

## **Comparison between surgical procedures and conservative treatments to reduce disability caused by low back pain - systematic review and meta-analysis**

### **Comparação entre procedimentos cirúrgicos e tratamentos conservadores para redução de incapacidade causada pela dor lombar - revisão sistemática e metanálise**

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**ABSTRACT**

**Introduction-** Low back pain affects all age groups and through surgical procedures or conservative treatments, the effects caused are reduced, usually assessed by the Oswestry questionnaire. **Objective-** The purpose of this meta-analysis was to compare the decrease in disability after surgical and conservative intervention, using the Oswestry Disability Index. **Methods-** This is a systematic review and meta-analysis, searching the databases: PubMed, SciELO and LILACS. Articles that provided data on the Oswestry deficiency index were considered, with a randomized methodology after surgical and conservative intervention in low back pain at 12 and 24 months of intervention. After tabulation of the data according to the PRISMA protocol, the test was performed to determine the difference between the means. Statistical analyzes were performed using the STATA® 16.0 software. **Results-** There was an average reduction of 15 points in the Oswestry questionnaire, after conservative treatment in 12 months and after 24 months, the average reduction was approximately 12 points. Surgical intervention, when compared to therapy, was superior with an average difference of approximately 15 points after 12 months and an average difference of 15 points after 24 months. **Conclusion-** The approach chosen despite the results needs to be assessed according to the condition of each patient. Surgical treatment, even with better results, presents risks of surgical complications that cannot be omitted. In conservative treatment, it is necessary to check the patient's response to treatment, so as not to prolong the individual's time of disability and pain.

**Keywords:** Low Back Pain, Conservative Treatment, Pain Measurement, Lumbosacral Region.

**RESUMO**

**Introdução-** A lombalgia afeta todas as faixas etárias e através de procedimentos cirúrgicos ou tratamentos conservadores, são reduzidos os efeitos causados, geralmente avaliados através do questionário *Oswestry*. **Objetivo-** O objetivo desta metanálise foi comparar a diminuição da incapacidade após intervenção cirúrgica e conservadora por meio do *Oswestry Disability Index*. **Métodos -** Trata-se de revisão sistemática e metanálise, com busca nas bases de dados: PubMed, SciELO e LILACS. Foram considerados artigos que forneciam dados referentes ao índice de incapacidade de *Oswestry*, com metodologia randomizada após intervenção cirúrgica e conservadora na

dor lombar em 12 e 24 meses de intervenção. Após a tabulação de dados de acordo com o protocolo PRISMA, foi realizado o teste para determinar diferença entre médias. As análises estatísticas foram realizadas com o auxílio do software STATA® 16.0. Resultados- Os resultados apontam redução média de 15 pontos no questionário *Oswestry*, após tratamento conservador em 12 meses e após 24 meses, a redução média foi de aproximadamente 12 pontos. A intervenção cirúrgica quando comparado a terapia, se mostrou superior com diferença média de aproximadamente 15 pontos após 12 meses e diferença média de 15 pontos após 24 meses. Conclusão- A abordagem escolhida apesar dos resultados precisa ser avaliada de acordo com a condição de cada paciente. O tratamento cirúrgico, mesmo obtendo melhor resultado, apresenta riscos de complicações cirúrgicas que não podem ser omitidos. Em tratamento conservador é necessário verificar a resposta do paciente ao tratamento, para não prolongar o tempo de incapacidade e dor do indivíduo.

**Palavras-chave:** Dor Lombar, Tratamento Conservador, Avaliação da Dor, Região Lombossacral.

## 1 INTRODUCTION

Low back pain is an everyday symptom experienced by all age groups<sup>1</sup>. Low back pain occurs among the last ribs and the gluteal folds, usually with painful experience in the lower limbs, that can be unilateral and bilateral, and neurological symptoms may be manifested<sup>2</sup>. Low back pain is usually classified as acute when it starts in less than four weeks, subacute when it manifests in four to 12 weeks and chronic when it lasts longer than 12 weeks<sup>3</sup>.

Several interventions in the treatment of low back pain have been developed over time, in conservative and surgical ways. In the USA, spinal fusion surgery for spinal pain has risen 220% in the last decades<sup>4</sup>. Conservative treatment is also valuable in controlling the patient's pain, stopping chronic disability and hastening the return to normal activities. Exercises and education on ways to bulk up the lower back also achieved good notoriety in the last years<sup>5</sup>.

