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Rating Neurological Impairment in Multiple Sclerosis

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Abstract
Thirty three patients with definite multiple sclerosis were enrolled in this study. These patients were subjected to full history and examination, then rated according to their (EDSS). Twelve (12) patients (36.3%) had the range (3-4) grade, nine (9) patients (27.7%) had (1-2) grade, eight (8) patients (23.2%) had (7-9) grade and four (4) patients (12.13%) had grade (5-6).This study showed that the highest percentage of the patients with pyramidal involved were with EDSS (3-4) and with score 2 on functional scoring system (FS).The study encourages us, that each patient with multiple sclerosis should be rated according to EDSS and to the functional scores of each functional system and these findings kept in patient's notes and be used in the follow-up of patient and to assess the effect of therapy in progression of disease; the use the score may give clue to the socio-economic impact of the disease on the community and planning of community to give services to such patients.

Aim of the study
The aim of this study is to assess the neurological disability in multiple sclerosis patients and to follow the progress of disease in each patient using EDSS (Expanded Disability Status Scale). Then to evaluate the value of the scale in assessment the effect of drugs in progression of the disease.

Introduction
Multiple Sclerosis
Multiple sclerosis is the most common immune demyelinating disease of the CNS and a significant cause of neurologic disability in young adults. M.S. is primarily disorder of myelin sheaths, and nerve axons being affected in a secondary manner (1,2).

Pattern of M.S. in population
In most cases, females predominate a slightly over males: [(1.4:1)], but when the age of onset is over 40 years, male patients out number females (3). M.S. is a disease of young (20 - 40) years old in about 70° o of patients, about 20% develop the disease over 40 years of age, but onset after 50 years is unusual. Only some 10% of cases occur on the second decade of life (1). It becomes trivial after the age of 60. In childhood, female / male ratio was higher than that of the adult onset M.S. (2.2 vs.1.6-1.4). Among- initial symptoms, these suggesting Brainstem Dysfunction were more common (3),(4).
Kurtzke concluded that the incidence in women reaches its peak at a slightly earlier age than in men (3). The average age of onset is similar whether the disease is common or rare in the locality. He also concluded that the average age of onset is generally slightly lower in women than in men(5,6).

The highest annual rates of incidence of M.S. reported in the world from (Orkney) [9.3 per 100,000 per year], Shetland [7.5 per 100,000 per year].

M.S. found to be more prevalent among the whites of each country than among the blacks. North / South discrepancy was found to be three times more common in northern Europe than along the Mediterranean. In other areas of the world, a high, moderate and low risk zones have been identified. All the high and moderate risk areas for M.S. have predominantly white population. The pattern of frequency of M.S. represents the interaction of both genetic and environmental influences(7).

M.S. incidence may be higher in the countries on the southern and eastern fringe of Mediterranean than in Iran, Egypt, Turky, Tunisia, and other Arab countreis(3).

Pathogenesis of M.S.
The pathogenesis of M.S. is related to genetic, epidemiologic and immunologic factors. M.S. is associated with certain HLA types especially class II determinants. The concordance rate is much higher in monozygotic twins than that in dizygotic twins, the finding that supports the significance of genetic factors(8).

Although M.S. is usually sporadic, the disease occurs some 20 times more often in first degree relative of M.S. patients than in the general population at risk, and the risk is greater for siblings than for parents. There is, however no Mendelian pattern in the genetic predisposition. The strongest evidence for the importance of environmental exposure, probably to a virus is the recognition of minor epidermis of M.S. such as the one that occurred in Faroe Islands after World War II. Infection with a virus or viruses, widespread in nature, may be responsible.. Exposure to this agent in early life leads to the formation of protective antibodies and immunity, in

adult life, the results of reinfection or infection will depend on genetic vulnerability, ethnic factors or possibly exposure to an over whelming infection (9).

Diagnostic criteria for M.S.

1. Examination must reveal objective abnormalities of the CNS.
2. Involvement must reflect predominantly disease of white matter long tracts.
3. Examination and history must implicate involvement of two or more areas of the CNS by:-

a) MRI may be used to document a second lesion when only one site of abnormality has been demonstrable on examination. A confirmatory MRI must have either four lesions involving the white matter or three lesions if one is periventricular in location. Acceptable lesion must be greater than 3 mm in diameter, for patients older than 50, two of the following criteria must also be met.

* Lesion size > 5 mm
* Lesion about the bodies of the lateral ventricles.
* Lesion(s) present in the posterior fossa.

b) Evoked response testing may be used to document a second lesion not evident on clinical examination.

