

# Pharos University in Alexandria



Students Community Research Projects

Pharos University in Alexandria  
Faculty of Physical Therapy



# Students Community Research Projects

Electromagnetic Field: A Physical Therapy  
Modality For Management Of Acute Low  
Back Pain

# Prepared by

<b>Name</b>	<b>ID</b>
<b>Ammar Gomaa Bendary</b>	<b>201900482</b>
<b>Alaa Ashraf Bader</b>	<b>201900031</b>
<b>Reem Mohamed Matter</b>	<b>201901173</b>
<b>Salma Khaled Elsharawy</b>	<b>201900198</b>
<b>Rewan Taha Ahmed Askalany</b>	<b>201900113</b>

Under supervision of  
Dr. Muhammad Al Bagoury  
Lecturer of Physical Therapy

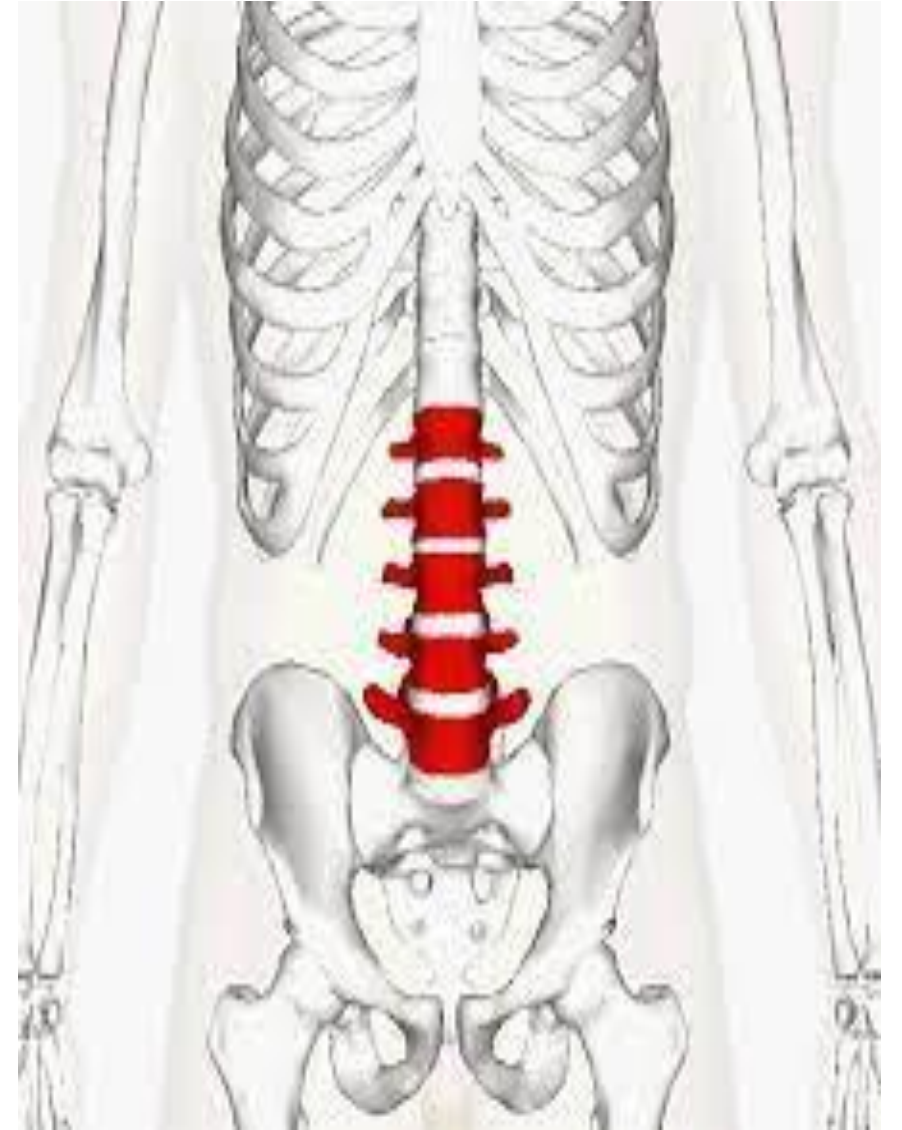


# Introduction

The lumbar section of the spine consists of five vertebrae (L1–L5) and five intervertebral discs. It is a weight bearing structure which may cause various problems, resulting in pain. It provides maximum stability while maintain crucial mobility of the trunk about the hips and pelvis (1).

Low Back Pain (LBP) is pain and discomfort localized below the costal margin and above the inferior gluteal folds with/without leg pain (2).

- ✓ **Acute** low back pain can last anywhere from a few days to a few weeks
- ✓ **Chronic** low back pain lasts longer than three months (3).



