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The evolving landscape of multiple sclerosis and related disorders in Sri Lanka: a 25-year exploration

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Introduction

Multiple Sclerosis (MS) is a central nervous system inflammatory demyelinating disorder (CNS-IDD) which affects the brain, spinal cord and the optic nerves, resulting in disrupted impulse conduction. More recently discovered Aquaporin-4antibody-positive Neuromyelitis Optica Spectrum Disorder (AQP4-NMOSD), Myelin Oligodendrocyte Glycoprotein Antibody-associated Disease (MOGAD) have clinical similarities to MS but are distinct disorders with different clinical outcomes and treatment responses. The third edition of the MS atlas published in 2020 by the MS International Federation (MSIF) shows an estimated point prevalence of 35.9/100,000 (2.8 million) worldwide, a significant 30% increase compared to 2013, globally as well as in Asia.[1]

The prevalence of MS is lower in Asia compared to the west and is not well defined with its association to ethnic, environmental, and socioeconomic factors. Though MS is known to be more common in locations far removed from the equator and in Caucasians, Sri Lanka has a significant population of MS sufferers, despite its location. MS affects the young in their most productive years of life with a clinical course which is largely unpredictable, but modifiable to a great extent with advanced medications, allowing patients to lead near normal lives.

In the mid 1990's as a trainee neurologist in Sri Lanka I suspected MS in many young patients with episodic neurology but a definitive diagnosis was difficult given the limitations. This was a time when colleagues from other specialties even questioned its existence in the country, given MS was not even a part of the medical school curricula. Also, there were no Magnetic Resonance Imaging (MRI) scanners in the country until the late 1990's. Lack of knowledge and awareness and the unavailability of diagnostic tools along with deficient nationwide neurology services resulted in many young affected MS patient in Sri Lanka suffer in silence with seriously poor mobility and visual outcomes.[2]

Although shrouded in mystery and misinterpretation in Sri Lanka, over the last two and a half decades this area of neurology has undergone tremendous advances. In 2013, we established a collaborative link with pioneering researchers at Mayo clinic, Rochester Minnesota, USA. This center is the point of many discoveries in diagnostics and precision medicine, including the AQP4 antibody in 2004. Through this link, a total of 2164 Sri Lankan patients have been sero-tested between 2013 to 2023 for AQP4-IgG and MOG-IgG-antibodies using highly specific live cell-based assays.

I established a dedicated clinic for MS and related disorders at the Institute of Neurology, National Hospital of Sri Lanka in 2017 where, over 300 MS patients are registered. Over 300 patients with all types of Central Nervous System Inflammatory Demyelinating Diseases (CNS-IDDs) including NMOSD and MOGAD visit this clinic monthly. Specific disease modifying therapies (DMTs) are issued at this clinic with approval from a specially established committee at the medical supplies division (MSD). This was a result of an advocacy program with the Ministry of Health, which I

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spearheaded over 15 years ago, where we convinced authorities to make these therapies available to young Sri Lankans affected. This effort has led to most of them leading productive, happy, near normal lives.

The SLCTRIMS (Sri Lanka Committee for the Treatment and Research in Multiple Sclerosis and related disorders), was founded in December 2018 together with four of my colleagues. Modelled after similar organizations like ECTRIMS (European) and PACTRIMS (Pan-Asia), it functions to facilitate communication and create synergies among clinicians and eminent scientists to promote and enhance research and to improve clinical outcomes.

I am humbled to have been able to contribute towards improving the quality of life of these patients over the last two and a half decades by creating greater awareness, disseminating knowledge, and helping to improve precision diagnostics by establishing international links. In the ensuing sections I describe my experience over the past 25 years in this field.

Studies/Observations

In the late 1990s we followed up 2 patients at the institute of neurology NHSL with episodic neurology. This heralded a new era in the field of CNS-IDDs, with the first report of MS in Sri Lankan patients. In a landmark paper published in the *Ceylon Medical Journal* in 2001, we described a 46-year-old female and a 21-year-old male who fulfilled the diagnostic criteria for MS.[3] Two decades later we described familial MS in a mother and son pair, which is the first such report from South Asia.[4] Between these two "firsts" lies a period of extensive research and in-depth analysis of MS in Sri Lanka.

