

## The Therapeutic role of Magnesium in different depressive syndromes of the male population comprising of different age groups

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### ABSTRACT

The basic and fundamental role of Mg as being the second most abundant intercellular cation is established in various studies. It is identified as a divalent metal cofactor in over 300 enzymatic reactions involving energy metabolism and protein and nucleic acid synthesis. The biological function is identified in neuromuscular excitability. Mg ion regulates calcium ion flow in neuronal channels, helping to regulate neuronal Nitric Oxide production<sup>1</sup>. Mg deficiency causes NMDA coupled Calcium channels to be biased towards opening, causing neuronal injury & neurological dysfunction, which may appear to humans as major depression. The present study confirms a reduction in the symptoms of depression found in the male population comprising of different age group by Mg treatment. CSF Mg has been found low in treatment resistant suicidal depression. Brain Mg is also low in TRD using phosphorous nuclear magnetic resonance Spectroscopy<sup>2</sup>. A 2009 randomized clinical trial shows that Mg therapy was an effective as TCAs in depressed diabetics. Increase in brain Mg enhances both short term synaptic facilitation and long term potentiation and improves learning and memory function<sup>3</sup>. The present study is based on findings that male subjects diagnosed as depressed showed a marked reduction in behavioral and somatic features of the disease after administration of Magnesium supplement. Physiological and somatic anxiety was also alleviated in a certain age group which displayed recovery from Insomnia and agitation. Suicidal tendency was also negative in all age groups. This study focuses on the behavioral and somatic responses pertaining to brain biochemical changes induced by Magnesium therapy.

**Keywords:** Depression, magnesium, antidepressants, insomnia, guilt feeling, calcium channels, suicidal depression, hypochondriasis

### 1. INTRODUCTION

The psychological and physical symptoms leading to specific behavioral and somatic features of major depression are identified and evaluated in this study for male patients comprising of three different age groups. The patients are classified as subject of either reactive/secondary depression or bipolar affective disorder. It is established that besides biological vulnerability of the disease to be inherited, a combination of genetic, psychological and environmental factors are involved in depressive disorder, later episodes of illness typically are precipitated by only mild stress.

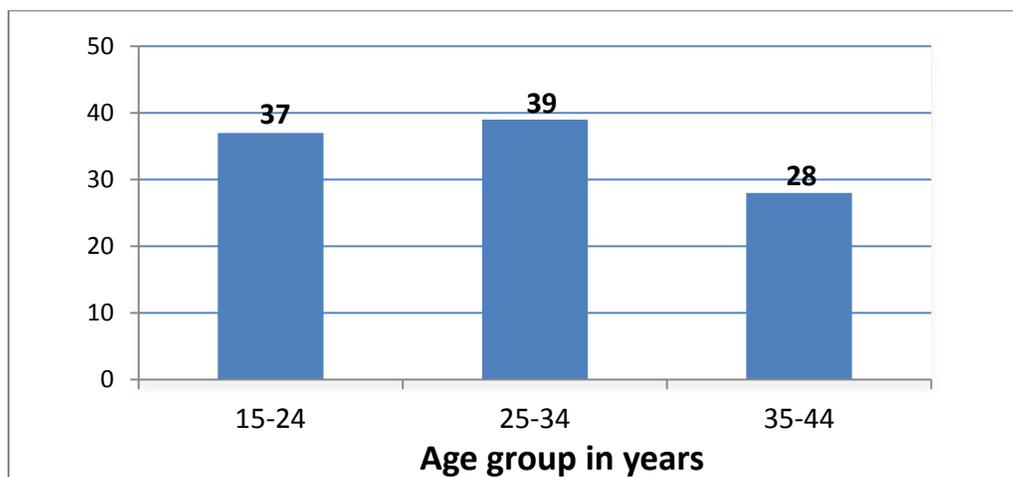
The male patients included in the study were clinically diagnosed by DSM IV as patients of chronic pain with major depression at the stage of diagnosis, low CSF magnesium and calcium are involved in many processes related to depression.<sup>4</sup> Valid studies have confirmed that hypercalcemia and hypomagnesaemia are associated with depression<sup>5</sup> based on the relationship of cations magnesium functions as a calcium antagonist. Serum and CSF ca/mg ratio are found to be elevated in depressed patients<sup>6</sup>, whereas patients of chronic pain with depression identified with low levels of CSF magnesium offer considerable data bearing clinical significance. Magnesium is a natural ca channel blocker. Clinically magnesium deficiency has been associated with cardiac arrhythmia, hypertension, MI, stroke, anxiety, migraine, panic attacks, epilepsy, osteoporosis, immune dysfunction as well as chronic fatigue, acute musculoskeletal pain and reflex sympathetic dystrophy, all illnesses with high incidence of concomitant depression<sup>7-10</sup>

