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Original Article

A Study of Liver Function Tests in leprosy

M Swathi

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Leprosy is a chronic progressive granulomatous disease caused by *Mycobacterium leprae*. Hepatic involvement is seen in early stages of the disease. Administration of the hepatotoxic drugs like Rifampicin and Dapsone may further deteriorate the liver function. The present study was undertaken to evaluate hepatic status by studying the various liver function tests in leprosy patients and compared to healthy controls. Thirty untreated leprosy patients (18 Multibacillary, 12 Paucibacillary) with duration of illness varying from one month to three years were selected as cases. Twenty healthy age and sex matched persons were taken as controls. Hepatic functional status was evaluated by estimation of serum total bilirubin, alanine transaminase, aspartate transaminase, alkaline phosphatase, total protein, albumin and globulin. Independent sample 't' test was used to compare the data. $P < 0.05$ was considered as significant. Except for serum total protein, there was a statistically significant difference between the mean values of all the parameters in cases when compared to controls. The present study revealed minimal derangement in hepatic function in leprosy patients. Therefore monitoring of liver function tests is very important to assess the functional status of the liver before administration of therapy in leprosy.

Key words : Leprosy, Liver Function Tests (LFT), Multibacillary (MB), Paucibacillary (PB).

Introduction

Leprosy is a disease of great antiquity and it still continues to be a significant public health problem in few countries including India. The prevalence of leprosy has decreased considerably with the implementation of leprosy control programmes and effective multidrug therapy (MDT) but the incidence of newly detected cases is still high. India records the highest number of new leprosy cases in the world (WHO 2012).

Leprosy is a chronic granulomatous disease caused by *Mycobacterium leprae*, an obligate intracellular bacillus that resides in macrophages and affects the eye, bone, bone marrow, muscle, Schwann cells of peripheral nerves and mediates derangement in the functions of certain internal organs like liver and kidney, resulting in a wide range of clinical manifestations during the chronic course of the disease. Depending on host resistance, leprosy may present as tuberculoid or lepromatous type with a spectrum of intermediate stages appearing between the two. Leprosy has long incubation period, usually upto

[1] M Swathi, MBBS, MD, Assistant Professor, Department of Biochemistry, Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur, Tamilnadu, India

Correspondence to: M Swathi **E-mail:** vennela.md@gmail.com

five years in the tuberculoid form (TT) of disease and twenty years or longer in the lepromatous form (LL) (Thomas and Modlin 2008).

Leprosy is a systemic disease which results in involvement of visceral organs like liver, adrenals, spleen, bone marrow, kidney and testis. Liver is one of the frequently affected visceral organs in leprosy, particularly in the lepromatous type. Asymptomatic contacts of leprosy patients have been shown to be positive for AFB (Acid fast bacilli) in skin, blood and liver. Although grossly no abnormal changes are seen in liver, microscopic lesions have been demonstrated in all types of leprosy and contacts (Kiran 2008).

Leprous granuloma is the main lesion seen in liver, both in TT and LL. Multiple and extensive granulomata are seen throughout the parenchyma of liver and heavily bacillated in LL. Granulomata comprised various types of cells, predominantly foam cells with scattered irregular histiocytes and lymphocytes. In some cases, hepatic lesions progress to stellate fibrosis and early cirrhotic changes (Lewis 2012, Ramesh and Kumar 2010). Exudative lesions like sinusoidal and portal vasculitis and foamy cell granulomas are seen in the liver during reactional states in many patients (Patnaik et al 1989).

Multidrug therapy (MDT) consisting of Dapsone, Rifampicin and Clofazimine is the main stay of treatment in leprosy patients. Dapsone and Rifampicin are hepatotoxic in nature. Dapsone-induced liver damage may occur in a few patients. Liver functions may show abnormalities and jaundice with enlarged liver may be seen. Hepatic granulomas, hepatocellular necrosis and cholestatic jaundice may occur with dapsone (Neuberger 2010, Deps et al 2007). In patients with hypersensitivity reaction / dapsone syndrome, hepatitis with abnormal LFT (Liver Function tests) is the main feature (Shivanthan and Satgurunathan 2011, Sudha and Arun 2005). One of the adverse effects of rifampicin is hepatitis which is dose-related (Patricia et al 2007, Prashant et al 2012). Acute cholestasis and cholestatic hepatitis may occur (Neuberger 2010). Abnormal LFT, jaundice and liver failure are also reported with rifampicin (Patricia et al 2007, Prashant et al 2012).

Therefore monitoring of liver function tests is very important to assess the functional status of the liver before administration of MDT. Few biochemical studies have been done to know the hepatic status in leprosy, mainly in LL with conflicting reports (Nigam et al 2003, Nwosu C and Nwosu S 2001). The present study was undertaken to evaluate the hepatic status by studying the various liver function tests in leprosy patients and compared to healthy controls.