This was a retrospective analysis of the disease in 35 patients with clinically definite MS diagnosed using the revised McDonald criteria of 2005, at NHSL. I found that the clinical and demographic profiles of MS patients throughout the region were similar (Table 1). In the region the average age at onset was 29.7 years with a female preponderance. Oligoclonal bands were seen only in 5/23 (21%), a known regional phenomenon.[5] Only 50% of this cohort were fully independent, with high rates of disability.[2] Also of serious concern was the limited access to DMTs. We struggled to create greater awareness to improve our diagnostic capabilities and treatment options.

Table 1. Demographic patterns of Sri Lankan patients with MS with a regional comparison

Clinical distribution	*Sri Lanka (N=35)*	*NW India (N=100)*	*Pakistan (N=142)*
1. Pyramidal	73.3%	87%	70%
2. Sensory	73.3%	65%	45%
3. Optic nerve	70%	57%	-
4. Bladder/ sphincter	50%	46%	-
5. Cerebellar	53.3%	44.3%	-
6. Devic's type	3.3%	7%	3%
Age of onset	29.68 y	29.49 y	27 y
Sex ratio M:F	1:4	1:1.45	1:1.45
Disability	Only 50% fully independent high rate of disability. In 26.6% EDSS was 7.5-8 and in 23.3% EDSS was 6-7.		31% severely and 45% moderately disabled. Average EDSS is 3.68 +/-3

Registries for Multiple sclerosis and related disorders

With the objective of describing the epidemiology, clinical characteristics, treatment responses and outcomes of patients with CNS-IDDs in Sri Lanka, a registry of all such patients was initiated in 2016. After approval of the Ethics Review Committee of University of Kelaniya, the registry was commenced at the Institute of Neurology, NHSL, and the final point of referral for patients with CNS-IDDs. The registry is continually updated with data collected by a team of doctors, directly under my supervision.

In 2017, the registry was revised, and sub-registries were formed. These include registries for MS (2017 McDonalds criteria), seropositive (AQP4) and seronegative NMOSD (2015 International Panel for Neuromyelitis Diagnosis [IPND] criteria), MOGAD, and Chronic Relapsing Inflammatory Optic Neuropathy (CRION) based on a consensus diagnostic criteria.[6,7] The remaining patients were listed as unclassified CNS-IDDs. Retrospective analysis of these registries led to three cross sectional studies, published in high impact journals.[8-10] For this purpose, data analysis was done using SPSS version 23. Simple description of characteristics was done by measures of central tendency and subgroup comparisons were done using chi-square and students' T-test analysis. The findings of the 3 seminal papers as well as results from several independent studies are summarized below.

National prevalence estimates of CNS-IDDs

At the time of analysis, our registry included 2053 patients, including 239 cases of MOGAD (11%), 82 cases of AQP4 NMOSD (4%), 261 cases of clinically definite MS (13%), 27 cases of seronegative NMOSD (1%) and 27 cases of CRION (1%). The other cases remained unclassified. We estimated a crude prevalence of 7.8 cases per 100,000 population for MS, 2.3 per 100,000 cases of NMOSD and 1.3 per 100,000 cases of AQP4 seropositivity based on our data. These estimates have limitations as they are hospital-based data, and the referral rates may vary across the country. Nonetheless, the estimated rate for MS is comparable to those from the regional countries in South Asia (Table 2). The prevalence estimate for AQP4 NMOSD is lower than that of East Asia (4/100,000) but similar to South Asia (0.72/100,000).11,12

Age and gender distribution

The median age at the onset of MS was 29 years. Patients with MOGAD were younger (median age at onset 26 years), while those with AQP4 NMOSD were older (median age at onset 35 years). Ramanathan et al from Australia and Pandit et al from India also have shown younger age of onset of MOGAD while Mariotto from Italy has shown a relatively older age of onset of 35 years.14-16 MS is more prevalent in females (67%) than males. This female preponderance is even more so in AQP4 NMOSD with a ratio of almost 9:1 (F:M 89%:11%) and in MOGAD it's almost equal (F:M 58%:42%). Larger the cohort, lesser the gender difference in MOGAD.[17,18] A summary of the characteristics of the three major groups of CNS-IDDs is shown in Table 3.