• **According to WHO in 19 Jun 2023,**

- **An estimated 619 million people live with LBP**
- **It is the leading cause of disability worldwide**
- **LBP is a major public health issue**
- **LBP is often associated with loss of work productivity**
- **Thus produces huge economic burden on individuals and on societies.**

## According to WHO in 19 Jun 2023 (4)

Item	Percentage
Lifetime prevalence of low-back pain	<b>84%</b>
Chronic low-back pain	<b>23%</b>
Adolescents with low-back pain	<b>11.8% to 33%</b>
Disability due to low-back pain	<b>11-12%</b>



# Common causes of LBP

---

**Occupational activities**

**Degeneration of the vertebrae**

**Degeneration of the discs**

**Poor physical fitness**

**Weak back/abdominal muscles**

**Obesity and excess weight**

**Strenuous exercise or work**

**Psychological conditions**

**Bad postures**

**Muscle or ligament strain**

---

# Statement of the problem

**LBP is a universal problem that affects most of the people of all ages all over the world frequently. It extends from just discomfort to even disability and has a variable impact on production of the individuals and nations. So examining efficacy of methods or modalities to discard its effects is urgent.**

# Purpose of the study

**We performed the current study to examine the effects of electromagnetic field when applied as a physical therapy modality on pain control and alleviation and functional gain in people suffering from low back pain**

**☐ Inclusion criteria :**

- ✓ 34 patients
- ✓ Having Acute LBP
- ✓ Aging 25-45 years

**☐ Exclusion criteria :**

- ✓ Lumber tumor
- ✓ Vertebral fracture

# Methodology

- **Subjects:**

- 34 patients (21 females and 13 males).
- Their ages between 25 and 45 years.
- Having acute LBP (less than 12 weeks)
- Extracted from outpatient clinics of faculty of Physical therapy, PUA.
- A consent signed by each participating patient.
- Subdivided randomly into 2 equal groups (17 patients each).

- **Group (A) control group:**

- ✓ Received TENS, Ultrasound and exercises

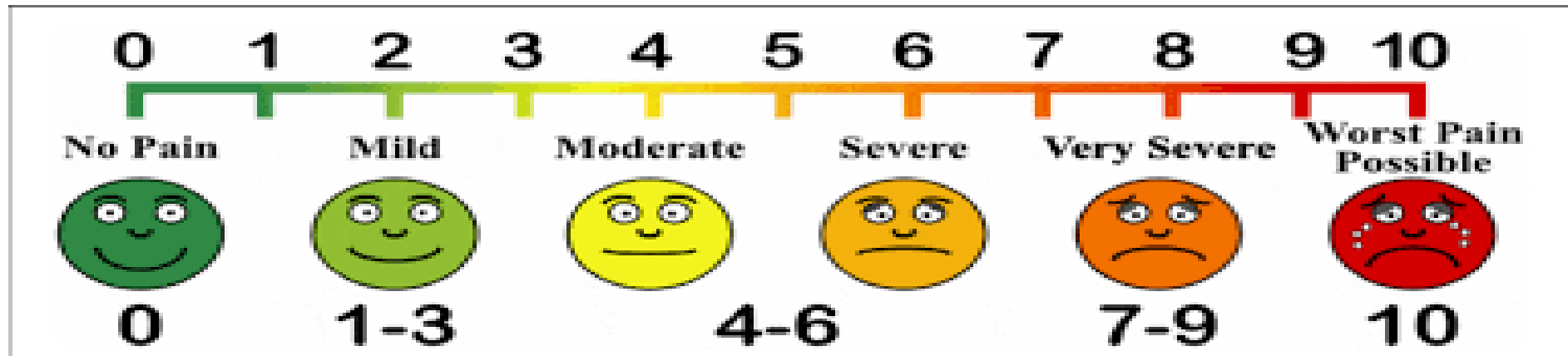
- **Group (B) study group:**

- ✓ Received the same treatment as group (A) in addition to EMF

- **Methods:**

- Methods of assessment:**

- Visual Analogue Scale (VAS)**



## ✓ **Oswestry Disability Index:**

- **Designed to give the therapist information about how back pain has affected patients' ability to manage in everyday life.**
- **It describes 10 domains, and each domain is measured on a scale from 0 to 5, where 0 is the least affection and 5 is the highest affection.**

### ○ **Domains are:**

- 1. Pain Intensity**
- 2. Personal Care (washing, dressing, feeding, etc)**
- 3. Lifting**
- 4. Walking**
- 5. Sitting**
- 6. Standing**
- 7. Sleeping**
- 8. Employment / Homemaking**
- 9. Traveling (driving, daily commute, public transportation)**
- 10. Social Life**



## ☐ Methods of treatment:

### ✓ Pulsed electromagnetic field (PEMF):

- It is a passive, noninvasive, safe, and easy to use therapeutic intervention
- Used frequency is 50 Hz for 15 min for 12 sessions day after day (5).
- PEMF doesn't just reduce pain, it potentially works on the underlying cellular health resulting in pain relief. It can improve bone density, improve circulation and stimulate recovery (6).
- PEMF is an effective wellness technology that enhances performance and rehabilitation (6).



## Electromagnetic Therapy

## ✓ **Therapeutic Ultrasound:**

- Is a form of *mechanical* energy
- The frequencies used in therapy are typically between 1.0 and 3.0 MHz
- Used for management of inflammation, increase tissue proliferation and remodeling (7).

## ✓ **Transcutaneous electrical nerve stimulation (TENS):**

- Uses low-voltage electrical currents to relieve pain.
- It delivers the current to sensory nerves to block or change perception of pain (8).



