

ORIGINAL RESEARCH

A single blind randomised control trial to evaluate the effect of Mg supplementation in combination with exercises in subject with non-specific neck pain

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ABSTRACT

A frequent condition that might affect people at some time in their lives is non-specific neck pain. Without a clear-cut origin or underlying illness, it is characterised by neck-region discomfort and pain. Magnesium is an essential mineral that is essential for many physiological processes in the body, including pain management. Magnesium also demonstrates significant characteristics that can affect how pain is perceived and offer relief from some types of pain. This study's objective is to compare the effects of magnesium supplementation and exercise to exercise alone in those with non-specific neck pain.

Method: 30 subjects with non-specific neck pain were randomly divided into 2 groups, experimental and conventional group (n=15). The control group received conventional therapy i.e. exercises like chin tuck, static strengthening exercises, as opposed to the experimental group who had a chin tuck, static exercises, and transdermal magnesium oil application. Pre- and post-intervention assessments of all outcome measures, including VAS, NDI, and magnesium RBC levels, were done using statistical analysis.

Result: The experimental group demonstrated particularly notable gains in VAS and magnesium RBC levels, whereas the control group experienced improvements in functional outcomes, most notably NDI, in both groups. Both groups displayed significant improvement. This evidence suggests that combining magnesium with exercise is more beneficial for treating people with non-specific neck discomfort than exercising alone.

Key words: Transdermal Magnesium, Magnesium RBC level, non-specific neck pain, static strengthening exercise.

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Introduction

The neck, also known as the cervical spine, is a complex structure composed of vertebrae, muscles, ligaments, discs, and nerves. It plays a crucial role in supporting the head and enabling various upper body movements. However, due to its complexity and constant use, the neck is vulnerable to various factors that can contribute to pain and stiffness.

Causes of non-specific neck pain include muscle strains, ligament sprains, poor posture, stress, repetitive motions, and sudden movements. Prolonged sitting, improper ergonomics, uncomfortable sleeping

positions, and psychological factors such as anxiety and depression can also play a role. Non-specific neck pain refers to cases where no specific structural abnormality or underlying condition can be identified as the sole cause of the pain.

The management of neck pain can involve a multidisciplinary approach for diagnosis and treatment. Physiotherapy plays a significant role in pain management through techniques like electrotherapy and muscle strengthening exercises. Medical or pharmaceutical management may include targeting NMDA receptors, which are involved in the

transmission of pain signals. Substances such as magnesium can act as NMDA receptor antagonists, similar to ketamine and dextromethorphan, but with a unique mechanism of action.

Exercises assist in correcting alignment and reduce unneeded stress on the neck by emphasising posture improvement. They also enhance blood circulation to speed up the healing process and encourage the release of chemicals called endorphin the body's natural painkillers. Additionally, workouts are beneficial for people getting better coming from injury to the neck or going through treatment.

Magnesium has been shown to possess anti-inflammatory properties. Inflammation is a common underlying factor in many pain conditions, and by reducing inflammation, magnesium can contribute to pain relief. It helps inhibit the production of pro-inflammatory molecules, such as cytokines and prostaglandins, while promoting the activity of anti-inflammatory substances within the body.

Methods

Study design: The study was a randomized controlled trial. The study was conducted at "PACIFIC MEDICAL COLLEGE AND HOSPITAL, PACIFIC COLLEGE OF PHYSIOTHERAPY", Udaipur,

Rajasthan, country India. Ethical committee approval was obtained from Institutional Ethical Review Committee.

Sample size

Total 30 subjects were included in the study with 15 subjects in each group (Flow Chart 1).

