ORIGINAL ARTICLE

Comparative Study of Lipid Profile in Multibacillary and Paucibacillary Leprosy Patients

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ABSTRACT:

Objective: To evaluate the lipid profile in Multibacillary and Paucibacillary leprosy subjects and compare them with age and sex matched healthy control subjects.

Materials and Methods: This observational study was performed after approval from BASR, University of Karachi in the Department of Biochemistry, University of Karachi, from December 2014 to November, 2015. Present study was conducted in 42 newly diagnosed leprosy patients of both sexes and all ages were included in this study. The diagnosis were on clinical ground and bacterial examination by slit skin smear test, and are classified in two groups, Paucibacillary (PB) and Multibacillary (MB), based on the WHO guide lines. 1-5 skin lesions were regarded as PB with no acid fast rods on the smear and skin lesions more than 5 were regarded as MB. A positive bacterial index classifies the patient as MB, regardless of the number of skin lesions with bacteria visible on a smear.

Results: A total of 30 control subjects and 42 leprosy patients among 24 Multibacillary and 18 Paucibacillary leprosy were recruited for this study. Biophysical parameters in Multibacillary and Paucibacillary subjects were completely non significant when compared with control group.In biochemical parameters among Multibacillary and Paucibacillary leprosy cases, all the lipid fractions total cholesterol, triglycerides and LDL -cholesterol were significantly decreased ($p<0.05$) but HDL –cholesterol significantly increased ($p<0.05$) in both Multibacillary and Paucibacillary leprosy groups when compared with control group.

Conclusion: This study showed that, all the lipid fractions except HDL cholesterol were decreased significantly ($p<0.05$), where as HDL Cholesterol was increased significantly ($p<0.05$) in both Multibacillary and Paucibacillary leprosy groups when compared with control group.

Keywords: Leprosy, Lipid profile, Multibacillary(MB), Paucibacillary (PB)

INTRODUCTION

Leprosy is a granulomatous, chronic infectious disease caused by Mycobacterium leprae.[1] Mycobacterium leprae was discovered in 1873, by G. H. Armauer Hansen in Norway, therefore leprosy is referred as Hansen's disease. It is a mutilating, debilitating, devastating and deforming disease. It mainly affects the skin and peripheral nerves, leading to sensory loss in the skin, muscle weakness and often permanent disabilities of hands and feet.[2]

Over the last 25 years with the efforts of leprosy control programs and multi drug therapy (MDT) leprosy have decreased worldwide dramatically prevalence from approximately 5.4 million registered cases during the start of 2008.[3,4,5] Leprosy remains a significant public health problem in several parts of the world. According to World Health Organization (WHO) by 105 countries, the number of new cases detected during the year 2011 were 219, 075. indeed in year 2012 were 33,955 new cases were detected in Brazil alone (WHO 2012).[6] Leprosy is now known to be neither sexually transmitted nor highly infectious after treatment. Approximately 95% of people are naturally immune and sufferers are no longer infectious after as little as 2 weeks of treatment. It is completely curable by using multi drug therapy.[7] Leprosy is not a killing disease, it is a crippling disease and if not treated early and properly, may form permanent deformities.[8] The signs and symptoms may be ignored in the early stages until visible disabilities have not occurred.[9] Leprosy affects both sexes but males are affected more than females and ratio is 2:1.Until coming of AIDS, leprosy was the most feared infectious disease globally. It is still considered to be dreadful infectious disease, so normal healthy people try to avoid and breakup all kind of links to these patients.[10]

Leprosy has struck fear into human beings for thousands of years. In the time of Christ it was considered to be a holy curse conferred upon the people due to their wrong doings and the affected unfortunate was totally isolated and discarded. According to some ancient transcript the patients were confined to huge dungeons or well and even tortured and stone to death if they even tried to enter the cities. Leprosy cases are found world wide, Leprosy remains a public health problem with over 210,000 registered cases in world at the beginning of 2008.[11] The intracellular germ Mycobacterium laprae mediate strong inflammatory response in affected

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individuals and causes gross destruction of tissues during the chronic course of infection.[12] Among all mycobacteria it is likely the most dependent on the host for basic metabolic functions, in part because of its extensive genomic decay.[13] Lipid metabolism in leprosy have examined in various studies, but there has been limited work using whole metabolite profiles.[14] With this background present study was designed to evaluate the lipid profile in Multibacillary and Paucibacillary leprosy subjects and to compare them with age and sex matched healthy control subjects.

MATERIALS AND METHODS:

This observational study was performed after approval from BASR, University of Karachi in the Department of Biochemistry, University of Karachi, from December, 2014 to November 2015. A total of 42 newly diagnosed leprosy patients of both sexes and all ages were included in this study, among them 33 males and 09 females, aged 13 to 70 years (mean 36.7 ± 1.71years).The diagnosis was made on clinical ground and bacterial examination by slit skin smear test, and are classified in two groups, paucibacillary (PB) and multibacillary (MB), based on the WHO guide lines. 1- 5 skin lesions were regarded as PB with no acid fast rods on the smear and skin lesions more than 5 are regarded as MB. A positive bacterial index classifies the patient as MB, regardless of the number of skin lesions with bacteria visible on a smear.[15] A total of 30 age, sex matched healthy control subjects were taken from general population for comparison. Informed consent was taken from each patient and control subject for this study. After overnight fasting, 6 ml of blood was drawn from anticubital vein after all aseptic measures, blood was allowed to clot at 37ºC, serum was separated after centrifuged at 3000 rpm for 10 minutes then analyzed. Serum cholesterol was estimated by the Enzymatic kit method, serum triglycerides were determined by enzymatic colorimetric (GPO-PAP) kit method, serum HDL-cholesterol was determined by CHOD-PAP kit method[16] and LDL-cholesterol was calculated according to Friedewald's formula.[17]

RESULTS:

A total of 30 control subjects and 42 leprosy patients among 24 were Multibacillary and 18 were Paucibacillary leprosy recruited for this study. Biophysical parameters in Multibacillary and Paucibacillary subjects were competely non significant when compared with control group (Table 1). In biochemical parameters among Multibacillary, Paucibacillary leprosy cases, all the lipid fractions Total Cholesterol, Triglycerides and LDL - Cholesterol were significantly decreased ($p<0.05$) but HDL –Cholesterol significantly increased ($p<0.05$) in both Multibacillary and Paucibacillary leprosy groups when compared with control group (Table 2, Figure 1).