4. The clinical pattern must consist of: a. Two or more separate episodes of worsening involving different sites of the CNS, each lasting at least 24 hours and occurring at least one month apart, or b. Gradual or stepwise progression over at least 6 months if accompanied by increased CSF IgG synthesis or two or more oligoclonal bands.
5. Age of onset between 15 - 60 years.
6. The patient's neurologic conditon could not be better attributed to another disease.

The diagnosis of M.S. remains a clinical one, and the essintial criteria are:

Demonstration of lesions disseminated in time and place and exclusion of conditions producing a similar clinical picture, like: Lab. testing that may be advisable in certain cases include CSF analysis, serum B 12 level, HTLV1 titer, ESR, serum VDRL, etc.(8,10)

The current diagnostic classification incorporates evidence of para-clinical involvement (as demonstrated by abnormalities of evoked responses and MRI and immunological changes in the CSF. The most useful CSF abnormalities are the presence of oligoclonal IgG. Though this is not specific for M.S. and is seen in a wide range of inflammatory and infectious disorders (7,11). VERs are sensitive in 80-90 % of patients with M.S., somatosensory ERs in 60 - 70 %, while BAERs in 50 - 60 % (12). MRI is the most useful investigation in the diagnosis of M.S.. Areas of high signal on conventional T2 - weighted images occur in over 95% of patients with clinically definite disease. MRI is superior to CSF and VER in establishing cerebral alterations in M.S.. Negative MRI results were obtained in patients with clinically proved M.S.. Alternations shown up by MRI corresponded to duration of the disease; in particular more abnormalities into periventricular regions were found in patients with long standing disease. More plaques were found in patients with primary relapsing - remitting course than with primary chronic progressive form. The clinical course and grade of disability did not correspond to differences in MRI. In (72-79%) of cases, the lesions remain unchanged, increase or decrease in the size of the plaques depend on clinical course, MR.I is the most sensitive technique in establishing the diagnosis (13).

Selection of electrophysiological tests in patients with suspected M.S.:- certain anatomical predilections of plaques at the onset of M.S. correlate to a limited extent with long - term prognosis as suggested by Kurtzke and others, practicularly with the relation to the disability and mortality. The frequency of symptoms and signs at the onset of M.S. seem to indicate that motor signs (pyramidal and cerebellar) head the list. Electrophysiological tests are specific for certain anatomical systems. Electrooculography and electronys-togmography offer the greater sensitivity. This is because of the significant interconnections between the Pyramidal, Cerebellar, Vestibular and the oculomotor systems. These two electrophysiological tests are important for the diagnosis of early M.S (14).

Kurtzke Expanded Disability Scale (EDSS)

Kurtzke Expanded Disability Scale (EDSS) is a two part scale measuring disability specifically related to MIS.. The first part documents neurological functions scored on a scale (0 - 6) specific functions to be rated are:- Pyramidal functions, Bowel & Bladder functions, Visual functions, Mental status functions and Other functions. The Sensory and Bowel & Bladder have been revised. Specific scorings of the Disability Status scale are:

1- Normal neurological examination. 1- No disability (minimal signs).
2- Minimal disability, slight weakness or stiffness.
3- Moderate edisability: mono paresis; mild hemiparesis.
4- Relatively severe disability not interfering with activities of living.
5- Disability severe enough to preclude working.

6- Assistance (canes, crutches, braces) required for walking.
7- Restricted to wheel chair.
8- Restricted to bed. 9-Totally helpless bed patients. 10-Death due to M.S..

A new Expanded Disability Scale (EDSS) is presented with each of the former steps (1,2,3,----,9), now divided into two (1.0,1.5,2.0,----,9.5)(19,20).

The Kurtzke EDSS is widely imployed to indicate a patient's status, progress, and response to therapy. Employing this scale, stage 3 - 4 can be expected in 5 - 6 years, at 10 years duration stages 5 - 6, after 18 - 20 years duration, stages 7 - 8 will be reached and stages 9 - 10 in 30 years. These views give a general outline but are o only limited value in individual patients(15,16). Disease steps can be used as a guide in therapeutic decision making, following response to therapy and in assessing disease progression (21). In 1955 Kurtzke described a new scale for evaluating disability in "Multiple Sclerosis" later known as the Disability Status Scale, devised to evaluate isonized as possible treatment. The scale was "intended to measure the maximal function of each patients as limited by -neurologic deficts" and it was based on neurologic examination. The DSS was later made half of bifid rating system, the other part being a series of grades in each of eight functional groupings (FS) mentioned above. In each portion there is a numerical rating which is mutually exclusive in its category, and the higher the number, the greater is the dysfunction. Only objective verifiable defects due to M.S. as elicited upon neurological examination are included. Symptoms are discarded. All the functional scores save the last (other) were graded from 0 (normal) to maximum impairment (grade 5 or 6); the (other) FS was dichotomous, with 0 as none and 1 as any present. The FS were not additive; each FS could be compared over time only with itsett, and for this reason it was necessary to retain the DSS for overall comparisons of the same patients at different examinations. The FS were modified in 1965 by changing the Sensory scale and Bowel Bladder. The two part system of assessing neurologic impaiment in M.S. has been proposed for adoption as one part of a tridimensional scheme for a "minimal data set" in M.S. The International Federation of Multiple Sclerosis Societies (IFMSS) is trying to establish a uniform minimum record of disability, which would be internationally acceptable as a way to characterize M.S. patients. Three separate scales were desired: one rating scheme to record neurologic signs, one to record the physical disabilities or impairments and one to record the societal impact of the disease.

