Oxidative Status in Degenerated Painful Intervertebral Disc Samples: Variability with Respect to Duration of Symptoms and Type of Disease

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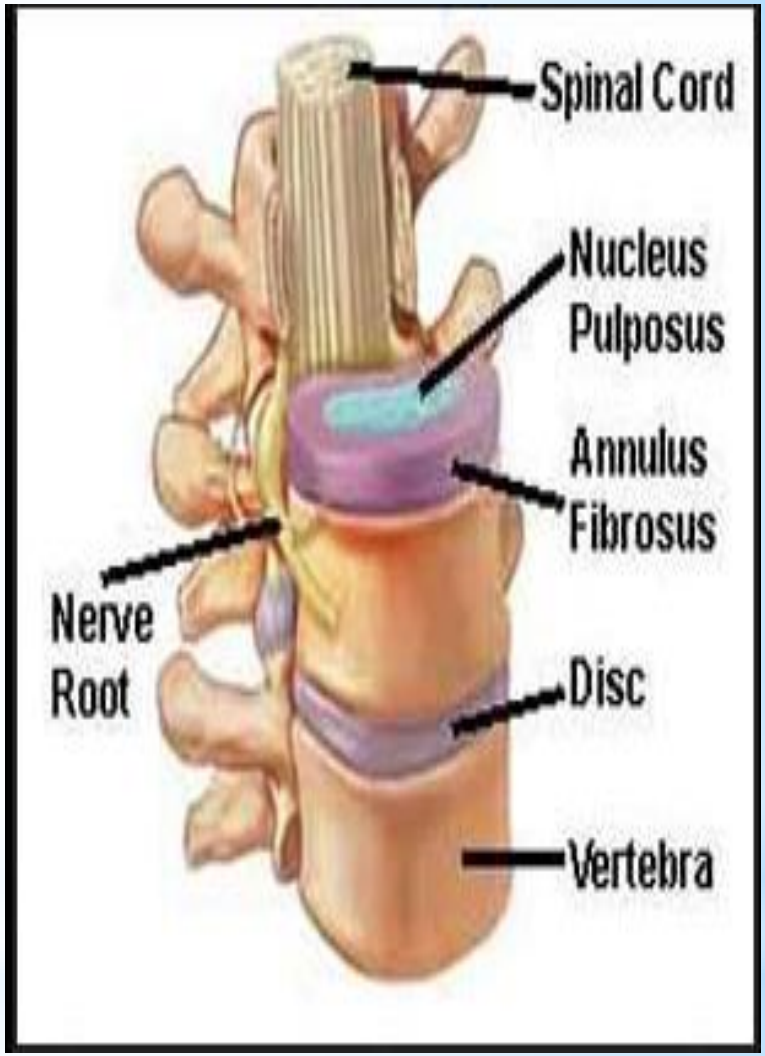
Intervertebral Disc

- The intervertebral disc *(intervertebral fibrocardilage)* is the part of the spine *(vertebral column)* between two vebtebra *(spine bone).*