The low functionality of the patient with low back pain directly affects their activities of daily living and their quality of life. In the year 2015, the universal prevalence of low back pain that makes it impossible to perform daily activities was 7.3%, which shows that 540 million individuals ended up being harmed collectively<sup>1</sup>. Low back pain has recently become a prominent generator of disability worldwide, bringing with it a great economic loss<sup>2</sup>.

The purpose of this meta-analysis was to compare the decrease in disability after

surgical and conservative intervention using the Oswestry Disability Index<sup>6</sup>.

## **2 METHODOLOGY**

It is a systematic review and meta-analysis, using the descriptive aspect. The systematic review methodology consists of a systematic search of the literature, when associated with meta-analysis, it becomes a tool designed to statistically examine the results of several studies on a given theme<sup>7</sup>.

For descriptive aspects, articles published between the years 2011 and 2020 were considered. On the other hand, for a systematic review and meta-analysis, the time period for research eligibility was not limited, considering all those that provided data related to the Oswestry Disability Index (ODI) questionnaire, applied with randomized methodology. Research published in English was considered, research where through the results of the ODI, they verified the effectiveness of the therapy and compared it with the surgical intervention in the periods of 12 and 24 months. Searches for articles were carried out in the PubMed database on the website of the National Center for Biotechnology Information (NCBI), in the database of the Scientific Electronic Library Online (SciELO) and in the databases of the Virtual Health Library (VHL), considering Latin American and Caribbean Literature in Health Sciences (LILACS). The strategy for retrieving articles consisted of searching for Health Sciences Descriptors (DeCS): Low Back Pain, Conservative Treatment, Pain Assessment, Lumbosacral Region. In LILACS, 44 references were found, in SciELO 50 and in PubMed 1,399. The repetitions and publications that were not related to the topic were excluded, resulting in 14 references used in the descriptive aspect and seven references considered for meta-analysis after systematic review (Figure 1).

### **EVALUATION AND ELIGIBILITY CRITERIA**

For data collection, the following data were considered: country of publication, first author, year, applied methodology, age of participants, total number of individuals who underwent therapy, total number of individuals who underwent surgical procedure, mean and standard deviation results related to the ODI questionnaire. All data collection, as well as the development of systematic review and meta-analysis,

were carried out based on the instructions and recommendations of the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)<sup>8</sup>.

#### DATA EXTRACTION

The articles selected for data extraction were evaluated by two reviewers and there were no disagreements regarding the interpretations. The data tabulated in the qualitative analysis were characterized as continuous, that is, research that worked by comparing average, standard deviation and number of individuals among groups. Thus, the present research compared continuous data from individuals who underwent therapy, with individuals who underwent surgical procedure.

Throughout the data collection, exclusion criteria were considered: works published in conference proceedings, monographs, master's dissertations and doctoral theses, research that brought superficial, outdated or incomplete information on the topic in their texts. The selected articles underwent an initial evaluation by reading the abstract, subsequent to this, all were read in full.