Inclusion criteria

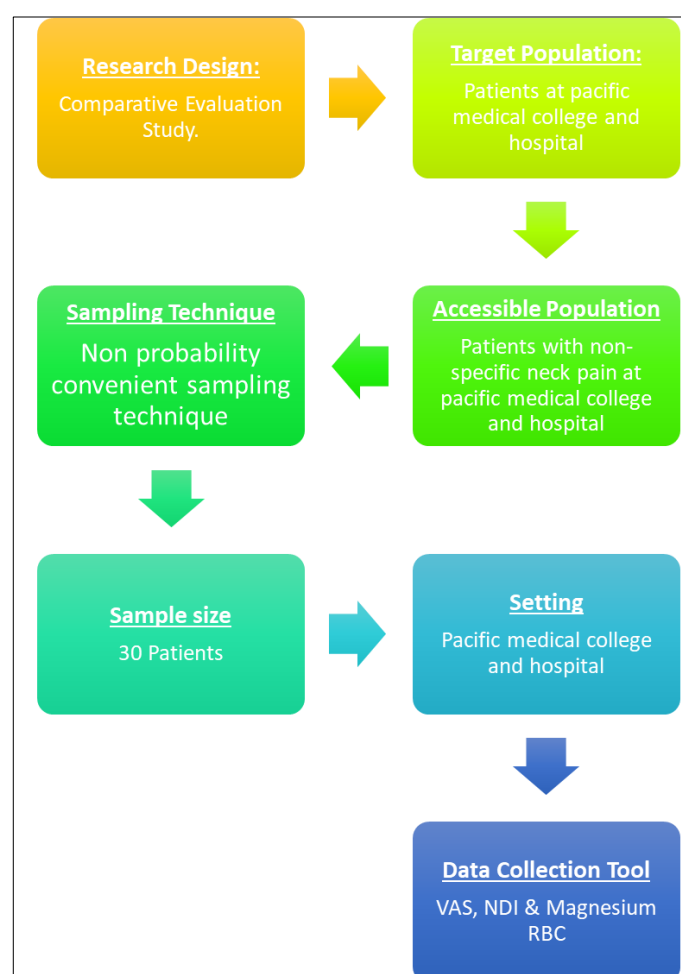
Age – 18- 40, both male and females.

Non-specific Neck pain more than 2 weeks.

Those who are willing to participate.

Exclusion criteria

- Patients with existing neurological condition, congenital diseases, auto-immunediseases, tumors and malignancies, cervical dystonia, cervical myelopathy, cervical spondylitis, spondylosis, cervical spondylolisthesis.
- Patients with history of any spine surgery
- Patients with fractures or any deformities
- Patients having any skin conditions
- Patients with history of whiplash injuries, dislocations of spine
- Age less than 18 and more than 40



Flowchart 1: Study design and methodology

Methodology

All the subjects were recruited after meeting the inclusion and exclusion criteria and the demographic data was collected with the initial assessment of the outcome measures, VAS, NDI questionnaire and Mg RBC level was assessed by taking blood sample at baseline levels on the 1st day. The individuals were divided into 2 groups: Experimental group and Control group randomly.

The conventional treatment was given to both groups

1. Supine retraction
2. Isometric strengthening:
 - Neck flexion isometric strengthening exercise
 - Neck extension isometric strengthening exercise
 - Neck side bend isometric strengthening exercise
3. Chin Tuck

The Experimental group was given the conventional treatment as mentioned above along with Application of 15-20 spray of DR MG+ magnesium oil/day for 6 months over affected area (transdermally).

All the outcome measures were again assessed post completion of treatment on 3rd month and 6th month. Results were analysed.