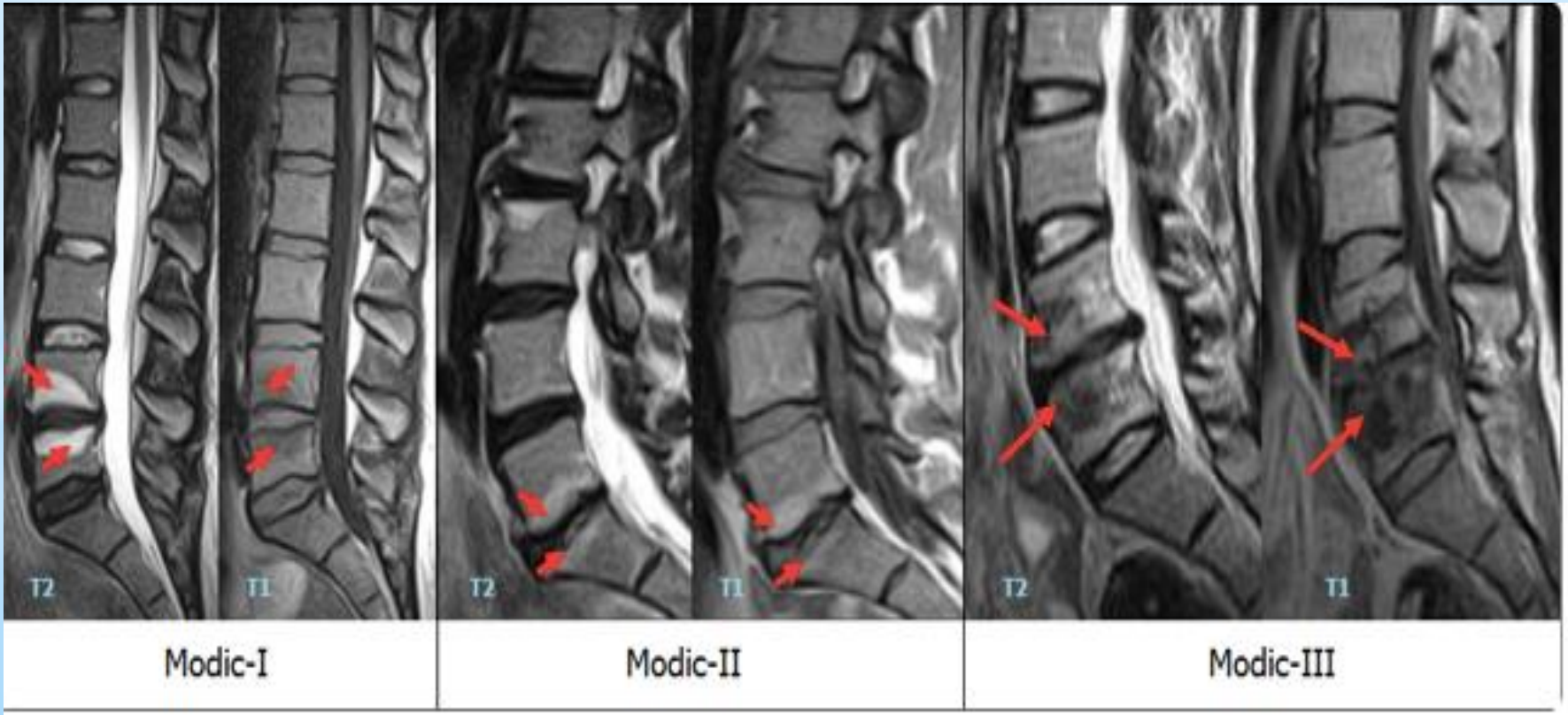


Modic (MC)

- Degenerated vertebra and plate signal changes on MRI are called modic.
- Modic is divided into three.

