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Radiological Profile versus Clinical Profile in the Diagnosis of Vitamin B12 Deficiency Neurological Deficits and Its Atypical Presentations.

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I. Introduction

Magnetic resonance imaging has revolutionized the diagnostic field of medicine helping to identify not only the clinically apparent diseases but even the subtle preclinical state of diseases and aid in treatment before they progress to a irreversible stage[1]. These diseases are identified based on the typical findings in various sequences on imaging, of the suspected organ or system involved. Among all, vitamin b12 deficiency is one such disease entity which if recognized early and treated prevents further progression to a irreversible stage.

B12 deficiency has system specific degeneration which can affect brain , spinal cord , optic nerves and peripheral nervous system manifesting as cognitive abnormalities , myelopathy , neuropathy or myeloneuropathic symptoms clinically. It usually affects the posterior cord followed by anterolateral and anterior tract involvement in the later part of the disease.[2] One such entity is the subacute combined degeneration of the cord.

The present study shows presence of the cord abnormalities in the absence of clinical symptoms suggesting the presence of subclinical myelopathy and varied presentation of the same. Two of the cases had presented acutely i.e < 2 weeks and is rare for b12 deficiency to present in such a short duration.

II. Materials and Methods

This is an observational clinical study undertaken in the department of neurology SSIMS & RC , over a period of 1 year. Patients who presented with symptoms suggestive of myelopathy or neuropathy or myeloneuropathy with low B12 levels were included for the study. Presenting symptoms were paresthesia of lower extremities (94% , 47 patients) , difficulty in getting up from squatting position (2% , 1 patient) and lhermittes sign (4% , 2 patients). MRI 1.5 T of the spinal cord and serum vitamin B12 levels were done for all these patients.

MRI findings of posterior column T2 hyperintensity and inverted V sign on axial image were taken as diagnostic finding of vitamin b12 deficiency after excluding other causes like HIV, copper deficiency and nitrous oxide poisoning. These patients also had low vitamin b12 levels. Patients with other causes of neuropathy , myelopathy and myeloneuropathy were excluded from the study. Patients of age less than 18 years were excluded from this study.

III. Results

The study included 50 patients , 31 (62%)were females & 19(38%) were males.

Table 1 Duration of Symptoms:-

- 48 patients presented by 2weeks to 3months and 2 of them presented in < 2 weeks duration.

Duration of Symptoms	**Gender**		**Total (n=50)**
	Female (n=31)	Male (n=19)	
2weeks to 3months	28(90.3%)	19(100%)	48(96%)
<2 Week	3(9.7%)	0(0%)	3(6%)

Subclinical myelopathy was seen in 50 % of patients 28% had myelopathy

In the clinic radiological correlaton group absent vibration sense upto anterior superior iliac spine was more common than absent ankle jerk . In patients with no clinic radiological correlation majority of the patients had abnormal mri with a stastical significance.

Duration of symptoms with no clinicoradiological group were 41 out of 50 and 40 were in 2 weeks – 3months which was also statistically significant with duration of symptoms , implying that no relation of duration of symptoms with imaging and all patients have to undergo imaging.

Over all in all the groups female were more common to have the clinical symptoms and signs with abnormal and normal mri findings and also among the group with no clinic hematological co relation group and clinico radiological.

No of patients with subclinical myelopathy were more in number than clinical myelopathy . Patients with no clinic radiological corealtion group was also statistically significant in our study determining the importance of imaging. It also helps to determine the subclinical stage of disease that could involve any part of neuraxis.

Table 2: Presentation

Presentation	**Gender**		**Total (n=50)**
	Female (n=31)	**Male (n=19)**	
Paresthesia of lower extremity	29(93.5%)	19(100%)	48(96%)
Lhermitte sign	2(6.5%)	0(0%)	2(4%)