**TENS**



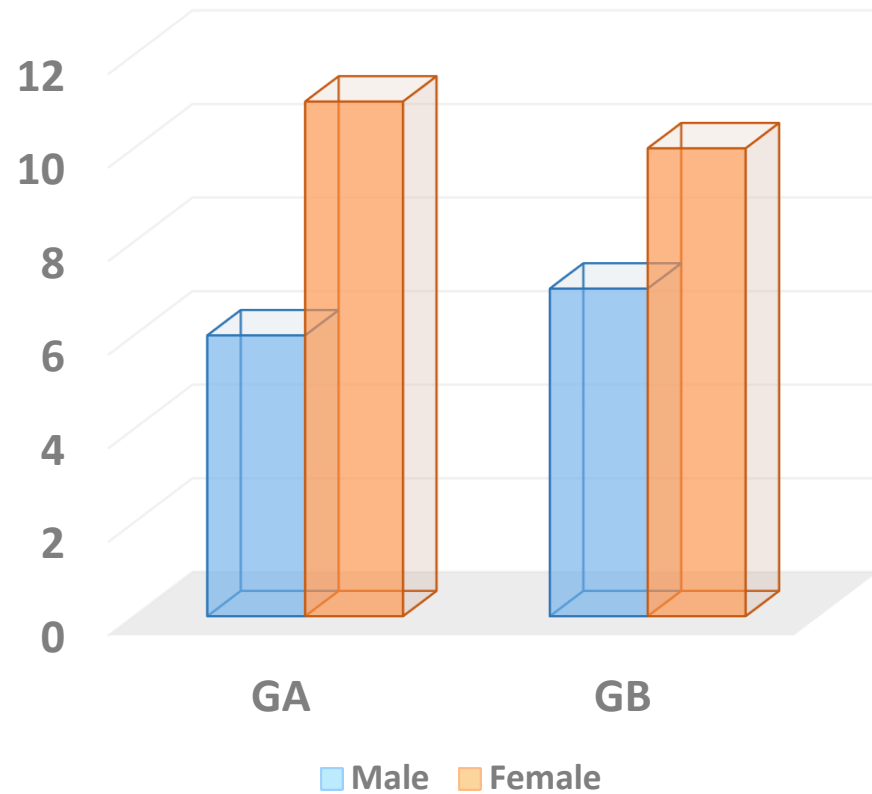
**Therapeutic US**



# Results

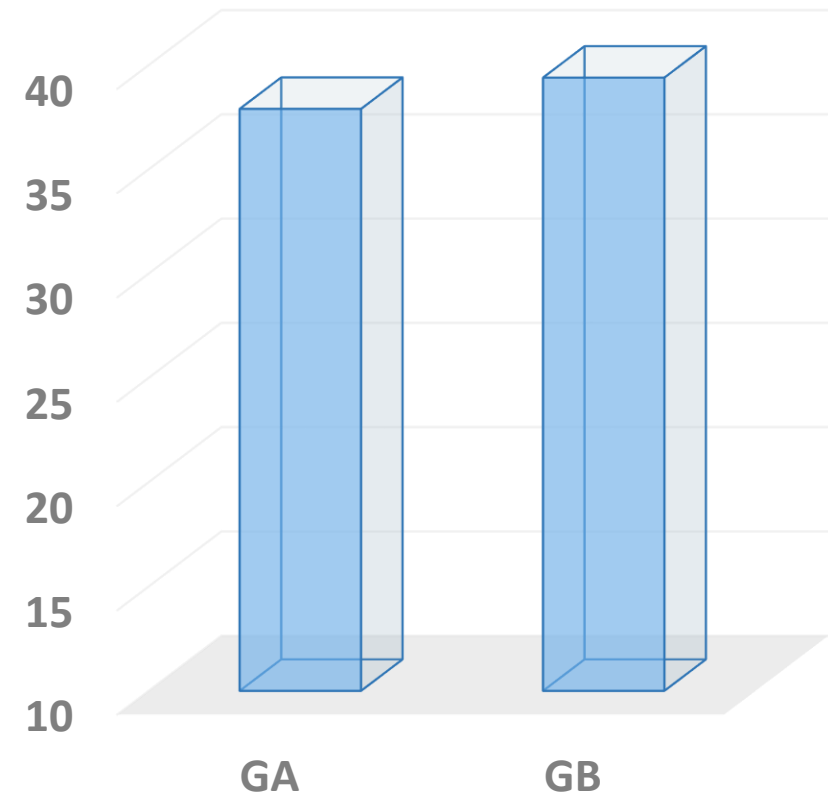
- Demographic Data

## Gender



A: 6 males & 11 females  
B: 7 males & 10 females

