

Radiological profile of multiple sclerosis in a tertiary care center: A study from Eastern India

Biswal N.R¹, Mallick Ashok K.², Mishra Shubhankar^{3*}

^{1,2}Senior Resident, ²Professor and HOD, Dept. of Neurology, S.C.B. Medical College and Hospital, Cuttack, Odisha, India

*Corresponding Author: Mishra Shubhankar

Email: dr.subham.scb@gmail.com

Abstract

Introduction: Idiopathic inflammatory demyelinating disorders of the central nervous system (IIDDs) represent a broad spectrum of central nervous system (CNS) disorders thought to be of autoimmune origin. Objective of the study was to diagnose multiple sclerosis by neurological examinations, to do neuroimaging and to see the most common area of involvement.

Materials and Methods: Prospective clinical study in Department of Neurology, S.C.B. Medical College & Hospital, Cuttack from January 2017 to December 2018 (2 years). All cases with diagnosis of multiple sclerosis who fulfilled the recent McDonald criteria were included in the study. The clinical and epidemiological data were recorded.

Results: Incidence of MS among the IIDDs were 18(14.7%). Male: female ratio was 3.5:1. Periventricular involvement was most common site. FLAIR sequence of MRI was best tool for detection.

Conclusion: Neuroimaging is best modality to diagnose MS. Periventricular lesions are most common.

Keywords: MRI, MS, Periventricular, Mc Donald.

Introduction

Idiopathic inflammatory demyelinating disorders of the central nervous system (IIDDs) represent a broad spectrum of central nervous system (CNS) disorders thought to be of autoimmune origin.¹ The spectrum includes monophasic, multiphasic and progressive disorders ranging from highly localized forms to multifocal or diffuse variants.² Multiple sclerosis (MS) is the most common IIDD worldwide³, while the ratio of Neuromyelitis optica (NMO) to MS is much higher in the Asian countries compared to their western counterparts.⁴ MS is a heterogeneous disorder with variable clinical and pathologic features reflecting different pathways to tissue injury.⁵ Inflammation, demyelination, and axonal degeneration are major pathologic mechanisms.⁶ Features highly suggestive of MS are relapses and remissions, onset between ages 15 and 50, optic neuritis, Lhermitte's sign, Internuclear ophthalmoplegia, fatigue, Uhthoff's phenomenon. Presenting symptoms and signs may be either monofocal (consistent with a single lesion) or multifocal (consistent with more than one lesion). Affective disorder occurs in up to two-thirds of patients with MS, and depression is the most common manifestation.

Disease Pattern

The pattern and course of MS is categorized as follows⁷:

1. Relapsing remitting (RRMS) - 85 to 90% of MS cases at onset.
2. Secondary progressive (SPMS) - Ultimately develops in most patients with RRMS and causes the greatest amount of neurological disability.
3. Primary progressive (PPMS) – 10% of cases at disease onset.⁸
4. Progressive relapsing (PRMS).

A clinic-based study of 1100 patients found that 66% had RRMS disease at onset, 15% PRMS, and 19% PPMS.⁹

The diagnosis depends upon Mc Donald criteria (2017)¹⁰. The dissemination of space is done by 2015 MAGNIMS DIS criteria¹¹

Materials and Methods

Prospective clinical study in Department of Neurology, S.C.B. Medical College & Hospital, Cuttack from January 2017 to December 2018 (2 years).

All cases with diagnosis of multiple sclerosis who fulfilled the recent McDonald criteria were included in the study. They were evaluated clinically and recorded in a format. Radiological evaluation was done using 1.5 Tesla MRI scan on second day of hospitalisation according to MS protocol with contrast. Isolated noncontrast MRI was not taken into account. It was reported by experienced radiologists.

Ethical clearance was obtained from institutional ethical committee. Statistical analysis was done using SPSS version 21.0.

Results

1. Incidence of MS among the IIDDs were 18 (14.7%)
2. Male: female ratio was 3.5:1.
3. Among all MS patients majority i.e.78% presented between 20-40 years of age.
4. Among MS all patients had polysymptomatic presentation and all having pyramidal features followed by optic, sensory, cerebellar and brainstem features.

Table 1: Abnormal brain MRI post contrast among subgroups

Category	Total no. of cases	No. of abnormal brain MRI					Percentage
		T1	T2	FLAIR	DWI	Contrast	
MS	18	18					100%
		12	14	18	16	14	

All MS patients had abnormal brain MRI. MS plaques were well visible in FLAIR sequence followed by diffusion restriction. 87% Patients had good contrast enhancement.