Table: 1
Comparison of biophysical parameters of multibacillary, paucibacillary leprosy cases and controls

	Cases		Controls
Biophysical Parameter	MB (n=24)	PB (n=18)	(n=30)
Weight (kg)	51.5 ± 1.44 *	52.3 ± 2.16	56.8 ± 1.36
Height (m)	1.60 ± 0.01	1.58 ± 0.01	1.61 ± 0.01
BMI	20.2 ± 0.55	20.9 ± 0.77	21.2 ± 0.53
BP Systolic(mmHg)	118.9 ± 1.23	116.8 ± 1.78	119.0 ± 1.30
BP Diastolic(mmHg)	77.1 ± 0.75	77.7 ± 1.07	77.8 ± 0.92

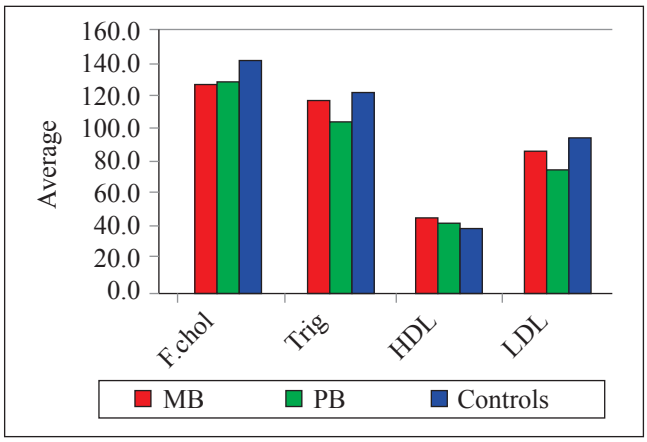
Values are expressed as mean ± s.e.m ,No significant difference was observed

Table: 2
Comparison of biochemical parameters of multibacillary, paucibacillary leprosy cases and controls

	Cases		Controls
Biochemical Parameter	MB (n=24)	PB (n=18)	(n=30)
Total Cholesterol (mg %)	* 146.1 ± 18.90	* 145.2 ± 16.90	148.2 ± 19.50
Triglyceride (mg %)	* 126.2 ± 13.08	* 125.4 ± 12.11	128.2 ± 17.08
HDL Cholesterol (mg %)	* 43.4 ± 3.24	* 44.3 ± 3.87	42.8 ± 4.40
LDL Cholesterol (mg %)	* 85.2 ± 10.28	* 84.4 ± 13.83	87.2 ± 12.6

Values are expressed as mean ± s.e.m, * $p<0.05$ statistically significant

Figure 1
Comparison of biochemical parameters of multibacillary (mb), paucibacillary (pb) leprosy cases and controls



DISCUSSION:

Lipids play an important role in all aspects of life. Although every living organism has been found to contain sterols, cholesterol is found almost exclusively in animals, it is also the main sterol. Studies have showed that lipid profile is altered in leprosy. The lipids inside the lepra cells may be of host origin and probably may result in alteration in serum lipids and therefore some research workers used alteration in the lipid profile as diagnostic tool for leprosy. Lipids are found everywhere in the body tissue and have an important role in virtually all aspects of biological life. Serving as hormones or hormone precursors, aiding in digestion, provide energy storage and metabolic fuels, acting as functional and structural components in bio-membranes and forming insulation to allow nerve conduction or to prevent heat loss.[18]

Metabolism of host-derived fatty acids is required for the synthesis of mycobacterial lipids including virulence factors such as phthiocerol dimycocerosate, sulfolipid-1, and polyketide synthase-derived phenolic glycolipid (PGL) and therefore, host lipids are used both for virulence and growth.[19, 20]The lipids inside the lepra cells may be of host origin and may result in alteration in serum lipids.[21] In this study we have found significant reduction in total cholesterol in both MB and PB groups ($p< 0.05$), when compared with control, this observation was in accordance with Gupta. [22] Similarly when triglycerides levels in the two test groups were compared with control we found statistically significant reduction in MB and PB Leprosy ($p<0.05$), whereas Misra[23] have documented an increased in serum triglyceride levels in their studies. These observations were not in agreement with our study.

In contrary when HDL cholesterol levels in both the test groups were compared with control we observed statistically significant increased levels in both groups of leprosy ($p< 0.05$). These observations were in agreement with the findings of Bansal.[24] Where as LDL cholesterol decrease was statistically significant in both groups when compared with control ($p<0.05$). These observations were in accordance with the Kher [25] and Ahaley.[26]

CONCLUSION:

All the lipid fractions except HDL cholesterol were decreased significantly ($p<0.05$), where as HDL cholesterol was increased significantly ($p<0.05$) in both Multibacillary and Paucibacillary leprosy groups when compared with control group.Increased level of HDL cholesterol as compared to controls are in favour of ailing lepers.

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