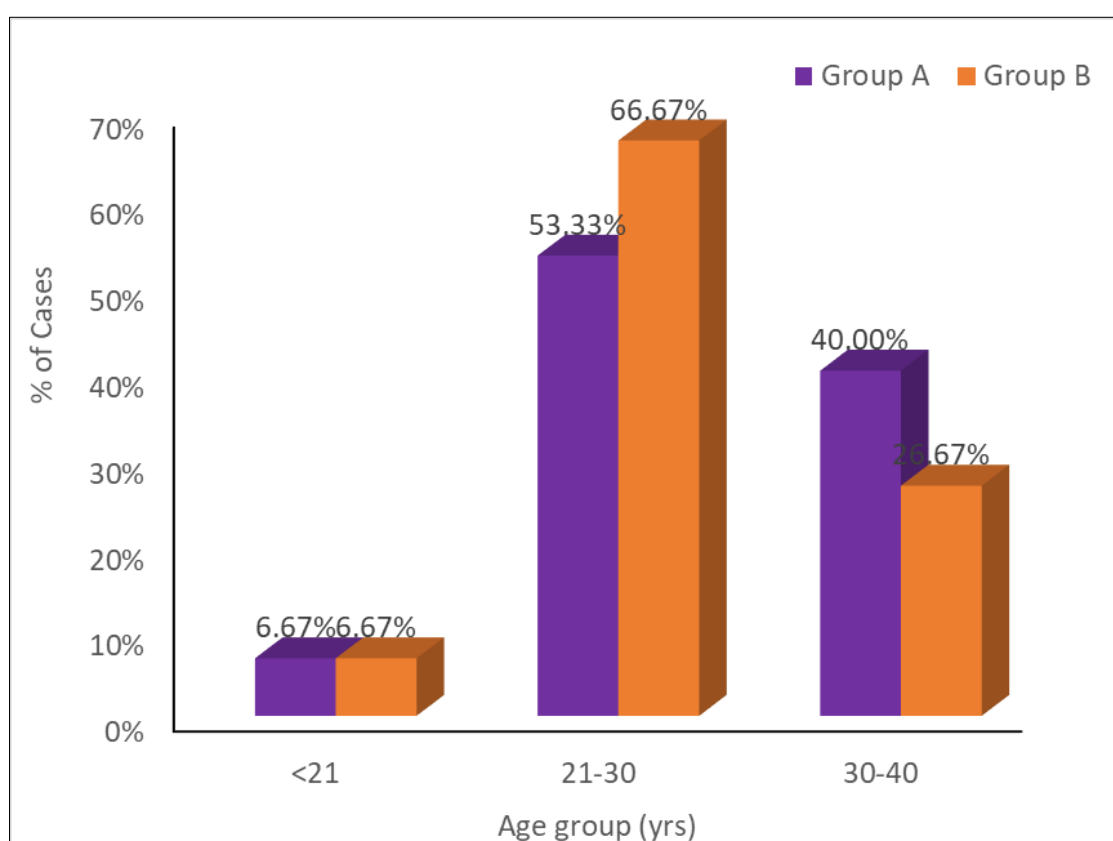
Statistical analysis

Data was collected using MS Excel and was then analysed using Statistical Package Of Social Sciences (SPSS) version 21. Variables were then subjected to find number and percentage, mean, standard deviation etc. Mann-Whitney U, Wilcoxon matched pair, ANOVA test and Chi square tests were applied as per requirement and level of significance was obtained. A p value of less than 0.05 was considered significant.