#### DATA PROCESSING

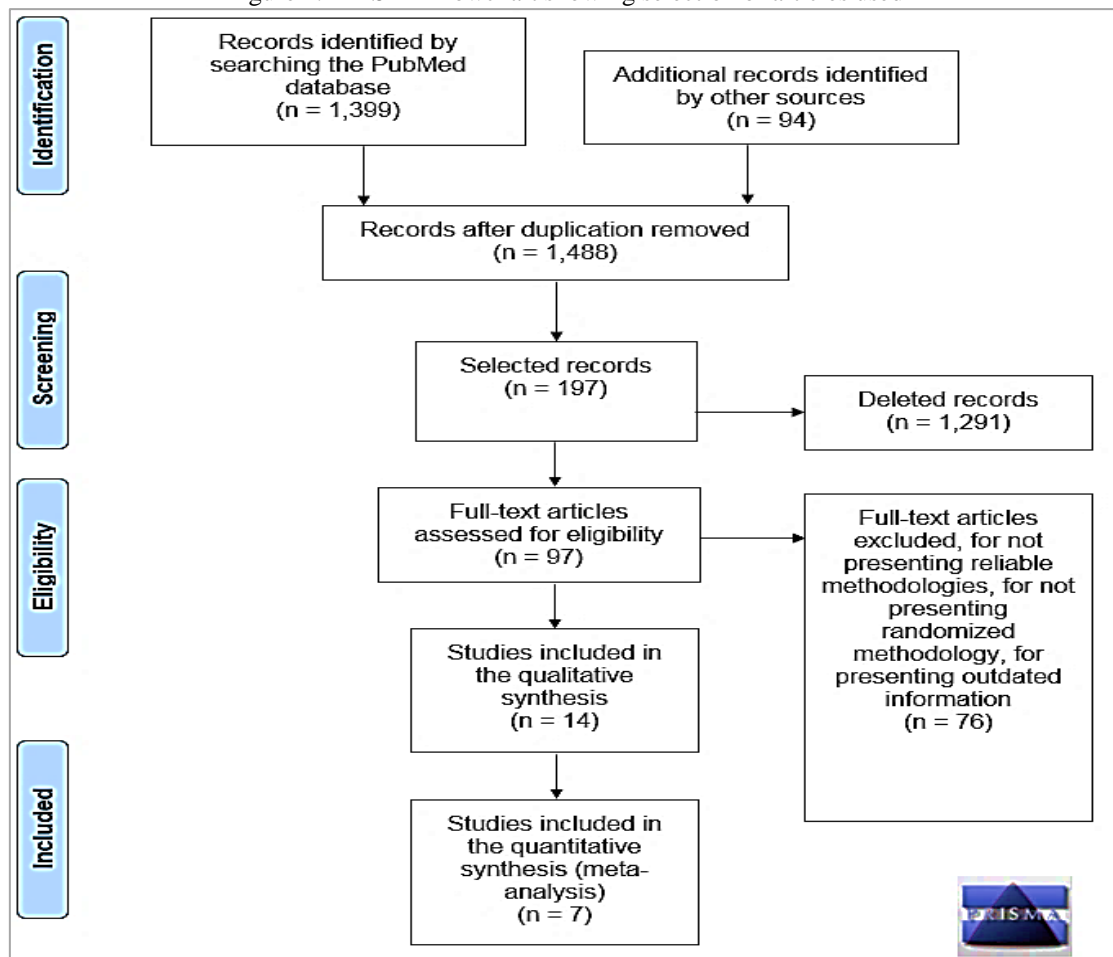
The data were organized as follows: comparison among ODI questionnaires before and after 12 months of therapy, with five surveys combined, totaling 440 research participants. The same organization was procedure comparing ODI questionnaires before and after 24 months of therapy, with three surveys combined, totaling 494 participants. Another comparison was done among ODI questionnaires after 12 months of therapy and surgical procedure after the same time period, with five combined surveys, totaling 454 participants. Finally a comparison among ODI questionnaires after 24 months of therapy and surgical procedure after the same time period, with three combined surveys, totaling 609 participants. The mean age varied between 33 and 43 years, considering both sexes.

#### STATISTICAL ANALYSIS

To estimate the difference among means, the Mean Difference test (MD) was applied, and, according to the heterogeneity among surveys, the fixed and randomized effects were adopted. Heterogeneity was determined with the combination of the chi-

square test ( $\chi^2$ ) and Higgins and Thompson  $I^2$  test. When the  $\chi^2$  test showed  $p < 0.05$ , and the  $I^2$  test showed a result  $\geq 50\%$ , the randomized effect was applied<sup>9,10</sup>. For significance of the results, alpha equal to 5% or p-value  $< 0.05$  was considered. Thus, the hypotheses evaluated were: “there is a significant difference among the results of the ODI questionnaires before and after therapy, there is a significant difference among the ODI questionnaires comparing therapy with a surgical procedure”. When there was no difference, the null hypothesis was considered. The results were presented using the Forest Plot graph and the tests were performed with the aid of the STATA<sup>®</sup> 16.0 software.