Table 2. Comparison of epidemiological studies on Multiple sclerosis in South Asia

Country, Author	*Setting*	*Period of study*	*Number of cases*	*Male: Female ratio*	*Mean age at onset*	*Estimated prevalence*
Pakistan, Zara et al[13]	Estimate from pooled data	1998-2017	Around 900	1.6:1	29	10
India, Pandit et al[14]	Multicenter-Hospital based; Prospective	2011-2013	35	1.6:1	35	8.35
Sri Lanka, Senanayake et al[9]	Single center-Hospital based; Retrospective	2014-2021	191	2.1:1	29	7.78

Table 3. Comparison of clinical characteristics between AQP4 NMOSD/MOGAD and MS

Characteristic	*AQP4*	*MOGAD (Senanayake et al., 2019)*	*Multiple Sclerosis (Senannayake et al., 2021)*	*P value****
Age of onset, median (range)	35 (12-73)	26 (3-68)	29 (6-57)	<0.01
Sex, female (%)	65 (89%)	70 (56%)	129 (67.5%)	<0.01
Symptoms at onset				
Optic neuritis (alone)	33 (23)	64 (51)	86 (34)	
Transverse myelitis (alone)	43 (31)	29 (23)	29 (23)	
Optic neuritis and transverse myelitis	9 (6)	8 (6)	12 (3)	
Transverse myelitis and hiccups	6 (3)	Unanswered	Unanswered	
Duration of follow (Y), Median (range)	5 (1-17)	4 (0.12-20)	6 (1-45)	
Median no of Relapses (Range)	1 (0-11)	1 (1-9)	2 (0-8)	
Number of patients with relapsing course	48 (66%)	43 (34%)	136 (81%)	<0.01
Number of patients with visual FSS <4 at last follow up*	19 (50%)	52 (88%)	77 (86.5%)	
Number of patients able to walk independently at last follow up**	39 (72%)	111 (94%)	120 (83%)	
Overall median EDSS (Range)	2 (0-8.5)	N/A	1 (0-8)	

* Out of those who had atleast one episode of optic neuritis.

** Excluding those with isolating optic neuritis.

*** Chi-square analysis comparing AQP4 group individually with MS/MOGAD.

Clinical phenotypes

Optic neuritis (ON) is the commonest presenting complaint in MS and MOGAD while transverse myelitis (TM) is the commonest in AQP4 NMOSD (Table 3). In MS, both at presentation and during relapses, ON and cortical syndrome were the predominant phenotypes (Figure 1). Brainstem syndrome was the next, seen in up to 1/3 of cases. Relapsing disease was most notable in MS with 4/5 patients having at least one relapse (81%). The median number of relapses was 2 (range 0-8) over a 4-6 year follow up period.

