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Original Article

Association of Modic Changes with Low Chronic Low Back Pain

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ABSTRACT

Objective: To determine the association of Modic changes with chronic low back pain in the adult population

Study Design: Comparative cross-sectional study.

Place and Duration of Study: Department of Neurosurgery, Combined Military Hospital, Lahore Pakistan, from Jan to Mar 2022.

Methodology: All the patients who were diagnosed with chronic low back pain by Neurosurgeon were included in the study. Detailed history and physical examination were conducted on all the patients diagnosed with chronic low back pain. MRI spine was performed on all the study participants for Modic changes. Relevant socio-demographic factors were associated with different types of Modic changes in patients included in our analysis.

Results: Out of 300 patients managed for chronic low back pain during the study period, 201(67%) were male, while 99(33%) were female. 172(57.3%) had no Modic changes, 33(11%) had Type-I changes, 80(26.7%) had Type-II changes, and 15(5%) had Type-III Modic changes. Advancing age, female gender and presence of comorbid illness had a statistically significant relationship with Modic changes in study participants (p-value<0.05).

***Conclusion*:** Modic changes were commonly seen in patients with low back pain. Type II Modic changes were most frequently seen in these patients. Elderly and female patients were more at risk of Modic changes than young and male patients. Comorbid medical illnesses also increase the chances of having Modic changes.

Keywords: Association, Chronic low back pain, Modic changes, MRI.

How to Cite This Article: *Shah A, Ishfaq A, Malik MJ, Akmal M, Javed A, Haider A. Association of Modic Changes with Low Chronic Low Back Pain. Pak Armed Forces Med J 2023; 73(3): 751-754. DOI: https://doi.org/10.51253/pafmj.v73i3.8618*

INTRODUCTION

Epidemiological data suggest that low back ache is the problem of almost all adult age groups, and both genders need detailed assessment by the treating physician.[1] Radiological investigations are widely carried out to look for the cause of low back pain in various settings.[2,3] Chronic cases not responding to treatment or those having vague clinical pictures undergo advanced imaging. MRI spine usually remains the investigation of choice in these cases.[4] MRI findings in patients with chronic low back pain were described systematically as Modic changes and then studied extensively.[5] Literature revealed that around half of the patients might have any Modic changes, which can cause low back pain for multiple reasons. Neuroimaging of patients, especially with chronic low back pain, may help the treating team to pick the changes and address them.[6,7]

The situation regarding back pain statistics may be similar in our part of the world, but we need to manage our resources well. Being a developing country, offering MRI to every patient with back pain may not be possible; therefore, a system should be in place based on evidence generated from local studies.[8,9] A recent study conducted at a tertiary care hospital highlighted that age, gender, profession, working hours, comorbid conditions, trauma, lifestyle, and stresses may affect back pain management.[10] Due to limited local data regarding the use of MRI in low back pain and Modic changes, we planned this study with the rationale to look for different types of Modic changes in low chronic low back pain and factors associated with the presence of these changes in a tertiary care hospital of Pakistan.

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Received: 22 Apr 2022; revision received: 15 Jul 2022; accepted: 18 Jul 2022

METHODOLOGY

The comparative cross-sectional study was conducted at the Department of Neurosurgery, Combined Military Hospital Lahore, from January to March 2022. Ethical approval was taken from the Ethical Committee (letter no 353/2022). The sample size was calculated using the WHO sample size calculation by using the population proportion of Modic changes in backache as 23.8%.[11] Non probability consecutive sampling was used to gather the sample.

Inclusion Criteria: Patients of either gender, aged 18 to 65 years, who were managed for chronic low back pain were included in the study.

Exclusion Criteria: Patients with autoimmune illnesses or any red flag signs of backache were not included in the study. Patients who had already undergone MRI and had no Modic changes or those with any secondary cause of back pain were excluded from the study. Patients with uncontrolled DM, HTN or any malignant condition or chronic infection were omitted as well. Pregnant or lactating ladies or those diagnosed with osteoporosis or osteopenia were part of the exclusion criteria.

Patients who agreed to participate in the study after written informed consent were interviewed with the help of a structured questionnaire. Chronic low back pain was diagnosed by Consultant Neurosurgeon /Resident Neurosurgery based on clinical findings. MRI spine was done at the radiology department of our hospital and reported by a consultant radiologist for the presence of Modic changes. On the basis of MRI findings, Modic changes were classified as Type I, II and III.[12,13]

Statistical Package for Social Sciences (SPSS) version 24.0 was used for the data analysis. Quantitative variables were expressed as Mean±SD and qualitative variables were expressed as frequency and percentages. Chi-square test was applied to explore the inferential statistics. The *p*-value lower than or up to 0.05 was considered as significant.