Figure 1. PRISMA flowchart showing selection of articles used



Source: Adapted from Moher *et al.*<sup>8</sup>

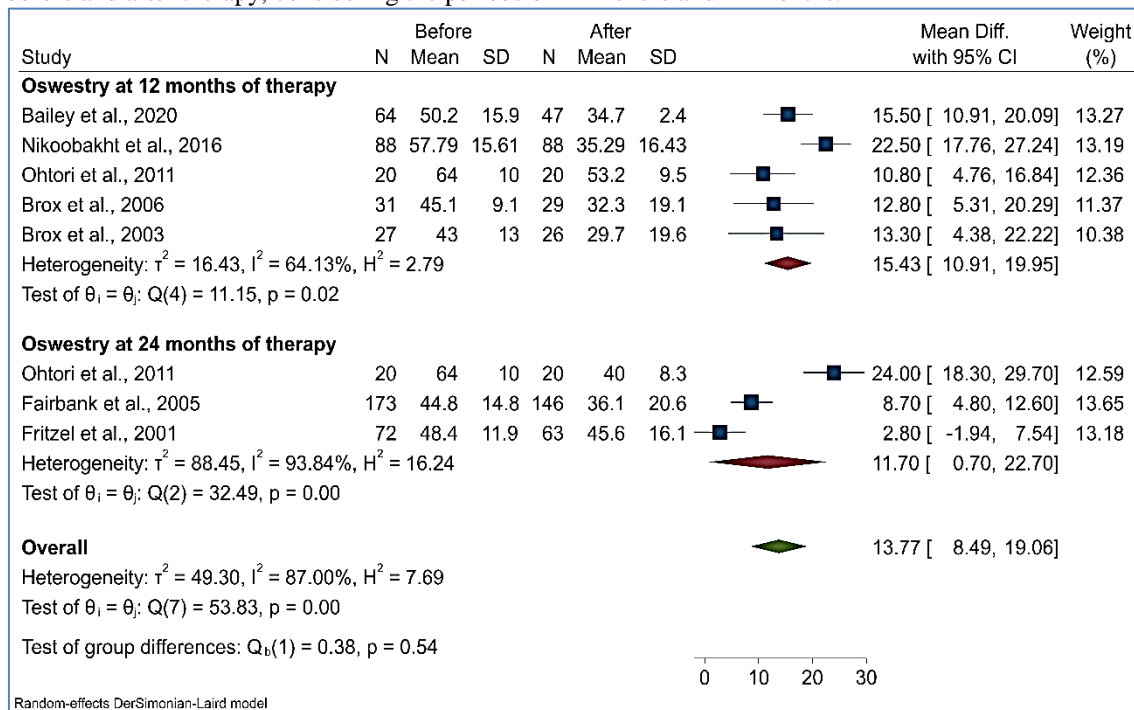
### 3 RESULTS

The extraction and combination of data, considering the comparison of ODI before and after therapy, resulted in 440 individuals in the period of 12 months and 494 in 24 months. With that, the statistical analyzes were evaluated according to the time

period. Likewise, therapy among 12 and 24 months was compared with the surgical procedure after the same period. The number of research

The combination of surveys, comparing data before and after 12 months of therapy, showed a significant difference for the means with MD = 15.43 (95% CI = 10.91-19.95;  $\chi^2 = 11.15$   $p = 0.02$ ;  $I^2 = 64\%$ ), showing an improvement, with an average reduction of 15 points in the ODI questionnaire, after therapy. Likewise, after 24 months of therapy, ODI showed an average reduction of approximately 12 points, with MD = 11.70 (95% CI = 0.70-22.70;  $\chi^2 = 32.49$   $p < 0.00$ ;  $I^2 = 94\%$ ). In both assessments, heterogeneity was significant, justifying the randomized effect applied (Figure 2).

Figure 2. Forest Plot graph: Mean Difference test; comparison among the means of the ODI questionnaire before and after therapy, considering the periods of 12 months and 24 months.