For the physical impairments or "disabilities" resulting from the disease, an incapacity scale was devised. The rating scheme presented here - the DSS plus FS -was the most likely to meet with what by WHO (World Health Organization) called "neurological impairment". The societal impact (WHO: "handicap") was assayed by what was then called a Socio - Economic Scale. There are over 1.3 million possible patterns of involvement by FS type and grade. Several points of clarification may be it order for the function systems. Pyramid, Cerebellar, Sensory, and Bowel & Bladder functions all refer to impairment of body parts below the head only (regardless of the site of the lesion), and Brain Stem functions have always referred to impairment attributable to lesions supra - and intersegmental tracts subserving cranial nerves 3 through 12, together with involvement of these nuclei or their intramedullary fibers. These, therefore encompass pseudo - bullbar palsies and scanning speech in addition to the so - called cranial nerve functions. The thesis that the DSS is a true numerical, equal interval scale, though is irrelevant to what Kurtzke believe to be the proper handling of the scale as an index of neurologic change with time. Improvement or worsening for each patients was defined as a gain or loss of at least one step on the DSS. This should not happen unless at least one FS changed by an equivalent degree in the same direction.

With EDSS, a gain / loss of 0.5 steps will defined as better / worse, but again, greater changes can be recorded. (18,20)

Disadvantages of the Kurtzke Expanded Disability Scale

It is considered that EDSS has important flaws that seriously limit its usefulness. The problems include: inadequate precision in defining the degree of impairment in some functional categories of the scale, and the use of a mixture of neurologic signs elicited on examination and subjective information obtained from the patients in defining the overall scale. In the light of the widely accepted three - tier classification of dysfunction by the World Health Organization (WHO), the title is inappropriate. Guide lines had been suggested for developing a (Neurologic impairment scale) to rate impairment in M.S.

Inter - rater reliability in assessing functional systems and disability of the Kurtzke scale: is rather low, ranging from 30 - 50 %, sensory and mental turned to be the most variable. So there is necessity for a specific training program for raters and for periodic control of inter observer variability in multicenter surveys (17,22).

Cognitive dysfunction in M.S., results in significant functional impairment at work or home despite probably mild physical disability (Kurtzke 3). Two new scales adapted for the investigation of these patients: cognitive function scale and frontal release scale.

Early disability compensation may have negative effect on the psychological wellbeing and coping behaviors. Therefore careful thought should be given to the timing when the questioning of pension is discussed (21,23).

Disability Profiles and Indexes

A number of assessment profiles have been designed to group the abilities and rehabilitation needs of disabled individuals. These measures have been useful in planning rehabilitation program.

These measures arc pulses profile, Barthel Index and Kurtzke disability scale. Pukes profile: is a scale developed in 19:57 by Moskowitch and Mc Cann. It consists of six components indicated by acronym PULSES:
P: physical condition including disease of the viscera (cardiovascular, pulmonary, gastrointestinal, urologic and endocrine).
U: upper extremities including shoulder girdle, cervical and upper dorsal Me.
L: lower extremities including the pelvis, lower dorsal, and lumbosacral spine. S: sensory components relating to speach, vision and hearing.
E: excretory functions i.e. bowel and bladder control.
S: mental and emotional study.