### 2. MATERIAL AND METHOD

Thirty male patients were diagnosed with depression by a positive DSM IV test for depression<sup>11</sup> as well as MMPI and clinical evaluation. These patients were classified in three age groups for assessment and clinical assessment of specific features such as agitation, guilt feeling, psychomotor retardation, insomnia, anxiety, weight loss and hypochondria. These patients were also subject to chronic pain with depression. The patients underwent lumbar puncture as part of an evaluation for headache or suspected meningitis and were found to demonstrate no physical or mental disorder. A low level of magnesium in the CSF was detected in all patients.

The patients underwent standard measurement of cell magnesium by magnesium load test<sup>12</sup> all thirty patients were found deficient in magnesium. The dietary intake of the patients were assessed during the course of study with a comprehensive food frequency questionnaire. The thirty patients were treated with a daily dose of oral Magnesium Taurate for six weeks and psychomotor and psychological symptoms were carefully monitored. The patients were divided into three categories of age group.

1) Age group 15-24    2) Age group 25-34    3) Age group 35-44



**Table-1:** Symptoms decreased /improvement (%) after treatment according to age

S.No.	Symptoms	Age in years		
		15-24	25-34	35-44
1.	Depressed Mood	16.7	16.7	62.5
2.	Guilt Feeling	66.7	66.7	33.3
3.	Suicidal Tendency	1.4	44.4	66.7
4.	Insomnia(early, middle, late)	20.0	40.0	0.0
5.	Work and Activities	40.0	57.1	33.3
6.	Retardation-Psychomotor	50.0	66.7	50.0
7.	Agitation	50.0	20.0	33.3
8.	Anxiety Psychological	40.0	50.0	60.0
9.	Anxiety Somatic	40.0	80.0	0.0
10.	Somatic Symptoms GI	50.0	75.0	0.0
11.	Somatic Symptoms General	0.0	0.0	0.0
12.	Sexual Dysfunction/Menstrual Disturbance	80.0	20.0	50.0
13.	Hypochondrias	0.0	25.0	0.0
14.	Weight Loss	0.0	0.0	0.0
15.	Insight	50.0	20.0	33.3

### 3. RESULTS AND DISCUSSION

Depressed mood was relieved in all the age groups and was markedly reduced in age group 35-44 after oral magnesium intake. The group was labeled for treatment resistant depression (hereafter referred to as TRD), however the male patients exhibited marked reduction of behavioral and somatic features of the disease after administration of magnesium supplement. The response in male patients with TRD has been reported in previous studies as well<sup>13</sup>

Symptoms of guilt feeling were much reduced in age group 15-24 and group 25-34. Both the age groups demonstrated a better judgment of self-esteem after six weeks of magnesium therapy. It was also noted that diabetic males in each group found relief from the intense guilt feeling at early stage of magnesium supplementation. Some studies<sup>14</sup> show that blood glucose levels cause flushing of different minerals along with magnesium sparing calcium.

Suicidal tendency and relishing the idea of suicidal attempts was overall resolved in all the patients. Significant improvement was seen in age group 15-24 after magnesium therapy. A previous trial has shown that magnesium supplementation with varapamil reduces suicidal tendency in male patients with mania.