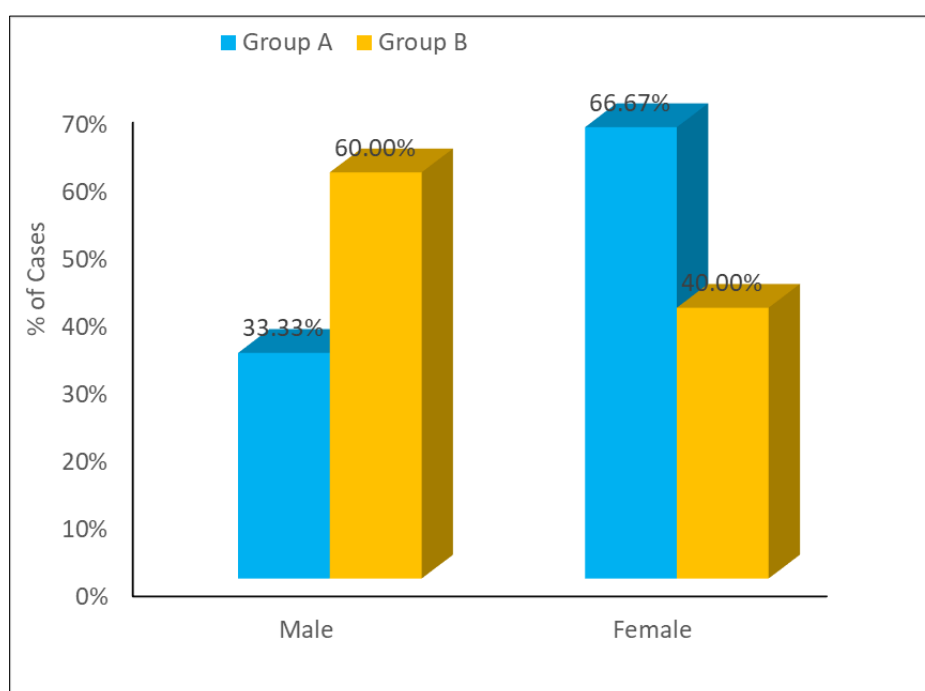
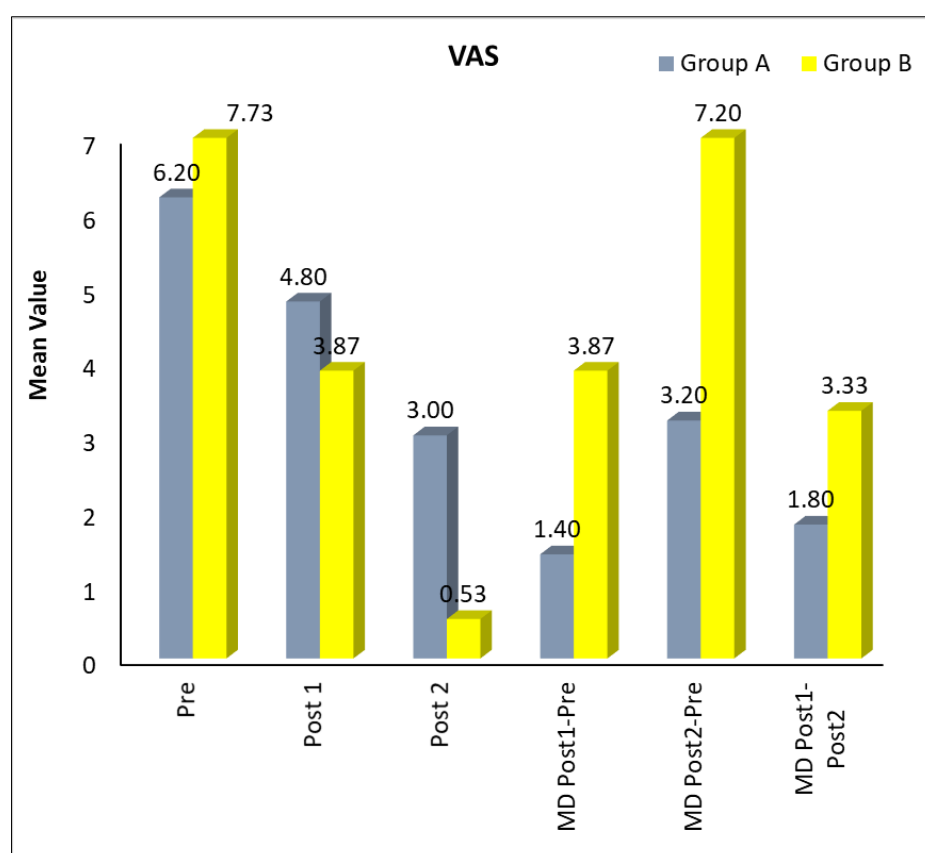
Results

Demographic characteristics of study population.