Barthel Index (BI):

Another profile scale-, it includes 10 self-care, sphincter control, and inability factors-Rating Guide Lines for Barthel Index.
1-feeding.
2-moving from wheel chair to bed and return.
3-doing personal toilet.
4-getting on and off toilet.
5-bathing self.
6-walking on a level surface.
6a-propelling a wheel chair. -ascending and descending stairs.
8-dressing and undressing.
9-continence of bowel.
10-controlling bladder.
A third assessment designed by KURTZKP, is a two part scale measuring disability specifically related to M.S..
The first part documents neurological functions scored on le of 0-6 specific functions to be rated are:
A: Pyramidal functions.
B: Cerebellar functions.
C: Brain stern functions.
D: Sensory functions.
E: Bowel and bladder functions.
F: Visual functions.
G: Mental status functions.
H: Others.
EDSS Steps

- DSS steps 1-2: These steps refer to minimal objective abnormality, with step I as signs without impaired function.
- DSS steps 3-4: These steps still refer to mild disorder, not sufficient to impede normal activities of daily living or work in most situations. However, a concert pianist, a pilot, or a steeple jack would doubt-less not be able to function as usual and still be ascribable to these steps .Full ambulation-meaning ability to up and about all day and to walk usual distances without resting-characterize these steps .Impaired ambulation of any degree should not occur with FS grades defining DSS step 3.There is some overlap of F.S in steps 4&5.
- DSS steps 5-6: The patient is not ordinarily housebound and can walk. Seldom is a full work day possible without special provisions.

We are after (usual best function) here, and neither supra maximal not insufficient efforts at performance.

- DSS 7-9: These are the severely involved patients who are almost invariably limited to wheel-chair or bed.

Patients and methods

Thirty three patients with multiple sclerosis were included in this study. All of these patients have been diagnosed and treated at three medical teaching centers:

Al- yarmuk teaching hospital, Baghdad teaching Hospital and the University Hospital of Saddam Medical College. All cases were collected in the period between January 1998 till February 1999. A thorough history and physical examination, including a detailed neurologic examination had been carried out for them.

All patients had been subjected to: - Routine investigations including complete blood picture and ESR , blood biochemistry, connective tissue screening tests , VDRL; visual evoked responses in most of the patients, and also CT scans and MRI if available. Bran stem Auditory evoked responses (BAER) and somato-sensory evoked responses (SSER) were also perfoimed if needed.

These thirty three patients were rated according to age, sex, disease duration, kurtzke expanded disability status (EDSS) and history of psychological trauma 6 months to 1 year before the onset of the disease (24).

Informations regarding the patients' illness were obtained from the patients themselves or from their close relatives especially those who stood behind the patient since the onset of illness and coming through all its difficulties. [Actually, best efforts had been offered to take a detailed and precise history of the illness hopefully trying to pick up the first notion to the onset of the disease. As many patients deliberately or not may ignore vents many years ago or may find them not worthy mentioned.

Our patients were divided into groups according to grades of disability and then will compare each functional system scores in each group.

Results

Our study includes assessment of neurologic disability of 33 patients is with M.S and the results were:

1-Mean age was: (35 ± 9.7) years.

2-The ratio of female patients / male patients was 1.53/1, being 20 patients females and 13 patients males (Table 1).

3-Disease duration: mean duration of the disease was (4.66 ± 4.3) years.

4-History of psychological trauma was positive in 11 patients (33.3%) with males ratio represents 9.09% (1 patient) and female ratio represents 90.9% (10 patients). (Table 1)-(Histogram).

5-Kurtzke Disability Status Scale (EDSS): was from grade (1-2) in 9 patients, (27.27%), from grades (3-4) in 12 patients (36.36%), from grades (5-6) in 4 patients (12.13%) and from grades (7-9) in 8 patients (23.23%).

6-Our study showed that pyramidal involvement was present in 96.9% of patients, sensory 87.8%, Bowel & Bladder 81.8%, Cerebellar 75.7%, Visual 78.7%, Brainstem 72.7%, Cerebral 33.3% and others 6.6%. (Table 2)

7-Our study showed that the highest percentage of the patients with pyramifil involvement were with EDSS (3-4) and with score 2 on functional scoring system (FS). (Table 3)

8-67% of patients with pyramidal tract dysfunction having disability graded (1-5) by EDSS, and 33% graded (6-9). (Table 4)

9-Our study showed that pyramidal functional scorings increasing as the disability measured by EDSS increases. (Figure 1).

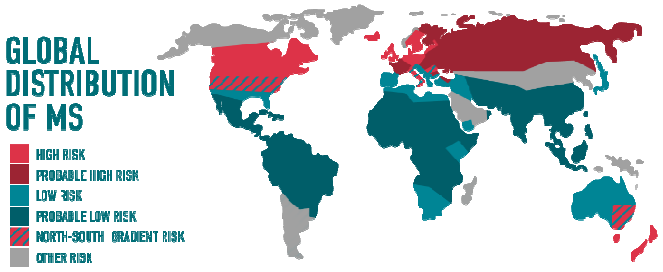
10-The study also showed that Cerebellar dysfunction remains in low scorings as the disability increases. (Figure 2).

11-The study showed that BrainStem dysfunction as measured by (FS) are increasing at lower grades of disability, and then returning to low scores at the highest disability grades.(Figure 3).