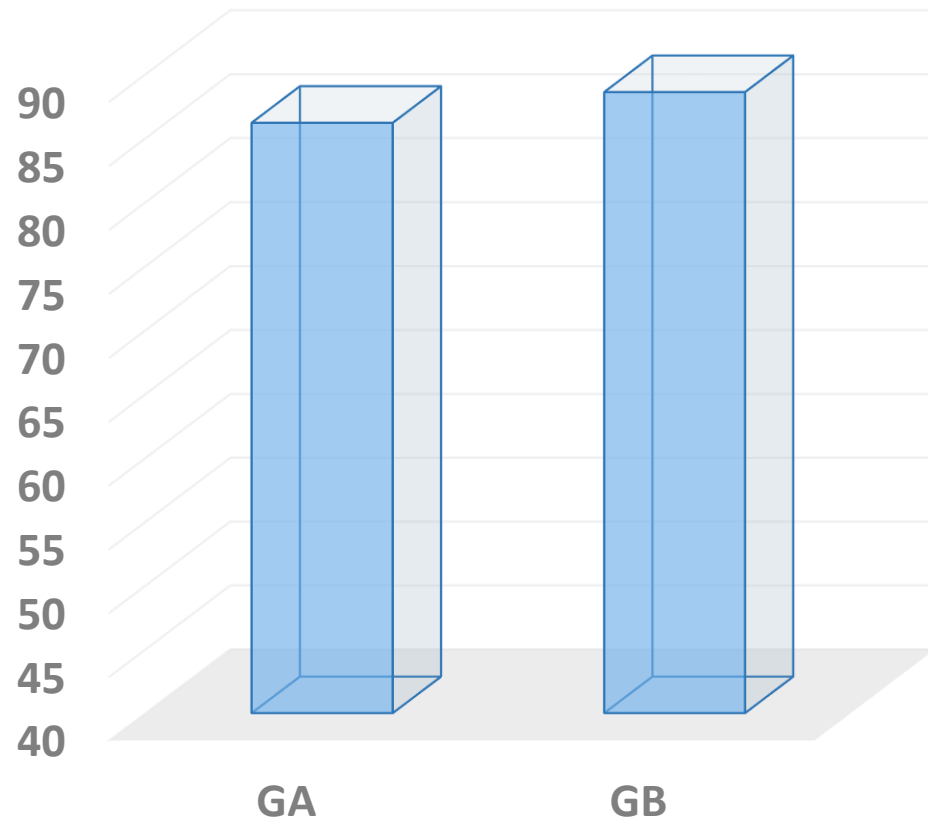
## Mean of age



A: 37.9 years  
B: 39.4 years

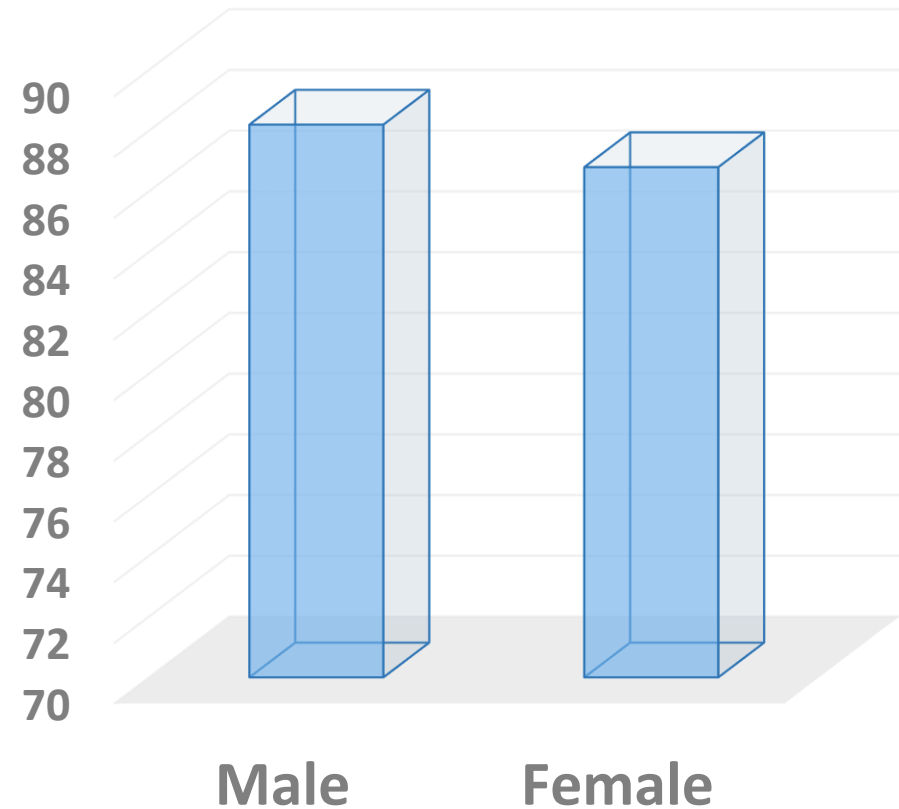
# Comparison of weight according to groups & gender

## Mean of Weight per group



A: 86.2 kg.  
B: 88.6 kg.

