Use of distraction corset in various spinal pathologies

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The goal of the research

- **Prospective** study

- Interest in a study that **quantifies the impact** of alternative treatment of chronic low back pain(CLBP).

- To **analyze the effect** of the Corset treatment on quality of life, depression and pain level of patients.

- To conduct a **preliminary study** on alternative and non-invasive treatments of CLBP.

Introduction

- Low back pain (LBP) is one of the most common musculoskeletal disorders, with a prevalence rate of 80% and an estimated annual cost of more than $600 billion. (Ashar et al.,2022 ; Suh et al.,2019)

- Years lived with disability caused by LBP increased by 54% between 1990 and 2015. (Hartvigsen et al., 2018)

- Pain-modulating mechanisms and pain cognitions have important roles in the development of persistent disabling low back pain. (Hartvigsen et al., 2018)

- Musculoskeletal disorders such as chronic low back pain (CLBP) can limit ability in daily activities , resulting in a lower quality of life. (Schaller et al., 2015)

Causes and origins of CLBP

- **Age**: Increases linearly from the third decade of life on, until the 60 years of age= related to occupational and domestic exposures that overload the low back along with the degenerative articular process shown after 30 years of age. (Freburger et al., 2008)

- **Sex**: The mechanism whereby females have consistently higher CLPB prevalence is partially known→ might be related to women's exposure to musculoskeletal loads due to pregnancy, child care, and double workday (domestic tasks plus paid work) as well as physiological characteristics such as less muscle and bone mass. (Hoy et al., 2016)

- **Income**: Less income and less schooling may be related to inferior living and working conditions, which can lead them to jobs that have greater risk to the lumbar spine. (Meucci et al., 2013)

- **Smoking**: Higher proportion of CLBP among smokers caused by the systemic effects of nicotine on the joints of the spine, accelerating the joint degeneration process, and increasing the potential of transmission of pain impulses in the central nervous system. (Meucci et al., 2013)

- **Lifestyle**: The intensive use of computers and other technologies has increased sedentariness → muscle weakness. (Heneweer et al., 2009)

- **Weight**: Obesity is a known risk factor for CLBP as it promotes overloading of the articular structures of lumbosacral spine. (Meucci et al., 2013)

Physiopathology
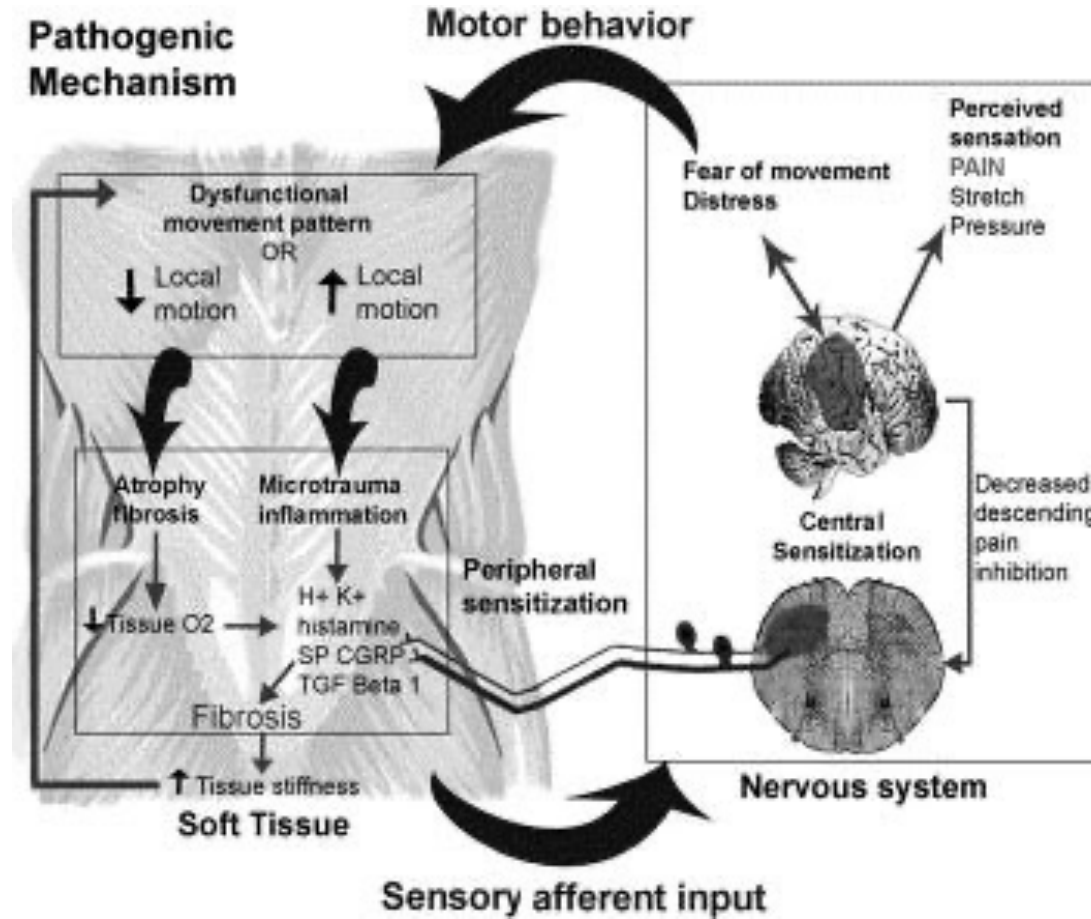
Helene M. Langevin, Karen J. Sherman, Pathophysiological model for chronic low back pain integrating connective tissue and nervous system mechanisms, Medical Hypotheses, Volume 68, Issue 1, 2007, Pages 74-80.

