass Reduction (BMI), and Functional Capacity (Oswestry)
Key findings	There were significant improvements in both pain and the reduction of body mass, and, with these, an improvement of the quality of life of the participants.
4 – Title/Year	Back Strength Predicts Walking Improvement in Obese, Older Adults with Chronic Low Back Pain - 2013
Authors	Heather Vincent, Kevin Vincent, Amanda Seay, Bryan Conrad, Robert Hurley, Steven George[20]
Study location	Gainesville and the neighboring regions of the University of Florida, United States
Objective	To compare the effects of 4 months of isolated lumbar resistance exercises and total body resistance exercises on the walking performance of obese, elderly participants with low back pain
Method	Randomized Clinical Trial
Risk of Bias Assessment (RoB 2.0)	Moderate risk of bias (some concerns)
Sample	49 obese individuals
Variables	Pain (VAS), Muscle Strength (Modified Sphygmomanometer Test), and Functional Performance (Roland Morris)
Key findings	There was considerable improvement in strength, but from the perspective of pain the improvement was not statistically significant.

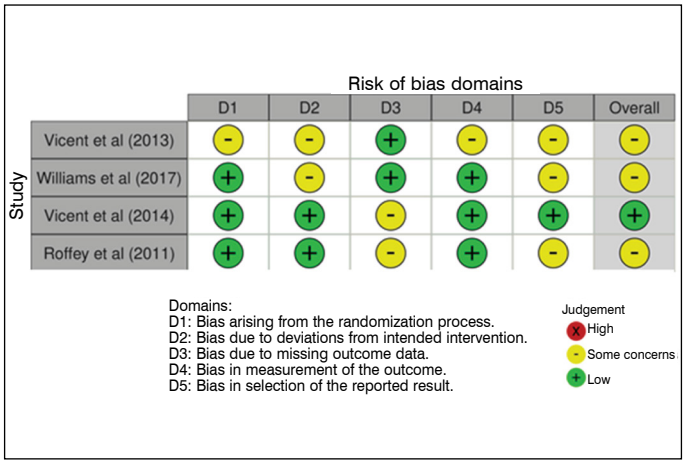

Figure 2. Aggregation of articles rated by Risk of Bias 2.0 (RoB 2.0), the Cochrane Collaboration (2016).

of 75 adults between 18 and 59 years of age, the objective of which was to understand the impacts of aerobic, strength, and resistance exercise programs associated with diet or not on the decrease in body mass, observed in their results that the program of exercise produced a negligible decrease in the body mass of obese individuals, while, when associated with diet, its effects were enhanced, in addition to becoming statistically significant.

Roffley et al.[20] evaluated an exercise program associated with a diet or not to reduce idiopathic low back pain and body mass in a sample of 46 obese individuals with low back pain between 18 and 45 years of age. The participants were divided into exercise plus diet (EDG), exercise (EG), diet (DG), and control (CG) groups. High intensity interval training (HIIT) was chosen as the exercise program, to be performed twice a week for 45 minutes during a 52-week period. The diets implemented in the study were low in carbohydrates and lipids and high in dietary fiber. The variables observed were pain level (VAS), quality of life (SF-36), reduction in body mass (BMI), and functional capacity (Oswestry). Significant improvements in pain and decrease in body mass were observed, and, consequently, in

participant quality of life. Exercise associated with diet increases the benefits of both pain and body mass reduction.

Although the results presented offer moderate evidence for the treatment of pain, disability, and quality of life in obese subjects with chronic low back pain, it is important to emphasize that there is a scarcity of these studies in the literature. Studies of obesity itself and the metabolic processes of the disease are more robust and continuous.

CONCLUSION

MIIT, HIIT, and total resistance or extension exercise may be a low-cost conservative treatment alternative for managing low back pain in obese people. However, standalone exercise programs do not result in a decrease in body mass, whereas better body mass reduction results are linked to the combination of exercise and diet. There is no direct relationship between reduced body mass and pain. They are complex experiences with vast systemic and behavioral connections. We suggest that further studies be conducted in a more homogeneous population to assess the effectiveness of exercise on the control of low back pain in obese individuals.

All authors declare no potential conflict of interest related to this article.

CONTRIBUTIONS OF THE AUTHORS: Each author made significant individual contributions to this manuscript. GAC, AVC, RRSJ, and VIOR were responsible for developing the research idea and preparing the clinical question. RRSJ, VIOR, LFA, PSR, EGF, and CFMF were the main contributors to the writing of the manuscript. GAC, AVC, RRSJ, and VIOR developed and structured the methodology based on the PRISMA guidelines. CFMF, PSR, EGF, LFA, RRJS, and VIOR performed data collection and produced the results tables. GAC, AVC, RRSJ, and VIOR prepared and analyzed the data. GAC, AVC, RRSJ, VIOR, CFMF, PSR, EGF, and LFA conducted the bibliographical research, the manuscript review, and contributed to the intellectual concept of the study.

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Appendix 1. High sensitivity search strategy.