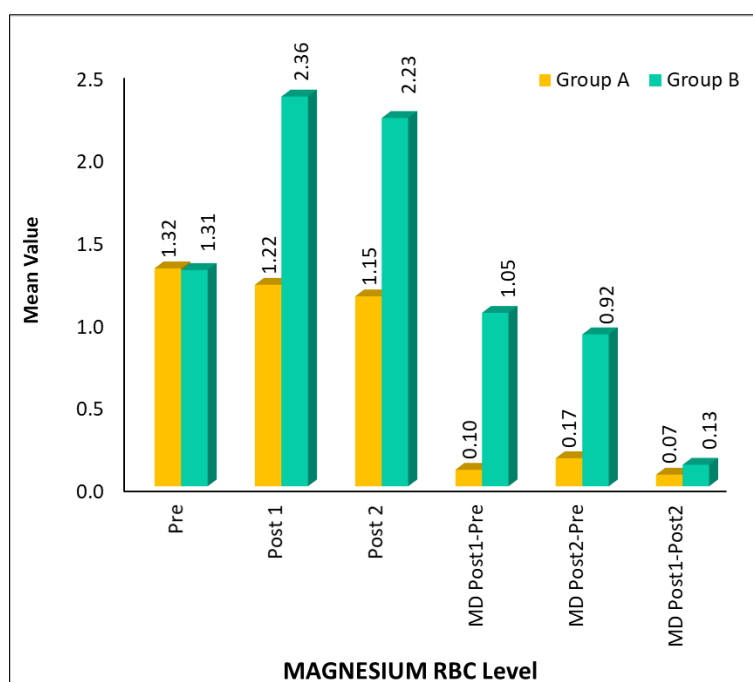
Comparison of Group A and B Patients by Age



Graph 1: Patient Age Distribution in Groups A and B

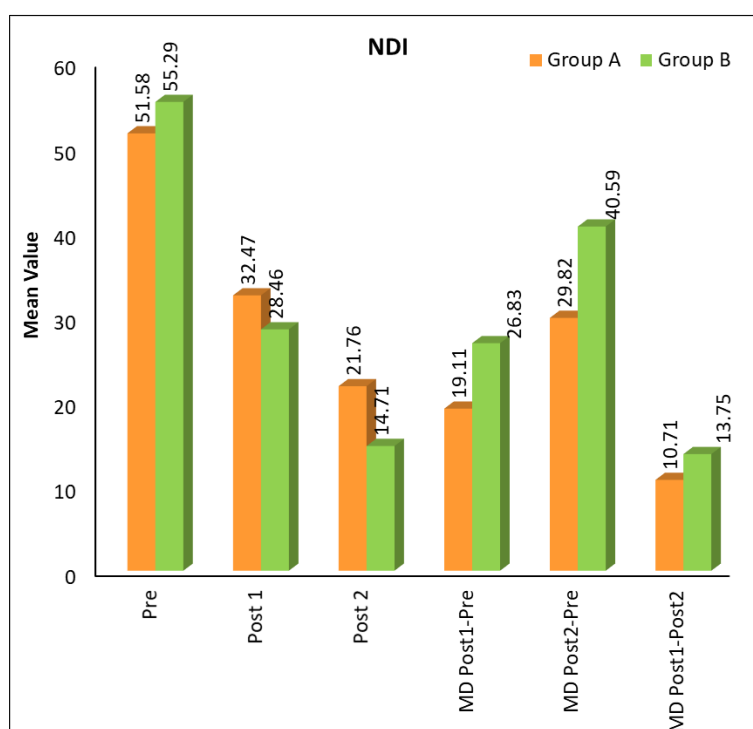
Patients in Groups A and B, Broken Down by Gender**Graph 2: Patients in Groups A and B, Broken Down by Gender****6.2 comparison of vas score at pre, post1 and post2 for group A and B****Graph 3: \bar{X} and σ of VAS at Pre, Post1 and Post2 for Group A and B**