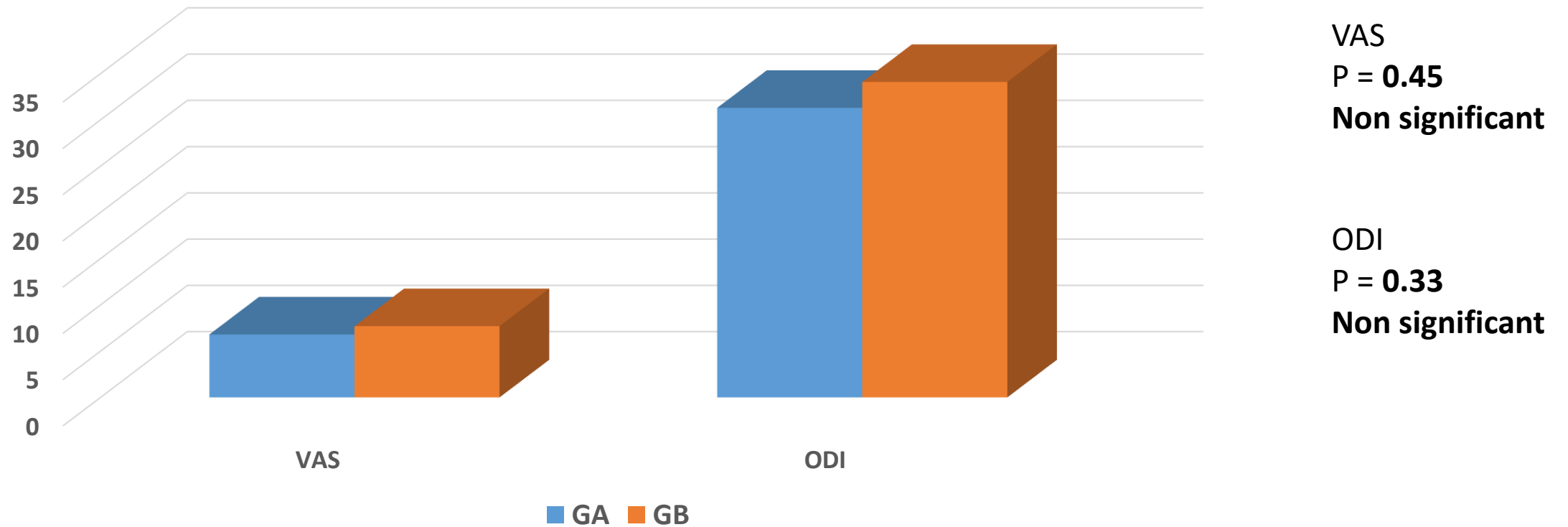
## Weight to gender



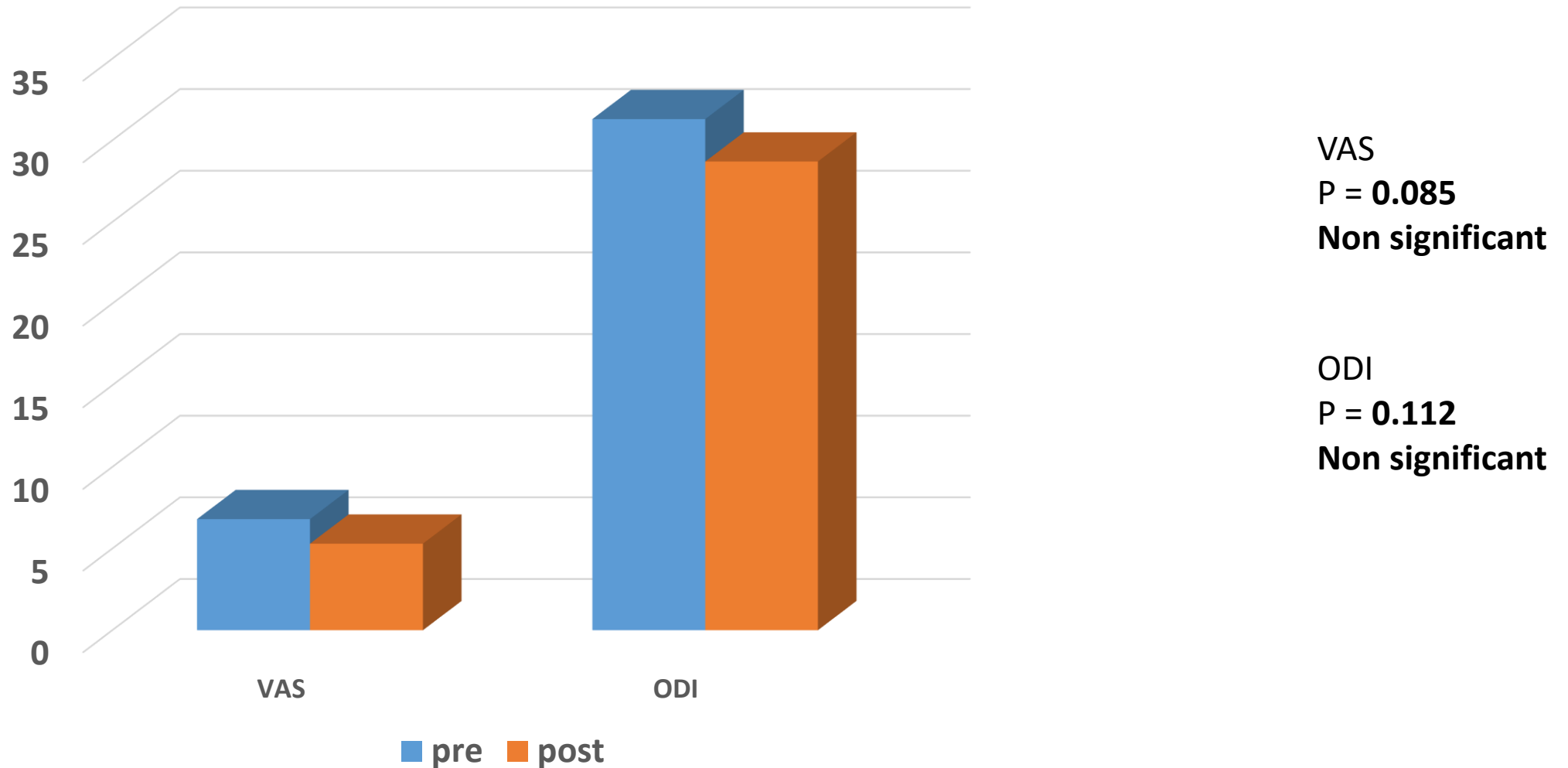
Male: 88.2 kg.  
Female: 86.8 kg.

