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Resident Corner

Classification of leprosy – From past to present

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Introduction

Leprosy is a chronic infectious disease caused by *Mycobacterium leprae*, characterized by varied clinical presentation. The various clinical manifestations in leprosy are the results of the variations in the tissue response of the host to the leprosy bacilli in the body in genetically susceptible persons. After entering in the body the bacteria are either killed or multiply according to the immune status of the body. According to the degree of resistance of the body, the disease manifests in two extreme forms one with a localized disease and second with generalized form. In between the two, various other forms are present that lead to difficulty and to differences in opinions of different authors. Thus, the classification in leprosy has faced marked difficulties in evolving a satisfactory universally acceptable clinical system of classification. In the literature, different classification systems are available based on clinical, bacteriological, pathological, immunological and therapeutic purposes (**Box 1**).

Pre-Manila classifications

Danielssen and Boeck in 1847 classified leprosy into three main clinical types as shown in **(Box 2)**.[1] Same authors in 1848 divided leprosy into nodular and anesthetic **(Box 2)**.[2] Hansen and Looft in 1895 divided it into tuberosa and maculoanesthetic types **(Box 2)**.[3] But, term nodular and maculoanesthetic were used by Kobner.[4] Neisser in 1903 described the disease under three forms **(Box 2)**.[5] Darier used the term 'tuberculoid' in relation to leprosy.[4]

The Manila classification

A round table conference (1931) was held by the Leonard Wood Memorial in Manila, Philippines. For the first time an international system of classification was made at this conference and divided the leprosy into three types **(Box 3)**.[6]

The Cairo classification

The International Leprosy Congress, Cairo (1938) adopted a classification in which the term 'cutaneous' of the Manila classification was replaced by the term 'lepromatous'. The term 'neural' was retained and the lesions in this type were subdivided into three types (**Box 4)**.[7] This classification had some disadvantages. First was regarding the use of the term 'neural', because nerves are affected in both types. The other defect of this classification was that it did not provide a place for the cases in which clinical features were clear-cut of either type but shared some features of both types.

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Box 1 Classifications of leprosy

1. Pre-Manila classifications
   a) Danielssen & Boeck (1847)
   b) Danielssen & Boeck (1848)
   c) Hansen & Looft (1895)
   d) Neisser (1903)
2. The Manila classification (1931)
3. The Cairo classification (1938)
4. The Strassbourg classification (1923)
5. The Pan American classification (1946)
6. The Havana classification (1948)
7. WHO expert committee (1952)
8. The Madrid classification (1953)
9. The Indian classification (1955)
10. Ridley-Jopling classification (1966)
11. The New IAL classification (1981)
12. Job & Chacko classification
13. WHO classification (1982)
14. WHO classification (1988)
15. WHO classification based on the number of lesions (1998)
16. Classification under NLEP, India (2009)

Box 2 Pre-Manila classifications

Danielssen and Boeck (1847)[1]
   1) Elephantiasis graecorum tuberosa
   2) Elephantiasis anesthetosa
   3) Mixta

Danielssen & Boeck (1848)[2]
   1) Nodular
   2) Anesthetic

Hansen & Looft (1895)[3]
   1) Tuberose (nodular) and
   2) Maculoanesthetic

Neisser (1903)[5]
   1) Lepra tuberosa
   2) Lepra cutanae
   3) Lepra nervosum

Box 3 The Manila classification (1931) [6]

The Leonard Wood Memorial held a round table conference (1931) in Manila, Philippines.
   1. Cutaneous (corresponding to the nodular of Hansen and Looft),
   2. Neural (corresponding to maculoanesthetic of Hansen and Looft),
   3. Mixed

Box 4 The Cairo classification (1938) [7]

The International Leprosy Congress, Cairo (1938)
Lepromatous
Neural
   1. Neuromacular simple
   2. Neuromacular tuberculoid
   3. Neuroanesthetic.

Box 5 The Strassbourg classification (1923) [1]

1. Skin leprosy
2. Nerve leprosy
3. Mixed

Box 6 The Pan American classification (1946) [8]

The Second Pan American Leprosy Congress, Rio de Janeiro (1946)
Lepromatous
Tuberculoid
Uncharacteristic

Box 7 The Havana classification (1948) [9]

The International Leprosy Congress, Havana (1948)
Lepromatous
Tuberculoid
Indeterminate

The Strassbourg classification

The International Leprosy Congress-III was held at Strassbourg in 1923 **(Box 5)**.[1] At this congress meeting leprosy was classified into three main types based on location of bacilli in various organs of the body.

The Pan-American classification

The Second Pan-American Leprosy Congress, Rio de Janeiro in 1946 classified leprosy based mainly on histological grounds. The term lepromatous was retained, and the term neural was replaced by the term tuberculoid. A third type was introduced and it was named 'uncharacteristic' **(Box 6)**.[8] As the classification was based on histopathology, it was an improvement over previous classification. But disadvantage associated with this classification was the use of the term 'uncharacteristic'.

The Havana classification

The International Leprosy Congress, Havana (1948) classification is a variant of the original Pan-American classification in which the term 'uncharacteristic' was replaced by 'indeterminate' **(Box 7)**.[9]

Box 8 WHO expert committee (1952) [10]

Lepromatous
Tuberculoid
Indeterminate
Borderline

Box 9 The Madrid classification (1953) [11]

Lepromatous type (L)
Macular
Diffuse
Infiltrated
Nodular
Neuritic, pure (?)
Tuberculoid type (T)
Macular (Tm)
Minor tuberculoid (micropapuloid) (Tt)
Major tuberculoid (plaques, annular lesion etc.) (TT)
Neuritic, Pure (Tn)
Indeterminate group (I)
Macular (Im)
Neuritic type (In)
Borderline (Dimorphous) group (B)
Infiltrated
(Others?)