RESULTS

Of 300 patients managed for chronic low back pain during the study period, 201(67%) were male, while 99 (33%) were female. The mean age of the study participants was 49.41±8.78 years (Table-I). 172(57.3%) patients had no Modic changes, 33(11%) had Type-I changes, 80(26.7%) had Type-II changes, and 15(5%) had Type-III Modic changes. 199(66.3%) patients had backache for less than two years, while 101(33.7%) had this issue for more than two years. 66(22%) had Type-II diabetes mellitus, 22(7.3%) had hypertension, and 10(3.3%) had depression as a comorbid illness. Table-II summarizes the results of the statistical analysis. It was revealed that advancing age (*p*-value <0.001), female gender (*p*-value<0.001), and presence of comorbid illness (*p*-value-0.042) had a statistically significant relationship with the presence of Modic changes in study participants having chronic low back pain.

DISCUSSION

Most of the patients had Type II Modic changes in the study participants, and female patients with more age were found to be more at risk of having Modic changes. Low back pain, especially chronic low back pain, may sometime get ignored by the patient, and treating physicians and painkillers remain the treatment of choice. Changes in the lumbar or sacral spine may cause this back pain and need more attention from the treating team or may be referred to a more equipped team relevant and expert in diagnosing and treating low back pain.[14] The facility of MRI is only available in some parts of our country, and machines in use are already burdened. The treating team, therefore, needs to make a nice balance in this regard. We, therefore, generated some evidence regarding the presence and Types of Modic changes in patients managed for chronic low back pain.

Table-I: Characteristics of Patients with Low Backache included in the Study (n=300)

Parameters	n(%)
Age (years)	
Mean±SD	49.41±8.78 years
Range (min-max)	18 years - 46 years
Gender	
Male	201(67%)
Female	99(33%)
Modic Changes	
Type-I	33(11%)
Type-II	80(26.7%)
Type-III	15(5%)
Duration of Backache	
<2 years	199(66.3%)
2 or more years	101(33.7%)
Comorbid Illnesses	
Diabetes mellitus	66(22%)
Hypertension	22(7.3%)
Depression	10(3.3%)
Others	08(2.7%)

Table-II: Relationship of various Factors with Presence and Severity of Modic Changes (n=300)

Factors studied	No Modic changes	Type I changes	Type II changes	Type III changes	*p*-value
Age					
18-35 years	154 (89.5%)	25 (75.7%)	47 (58.75%)	10 (66.7%)	<0.001
35-60 years	18 (10.5%)	08 (24.3%)	33 (41.25%)	05 (33.3%)	
Gender					
Male	135(78.5%)	18(54.5%)	44 (55%)	04(26.7%)	
Female	37(21.5%)	15(45.5%)	36 (45%)	11(73.3%)	<0.001
Presence of Comorbid Illnesses					
No	121(70.3%)	15(45.4%)	47(58.75%)	11(73.3%)	
Yes	51(29.7%)	18(54.5%)	33(41.25%)	04(26.7%)	0.026
Duration of Backache					
<2 years	118(68.6%)	21(63.6%)	53(66.25%)	07(46.7%)	
>2 years	54(31.4%)	12(36.4%)	27(33.75%)	08(53.3%)	0.400

Saukkonen *et al*.[15] revealed that Modic changes were associated with chronic low back pain in their

study participants. Our results supported the findings generated by Saukkonen *et al*. as more than 40% of the study participants had Modic changes, and more than1/4th of the study participants had Type-II Modic changes. Manniche *et al.* evaluated the role of MRI studies, and Modic changes in determining the role of infections and their treatment on low back pain.[16] They concluded that studying Modic changes may help determine the impact of infections and their treatment on long-term chronic low back pain. A Russian study published in 2017 summarized the pathogenesis and other aspects of the relationship of Modic changes with chronic low back pain.[17] Our results also concluded that Modic changes were commonly seen in patients with low back pain. Type II Modic changes were most frequently seen in these patients. Elderly and female patients were found more at risk of Modic changes than young and male patients. Comorbid medical illnesses also increase the chances of having Modic changes. A systematic literature review and meta-analysis were published in 2008 regarding the association of Modic changes with non-specific LBP (low back pain) and/or activity limitation and if such associations are modified by other factors.[18] They concluded that there was some association between Modic changes and low back pain. However, they faced the problem that these changes might also be present in patients without low back pain. Though the design was slightly different, our study still revealed similar findings. These changes were present in patients with low back pain and more in females and patients with other chronic medical conditions.

LIMITATIONS OF STUDY

The main limitation of this survey is that low back pain was established based on patients' accounts and clinical findings instead of the detailed quality of life review. Interpretation of MRI by different radiologists and Neurosurgeons may be biased as it is observer dependent. It may not be an actual representation of the burden of Modic changes among these patients. Many patients did not accept to undergo MRI, which may affect the overall results.

CONCLUSION

Modic changes were seen commonly in patients presenting with low back pain. Type II Modic changes were most frequently seen in these patients. Elderly and female patients were found more at risk of Modic changes than young and male patients. Comorbid medical illnesses also increase the chances of having Modic changes.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

AS & AI: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

MJM & MA: Critical review, data acquisition, drafting the manuscript, approval of the final version to be published.

AJ & AH: Data acquisition, data analysis, drafting the manuscript, concept, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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