Literature review

- Patients with CLBP frequently present impaired lumbar movements = limited movement range, atypical lumbar movement variability, and abnormal trunk muscle contraction.

  → slower lumbar movements are robustly observed in CLBP patients. (Laird et al., 2013; Van Dieën et al., 2019)

- Optimal movement patterns based on lumbar movement assessments, have been found to improve pain and disability associated with CLBP. (Byström et al.,2013)

- Advances in the neuroscience of pain and interoception suggest new directions for treatment development for CLBP treatment and pain management. (Dale et al.,2018)

The DAUM© distraction corset was used in this study

Presentation

How it works

- Two effects : **Pain relief** + **Mobility**

1. Alleviates the weakened segments of the spine redistributing the weight on two lateral pistons that act as shock absorbent pillars

2. The pneumatic system ensures maximum mobility for the patient

By relieving pain and allowing the patient to move freely, the brace allows them to restore painless movement and **eventually not need the orthosis anymore**

Methodology

Methodology

We performed a prospective longitudinal study on the use of a distraction corset in a consecutive series of 79 cases with low back pain in subjects with a variety of diagnoses, some having had previous spinal surgery and others not.

Methodology

N=79 (N= 150)

N=22 (28%) of the patients had surgery prior to the treatment

Methodology

Patient were enrolled from February till October 2023

Methodology

Three outcome measures were analyzed: Oswestry score, Zung score and Pain VAS.