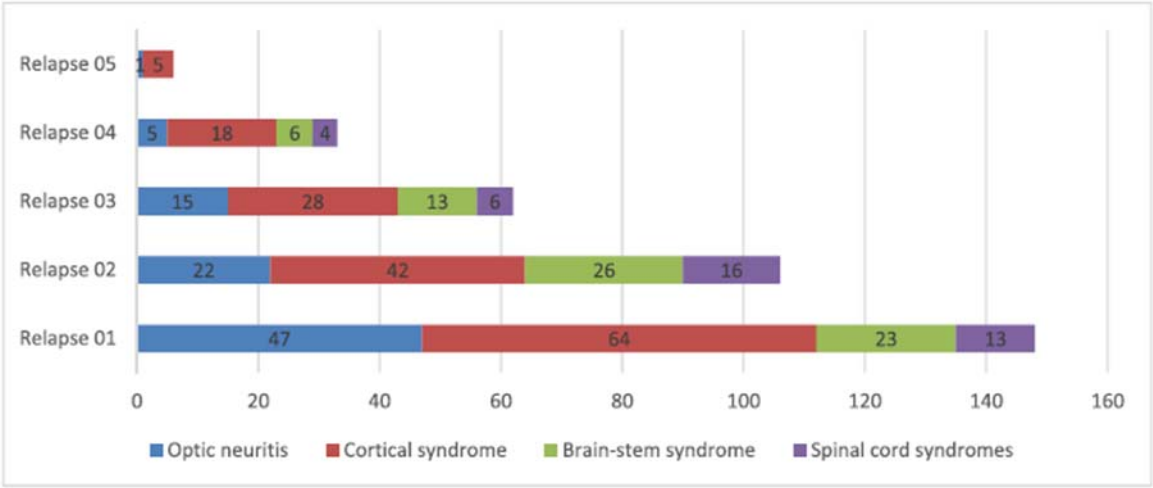

Figure 1. Types and frequency of relapses seen in MS patients.

The clinical phenotype of AQP4 NMOSD is dominated by episodes of optic neuritis and transverse myelitis which previously was known as "optico-spinal MS" a term which is now discarded. Cortical syndrome, area postrema syndrome and ADEM were seen in a minority. They too relapsed, though less than those with MS; with 2/3 (66%) patients having one or more relapses (median 1; range 0-11).

The MOGAD paediatric population was 30% (44/126). In both adults (57%) and children (37%), ON was the commonest presenting feature (Table 4). This is consistent with global reports.[14-16,19] The second commonest was ADEM in the paediatric population (25%), while it was TM in adults (28%). Overall one fourth of all MOGAD had the final phenotype of NMOSD.[10] In MOGAD, monophasic illness was more common with only 1/3 relapsing (34%). Of the 17 patients with persistent MOG positivity, 13 (76%) had relapsing disease at median follow up 7 years (range 3-17y) while 4 (24%) had monophasic illness at median follow up of 1year (range 1-2 y). The confounding factor was that the duration of follow up was higher in those with relapsing disease (0.5-20y) than those with a monophasic illness (0.25-5y) ($p<0.001$) with a median time to first relapse being 1y (range 0.25-13y).

Imaging: MRI and Optical Coherence Tomography (OCT)

The hallmark of MS is demyelination, disseminated in time and space. Accordingly, all of our patients with MS had brain lesions, scattered mostly over periventricular (93%), juxtacortical (55%), corpus callosal (53%) and brainstem regions (38%). Two thirds of these patients had abnormal MRI spines, with 59% showing short lesion myelitis and 4% showing long lesions (LETM), spanning over three or more vertebral segments.[9] In MOGAD 90% had isolated ON with a normal MRI brain outside of the optic nerve. TM when present (up to 30%) was more likely to be long lesion myelitis than a short lesion (57% vs 43%).[10] Having a normal MRI brain is even more common in AQP4 NMOSD with a percentage of 62%. In contrast 76% of them had abnormalities in the MRI spine, with over 90% being LETM.[8] Pandit et al reported many AQP4 NMOSD having normal MRI brain.[11] However, reports from Australia and Latin America show higher proportions of patients with brain lesions (up to 80%).[20,21]

Optical Coherence Tomography (OCT) is a non-invasive, easily reproducible method of demonstrating micrometer resolution of inner structures of the eye. It is useful in quantifying retinal damage in CNS-IDDs. We performed a 3-month pilot study in 2021 where we tested 38 patients with at least one prior attack of optic neuritis (MS n=21 and MOGAD n=17) with OCT. We found that both MS and MOGAD showed significant thinning of retinal nerve fiber layer thickness (RNFL), more evident in MOGAD (average 74.1µm vs 80.6µm in MS). The temporal quadrant was the most affected in both diseases. Combined superior and inferior quadrants were affected in 42.8% in MS and 67.6% in MOGAD. We now consider OCT to be integral part of the evaluation of ON, at acute stage and in follow up.