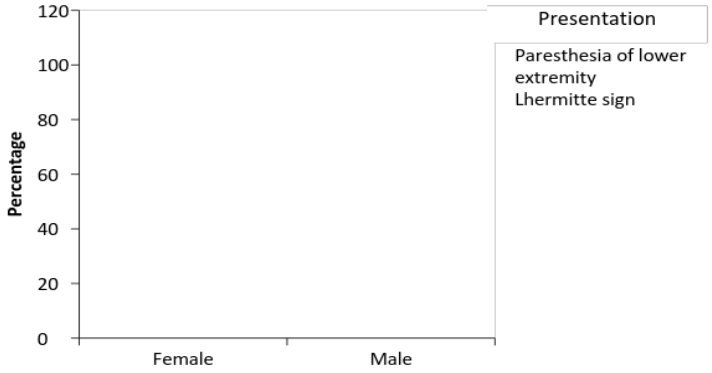


Table 4: Examination mc abnormality

Examination mc abnormality	**Gender**		**Total (n=50)**
	Female (n=31)	**Male (n=19)**	
Absent AJ*	13(41.9%)	7(36.8%)	20(40%)
Absent vibration sense			
• 1)Only toes	3(9.7%)	0(0%)	3(6%)
• 2)Upto ant.superior iliac spine	21(67.7%)	11(57.9%)	32(64%)

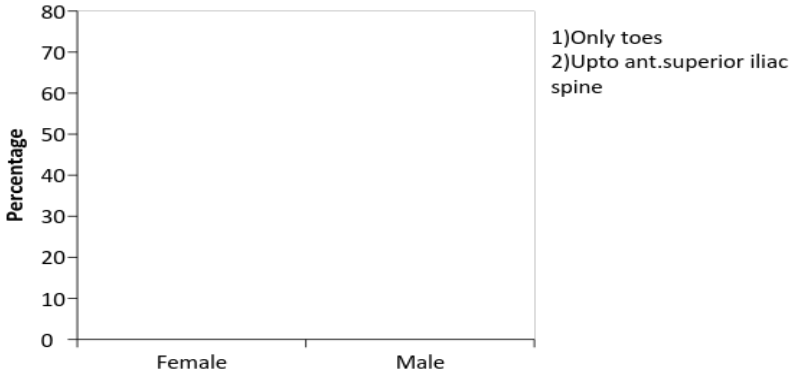


Table 6: MRI findings

MRI	**Gender**		**Total (n=50)**
	Female (n=31)	**Male (n=19)**	
Normal	15(35.5%)	4(10.5%)	19(26%)
Abnormal	16(51.6%)	15(78.9%)	31(62%)

P=0.040*, Significant, Chi-Square test

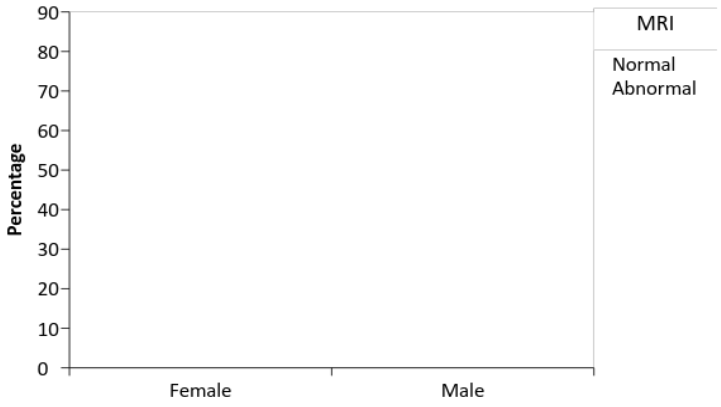


Table 8: Results

Results	Gender		Total (n=50)
	Female (n=31)	Male (n=19)	
Neuropathy clinical	6(19.4%)	0(0%)	6(12%)
Myelopathy clinical	6(19.4%)	8(42.1%)	14(28%)
SubclinicalMyelopathy	12(38.7%)	13(68.4%)	25(50%)

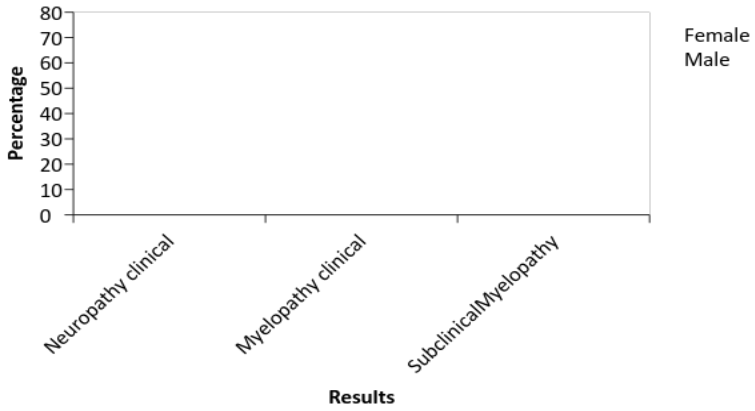


Table 15: Gender distribution in association with clinical and radiological correlation