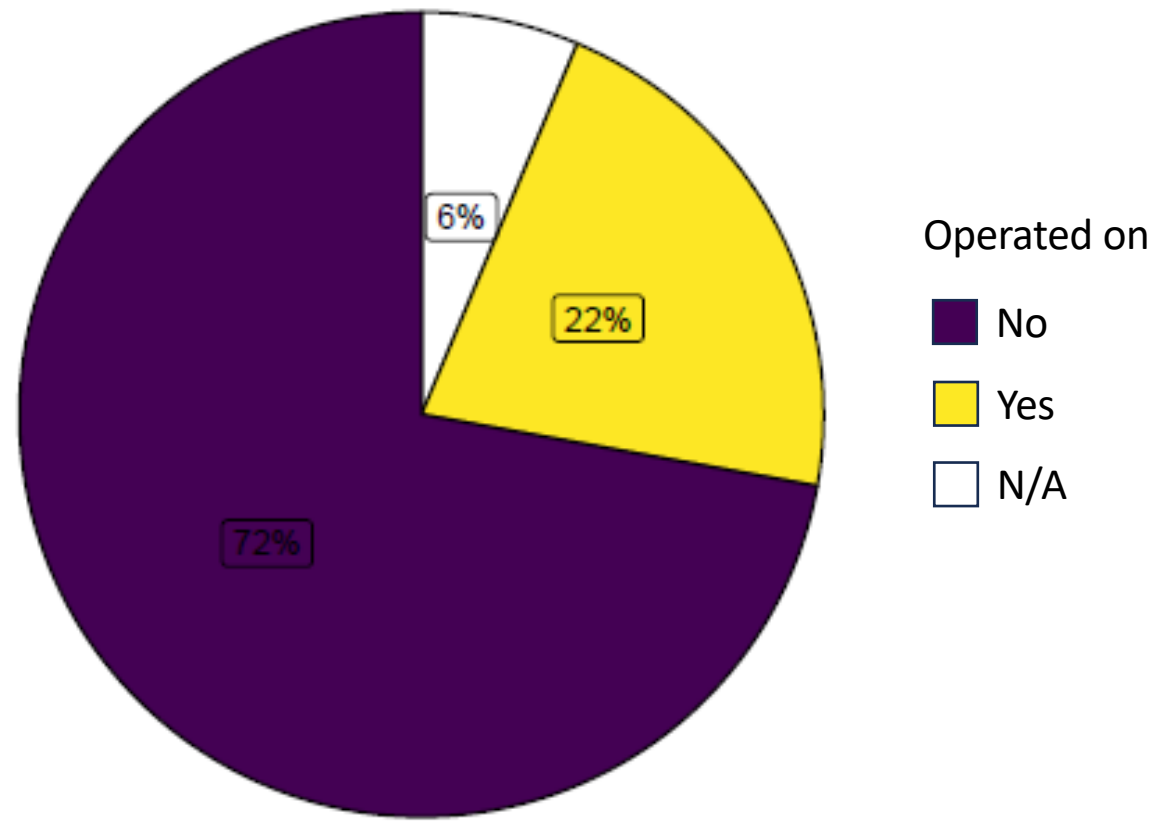The duration of symptoms prior to enrolment by age was also noted.
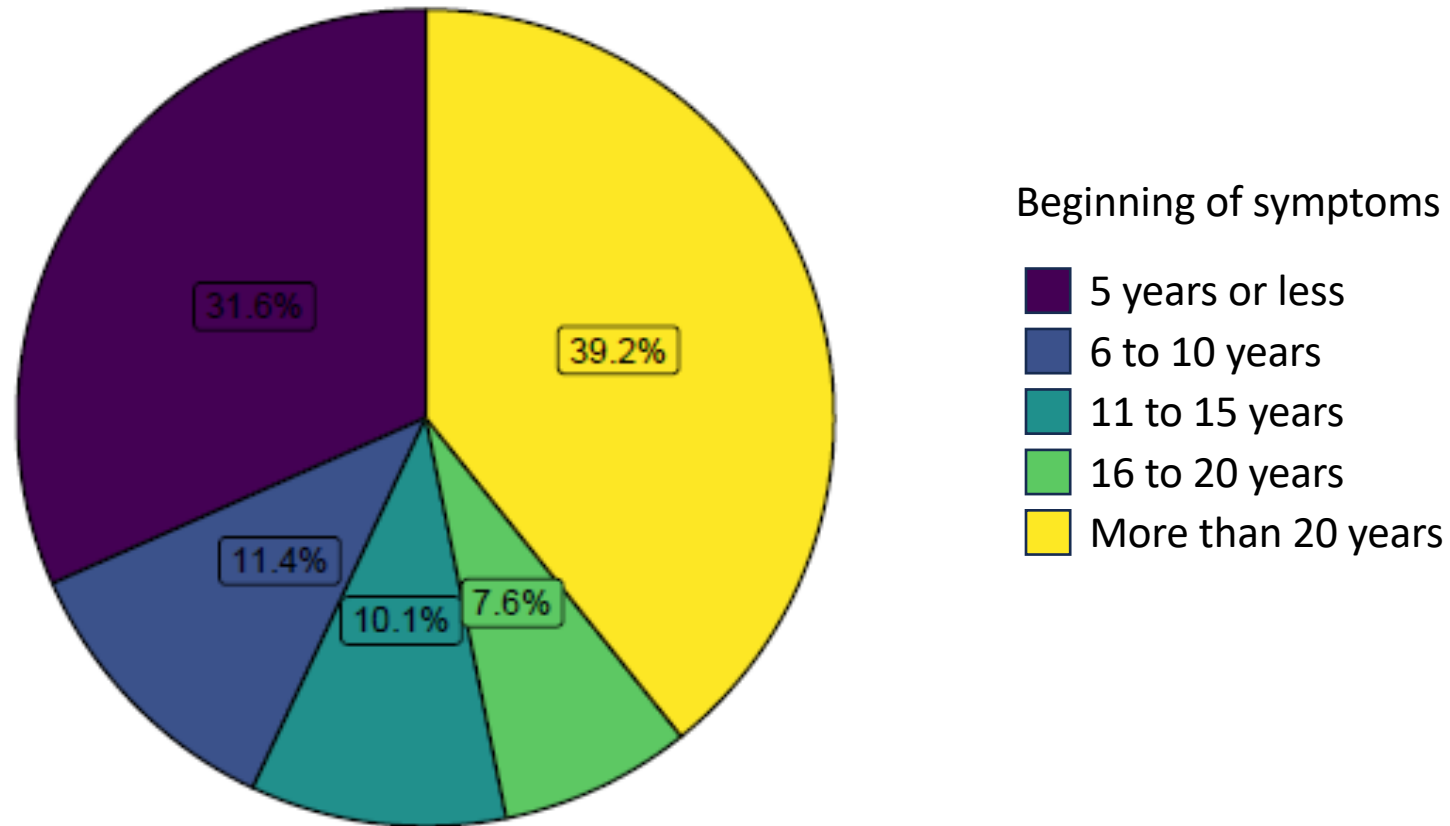
Results