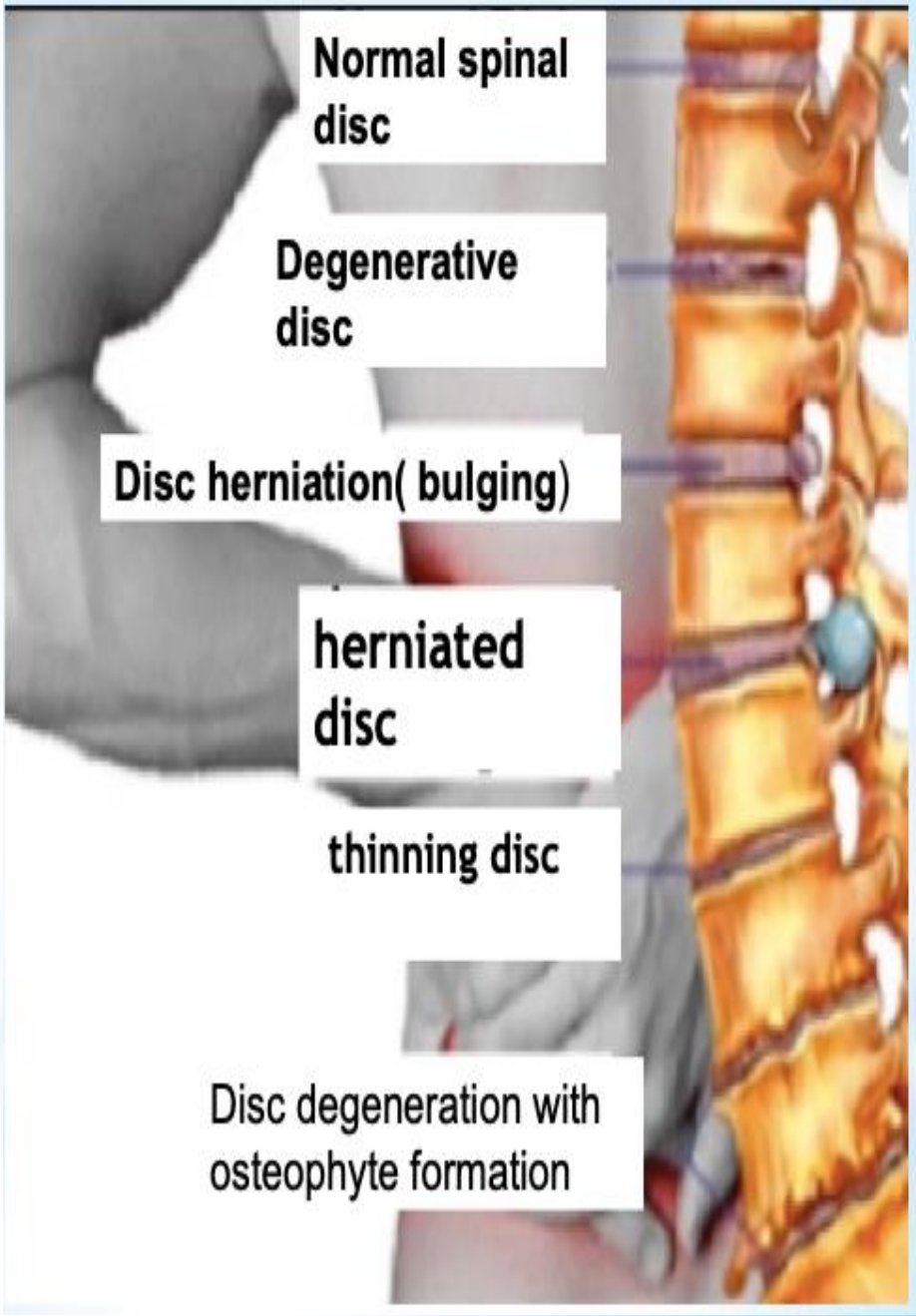
- The earliest accepted type I change lesions were; The most active stage during the modic evolution is associated with vascular granulation tissue within the subchondral bone.
- Modic II reflects fat replacement of the red bone marrow.
- Type III lesions are seen in vertebral bodies showing sclerotic changes.

Modic types



Objectives

- Degenerated discs and endplate abnormalities is postulated as a possible source of low back pain.
- Oxidative stress plays an important the role in various human diseases.
- This is the first study, we aimed to investigate the levels of oxidative stress biomarkers in disc samples of patients with Modic Changes.



Materials and Methods

- Patients (n:15) were separeted as modic(MC) I, II, and III types.
- Of these cases, 3 had complaints for less than 6 months, whereas 3 patients had been suffering from low back pain and leg pain for more than 6 months.
- Six patients have been diagnosed with subligamentous type and 3 patients had free fragment type of disc degeneration.
- The activities of catalase (CAT) and superoxide dismutase (SOD), and the levels of malondialdehyde (MDA) in disc samples were determined on spectrophotometer.
- CAT Beutler method, SOD Fridovich method, MDA Ohkawa method were studied.