P: Obese adults with low back pain I: Aerobic exercise C: No comparison O: Pain control S: Clinical trials
Medline via PubMed #1"Low Back Pain"[Mesh] OR (Back Pain, Low) OR (Back Pains, Low) OR (Low Back Pains) OR (Pain, Low Back) OR (Pains, Low Back) OR (Lumbago) OR (Lower Back Pain) OR (Back Pain, Lower) OR (Back Pains, Lower) OR (Lower Back Pains) OR (Pain, Lower Back) OR (Pains, Lower Back) OR (Low Back Ache) OR (Ache, Low Back) OR (Aches, Low Back) OR (Back Ache, Low) OR (Back Aches, Low) OR (Low Back Aches) OR (Low Backache) OR (Backache, Low) OR (Backaches, Low) OR (Low Backaches) OR (Low Back Pain, Postural) OR (Postural Low Back Pain) OR (Low Back Pain, Posterior Compartment) OR (Low Back Pain, Recurrent) OR (Recurrent Low Back Pain) OR (Low Back Pain, Mechanical) OR (Mechanical Low Back Pain) #2 "Exercise"[Mesh] OR (Exercises) OR (Physical Activity) OR (Activities, Physical) OR (Activity, Physical) OR (Physical Activities) OR (Exercise, Physical) OR (Exercises, Physical) OR (Physical Exercise) OR (Physical Exercises) OR (Acute Exercise) OR (Acute Exercises) OR (Exercise, Acute) OR (Exercises, Acute) OR (Exercise, Isometric) OR (Exercises, Isometric) OR (Isometric Exercises) OR (Isometric Exercise) OR (Exercise, Aerobic) OR (Aerobic Exercise) OR (Aerobic Exercises) OR (Exercises, Aerobic) OR (Exercise Training) OR (Exercise Trainings) OR (Training, Exercise) OR (Trainings, Exercise) #3 (randomized controlled trial[pt] OR controlled clinical trial[pt] OR randomized controlled trials[mh] OR random allocation[mh] OR double-blind method[mh] OR single- blind method[mh] OR clinical trial[pt] OR clinical trials[mh] OR ("clinical trial"[tw]) OR ((singl*[tw] OR doubl*[tw] OR trebl*[tw] OR tripl*[tw]) AND (mask*[tw] OR blind*[tw])) OR ("latin square"[tw]) OR placebos[mh] OR placebo*[tw] OR random*[tw] OR research design[mh:noexp] OR follow-up studies[mh] OR prospective studies[mh] OR cross-over studies[mh] OR control*[tw] OR prospectiv*[tw] OR volunteer*[tw]) NOT (animal[mh] NOT human[mh])
Cochrane #1(Low Back Pain) OR (Back Pain, Low) OR (Back Pains, Low) OR (Low Back Pains) OR (Pain, Low Back) OR (Pains, Low Back) OR (Lumbago) OR (Lower Back Pain) OR (Back Pain, Lower) OR (Back Pains, Lower) OR (Lower Back Pains) OR (Pain, Lower Back) OR (Pains, Lower Back) OR (Low Back Ache) OR (Ache, Low Back) OR (Aches, Low Back) OR (Back Ache, Low) OR (Back Aches, Low) OR (Low Back Aches) OR (Low Backache) OR (Backache, Low) OR (Backaches, Low) OR (Low Backaches) OR (Low Back Pain, Postural) OR (Postural Low Back Pain) OR (Low Back Pain, Posterior Compartment) OR (Low Back Pain, Recurrent) OR (Recurrent Low Back Pain) OR (Low Back Pain, Mechanical) OR (Mechanical Low Back Pain) #2 (Exercise) OR (Exercises) OR (Physical Activity) OR (Activities, Physical) OR (Activity, Physical) OR (Physical Activities) OR (Exercise, Physical) OR (Exercises, Physical) OR (Physical Exercise) OR (Physical Exercises) OR (Acute Exercise) OR (Acute Exercises) OR (Exercise, Acute) OR (Exercises, Acute) OR (Exercise, Isometric) OR (Exercises, Isometric) OR (Isometric Exercises) OR (Isometric Exercise) OR (Exercise, Aerobic) OR (Aerobic Exercise) OR (Aerobic Exercises) OR (Exercises, Aerobic) OR (Exercise Training) OR (Exercise Trainings) OR (Training, Exercise) OR (Trainings, Exercise)
Embase #1 'low back pain'/exp OR (acute low back pain) OR (back pain, low) OR (chronic low back pain) OR (loin pain) OR (low backache) OR (low backpain) OR (lowback pain) OR (lower back pain) OR (lumbago) OR (lumbal pain) OR (lumbal syndrome) OR (lumbalgesia) OR (lumbalgia) OR (lumbar pain) OR (lumbar spine syndrome) OR (lumbodynia) OR (lumbosacral pain) OR (lumbosacral root syndrome) OR (lumbosacroiliac strain) OR (pain, low back) OR (pain, lumbosacral) OR (lumbosacroiliac) #2' 'exercise'/exp OR (exercise) OR (biometric exercise) OR (effort) OR (exercise capacity) OR (exercise performance) OR (exercise training) OR (exertion) OR (fitness training) OR (physical conditioning, human) OR (physical effort) OR (physical exercise) OR (physical exertion) #3 'crossover procedure'/exp AND [embase]/lim OR ('prospective study'/exp AND [embase]/lim) OR ('follow up'/exp AND [embase]/lim) OR ('placebo'/exp AND [embase]/lim) OR ('clinical trial'/exp AND [embase]/lim) OR ('single blind procedure'/exp AND [embase]/lim) OR ('double blind procedure'/exp AND [embase]/lim) OR ('randomization'/exp AND [embase]/lim) OR ('controlled clinical trial'/exp AND [embase]/lim) OR ('randomized controlled trial'/exp AND [embase]/lim)
BVS #1 MH:"DorLombar" OR (Low Back Pain) OR (Dolor de la Región Lumbar) OR (Lombalgia) OR (Lumbago) OR (Ciática) OR MH: C23.888.592.612.107.400 #2 MH: "Exercise" OR (Exercício Físico) OR (Exercise) OR (Ejercicio Físico) OR (Atividade Física para Idoso) OR (Exercício) OR (Exercício Aeróbico) OR (Exercício Agudo) OR (Exercício Isométrico) OR (Treinamento Físico) OR MH: G11.427.410.698.277$ OR MH: I03.350$