Sex of patients
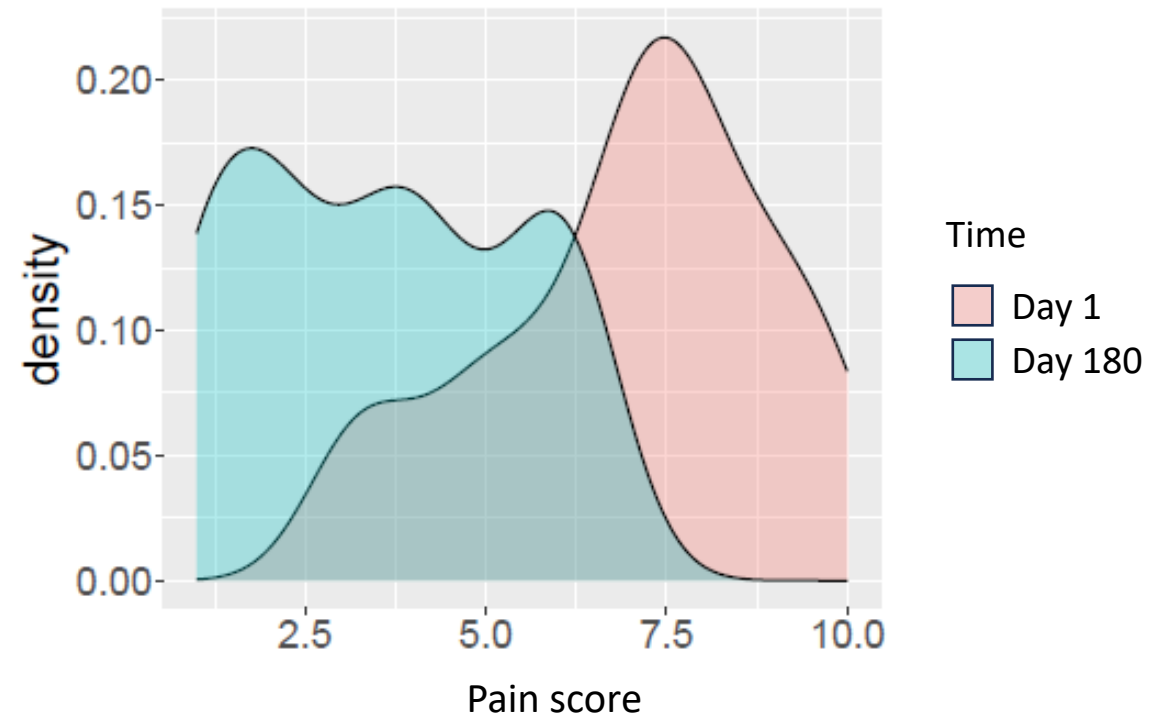
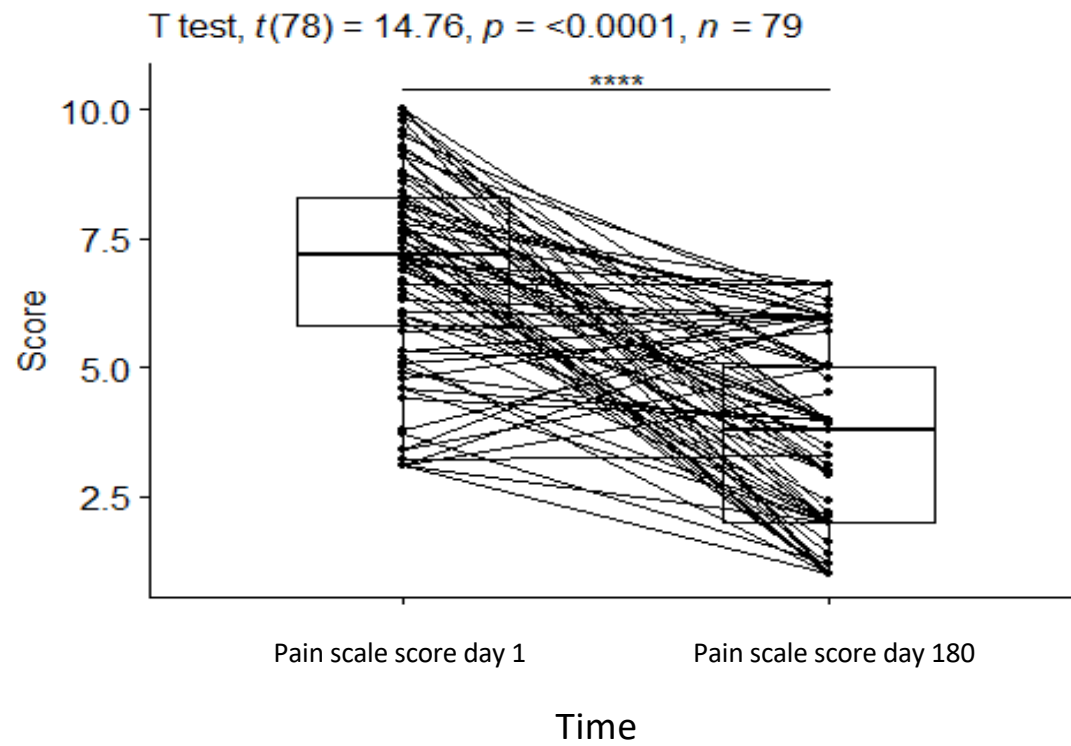# Surgery status