Table 4. Demographic and clinical characteristics of MOG-IgG1 positive Sri Lankan patients

	MOG-IgG1-positive patients, N (%)		
Characteristics	*Total N=126*	*Paediatric N=44*	*Adult N=82*
Age at onset, years, median (range)	26 (3-68)	9 (3-18)	33.5 (19-68)
Sex, female	70 (56)	22 (50)	48 (58)
Symptoms at onset			
Optic neuritis (alone)	64 (51)	17 (38)	47 (57)
Transverse myelitis	29 (23)	7 (16)	47 (57)
ADEM	11 (9)	11 (25)	0 (0)
Optic neuritis and transverse myelitis	8 (6)	2 (4)	6 (7)
Optic neuritis and ADEM	13 (10)	7 (16)	6 (7)
Optic neuritis and intractable hiccups	1 (1)	0 (0)	1 (1)
Clinical phenotype at last follow-up			
Optic neuritis (single or relapsing)	58 (46)	16 (36)	42 (52)
Transverse myelitis	24 (19)	4 (10)	20 (24)
ADEM	12 (10)	12 (27)	0 (0)
NMOSD	32 (25)	12 (27)	20 (24)
Duration of follow-up, years, median (range)	4 (0.12-20)	3 (0.5-18)	3 (0.25-20)
Number of patients with relapsing course	43 (34)	15 (34)	28 (34)
Median number of relapse (range)	1 (1-9)	1 (1-8)	1 (1-9)
Acute treatment	115 (100)	44 (100)	82 (100)
Long-term immunotherapy	55 (50)	18 (45)	38 (53)

Treatment

Acute episodes were treated with intravenous methyl prednisolone pulses (IVMP) and/ or intravenous immunoglobulin (IVIG) and/ or plasma exchange (PLEX) in all patients. 37% (27/73) of all AQP4- NMOSD received PLEX initially or when relapsed. Long term disease modifying therapy (DMT) was used for 74% (141/191) in MS (beta interferon in 86% or fingolimod in 14%). Half the population of MOGAD were given maintenance immunosuppression with prednisolone/ azathioprine/ mycophenolate or combinations thereof. All patients with AQP4 NMOSD were continued on long-term immunosuppression with either prednisolone combined with azathioprine (74%) or mycophenolate (5%) or with rituximab (7%).

We have demonstrated that mitoxantrone is an effective, low-cost disease modifying treatment for relapsing-remitting MS (RRMS) and relapsing progressive MS (RPMS). In a pilot study, 8 patients with RRMS, who had more than 2 relapses during the preceding 2 years (male: female = 1:3, age; between 21-51, mean disease duration-7.6 years) were given mitoxantrone and followed up for 3 months. All had a pre-treatment EDSS above 6 (mean = 6.7). At 3 months, there were no relapses, EDSS remained static in

37.5%, maximum increase was 1.5 points, and only one patient developed significant leucopenia. These findings were presented at the SLCTRIMS Annual Conference in 2021. Currently we use rituximab and tocilizumab too to treat CNS-IDDs. They are highly effective with minimum adverse effects, and we hope to publish our findings in the future.

Overall outcomes

Outcomes in CNS-IDDs are described in terms of the Expanded Disability System Score (EDSS) based on history and examination findings and disability at a given point of time. This gives an overall score as well as individual functional system score (FSS).[22] We assessed disability by serial EDSS scores, mobility scores and visual FSS. Visual scores were calculated in those who had at least one episode of optic neuritis and mobility outcomes were calculated after excluding those with isolated ON. 83% of our MS patients could walk independently at the last follow up while 87% had a visual FSS score of <4 (normal vision or non-disabling visual impairment). Similarly, 94% of our MOGAD could walk independently at last follow up with 88% of them having visual FSS of <4. Better visual outcomes in MOGAD have been reported by other researchers as well.[14,15]

In the AQP4-NMOSD group, mobility outcomes were fair with 72% being able to walk independently, though this is worse than the MOGAD and MS counterparts. Visual outcomes were poor with 50% having disabling visual impairment or blindness at last follow up (Table 3). In comparison with Caucasian data, although our visual outcomes were poorer, mobility was better.[19] This could be a regional phenomenon as observed by Kitley et al who reported that the time to first relapse was longer, annualized relapse rate was lower and median time to disabling mobility end points were longer in Japanese than the Caucasian and Afro-Caribbean populations.[23] Another contributory factor could be our early initiation of second line immuno-therapy, like PLEX and rituximab.