Materials and Methods

In the present study, thirty newly diagnosed leprosy patients attending Osmania General Hospital, Dermatology department were included as cases before the start of Multi-drug therapy. The diagnosis is based on clinical grounds into Paucibacillary (P.B) {2 to 5 skin patches} and Multibacillary (M.B) {$\geq$ 6 skin patches} cases as per the WHO Operational classification (Lockwood and McAdam 2004). In this study, out of 30 leprosy patients, 18 were of M.B type and 12 were of P.B type. The duration of illness of leprosy patients varied from 1 month to 3 years with a mean duration of 11 months. Leprosy patients suffering from reactions, ulceration, co-infection and history of smoking, infectious diseases and other major illnesses were excluded from the study.

Twenty age and sex matched healthy individuals without any past history of leprosy disease were selected as controls. Under aseptic precautions, 5 ml of fasting venous blood samples were collected from the study subjects in plain

vacutainers, sample is centrifuged at 3000 r.p.m for 10 minutes. Serum was separated and used for the estimation of total bilirubin by Malloy & Evelyn method (Higgins et al 2012), alanine transaminase (ALT) and aspartate transaminase (AST) by Modified UV (IFCC) Kinetic assay method and alkaline phosphatase (ALP) by PNPP-AMP (IFCC) Kinetic assay method (Panteghini and Renze 2012). Serum total protein was estimated by Biuret method and Serum albumin by B.C.G Dye binding method (Hortin 2012). Serum globulin was calculated from total protein and albumin and albumin / globulin (A/G) ratio was estimated (Tymchak 2010).

The data was analysed by using SPSS 15.0 version. The results were expressed as Mean ± Standard Error (S.E). Independent sample't' test was used to assess the significance of difference of means of the parameters in two groups (cases and controls). $P < 0.05$ was considered as significant.

Results

Except for serum total protein, there was a statistically significant difference between the mean values of all the study parameters in leprosy cases when compared to controls. The Mean (SE) and 'p' values are shown in Table 1.

In the present study, out of 30 leprosy patients, 10 patients (33.3%) had increased serum bilirubin level, 11 patients (36.6%) had increased ALT, 6 patients (20%) had increased AST and 9 patients (30%) had increased ALP levels. Serum albumin was found to be decreased in 8 patients (26.6%), globulin was increased in 22 patients (73.3%) and reversal of A/G ratio was observed in 20 patients (66.6%).

Discussion

Leprosy is a chronic infectious disease caused by *M leprae*. Though the clinical signs and symptoms are more prominent in the skin and nerves, the disease involves almost all organs. Liver involvement is frequently seen in leprosy. Involvement of liver is through haematogenous spread and has been noted in both TT and LL (Ramesh and Kumar 2010). Leprosy does not usually lead to hepatic functional impairment on its own, but use of hepatotoxic drugs, chronic alcoholism, and concomitant hepatic viral infection lead to functional impairment (Kiran 2008). It was proposed that leprosy is not associated with impaired hepatocellular function unless a severe complication like secondary amyloidosis or hepatocellular carcinoma / coincident disease is present (Cook and Corachan 1982).

In the present study, there was a stastically significant increase in mean values in all study parameters except total protein in leprosy patients when compared to controls. However the mean values for all the parameters were with in normal limits except the lowering of A/G ratio in leprosy cases which was statistically significant ($p< 0.05$). In this study, there was no significant difference in mean values of parameters in M.B and P.B cases. This finding was in contrary to other studies (Karat et al 1971). The minimal derangement in LFT observed in cases was not related to the duration of the disease in this study. This finding was in agreement with earlier studies (Nigam et al 1982).

The slight increase in SGPT, SGOT in leprosy, as observed in the present study, can be attributed to the hepatic damage and muscle involvement (Nigam et al 1982). The mean serum protein levels were normal in leprosy patients. This finding was in contrary with other studies (Nayak et al 1989) and in agreement with earlier studies (Nigam et al 2003). There was a decrease in albumin and an increase in globulin levels with lowering of A/G ratio in leprosy patients. This finding was in agreement with earlier studies (Ferrari et al 2002, Nigam et al 2003, Nwosu 2001). This may be

attributed to antigenic stimulation, immunological phenomenon and hepatic involvement in leprosy (Nigam et al 2003). It can also be due to hyperplasia of reticulo endothelial cells (Nigam et al 1982).

Conclusion

The present study reveals minimal derangement in hepatic function in leprosy. This alteration was irrespective of the type and duration of the disease. Therefore monitoring of liver function tests is very important to assess the functional status of the liver before administration of therapy in leprosy.

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