Operated on
- No
- Yes
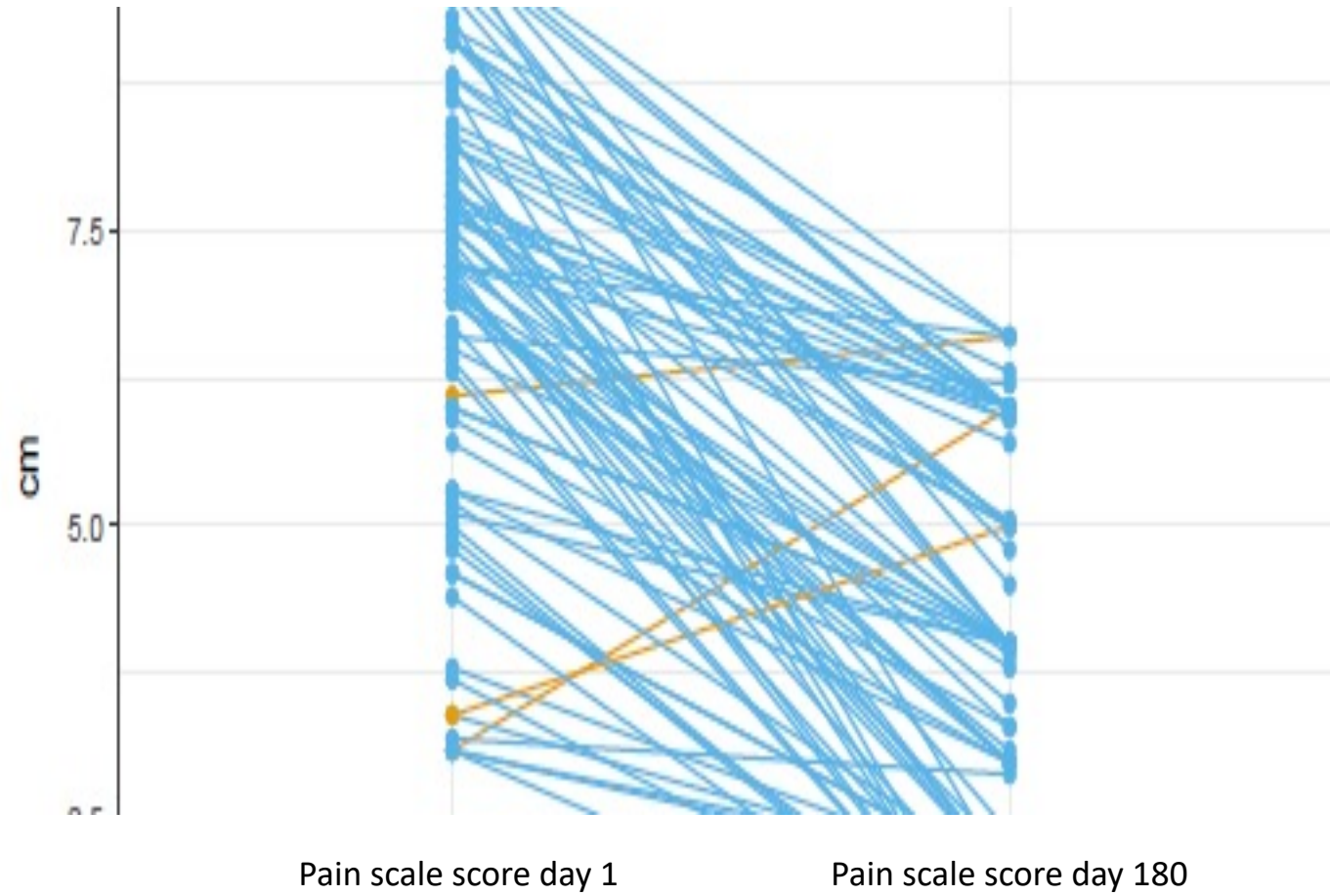- N/A

6%

22%

72%
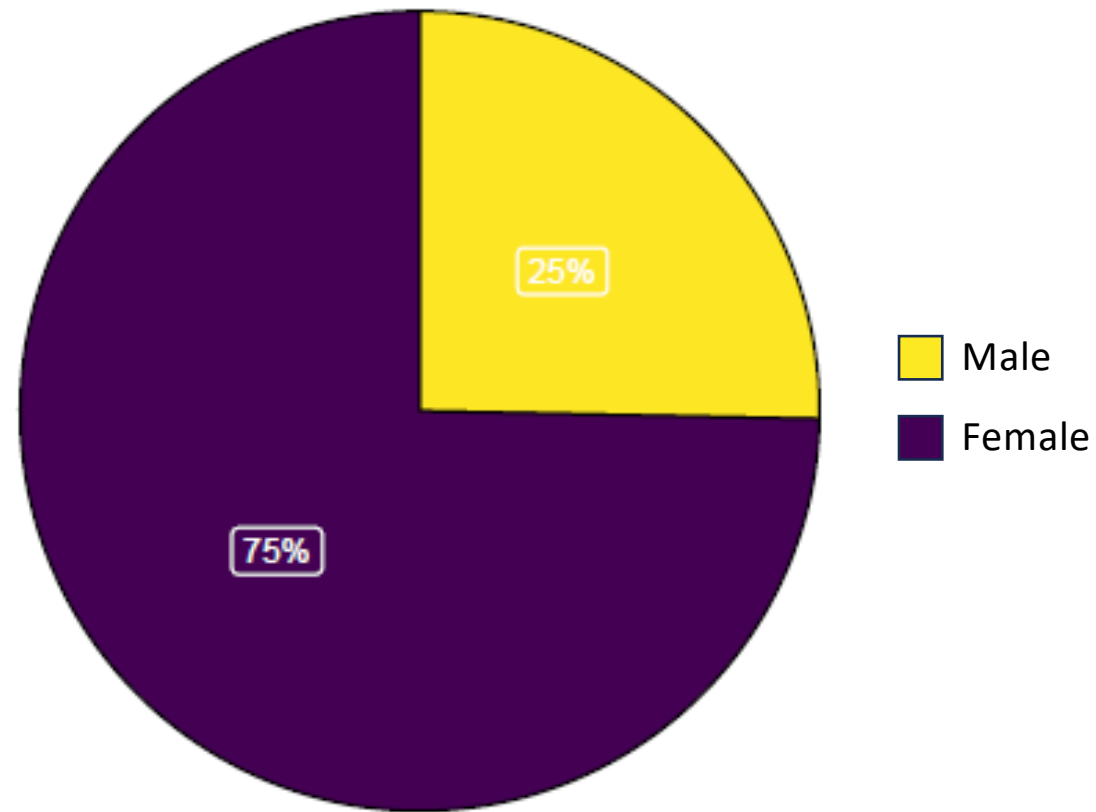
Duration of symptoms prior to enrollment