Bladder dysfunction in Multiple Sclerosis

A descriptive study on lower urinary tract symptoms in MS is currently underway and a preliminary analysis was performed in 2021. Eleven MS patients (Male: Female = 1:2.7, age; between 23-57 years (SD=11.8), average EDSS 4 (SD=2.3), mean duration of disease to onset of bladder symptoms 10 years) with urinary symptoms were evaluated out of 100 patients who were screened. Three had hypotonic non-compliant bladder without outlet obstruction, five had hypotonic non-compliant bladder with outlet obstruction, two had normal detrusor with sensory urgency and one had isolated bladder outlet obstruction. 91% of patients had demyelinating plaques in the cervical and dorsal spine on MRI. Treatment was commenced according to the type of bladder dysfunction (antimuscarinics, alpha blockers) and the “Actionable questionnaire”, an 8-item tool to screen MS patients for neurogenic bladder problems was applied before and after 10 weeks of treatment.24 The mean Actionable questionnaire scores pre- and post-treatment were 5.1 and 2 respectively, indicating that targeted treatment significantly improved symptoms and quality of life.[25]

Cognitive difficulties and Depression in Multiple sclerosis

In 2019, we performed a cross sectional descriptive study in 82 confirmed MS patients (McDonald 2010, MAGNIMS 2016) to assess their cognitive difficulties and depression. In this cohort, the mean age at diagnosis was 29 years (61.4% females), and the average age at evaluation was 35 years with an average disease duration of 6 years. 63.9% had cognitive impairment and 49.4% had some degree of depression (Figure 2). 50.9% of cognitively impaired patients were also depressed. A significant association was noted between cognitive impairment and the time to first relapse (p=0.045) and between depression and duration of diagnosis (p=0.02). However, we found that cognitive deficits and depression were not significantly associated (p=0.88).[26]

Benign MS

A significant proportion of our cohort represent an entity known as 'benign MS' (patients with an EDSS <=2 at 5 years of follow up or <=3 at 10 years of follow up). 78% of those who had the disease for 10 years or more had an EDSS of <=3 while 63% of those had the disease between 5-10y had an EDSS of <=2 (Figure 3). Potential reasons for lesser disability include our tropical location and lower CSF OCB positivity. MS is known to be more prevalent in countries farther from the equator. Studies have observed that with increasing latitude, disease onset is earlier and time to relapse is shorter.[6,27] Dobson et al have shown that having CSF-OCBs increases the odds of having worse outcomes.[28] Our subgroup analysis shows that the annualized relapse rate (ARR) is higher in those with positive OCB, although we could not demonstrate a correlation between OCB positivity and final outcomes.[9]