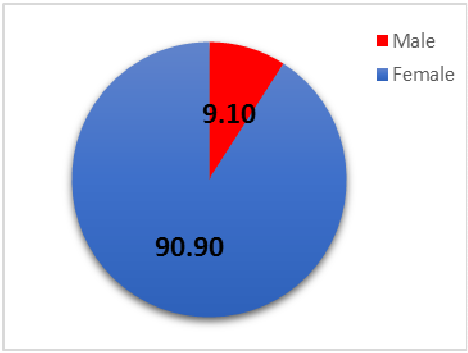
12-Sensory functional scorings remained constant throughout the progression of the disability as measured by EDSS. (Figure 4).

13-From our study it is showed that Visual dysfunction develop early in the disease, and remain relatively constant and increases as the disease progresses reaching (FS) 3 then it regresses 2 (FS) at grades (7- 9).(Figure 5).

14-Both Bowel & Bladder and Cerebral functional scores increase as the disability increases as measured by EDSS. (Figure 6, Figure 7).



World map MS incidence.



More than 90 % of total patients with positive history of psychological trauma were females and only 9.09% where males. This points to the probability that female patients might be more susceptible to develop M.S. in relation to psychological trauma than males. In spite of small number of the sample, this significant finding can be explained on the basis of the hounonal differences between males and females.

Table 1.

History of psychosocial trauma

Sex	Yes	No	Total
M	1	12	13
F	10	10	20
Total	11	22	33

P 0.02

33.3% of our patients were with positive history of psychological trauma 6 months to one year before onset of the disease and 66.7% with negative history.

Table 2.

Functional System (FS)	Involved %	Total N Known
Pyramidal (P)	96.9	33
Cerebellar (CLL)	75.7	33
Brain Stern (BS)	72.7	33
Sensory (S)	37.3	33
Bowel & Bladder (BB)	81.8	33
Visual (V)	78.7	33
Cerebral (cb) total	32.3	33
Cerebral (cb) mental	33.3	33
Others	6.6	33

* from Neurology 33 Nov; 1983

Functional System (FS)	Involved %	Total N Known
Pyramidal (P)	84.9	511
Cerebellar , (CLL)	76.9	481
Brain Stern (BS)	73.0	514
Sensory (S)	55.2	478
Bowel & Bladder (BB)	22.6	517
Visual (V)	33.9	425
Cerebral (cb) total	20.7	487
Cerebral (cb) mental	2.9	487
Others	14.9	523

Our study shows that pyramidal signs present in 96% of patients, i.e. the highest percentage of all systems in the functional scorings. This finding is compatible with that observed in other studies. Regarding other functional scoring systems, the sequence of frequency of occurrence was different. This may be due to difference in the type of presentation and development of neurologic dysfunction in our patients from patients in other countries. The other possibility is that the number of patients included in our study is not large enough to demonstrate the various distribution of involvement in functional systems as shown in table 1.

Table 3. Kurtszke EDSS								
	0	1	2	3	4	5	6	
1 — 2		5	4	-	-	1		31.2
3 — 4	1	1	3	4	3			33.3
5 — 6	-		1	3		-	-	12.1
7 — 9	-	-	-	-	3	3	1	21.0
	1	6	8	7	6	4	1	

Table 4.

Kurtzke EDSS (1 - 5) 67%	Kurtzke EDSS (6-9) 33%

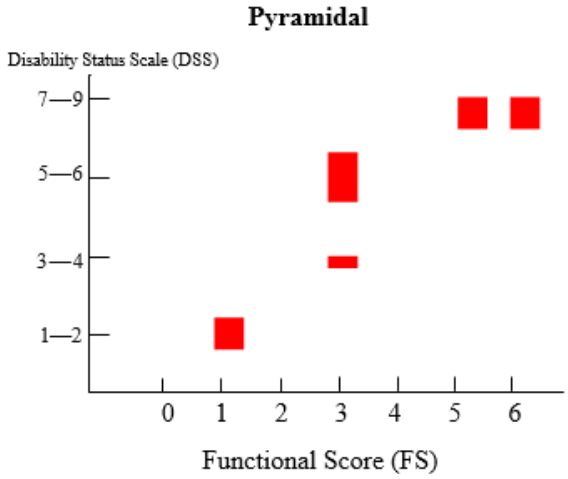


Figure 1: shows that Pyramidal function is shifted to the right as the EDSS grades are increasing. This means that pyramidal function is correlated well with the disability.