VAS

Pain scale score

Pain scale VAS
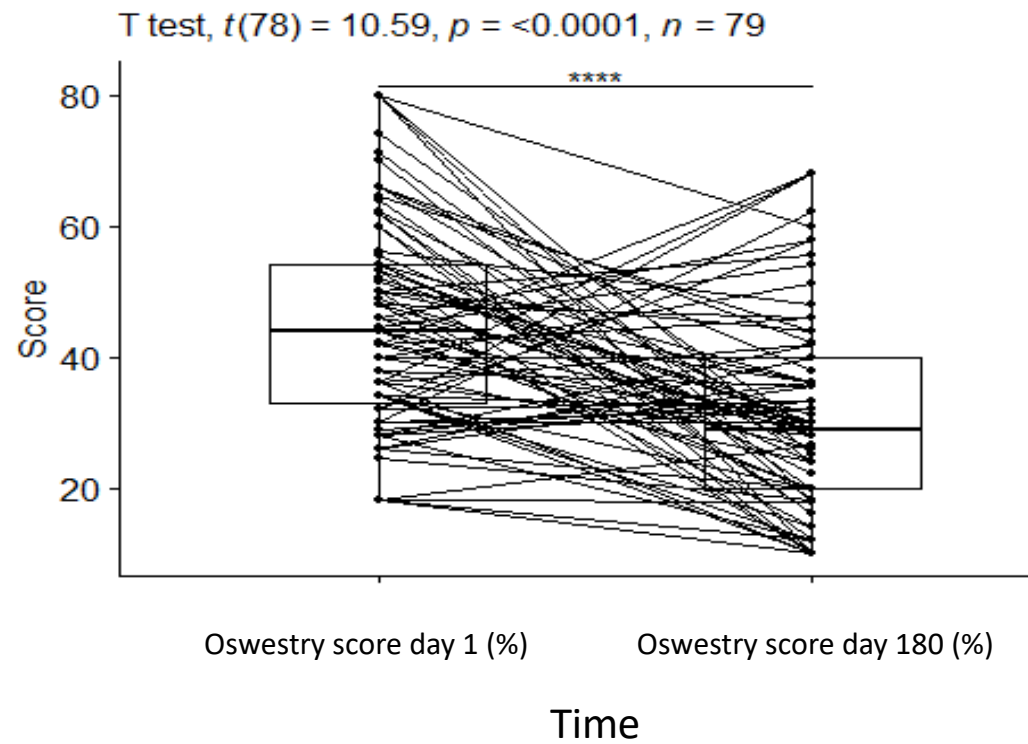
T test, $t(78) = 14.76$, $p = <0.0001$, $n = 79$