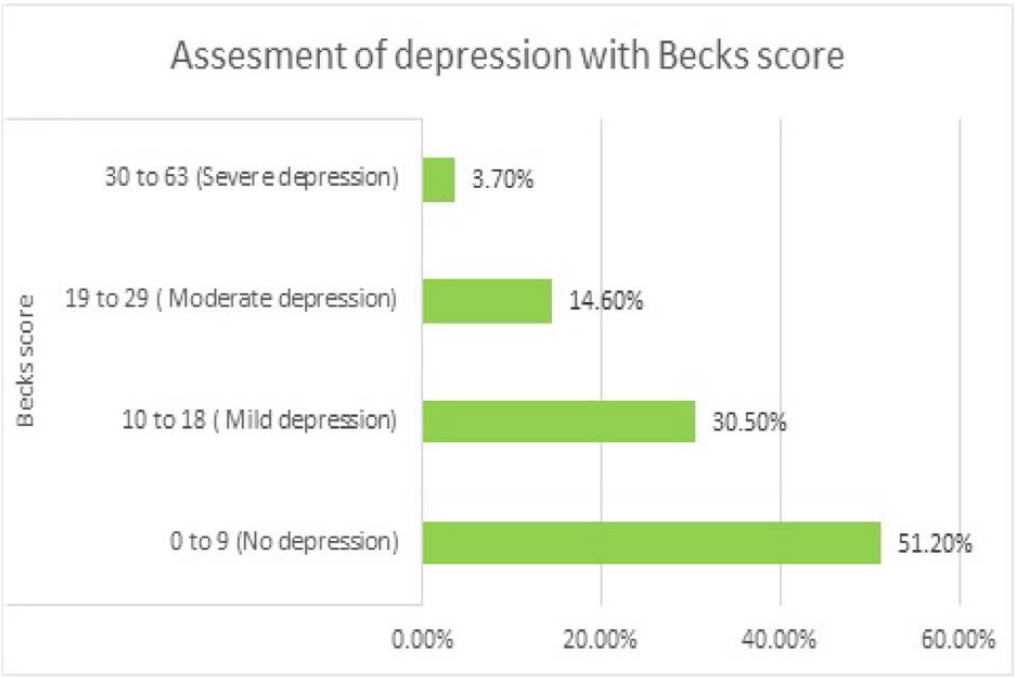

Figure 2. Assessment of depression in MS patients using Beck's depression scale.

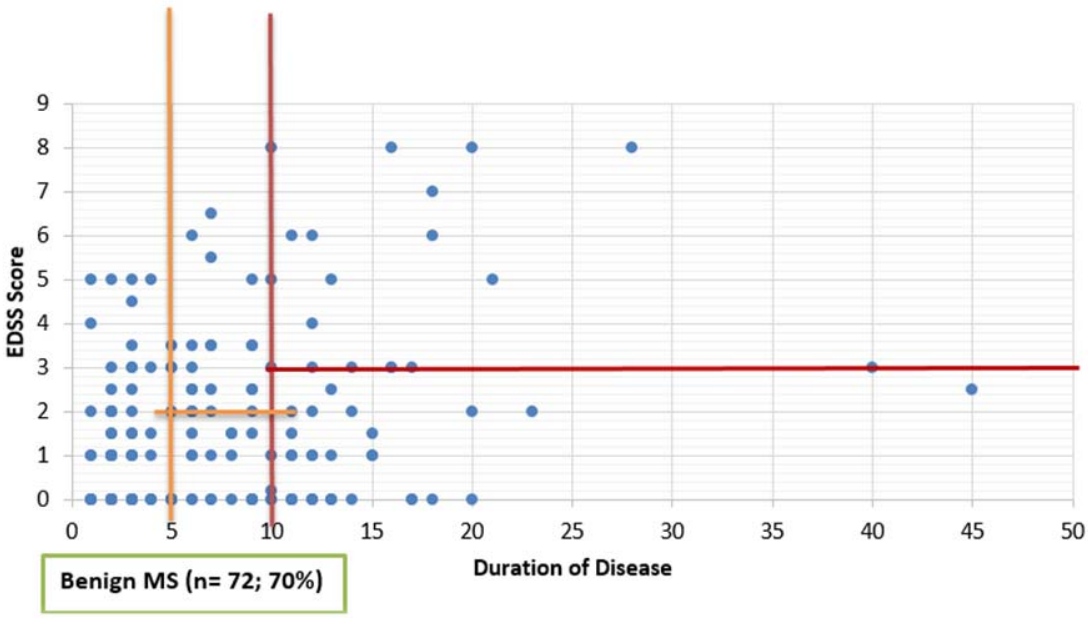

Figure 3. Scatter plot showing EDSS scores against MS disease duration.

Oxidative Burden, Antioxidant Capacity and Vitamin D Levels in CNS-IDDs

With the objective of studying the etiopathogenesis of CNS-IDDs, we collaborated with the Open University of Sri Lanka in 2018. Ethical clearance was obtained from the Faculty of Medicine, University of Colombo, and the National Hospital of Sri Lanka. The study was funded by a research grant awarded by the Open University of Sri Lanka. A total of 71 participants; 22 MS patients (2017 revised McDonald criteria, seronegative for AQP4-IgG and MOG-IgG), 19 NMOSD patients (AQP4-IgG or MOG-IgG positive, fulfilling the 2015 diagnostic criteria), 15 disease controls and 15 healthy controls were recruited. We found that high oxidative burden and low antioxidant stress contributes more towards MS than NMOSD. This was evidenced by significantly greater nitric oxide levels (p=0.002) and lower total antioxidant status (p=0.062) in MS patients compared to NMOSD. In addition, we found a mean value of IFNϒ of 0.87pg/ml (±0.145), in MS patients whereas it was undetectable in the other groups. The highest levels of IL-10 were also observed in MS patients. We conclude that these differences may be reflective of progression independent of relapse activity (PIRA), an emerging area of interest in MS. Interestingly, the mean Vitamin D levels of all patients were deficient (<20 ng/mL), appearing not to play a significant role in the pathogenesis of MS and NMOSD in Sri Lanka.[29]