Table 1 : Demographic and clinic data in patients with modic changes

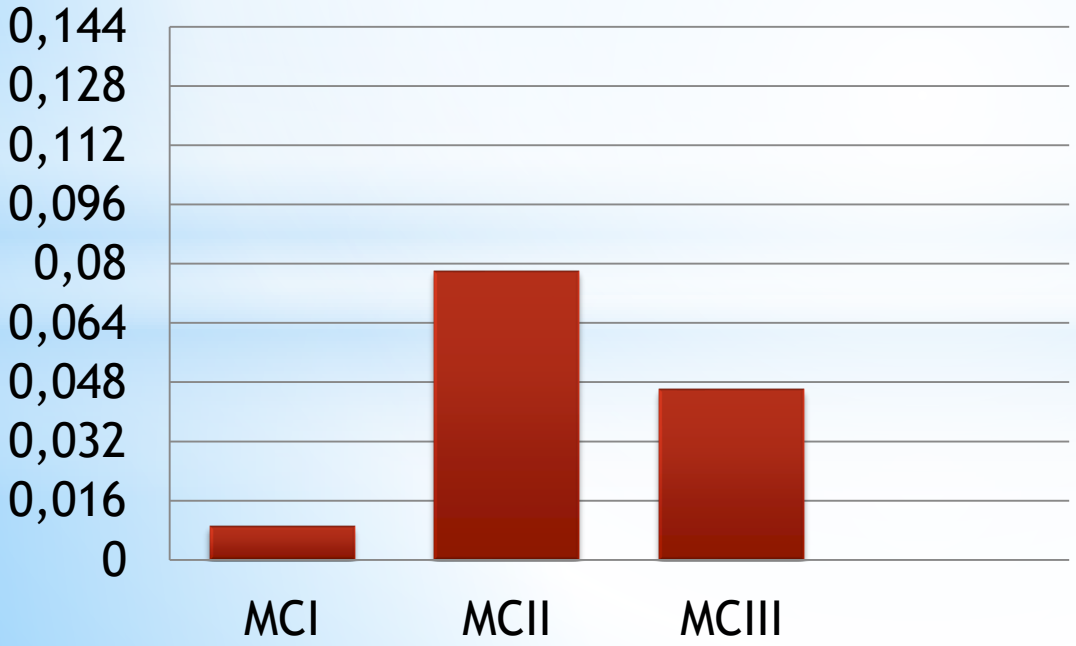
sex	age(yr)	duration	symptom	diagnosis	level	Endplate (MRI)
male	54	2 year	Low back pain	Disc degeneration	L4-L5	MCII
male	60	2 year	Low back pain+leg pain	Disc degeneration	L4-L5	MCIII
male	37	1 year	Leg pain	Disc herniation (protrusion)	L3-L4	MCI
male	39	2 year	Low back pain+leg pain	Disc herniation (protrusion)	L3-L4	MCII
female	69	5 year	Low back pain	Disc herniation (bulging)	L4-L5	MCI
male	55	3 year	Low back pain	Disc herniation (bulging)	L5-S1	MCI
female	49	2 year	Low back pain	Disc herniation (protrusion)	L3-L4	MCIII
female	47	3 year	Leg pain	Disc herniation (protrusion)	L4-L5	MCI
female	37	1 year	Leg pain	Disc herniation (protrusion)	L5-S1	MCI
female	73	8-9 year	Low back pain+leg pain	Disc herniation (protrusion)	L1-L2	MCII
male	39	4 year	Low back pain	Disc herniation (protrusion)	L4-L5	MCI
male	35	2-3 year	Low back pain	Disc degeneration	L4-L5	MCIII
female	40	4-5 month	Low back pain	Disc herniation (bulging)	L3-L4	MCII
female	37	3-4 month	Leg pain	Disc herniation (protrusion)	L3-L4	MCIII
male	52	5-6 month	Leg pain	Disc herniation (protrusion)	L3-L4	MCII