Oswestry score
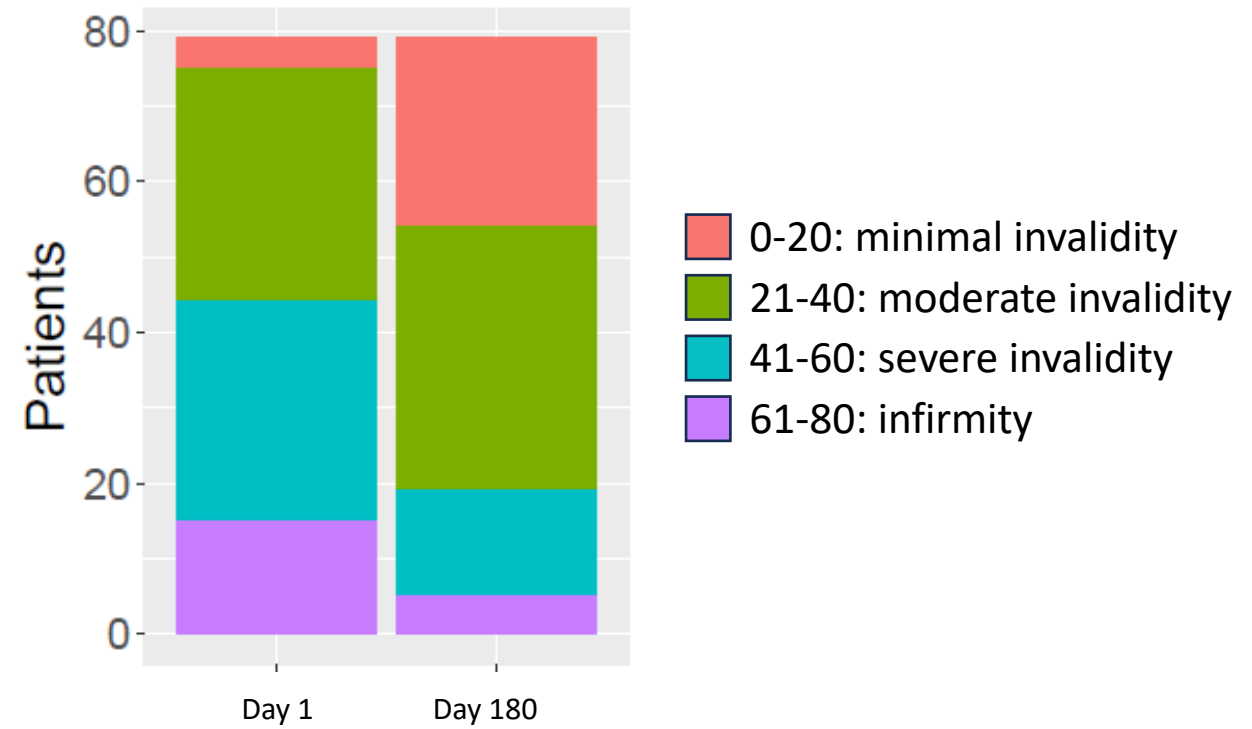
T test, $t(78) = 10.59$, $p = <0.0001$, $n = 79$

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Score

Oswestry score day 1 (%)   Oswestry score day 180 (%)

Time

Patients

80

60

40

20

0

Day 1   Day 180

0-20: minimal invalidity

21-40: moderate invalidity

41-60: severe invalidity

61-80: infirmity

Oswestry score day 1 (%)   Oswestry score day 180 (%)

Zung score

T test, $t(78) = 7.5$, $p = <0.0001$, $n = 79$

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Score

Zung score day 1 (%)   Zung score day 180 (%)