# Comparison of pre-treatment mean values of both groups

## Pretreatment mean values

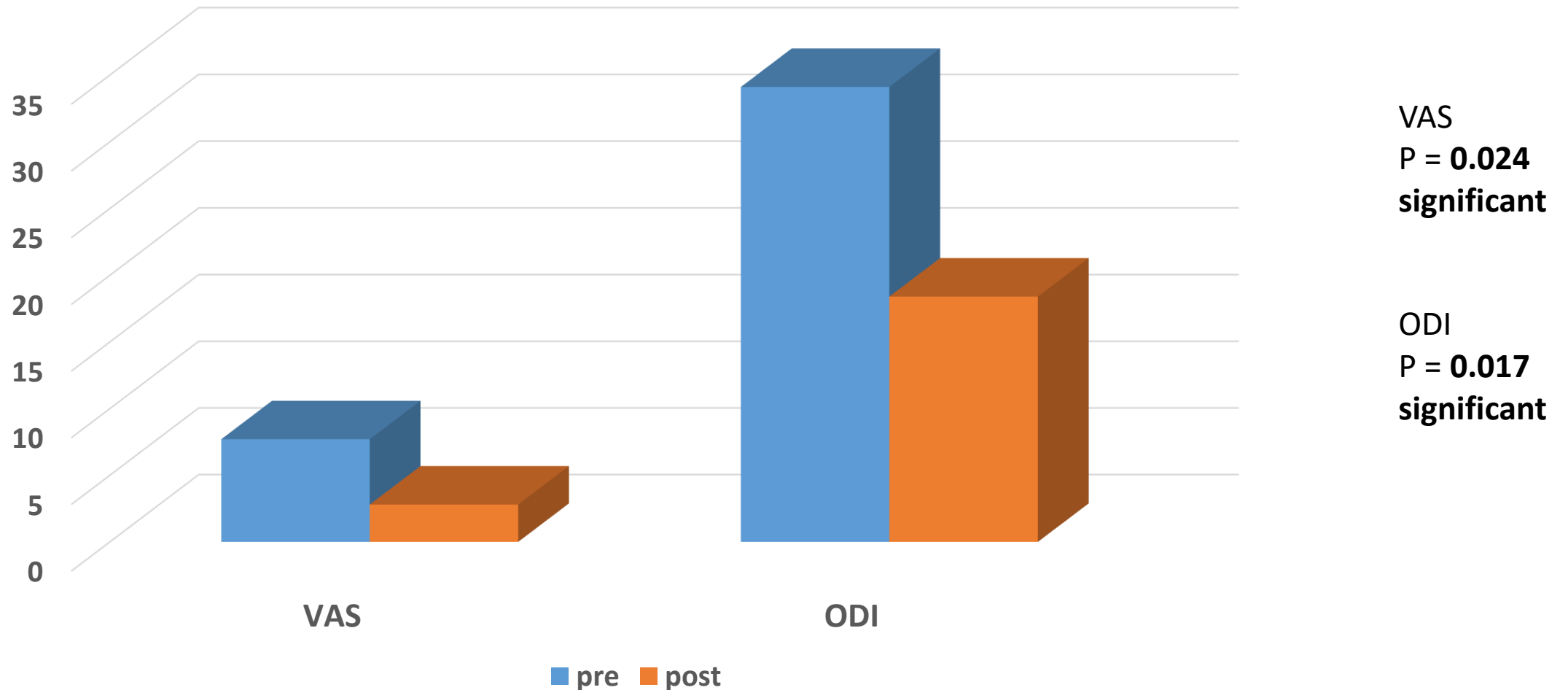


# Comparison of pre and post treatment mean values of group A (control)

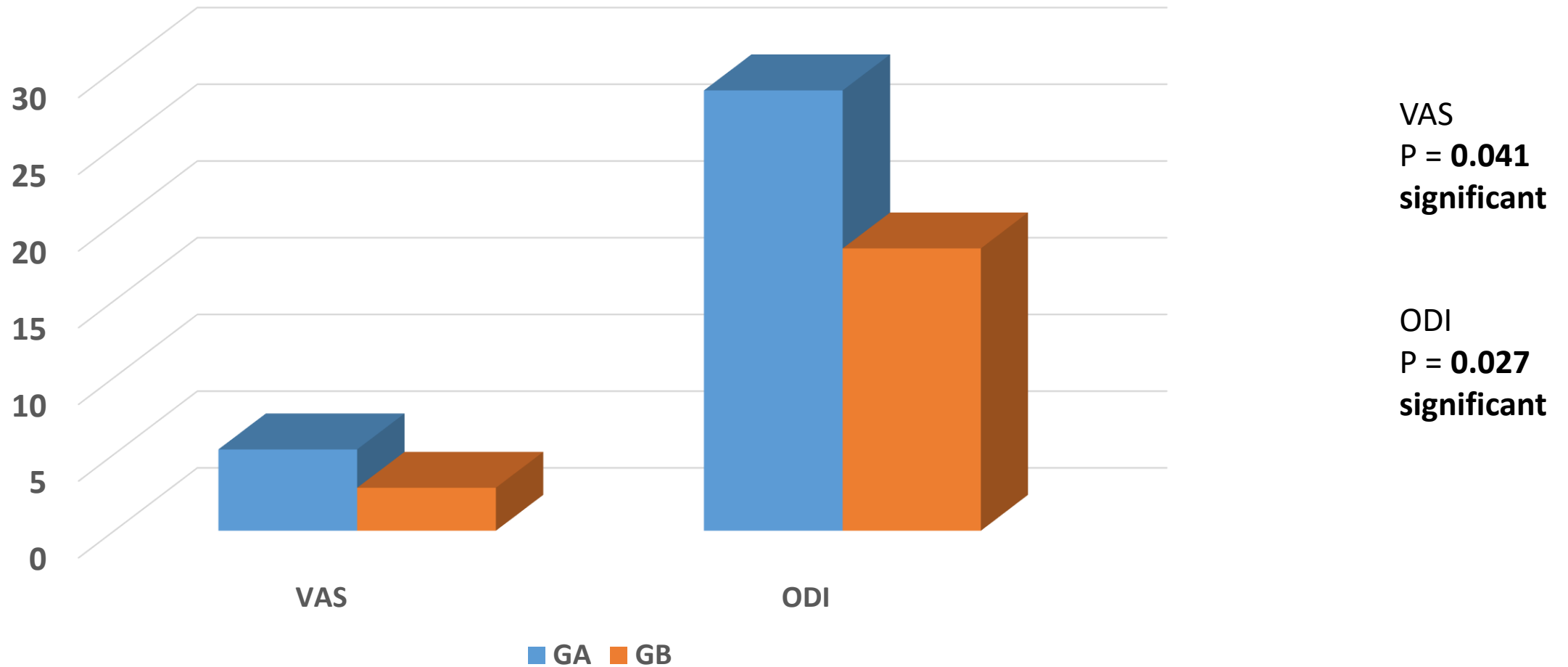




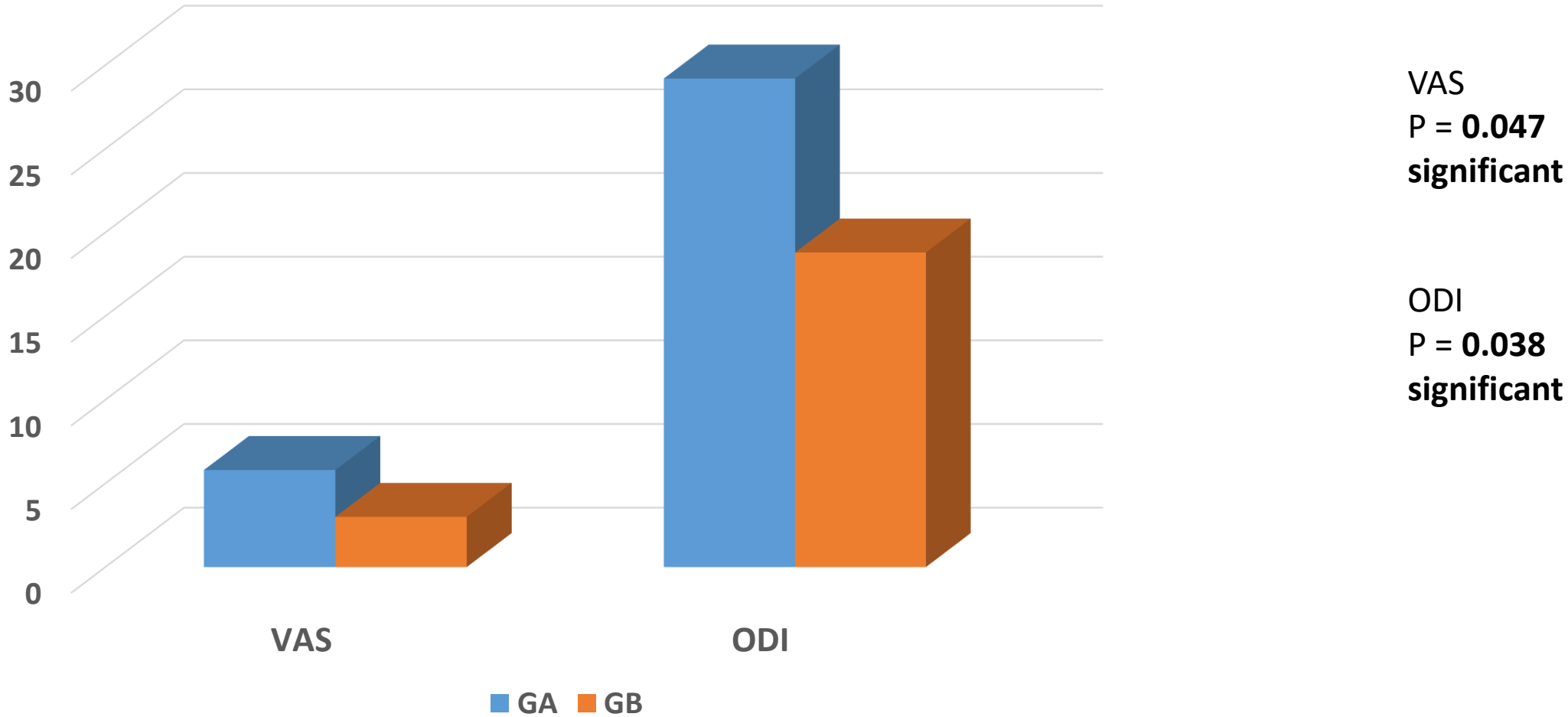
# Comparison of pre and post treatment mean values of group B (Study)



# Comparison of post-treatment mean values of both groups



# Comparison of post-treatment mean values of both groups (excluding patients receiving NSAIDs)



# Discussion

The different results obtained from the previous studies, may be referred to the different parameters applied. Many studies used high intensity and frequency of the PEMF, while others applied low parameters of the PEMF (9) and (10).