RESULTS

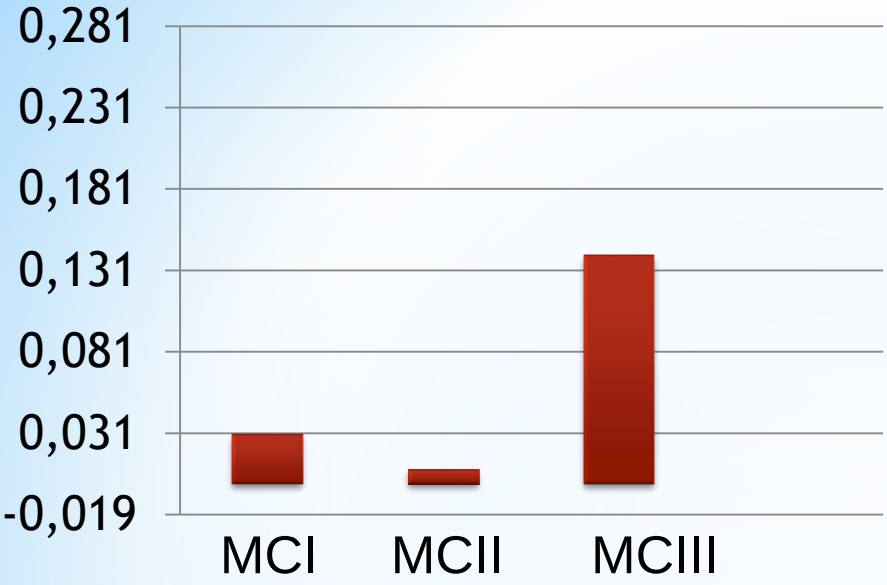
Table 2: The results of CAT, SOD and MDA in all groups

	Modic I	Modic II	Modic III
CAT(U/mg protein)	0.012±0.006*	0.142±0.0147**	0.077±0.016***
SOD(U/mg protein)	0.0015±0.003*	0.036±0.015**	0.011±0.007***
MDA(nmol/mg protein)	0.0078±0.0029*	0.013±0.006**	0.281±0.094***

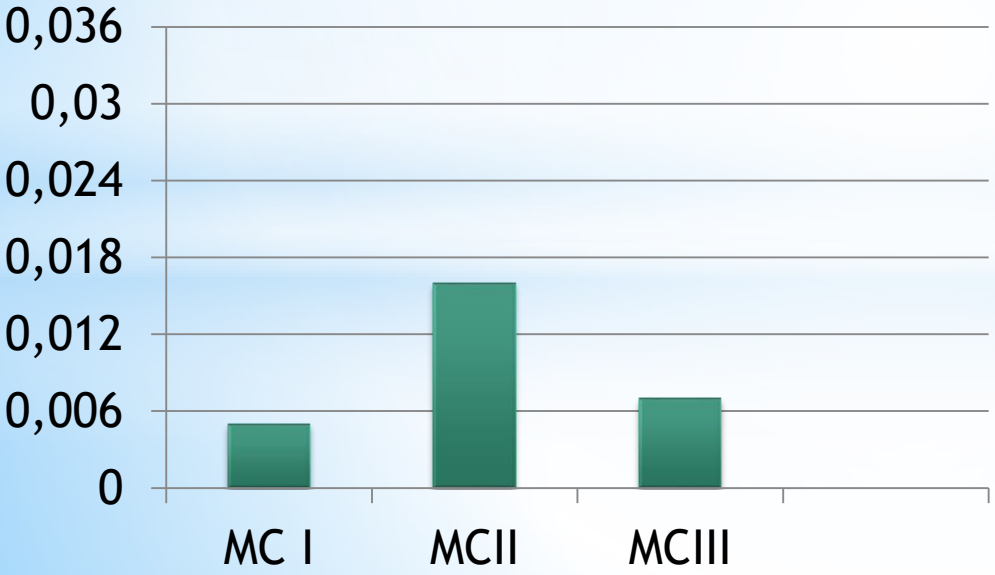
- *'**There were significant differences between MC I and MC II ($p<0.05$)
- *'**There were significant differences between MC I and MC III ($p<0.05$)



Catalase (U/mg protein) level in modic patients



MDA(nmol/ mg protein) level in modic patients



SOD (U/mg protein) level in modic patients

- Oxidative stress was confirmed by the significant elevation MDA levels and decreased of CAT and SOD activities in MCI compared with other MCs ($p<0.05$).
- The highest CAT and SOD activities were found in patients with MCII compared with the other MCs. However, the levels of MDA showed moderate increase in this group ($p<0.05$).
- In addition, the levels of oxidative stress biomarkers in patients with MCIII were slightly higher than the other MCs ($p< 0.05$).

Conclusion

Our findings indicated that oxidative stress in patients with MCI may be aggravated as a result of oxidant/antioxidant imbalance and it may cause formation of the lesion in these patients.

THANK YOU FOR YOUR ATTENTION

Any Questions?