Time

Patients

Day 1   Day 180

0-49: Normal

21-40: midly depressed

41-60: moderately depressed

Zung

T test, $t(78) = 7.5$, $p = {<}0.0001$, $n = 79$

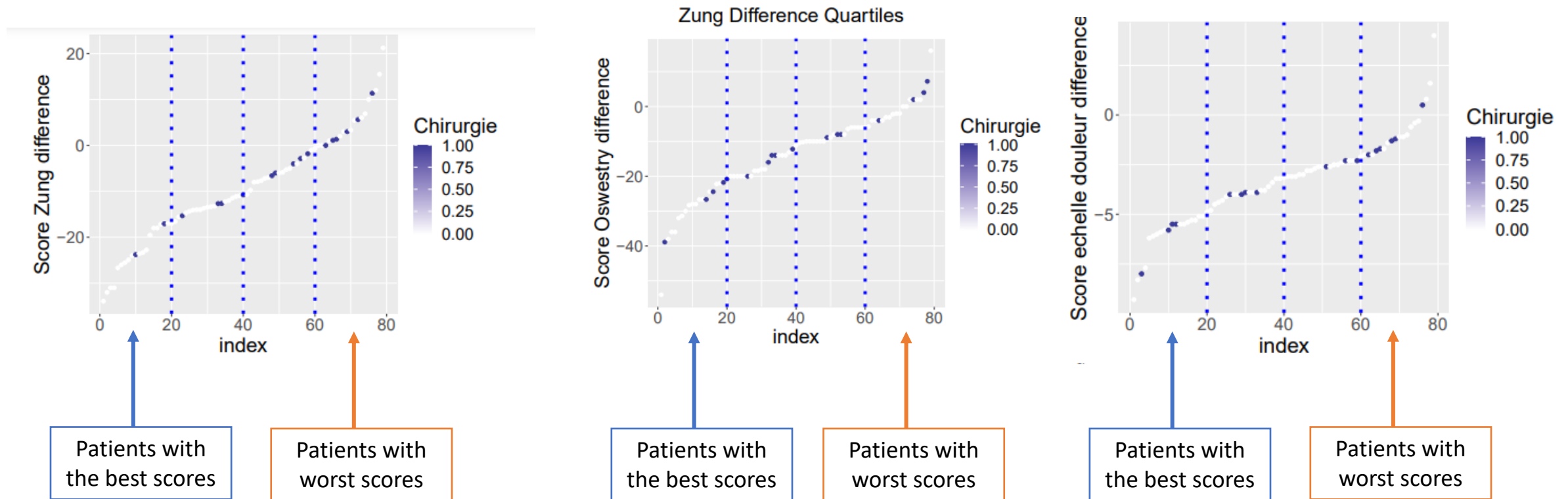Zung score day 1 (%)   Zung score day 180 (%)

The effects of surgery on the patients results

The **blue points** on the graph (=operated patients) illustrate in which category the operated patients are from "Best result patients(0-20)" to " Worst result patients(60-80)"

Conclusion: The non-operated patients have shown a better result to the therapy

Conclusions

❖**Pain score:** 95% of patient showed a reduction on the pain scale Score while 5 % of patients increased.

❖**Zung score:** 79.8% of patient showed a reduction of Zung score while 20.2 % of patients increased.

❖**Oswestry score:** 91.2 % of patient showed a reduction of Oswestry Score while 8.8 % of patients increased.

Conclusions

All 3 parameters were statistically significant at day 180 when compared to day 1 using Paired-Samples T Test.

- Firstly, the VAS score experienced a substantial reduction of 3.39, declining from an average of 6.98 on day 1 to 3.6 on day 180 (t(78) = 14.76, p < 0.0001). **This reflects a considerable reduction in pain levels.**

- Secondly, the Oswestry score saw a significant decrease, dropping from an average of 45.0% on day 1 to 31.2% on day 180 (t(78) = 10.59, p < 0.0001). **This suggests an improvement in functional disability among the participants.**

- Lastly, the Zung score exhibited a remarkable reduction of 9.45%, shifting from an average of 45.6% on day 1 to an average of 36.2% on day 180 (t(78) = 7.5, p < 0.0001). **This indicates a positive trend in the psychological well-being of participants.**

Conclusions

1. Our analysis revealed a significant correlation between the changes in **Oswestry** and **VAS** scores over the 180 days.

2. Similarly, the alterations in **Zung** scores correlated significantly with changes in **Oswestry** scores.

3. Importantly, none of these parameter changes showed any correlation with the **age** of participants.

These findings collectively suggest promising outcomes associated with the use of our medical device, particularly in terms of psychological well-being, functional disability, and pain management over the study period.

Future research perspectives

Following this preliminary research, it will be useful, in the future to further analyze and demonstrate:

- Which pathologies and medical indications respond best to the treatment

- Which populations respond best to the treatment

- How and for which period (number of months) the patients wear the brace

Thank you