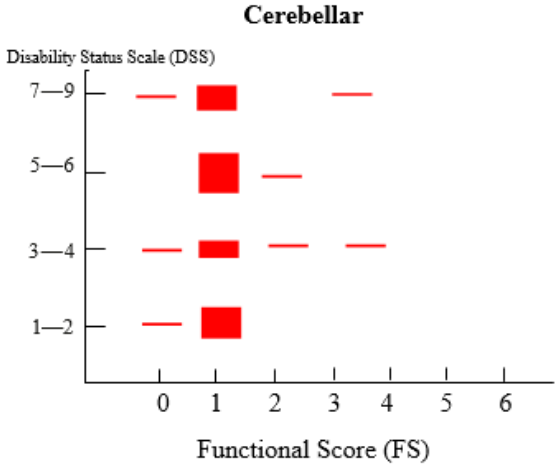


Figure 2: shows that patients with cerebellar dysfunction remain with low scoring as the disability increases. This means that cerebellar dysfunction may not have a significant role in the highly disabled patients.

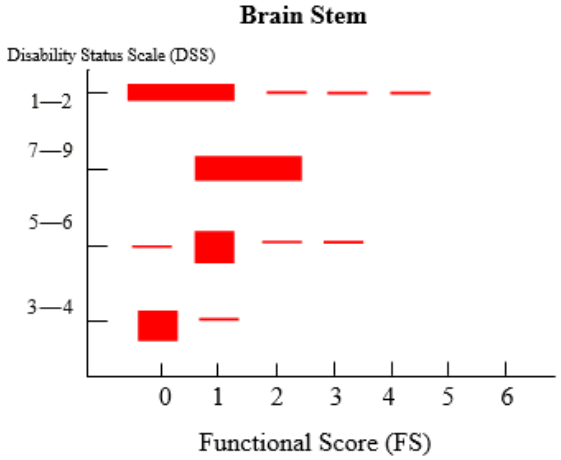


Figure 3: shows that brain stem functions are increasing slowly at lower grades of disability, and then returning to low scores at the highest disability grades. Therefore, the brain stem is not severely affected even in the highly disabled patients in majority of our patients.

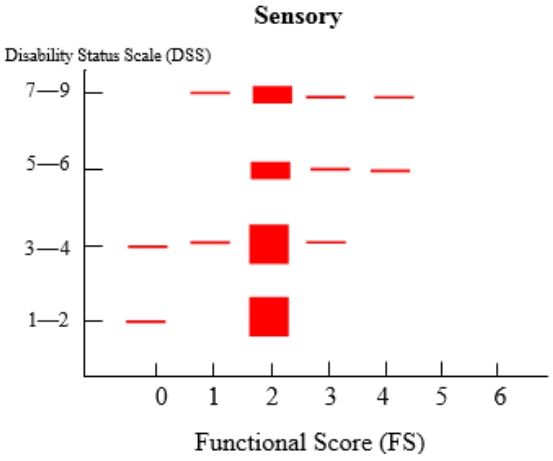


Figure 4: shows that sensory functional scorings remain constant throughout the progression of the DSS grades. This means that sensory function plays a major role in the disability of M.S. patients with lower grades of disability. As the disease progresses, the sensory function remained in the same functional score. So the sensory functions are of less important role in the high grades of disability.

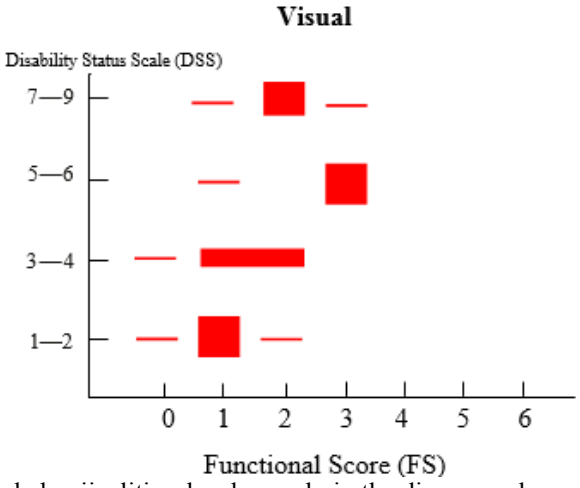


Figure 5, shows that the visual abnoiinalities develop early in the disease and remain relatively constant in most of our patients.