Insignificant relief of insomnia is observed in all age groups. Maximum improvement in work and activities was seen in age group 25-34. The erythrocytes and also plasma magnesium is shown to be associated with the intensity of depression. Blood hypomagnesaemia and CSF hypermagnesaemia causes hyperexcitability in depressed people<sup>15</sup>, further investigations are in process to show whether hypermagnesaemia might be in contrast associated with psychomotor Retardation as observed in depressed patients. After intake of oral magnesium supplements for six weeks psychomotor retardation was reduced in all the patients. Age group 15-24 also exhibited relief from agitation. Psychological anxiety was relieved markedly in age group 35-44, whereas somatic anxiety was reduced in age group 25-34 markedly. This group also responded to magnesium intake by showing a reduction in somatic symptoms GI. General somatic symptoms however were not relieved.

Sexual function was improved in age group 15-24. Hypochondrias was not relieved in any age group except for age group 25-34. There was no weight loss seen in any patient. Insight was improved the most in age group 15-24. the chronic pain with depression is reduced in each patient with an overall sensation of wellbeing.

#### 4. CONCLUSION

On the basis of the study magnesium is found to alleviate the physical and psychological symptoms of depression. Magnesiumtaurate therapy at a daily dose of 450mg is also effective in TRD and can also be given with classical antidepressants for synergistic effects. Increased intake of magnesium rich food substances in patients of anxiety and depression is advised. The study of effect of magnesium therapy at different doses in depression or chronic depression with diabetes bears ample prospect and is open for study.

#### 5. REFERENCES

1. Galburt, E. A., Stoddard B. L. *Biochemistry* 4 (2002) 1: 13851-13860.
2. Slutsky, I., Abumaria, N., Wu, L., Huang, C., Enhancement of learning and memory by elevating brain magnesium. *Neuron*, Jan 28, (2010).
3. *Med. Hypothesis* 2010 Apr; (2009) 74(4): 649-60. Epub Nov 27.
4. Bank, C. M., et.al *Biol. Psychiatry* Feb; (1985) 20(2) 163-71.
5. Levine, J., et.al. *Neuropsychobiology* (1999) 39 (2) 63-70, <http://dx.doi.org/10.1159/000026562>.
6. Widmer, J., et. al, *J. Affect disorder*, June 8; (1995) 34(3); 201-9.
7. Seeling, M. S., *Magnesium Deficiency in the Pathogenesis of Disease*, New York, Plenum Publishing Corporation, (1980), <http://dx.doi.org/10.1007/978-1-4684-9108-1>.
8. Seeling, M. S., *Magnesium Deficiency in Two Hypertensive Patient Groups*. *Southern Medical Journal* (1990) 83:739-42, <http://dx.doi.org/10.1097/00007611-199007000-00004>.
9. Reinhart, R. A., *Magnesium Metabolism*. *Arch Intern Med* (1988) 148: 2415-2420, <http://dx.doi.org/10.1001/archinte.1988.00380110065013>.
10. Seeling, C. B., *Magnesium Deficiency in Two hypertensive Patient groups*. *Southern Medical Journal* (1990) 83: 739-742, <http://dx.doi.org/10.1097/00007611-199007000-00004>.
11. DSM IV (Diagnostic and manual of mental disorder 4th edition, Washington. D.C: APA, (1994): Copyright 1994.
12. Ryzen, E., Elbaum, N., Singer, F. R., et al, *Parenteral Magnesium Tolerance Testing in the Evaluation of Magnesium Deficiency*. *Magnesium* (1985) 4: 137-147.
13. Eby, K. L., *Med Hypotheses*. Apr; (2010) 74(4): 649-60. Epub (2009) Nov 27.
14. Barbagello, renick (1994).
15. Widmer, J., *J Affect Disord*. Jun 8, (1995) 34(3): 201-9.