Reports of unusual and rare cases

In my 25-year exploration of CNS demyelinating disorders I have come across several fascinating patients. Acute hemorrhagic encephalomyelitis (AHEM) is the most severe form ADEM and is rare. We reported a case of a 35-year-old man presenting with pseudobulbar palsy whose MRI revealed T2 hyperintensities in bilateral frontal and occipital lobes with ring enhancement, perilesional oedema and hemorrhages. His CSF was acellular with elevated protein, but was negative for OCB. Brain biopsy revealed demyelination with perivascular lymphocytic infiltration, confirming a diagnosis of AHEM.[30] Another interesting case was that of a 43-year-old female who presented with long lesion myelitis and recurrent optic neuritis. She was found to have AQP4 antibody positivity in association with a Grade 1 ovarian teratoma. This association is extremely rare and surprisingly we came across this identical presentation in a 17-year-old girl several years later.[31,32]

Conclusions

Initially masked by diagnostic challenges and limited awareness, Sri Lanka has now developed a robust framework for managing and understanding multiple sclerosis and related other CNS-IDDs. I am privileged to have played a pivotal role in this evolution by the establishment of a dedicated clinic, and comprehensive registries, and significant international collaborations with the likes of Mayo clinic USA to serotest our patients with the most sensitive assays. These efforts have led to more accurate diagnostic capability and precise treatment which in turn ensure better patient outcomes.

Despite progress, challenges remain, particularly in terms of early diagnosis and access to advanced therapies. Continued advocacy, education, and research are essential to further improve outcomes. The dedicated registry initiated in 2016, encompassing various CNS-IDDs, has facilitated numerous studies on prevalence, clinical phenotypes, and treatment outcomes, contributing to the global understanding of these disorders. The demographics and clinical characteristics of our patients reveal patterns similar to global trends, however, unique regional phenomena highlight the importance of localized research and tailored healthcare approaches.

In the future we hope to further characterize the burden of optic neuritis in Sri Lanka, with a focus on specific disease phenotypes and treatment responses. The role of Epstein – Barr virus (EBV) in the pathogenesis of MS is now recognized. Unpublished data from our research suggests that EBV may indeed act as a triggering factor for MS, as reported in Western countries.[33] This opens up discussions on vaccination to prevent MS. Furthermore, a study on the utility of serum neurofilament light chain (NfL), a promising new biomarker in MS, is currently underway. We believe utilizing NfL may allow the early identification of patients at higher risk of disease progression who require closer monitoring or intensive interventions. High altitude residence, carrying the HLA DRB1*04:05 allele and lesser OCB-IEF positivity are independently associated with lesser degree of disease severity[5]. Thus, HLA typing in Sri Lankan MS patients is planned.

The journey from the initial cases of MS to the current state of comprehensive care and research exemplifies the significant strides made as a country as well as my ongoing commitment to enhancing patient care in this field. “It’s much more common now to see MS patients walking around, that you would never suspect they had a neurologic disease’ – that’s the new face of MS.”

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Our young enthusiastic trainee neurologists and dedicated research assistants, too many to mention by name, supported me over the years. A special thanks to the Mayo Clinic, USA, especially Profs. Pittock and Flanagan. This collaborative link has been pivotal in significantly enhancing our diagnostic precision.

Lastly, I would like to acknowledge the courage and resilience of our patients. Their experiences and perseverance inspire us to strive for better treatments and outcomes. It has been a privilege to contribute to this field and witness the progress we have made together.

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