6.3 comparison of mg RBC level at pre, post1 and post2 for group A and B



Graph 4: Values Comparing Means for Magnesium RBC Level at Pre, Post1, Post2 and within Group A and Group B

6.4 comparison of NDI at Pre, Post1 and Post2 for Group A and Group B



Graph 5: Values Comparing Means for NDI at Pre, Post1, Post2 and within Group A and B

Discussion

There are major components for the traditional management of neck pain or rehabilitation for neck pain, but there is a major disorientation in treating

neck pain because physical symptoms are only one part of other associated factors. Blood chemistry also plays a major role in treating neck pain in the modern era, but it is ignored because of a lack of awareness,

and magnesium deficiency is profoundly correlated with neck pain.

According to muscle physiology, muscles can only communicate through contraction and relaxation; as a result, if a muscle is unable to contract or relax for any reason, this interferes with the production of normal movement. Additionally, because the muscle's cellular level mechanism is altered as a result of the lack of muscle contraction, PH imbalance results, which can have devastating effects.

Increasing intracellular magnesium levels and achieving a favourable calcium-magnesium balance is a very efficient and successful method. Transdermal application is the greatest method to replenish low cellular magnesium levels since every cell in the body bathes and feeds on magnesium. Magnesium sulphate (MgSO₄) and magnesium citrate (C₆H₆MgO₇) are frequently utilised as a muscle relaxant for usage in orthopaedic medicine because they contain qualities that can relieve pain by relaxing NMDA receptors and vasodilators. These characteristics are probably due to its capacity to inhibit presynaptic acetylcholine discharge from sympathetic and neuromuscular synapses.

Furthermore, C₆H₆MgO₇ solution has the potential to be used as an adjuvant pain medication with few side effects because it can have an antinociceptive impact in both central and visceral pain tests. In earlier research, C₆H₆MgO₇ has been given orally or intravenously to lessen pain intensity, especially in patients with myogenous pain.

We discovered that in patients with resistant non-specific neck pain, using C₆H₆MgO₇ supplements transdermally decreased pain intensity and increased cervical mobility.

Magnesium supplementation for myofascial persistent neck pain is not supported by the available research at this time. However, a modest body of research suggests that magnesium may be helpful for preventing migraines and tension headaches, and may help individuals with type 1 complex regional pain syndrome (CRPS) experience less discomfort.[54] So, the present study was conducted to test the role of Transdermal magnesium supplementation with standard physiotherapeutic treatment for NSNP patients. The effect was demonstrated through by using various clinical outcome measures before and after the administration of intervention.

Limitation

- Patients were not asked about the drug history which can significantly affect the pain intensity and magnesium RBC levels.
- Limited Group was selected
- It was a single centric, small sample size study with no long term follow up due to time constrain of the study.

Recommendation

- A multi-centric study can be conducted with a larger sample size and long term follow up.
- Systemic review and meta-analysis have to be conducted to confirm the effect of magnesium for given condition.
- Magnesium RBC Test may be use as primary outcome measure to check Magnesium level or deficiency in subjects.
- To focus on a larger number of human subjects given higher concentrations of Mg oil application administered for longer durations to investigate whether transdermal application may show a significant contribution to improvement in magnesium status and pain.
- To use different type of magnesium for pain relief in various different conditions.
- To look at the effect of transdermal Mg supplementation on athletes as compared to a sedentary population group.

Abbreviations

NSNP – Non-specific neck pain; VAS – Visual analogue scale; NDI – Neck disability index; NMDA – N-methyl-D-aspartate receptors; Mg – Magnesium; RBC – Red blood cells; SD – Standard Deviation; MD – Mean deviation; DHEA – Dehydroepiandrosterone; RCT- Randomized clinical trials

Conclusion

We found from the current research that patients who got transdermal application of Mg oil had substantial improvements in pain, neck impairment, and magnesium RBC levels compared to those who received simply exercise treatment.

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