Table 2: Abnormal cord MRI among subgroups

Category	No. of cases	Abnormal cord MRI				Percentage
MS	18	14				77%
		T1	T2	Flair	Contrast	
		10	12	14	11	

Abnormal cord MRI was seen 77% cases of MS. MS plaques were well visible in FLAIR sequence.

Table 3: Lesion location among ms patients in abnormal brain MRI(N=18)

Lesion location	No.of patients	Percentage
Paraventricular	16	88.8%
Juxta cortical	14	77.7%
Infratentorial	10	55%
Spinal	8	44%
Basal ganglia	2	11%

Among 18 patients of multiple sclerosis multiple sites were involved in all cases where as paraventricular location was most common followed by juxta cortical and infratentorial. Spinal cord was abnormal in 8 cases (44%) and basal ganglia was involved in 2 case. Dawsons finger was seen in 12 cases. (Fig. 1,2)



Fig. 1: Small plaque of MS patients

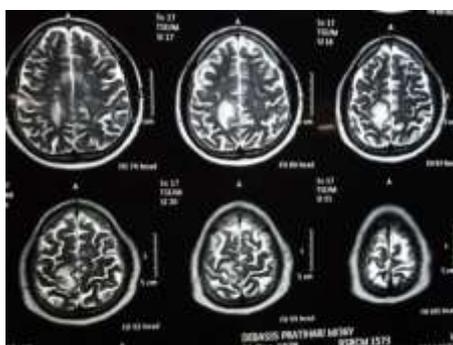


Fig. 2: MS plaque in brain T2 Axial Section

Discussions

Among the subcategories of MS male constitutes 77% of case whereas female constitutes 23% cases with a male to female ratio of 3.3:1 which is unusual according to other studies worldwide and India. In a study by P.Syal, S.prabhakar from Chandigarh India who found the male to female ratio to be 1:1.32¹². In similar study from Pakistan by Hoori Shahwar et al¹³ depicted the M:F ratio to be 1:2. But in other studies from India like Mathews et al, vellore, chopra et al Chandigarh, Gouri devi et al Bangalore who found to be male predominance. Among the MS subgroup mostly presented with pyramidal (100%) and optic (55%) features. Bladder symptoms were seen in two case only. Sensory presentation was also found in all cases. This is concordance with the findings according to Gangopadhyay et al from Bengal where he found 94% of pyramidal involvement, 53% of optic involvement, 55% of cases with sensory involvement. In another study from Pakistan by Hoori Shahwar et al¹³ found pyramidal weakness 75%, visual impairment 70%, sphinter disturbance 60%, sensory impairment 53%. Different studies from India by Mathew et al, Singhal and wadia et al, Nair and saharanam et al, chopra et al, Gouri devi and Nagraja et al, Verma and Ahuja et al, M Maheswari et al¹⁴ found the incidence of optic involvement to be 22-58% which is similar to our findings. In another study from North-West India by Syal et al found pyramidal involvement was seen in 87% of cases followed by sensory involvement in 65% cases and optic involvement in 57% cases which is slightly lower than our study.

In the study by P.Syal, S.prabhakar from Chandigarh found that 87% of cases of brain MRI was abnormal.¹² Also another two studies by Bansil S et al and Bhatia M et al

shows similar results of abnormal brain MRI in 87.9% to 92%. Western data shows a high incidence of brain MRI upto 99% in clinically diagnosed multiple sclerosis. In one study by J. Mani, N Choudhury from Mumbai¹⁵, India revealed brain MRI lesions consistent with MS in 96% of cases but the spine MRI was abnormal in 90% cases in clinical MS. The high frequency of MRI abnormalities were because of strict adherence to recent McDonald's criteria. Among the lesion locations in multiple sclerosis patients 88.85% were periventricular, 77% juxta cortical, 44% infratentorial, 75% spinal. In a study from Vellore South India shows locations were periventricular (95.5%), juxtacortical (93.6%), infratentorial (65.6%) and spinal cord (85.3%). The problem of identifying lesions in the periventricular region by obscurity in T2 and T1, which is a common site for MS lesions, can also be addressed by suppressing the signal from CSF yet maintaining heavy T2 weighting using a fluid attenuated inversion recovery (FLAIR) sequence. This sequence is also superior at detecting cortical/juxtacortical lesions. FLAIR is therefore a commonly used MR sequence on clinical scanners when MS has been raised as a possible clinical diagnosis. Our study also coincides in that theory.

Conclusion

MS is a common demyelinating disorder in eastern India. But its incidence is less than NMOSD. It is clearly contrast to western studies. Pyramidal and optic nerve involvement is most common presentation. Neuroimaging is best modality to diagnose MS. Periventricular lesions are most common. FLAIR imaging provides best result. All clinicians must have this knowledge for early diagnosis and better management.

Conflict of Interest: None.

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