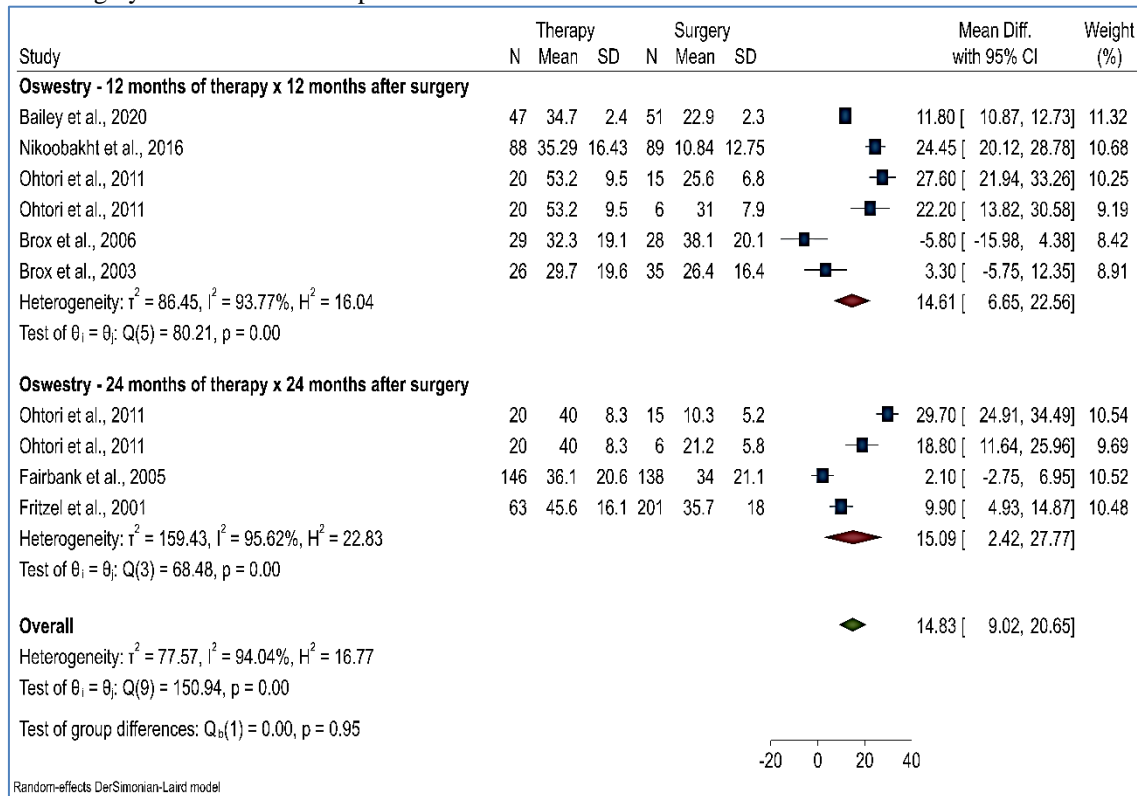


Source: Authors' own file.

The comparison among therapy and surgical procedure, considering the results obtained through the ODI questionnaire, in the periods of 12 and 24 months, presented MD = 14.61, respectively (95% CI = 6.65-22.56;  $\chi^2 = 80.21$   $p < 0.00$ ;  $I^2 = 94\%$ ) and MD = 15.09 (95% CI = 2.42-27.77;  $\chi^2 = 68.48$   $p < 0.00$ ;  $I^2 = 96\%$ ). The results indicate superiority in surgical intervention when compared to therapy, with an average difference of approximately 15 points after 12 months and an average difference of 15 points after

24 months. The  $\chi^2$  tests of heterogeneity and  $I^2$  of Higgins and Thompson, showed significant heterogeneity among the results of the combined studies, contrasting with the randomized effect used (Figure 3).

Figure 3. Forest Plot graph: Mean Difference test; ODI after 12 and 24 months of therapy compared to ODI after surgery after the same time period.



Source: Authors' own file.

#### 4 DISCUSSION

The results obtained in this meta-analysis with the addition of more current articles, showed a decrease in the disability caused by low back pain. In 12 months, the score on the Oswestry Disability Index dropped by an average of 15 points, and in 24 months, disability was reduced by 12 points compared to the assessment before the conservative treatment intervention. According to Boyraz et al.<sup>5</sup>, conservative treatment is valuable to control the patient's pain, stop chronic disability and hasten the return to normal activities.

Surgical intervention, compared to conservative treatment, showed an average difference of 15 points less in the Oswestry Disability Index. In the surgical treatment after the 12-month period, greater efficacy of the surgery was verified in relation to the



conservative therapy, in the reduction of the incapacity caused by the low back pain, in 24 months the average difference was also 15 points. Despite having been shown to be better, surgical intervention also has a high cost and can bring several risks<sup>18</sup>, among them the disease of the adjacent segment<sup>19</sup>, wound dehiscence<sup>20</sup> and the need for new surgery<sup>21</sup>.

Brox et al.<sup>14</sup> observed that conservative treatment obtained better results based on the ODI questionnaire compared to surgical treatment in 12 months, however, other studies have shown different results for 12 months<sup>11,12,13,15</sup> and 24 months<sup>13,16,17</sup> that is, when applying the same questionnaire, they pointed out better rates for surgical intervention in reducing the disability generated by low back pain.

However, conservative intervention is important, all authors Bailey et al.<sup>11</sup>, Nikoobakht et al.<sup>12</sup>, Ohtori et al.<sup>13</sup>, Brox et al.<sup>14</sup> and Brox et al.<sup>15</sup>, obtained considerable results measured by the ODI regarding of the conservative intervention in low back pain after 12 months, all researches showed a decrease in the ODI score, that is, a decrease in the disability generated by low back pain after 12 months of intervention. In 24 months, it was no different Ohtori et al.<sup>13</sup>, Fairbank et al.<sup>16</sup> and Fritzell et al.<sup>17</sup>, obtained confirmatory results of improvement after conservative treatment in relation to the assessed disability.

The meta-analysis in question considered the randomized effect, considering the heterogeneity among therapies used in the research, thus, the results point to assertiveness and credibility. However, more research is needed considering specific groups of patients.

## 5 CONCLUSION

Although conservative treatment is less effective than surgical procedures, the results of this meta-analysis showed important results in reducing ODI after 12 and 24 months, however, the condition of each patient is necessary for intervention decision. Despite the surgical procedure showing better results, there are risks of complications that cannot be omitted.

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