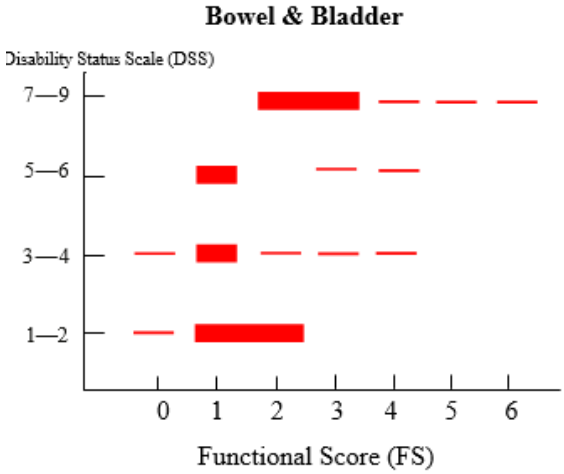


Figure 6

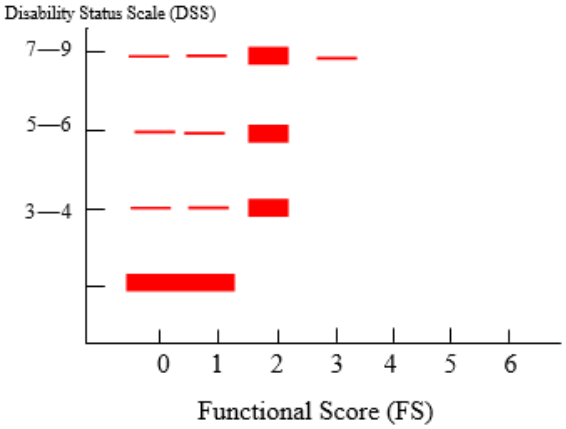


Figure 7

Figure 6 & 7: shows that both Bowel & Bladder and Cerebral functional scores increase as the disability increases. This means that Bowel & Bladder and Cerebral functions are correlated with increasing

KS 1-2

	0	1	2	3	4	5	6	Total
Visual	11.1%)	(66.7%)	(22.2%)					
Cerebral	(50%)	(50%)						
Brain stem	(55.6%)	(44.4%)						
Bladder & Bowel	(25%)	(37.5%)	(37.5%)					
Cerebellar	(33.3%)	(66.7%)						
Sensory	(20%)	-	(80%)					
Pyramidal	-	(55.6%)	(44.4%)					

KS 3-4

	0	1	2	3	4	5	6	Total
Visual	(15.4%)	(38.5%)	(38.5%)	(7.6%)				
Cerebral	(16.7%)	(33.3%)	(50%)					
Brain stem	(16.7%)	(66.7%)	(8.3%)	(8.3%)				
Bladder & Bowel	(21.4%)	(57.1%)	(7.1%)	(7.1%)	(7.1%)			
Cerebellar	(16.7%)	(58.3%)	(16.7%)	(8.3%)				
Sensory	(10%)	-	(80%)	(10%)				
Pyramidal	(8.3%)	(8.3%)	(25%)	(33.3%)	(25%)			

KS 5-6

	0	1	2	3	4	5	6	Total
Visual	-	(33.3%)	-	(66.7%)				
Cerebral	(25%)	(25%)	(50%)					
Brain stem	(16.7%)	(50%)	(50%)					
Bladder & Bowel	-	(50%)	-	(25%)	(25%)			
Cerebellar	-	(75%)	(25%)					
Sensory	-	-	(50%)	(25%)	(25%)			
Pyramidal	-	-	(25%)	(75%)				

KS 5-6

	0	1	2	3	4	5	6	Total
Visual	-	(33.3%)	(50%)	(16.7%)				
Cerebral	(16.7%)	(16.7%)	(66.7%)	(3%)				
Brain stem	(28.6%)	(28.6%)	(14.2%)	(14.2%)	(14.2%)		(3%)	
Bladder & Bowel	-	-	(33.3%)	(33.3%)	(16.7%)	(16.7%)		
Cerebellar	(28.6%)	57.1%)	-	(14.3%)				
Sensory	-	-	(50%)	(14.3%)	(14.3%)			
Pyramidal	-	-	-	-	(50%)	(50%)	(3%)	