Gender	clinicaland radiological correlation		Total
	No	Yes	
Female	26(63.4%)	5(55.6%)	31(62%)
Male	15(36.6%)	4(44.4%)	19(38%)
Total	41(100%)	9(100%)	50(100%)

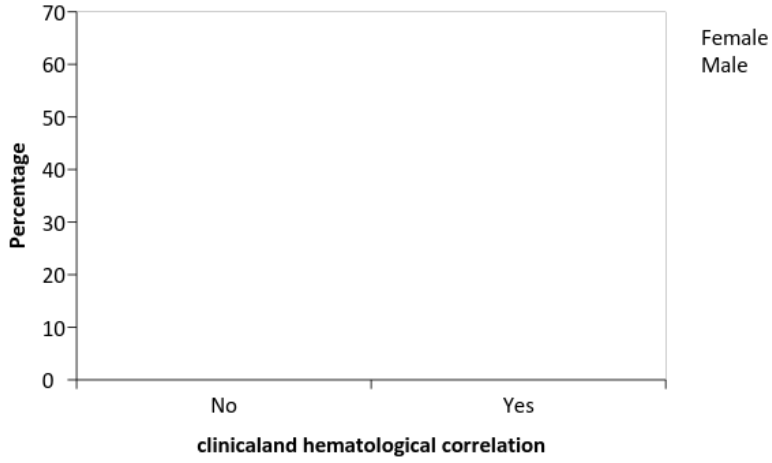


Table 16: Presentationin association with clinical and radiological correlation

Presentation	clinicaland radiological correlation		Total (n=50)
	No (n=41)	Yes (n=9)	
Paresthesia of lower extremity	39(95.1%)	9(100%)	48(96%)
Lhermitte sign	2(4.9%)	0(0%)	2(4%)

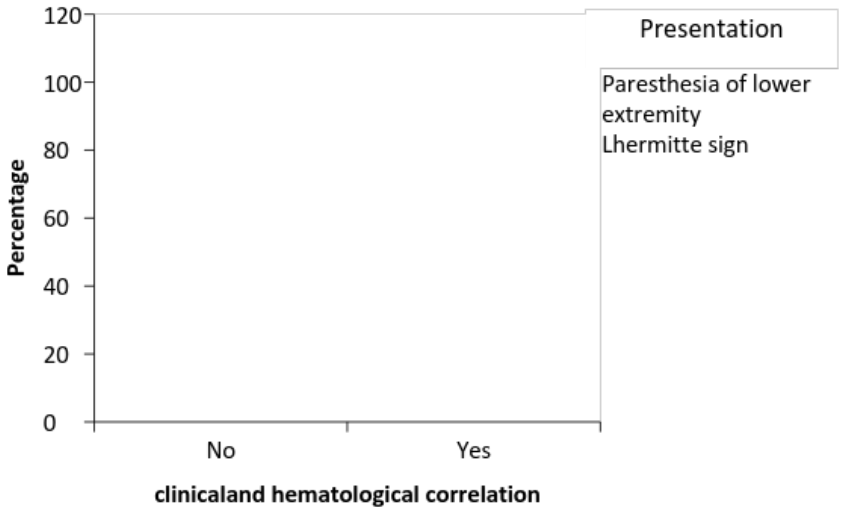


Table 17: Duration of Symptoms in association with clinical and radiological correlation

Duration of Symptoms	clinicaland radiological correlation		Total (n=50)
	No (n=41)	Yes (n=9)	
2weeks to 3months	40(97.6%)	7(77.8%)	47(94%)
<2 Weeks	1(2.4%)	2(22.2%)	3(6%)