Nayback-Beebe et al said that acute musculoskeletal LBP is a particularly obvious public health problem in young and healthy military population. PEMF therapy demonstrated efficacy in small-scale studies examining muscle recovery and function in injured athletes, pain control, and treatment of musculoskeletal pain and dysfunction (11).

## Discussion cont.

**Lisi et al reported that it is feasible to conduct a clinical trial of a PEMF therapy device for non-specific LBP. This work shows that the device was safe and provides preliminary evidence of effectiveness in improving function in patients with non-specific LBP (12) and (13).**

## Discussion cont.

**Elshawi AM et al found that adding pulsed electromagnetic field to Conventional physical therapy Protocol yields superior clinical improvement in pain, functional disability, and lumbar ROM in patients with non-specific low back pain than Conventional physical therapy alone (14).**

## Discussion cont.

Thuile Ch and Walzl M said that PEMF therapy is an effective modality for conservative treatment of lumbar pain caused by lumbar disc prolapse, with significant reduction in pain severity, significant improvement in total modified Oswestry score domains (15).

Marks and R.A said that the use of PEMF stimulation significantly enhanced fusion healing, both statistically and clinically, in patients with discogenic low back pain. An excellent or good clinical outcome was related to fusion success (16) and (17).

# Conclusion

**We conclude that PEMF therapy can relieve pain, improve function and improve Health-Related Quality of Life in middle-aged individuals with different low back pain conditions.**



# Recommendation

- ✓ Further studies about effectiveness of Electromagnetic field on acute LBP using larger sample size.
- ✓ Further studies about effectiveness of Electromagnetic field on chronic LBP
- ✓ Further studies about effectiveness of Electromagnetic field on acute and chronic LBP in 5th and 6th decades people.

# References

- (1) Adams MA, Burton AK, Dolan P, and Bogduk N. 2007. *The Biomechanics of Back Pain*. Churchill Livingstone.
- (2) Agur A.M.R., Dalley A.F. *Grant's Atlas of Anatomy*. 12th ed. Lipincott Williams & Wilkins; Pennsylvania, PA, USA: 2009. p. 841.
- (3) Ali F, Reddy V, Dublin AB. *StatPearls* . StatPearls Publishing; Treasure Island (FL): 2020. *Anatomy, Back, Anterior Spinal Artery*.
- (4) Anne M Gilroy, Brian R MacPherson, Lawrence M Ross and Michael Schuenke, *Atlas of Anatomy*, 2nd edition, Thieme, Chapter 2,2014.
- (5) Arneja AS, Kotowich A, Staley D, Summers R, Tappia PS. Electromagnetic fields in the treatment of chronic lower back pain in patients with degenerative disc disease. *Future Sci OA*. 2016;2(1):FSO105. Published 2016 Feb 11. doi:10.4155
- (6) Cohen SP, Argoff CE, Carragee EJ (December 2008). "Management of low back pain". *BMJ*. 337: a2718.
- (7) Watson T. Soft Tissue Healing. *In Touch* 2003;104: 2-9.
- (8) Hayden JA, et al. (2005). Systematic review: Strategies for using exercise therapy to improve outcomes in chronic low back pain. *Annals of Internal Medicine*, 142(9): 776–785.
- (9) . Krath A, Klüter T, Stukenberg M, et al. Electromagnetic transduction therapy in non-specific low back pain: a prospective randomised controlled trial. *J Orthop*. 2017;14(3):410---415.
- (10) 7. Andrade R, Duarte H, Pereira R, et al. Pulsed electromagnetic field therapy effectiveness in low back pain: a systematic review of randomized controlled trials. *Porto Biomed J*.2016;1(5):156---163.
- (11) Nayback-Beebe A, Yoder L, Goff B, Arzola S, Weidlich C. The effect of pulsed electromagnetic frequency therapy on health-related quality of life in military service members with chronic low back pain. *Nurs Outlook*. 2017;65(5S):S26-S33.

- 12) Lisi, A.J., Scheinowitz, M., Saporito, R. et al. A Pulsed Electromagnetic Field Therapy Device for Non-Specific Low Back Pain: A Pilot Randomized Controlled Trial. *Pain Ther* 8, 133–140 (2019).
- 13) Oke KI, Umebese PF. Evaluation of the efficacy of pulsed electromagnetic therapy in the treatment of back pain: a randomized controlled trial in a tertiary hospital in Nigeria. *West Indian Med J.* 2013;62:205–9.
- 14) Elshawi AM, Hamada HA, Mosaad D, Ragab IMA, Koura GM, Alrawaili SM. Effect of pulsed electromagnetic field on nonspecific low back pain patients: a randomized controlled trial. *Brazilian Journal of Physical Therapy.* Published online May 2019:244-249.
- 15) Thuile Ch, Walzl M (2002) Evaluation of electromagnetic fields in the treatment of pain in patients with lumbar pain or the whiplash syndrome. *NeuroRehabilitation* 17, 63–7.
- 16) Marks, R.A. Spine fusion for discogenic low back pain: Outcomes in patients treated with or without pulsed electromagnetic field stimulation. *Adv Therapy* 17, 57–67 (2000).
- 17) Trock D, Bollet A, Duer R, Fielding L, Miner W, Markell R (1993): A double-blind trial of the clinical effects of pulsed electromagnetic fields in osteoarthritis *J. Rheumatol*; 20(3): 456-460.



THANK YOU