***KS: Kurtzke-scale**

Discussion

- Our study showed that mean age of our patients is compatible with mean age of other studies being (35 ± 9.7) years V.s. (20-40) years in other studies. (1)
- Sex ratio of our patients is compatible with other studies being 1.53/1 V.s. 1.6-1.4/1.(1)
- Patients rated were from different areas of our country and they were from different social, educational and economical classes, and were occupying verities of jobs.
- Mean disease duration of our patients is (4.66 ± 4.3) year this figure may not be regarded so much beneficial.
- History of psychological -trauma :- The history of psychological trauma 6 months to 1 year before onset of the disease may be more pronounced in other studies than ours, beina. 77% V.s. 33.3% in our patients. (24). This figure may be :high in other studies because they used the Life Events and Difficulties Schedule (LEDS) which is not available in our teaching centers, besides, some of our patients ignore any stressful event for their own reasons, and in fact, many of them don't put much weight on it, and hopefully they may forget their adversities in life
- In our study the sequence of involvement of functional systems is different from other studies. In our paitentssensory system involvement is the next after pyramidal, and Bowel and Bladder is the 3 rd. While in the other study cerebeller and then Brainstem involvement are the major first causes of disability. This may be explained by the predominance of sensory functions and Bowel and Bladder in the contribution to the, disability of our patients compared to the cerebellar and Brain stem in the other study. Of course in both studies the prymidal affection heads the list among the functional impairments in causing disability in m.s patients.
  The difference in the sequence of frequency of involvement in different functional systems from other studies, can also explained by the fact that our number of patients is not large enough to demonstrate the various distribution of involvement among functional systems.(Table 2.)
- We can see that pyramidal function involvement is increasing regarding the (functional scoring system) (FS) in relation to the disabilityrepresented by the EDSS. This means that pyramidal involvement plays a major role in the disability of m.s patients (fig 1). In fact only trauma and rheumatoid Arthritis exceed m.s. in causing physical disability in young adults.
- We can see that :The majority of patients with pyramidal affection were on step 2 on functional scoring system which consists of 6 grades and lying on disability status scale EDSS 3-4 . This means that these patients are with mild disturbance not sufficient to impede normal activities of daily living. (Table 3) . this is probably because this group of patients (with EDS 3-4) having, a mean duration of (4.9 ± 3.2) years which is the lowest expectable duration in causing disability in this group , as mentioned in other studies that put an expectation.to the DSS (3-4) of being (5-10 years) .
  In addition, most of our patients are known to have m.s long time before been rated and mostly they received several types of treatment including drugs, physiotherapy and others. Also we can say that the number of patients rated in this study is small. This finding confines the validity of (F.S.) system in rating the expected disability measured by DSS.

- In our study 67% of patients with pyramidal involvement were lying between (1-5) EDSS, that means they are able to be up and about most of the day. While 33% of them were having grades (6-9) EDSS. This may be interpreted as most of our patients are not severely disabled and probably the severity of disability may be shared between pyramidal involvement and other systems (Table 4).
- Cerebellar dysfunction may not have a significant role in the highly disabled patients rated in our study because patients with cerebellar dys function remain with low scoring as the disability represented by the EDSS increases. (fig 2)

  In fact as pyramidal functional scorings approach wades 3 on (F.S) and above the cerebellar function retains a low scoring system. This is because when weakness increases in a limb the cerebellar signs being, to disappearsimply because the paralyzed limb can not move.
- In our study, we can see that Brain stem involvement is not so evident in severely disabled patients, in fact Brain Stem impairment contributes to low grades of disability as measured by EDSS as shown in (fig. 3).
- Sensory functional impairment play a major role in the lower grade of disability, as the disease progresses, which is evident from the increases in EDSS grades, the sensory functional scorinas remained low, so the sensory functional impairment plays significant role in disabled m.s patients in our study as shown in (fig. 4.)
- The fact that the percentage of our patients with high grades of disability is low, may explain the findings regarding the sensory and brain stem functions.

  The other fact is that many of our patients and especially the severely disabled ones may not be able to express their true feeling on examining their sensory systems.

  One of the flaws of the EDSS rating system is that it includes sensory system examination which is not so conclusive.
- Visual system involvement increases as the disability increases but not at the highest grades of disability. This may be explained by the fact that visual impairment occurs mainly in the early stages of the disease during which the patient have had received treatment and achieved improvement in his vision by the time seen by a doctor and rated for his disability (fig 5).

  In our patients we can see that as the disability increases Bowel and Bladder and Cerebal functional involvements increase. This means that these two functional systems are correlated well with the disability (fig 6, fig 7).

  We can observe that Bowel and Bladder involvement is correlated well with the disability in our patients than in other studies as shown in (Table 2). This probably be explained by nature of the disease in our country. The other possibility is that our Iraqi patients are so bothered by their bladder and bowel complaints mainly incontinence, for social and religious considerations and they seek the help of the doctor mainly for this complaint and they may ignore other complaints happened a time before this "embarrassing" complaint.

Recommendation

Every patient with multiple sclerosis whether recently diagnosed or known to have the disease - should be rated according to Kurtzke EDSS and the total grade in addition to the functional score of each functional system should be kept in his case sheet , or visiting card and these can be compared with other readings in subsequent visits. As the disability is modified by treatments, doctors can benefit from their rating regarding the efficacy of treatment, disease progression and the need of other measures.

Also can monitor the increase or decrease in any individual system in the functional score and specify the needed treatment for each one of them.

Listing to m.s patients' complaints is very important because these patients are not only disturbed by the physical disability caused by the disease , but also by the mental and sphincteric dysfunction causing variable social impacts .So every complain should be taken seriously and every possible assistance should be offered to these patients

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