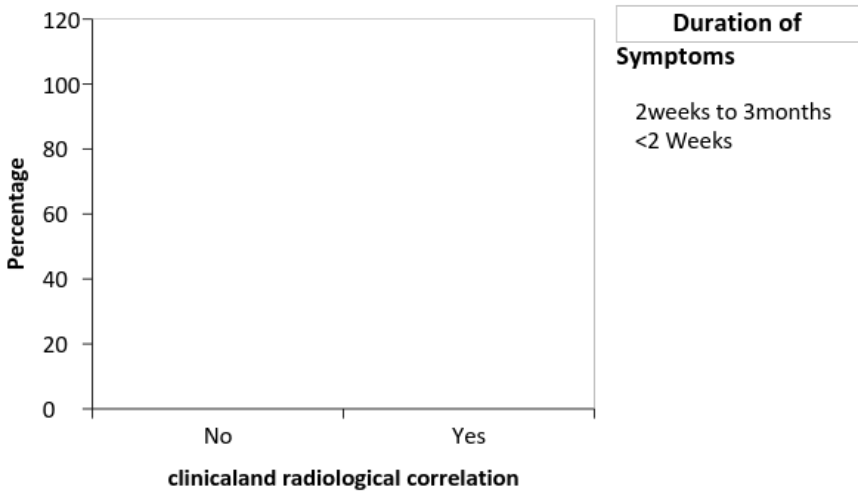


Table 24: Examination MC Abnormality in association with clinical and radiological correlation

Examination MC Abnormality	clinicaland radiological correlation		Total (n=50)
	No (n=41)	Yes (n=9)	
Absent AJ*	16(39%)	4(44.4%)	20(40%)
Absent vibration sense			
• 1)Only toes	3(7.3%)	0(0%)	3(6%)
• 2)Upto ant.superior iliac spine	23(56.1%)	9(100%)	32(64%)

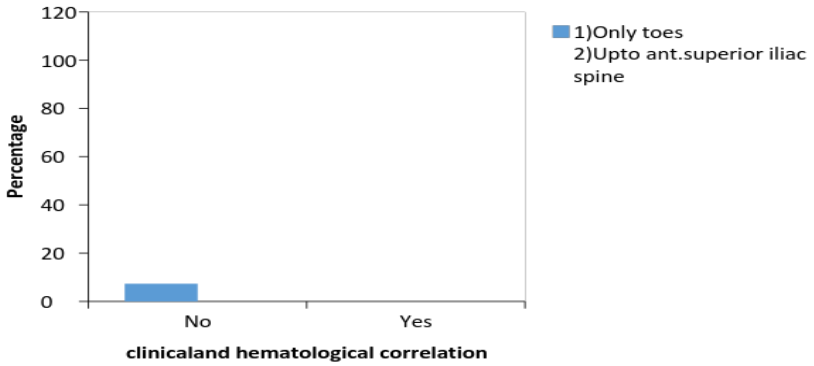


Table 26: MRI in association with clinical and radiological correlation

MRI	clinicaland radiological correlation		Total (n=50)
	No (n=41)	Yes (n=9)	
Normal	13(31.7%)	0(0%)	13(26%)
Abnormal	24(58.5%)	7(77.8%)	31(62%)

P=0.062+, significant, Chi-Square test

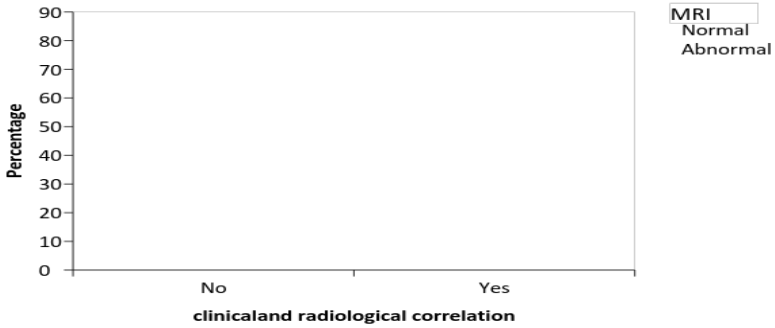
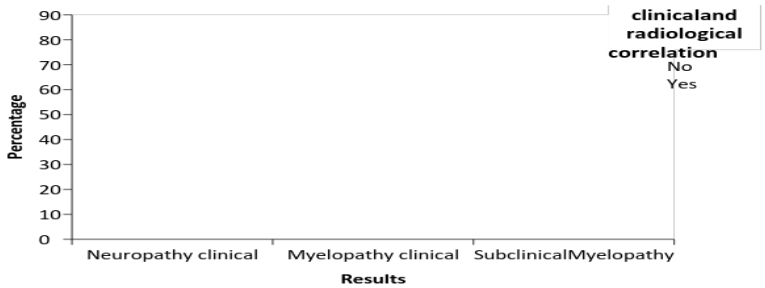