Box 10 The Indian classification (1955) [12]

Lepromatous (L)
Tuberculoid (T)
Maculoanesthetic (MA)
Polyneuritic (P)
Borderline (B)
Indeterminate (I)

Box 11 Ridley-Jopling classification (1966) [13,14]

Tuberculoid leprosy (TT)
Borderline tuberculoid leprosy (BT)
Mid-borderline leprosy (BB)
Borderline lepromatous leprosy (BL)
Lepromatous leprosy (LL)

Box 12 The New IAL classification (1981) [15]

Lepromatous (L)
Tuberculoid (T)
Polyneuritic (P)
Borderline (B)
Indeterminate (1)

WHO Expert Committee classification (1952)

The World Health Organization Expert Committee on Leprosy at its first meeting in 1952 recommended adding a borderline group to the three types accepted at Havana. Therefore, leprosy was divided into four main classes: lepromatous, tuberculoid, borderline and indeterminate **(Box 8)**.[10]

The Madrid classification

The classification at the International Leprosy Congress, held at Madrid in 1953 was a major improvement over the preceding classifications **(Box 9)**.[11] The major problem with this classification was that the pure neuritic type was included in indeterminate, lepromatous and tuberculoid groups.

The Indian classification

The classification system devised by Indian authors is shown in **Box 10**.[12] This classification is almost similar to the Madrid classification, but maculoanesthetic and pure neuritic were kept as separate categories. The classification was kept simple for field workers.

Ridley-Jopling classification

This classification divided the leprosy into two stable polar forms with unstable borderline in between the two (**Box 11)**.[13,14] The main advantage with this classification was that it was based on bacteriological, immunological, histopathological and clinical features of leprosy. For these reasons, this classification has been widely accepted. The main drawback of Ridley-Jopling classification is that there is no specific place for the indeterminate and pure neuritic leprosy in the spectrum. There can be clinicohistopathological discordance that may cause confusion under this classification.

The New IAL classification

Indian Association of Leprologists (IAL) general meeting at Agra in 1981 classified leprosy into

five groups **(Box 12)**.[15] This was a modification of previous Indian classification in which the maculoanesthetic leprosy was merged with tuberculoid leprosy.

Job and Chacko classification

According to Job and Chacko, leprosy was classified into six main types **(Box 13)**.[16]

WHO classification (1982)

World Health Organization (WHO) experts in 1982 outlined a simple classification system based on the probable number of *M. leprae* being harbored by an individual and classified it into paucibacillary and multibacillary leprosy **(Box 14)**.[17]

WHO classification (1988)

This classification is shown in **Box 15**.[18] All the patients with demonstrable acid fast bacilli in slit-skin smear without any reference to bacterial index were to be categorized as multibacillary.[18]

WHO Classification based on the number of lesions (1998)

In 1998 WHO proposed classification based upon the total number of leprosy lesions in the patient and categorized into paucibacillary (PB) and multibacillary (MB) types **(Box 16)**.[19] If skin smear facilities are available or whenever practised on any patient, the smear positive cases should be placed in multibacillary type irrespective of the number of lesions. With the use of this classification, some MB cases may wrongly be classified into PB types resulting in under treatment.

Classification under NLEP, India (2009)

As per criteria laid down under the National

Box 13 Job & Chacko classification [16]

Lepromatous leprosy (L) Tuberculoid leprosy (T) Borderline tuberculoid leprosy (BT) Borderline lepromatous leprosy (BL) Indeterminate leprosy (I) Polyneuritic leprosy (P or N)

Box 14 WHO classification (1982) [17]

Paucibacillary leprosy (BI<2+) Multibacillary leprosy (BI≥2+)

BI=Bacterial index

Box 15 WHO classification (1988) [18]

1. *Paucibacillary leprosy*: It included only smear negative cases belonging to • Indeterminate (I), tuberculoid (TI), and borderline tuberculoid (BT) cases as classified under Ridley-Jopling classification and • Indeterminate (I), and tuberculoid (T) cases under Madrid classification 2. *Multibacillary leprosy*: included all • Mid-borderline(BB), borderline lepromatous (BL), and lepromatous (LL) under Ridley-Jopling classification • Borderline (B) and lepromatous (L) cases under the Madrid classification • Any other smear positive case

Box 16 WHO classification based on the number of lesions (1998) [19]

Paucibacillary single lesion leprosy (SLPB); Paucibacillary leprosy (2-5 skin lesions); Multibacillary leprosy- six or more skin lesions and also, all smear positive cases.

Box 17 Classification under National Leprosy Eradication Programme, India (2009) [20]

Paucibacillary (PB) Skin lesions - 1-5 lesions Peripheral nerve involvement - No nerve or only one nerve with or without 1-5 lesions Skin smears - Negative at all sites *Multibacillary (MB)* Skin lesions – 6 and above Peripheral nerve involvement - More than one nerve irrespective of the number of skin lesions Skin smears - Positive at any site

Note: If skin smear is positive; irrespective of number of skin lesions and nerve involvement, the disease is classified as MB leprosy but if skin smear is negative it is classified on the basis of number of skin lesions and nerve involvement.

Leprosy Eradication Programme (NLEP) of Government of India, the number of nerves involved is also taken into consideration for classification of leprosy **(Box 17)**.[20]

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