Table 28: Results in association with clinical and radiological correlation

Results	clinicaland radiological correlation		Total (n=50)
	No (n=41)	Yes (n=9)	
Neuropathy clinical	6(14.6%)	0(0%)	6(12%)
Myelopathy clinical	14(34.1%)	0(0%)	14(28%)
SubclinicalMyelopathy	18(43.9%)	7(77.8%)	25(50%)



IV. Discussion

Vitamin b12 deficiency can affect various systems apart from nervous system, including mucus membrane , skin ,hematological system and the gastrointestinal system. It can affect any part of the nervous system of which affection of the cord is a well known entity as subacute combined degeneration involving predominantly posterolateral columns. Vitamin b12 deficiency causes decrease in the myelin synthesis due to accumulation of methylmalonyl coa and impaired DNA synthesis hindering olingodendrocyte growth and

myelin production.[3] These factors manifest as diffuse multifocal pattern of axonal loss and demyelination in the various parts of the neuroaxis.

When the above process affects posterolateral column of spinal cord it is seen as posterior cord T2 hyperintense signal on saggital images and inverted V sign appearance on axial section of the images.[4-5] The involvement of the cord on mri may be detected earlier than the presence of myelopathic symptoms and signs. Determination of the cord abnormalities on mri is important because when treated at early stages there is a complete reversal of both clinically and mri in our study.[6,7] Those patients which had acute presentation had a rapid improvement as compared to patients who had subacute to chronic presentation. Persistence of imaging findings for a longer period was observed for those who had subacute presentation than acute ,which showed complete resolution following treatment with vitamin b12 parenteral therapy.

Out of the 50 cases, there was a 20 yr female who presented with GBS like picture as acute onset progressive ascending assymetric weakness of both lower limbs with areflexia , with no sensory abnormalities on examination , on mri was found to have posterior cord enhancement with inverted v sign and low b12 levels. She showed a dramatic improvement following b12 supplementation.

Another case was a 25 yr female who presented with repeated falls without loss of consciousness since 15 to 20 days which on examination had a positive rombergs with no other deficit. On imaging the patient had a posterior cord enhancement with significantly low b12 levels and showed a dramatic improvement following the b12 supplementation.

Two cases had presented with only lhermittes sign with no other symptoms on history or signs in examination.Symmetrical hyperintense signals in lateral columns and posterior columns in diffusion weighted imaging (DWI) have been reported.[8,9] . MRI seems to be a good diagnostic tool for the follow-up evaluation. Vasconcelos et al. concluded that the absence of sensory dermatomal deficit, Romberg, and Babinski signs, MRI lesions in ≤7 segments, and age younger than 50 were associated with a higher complete resolution rate[10]

Many of the patients who had presented with only paresthesia or sensory symptoms of lower limbs were found to have significant cord abnormality on mri along with low b12 levels. Most of the patients had shown significant clinical improvement on follow up after a period of 3 to 4 weeks. However, diagnostic delay and/or late initiation of therapy may result in permanent irreversible injury to the spinal cord with little or no improvement on treatment. Our cases were diagnosed early and clinical and radiological improvements were observed during followup. Ataxic myelopathy might be seen in patients with copper deficiency. Copper deficiency myelopathy is associated with symmetric involvement of the pyramidal tract and posterior columns, and it shares same clinical and radiological features[11]

V. Conclusion

Magnetic resonance imaging plays a vital role for the diagnosis of the subclinical myelopathy which helps in early and prompt diagnosis and treatment, preventing the disease course from progressing to a irreversible stage. The knowledge of which is very essential as these are the common and readily treatable diseases which we encounter in our day to day practice. Also the above study determines the varied presentation of the B12 deficiency disorder determining to have a high index of suspicion to diagnose when patients have a atypical presentation. The present study also determines the characteristic radiological (MRI) findings of B12 deficiency and differential diagnosis to be ruled out with the same (eg. Copper deficiency , hiv myelopathy etc)

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