Indian J Lepr 2012, 84 : 17-22

http://www.ijl.org.in

Original Article

Nutritional status of leprosy patients in India

PSS Rao, AS John

Received : 01.08.2011 Revised : 07.03.2012 Accepted : 08.03.2012

A cross-sectional epidemiological study was carried out at a Leprosy Referral Hospital in Delhi to assess the nutritional status of multibacillary leprosy patients in comparison to the general population using BMI. 150 people affected with multibacillary leprosy were included in the study, of whom 108 (72%) had WHO Grade 2 disability. 100 non leprosy patients were also included as a control group. Socio-demographic and clinical details as well as their height and weight were measured and the BMI computed. The findings clearly showed that under- nutrition (BMI < 18.5) was more common in people affected by leprosy than in those without leprosy, regardless of age or sex. Presence of disability made the incidence of under- nutrition more likely. The duration of disease, number of lesions or bacterial index had no impact on the level of nutrition. There may be multiple factors working together to lead to this under-nutrition and these are discussed briefly. If, we aim to provide high quality services with a holistic approach, a mandatory BMI should be calculated for every patient and if under nourished, a qualitative diet summary should be done and suitable nutritional advice given. Further, studies are needed for a better understanding of the occurrence and progression of under-nutrition in leprosy to find efficient ways to combat this problem.

Key words : Under-nutrition, Leprosy, BMI, India

Introduction

Malnutrition, with its two constituents of protein-energy malnutrition and micronutrient deficiencies, continues to be a major health burden in developing countries (Muller and Krawinkel 2005) including India (Das 1993, Rao 1989). The Food and Agriculture Organization (FAO) defines under-nutrition as a pathological state arising from intake of an inadequate amount of food over a considerable period of time, with reduced body weight as its principal manifestation (Srinivasan 1983). Several diseases have shown concomitant malnutrition or under-nutrition and must be properly investigated before appropriate clinical management can produce better patient outcomes.

Leprosy, a chronic mycobacterial disease, falls under this category and is often associated with under-nutrition (Diffey et al 2000, Oh et al 1998). The reduced nutritional status could be due to inadequate food intake in quantity or in quality or caused by alcoholism and/or other addictions, parasitic infestations etc. Regardless of the etiology, holistic care demands that the

[1] PSS Rao, DrPH, Head Research
[2] AS John, MD, Medical Specialist
Research Resource Centre, TLM Media Centre, B 13-A, Institutional Area, Sector 62, Noida- 201 307, India
Correspondence to: PSS Rao **Email:** sundarraopss@rocketmail.com

nutritional problem be assessed carefully and addressed effectively.

Among several methods of measuring under-nutrition, the calculation of the body mass index (BMI), has been used around the world in several studies to assess nutritional status (Karmakar et al 2010, Montenegro et al 2011, Tambalis et al 2011) and has proved practical and fairly accurate. Vaz et al (2001) used it to measure the nutritional status of people affected by leprosy and reported that out of 151 cured leprosy patients with disability, 57% were found to be undernourished using body mass index (BMI) derived from body weight and height and 10% of the patients were severely under-nourished.

The past two decades has witnessed great strides in the early detection and prompt treatment with multi drug therapy (MDT) which has overcome to some extent the problems of progressive disability and eventual dehabilitaion of the leprosy affected person. However, in a resource poor country such as India, where under-nutrition is common, there is a need to periodically asses the nutritional status of leprosy patients.

Currently, there is no published literature on the prevailing situation relating to health and nutrition among different groups of leprosy-affected persons. Hence this study, using BMI as the main criterion; the outcome of which can help decide whether such assessment should be included in the initial evaluation of new leprosy patients. It can also point to the need for nutritional counseling of leprosy patients while on treatment or even after release from treatment (RFT).

Materials and Methods

The study was done at the Leprosy Mission Community Hospital, Shahdara, in eastern Delhi during 2009. All consecutive multi-bacillary leprosy patients and matched controls were chosen as they reported to the Hospital. The patients were interviewed using a predesigned form and their demographic, social and clinical details ascertained. Then their heights and weights were measured using standard equipment and recorded by a trained physio-technician. Blood was also taken for hemoglobin estimation by cyano-methaemoglobin method.

The body mass index (BMI) was the main parameter used in this study to decide chronic nutritional deficiency of the patients (Stommel and Schoenborn 2009). The BMI was calculated using the formula :

$$\textbf{BMI = Weight (kg) / Height (mtr)}^2$$

The cut-off values for under-nutrition are (Ferro-Luzzi et al 199, Shetty and James et al 1994) : 18.5 and above - healthy, well-nourished; < 18.5 - under-nutrition /under-nourished.

Minimum sample size was determined assuming a difference of 20% between leprosy and non-leprosy patients who are below BMI 18.5 (30% among leprosy and 10% among non-leprosy), with alpha as 0.05, power of 80% and precision of 25%. Thus, 150 leprosy patients and 100 controls were decided. Data were entered onto Excel sheets and analyzed using SPSS software.

Results

150 consecutive multi bacillary leprosy patients and 100 matching consecutive non-leprosy patients, were included in the study. Some of the leprosy patients were under treatment with WHO recommended MDT-UT (Under Treatment) and some had completed MDT and been released from treatment (RFT). The age and sex distribution of these patients are presented in Table 1. There was no significant difference in the percent under-nourished (BMI < than 18.5) between those who were under treatment (33%) and those who had been released from treatment (32%), therefore, the leprosy affected people are

Table 1 : Age and sex distribution of leprosy and non- leprosy patients

Sex	Age (years)	Leprosy		Non-leprosy	Total
		UT	RFT		
Female	<40	7	4	33	44
	>40	5	5	18	28
Male	<40	34	21	33	88
	>40	14	60	16	90
Total		60	90	100	250

Table 2 : BMI among leprosy and non-leprosy patients by sex: Mean (SD) and the percent under 18.5

Sex	Leprosy patients			Non-leprosy patients			*p* Value
	No.	Mean (SD)	% under 18.5	No.	Mean (SD)	% under18.5	
Female	21	20.6(5.03)	43.0	51	25.1(5.08)	10.0	0.001
Male	129	20.4(2.99)	29.0	49	22.6(3.66)	6.0	0.0001
Total	150	20.4(3.33)	33.0	100	23.9(4.60)	8.0	0.0001

Table 3 : BMI among leprosy and non-leprosy patients by hemoglobin level: Mean (SD) and percent under 18.5

Hb	Leprosy patients			Non-leprosy patients		
	No.	<18.5		No.	<18.5	
		No.	%		No.	%
<10	9	5	55.6	7	1	14.3
>10	141	44	31.2	93	7	7.5
Total	150	49	32.7	100	8	8

Table 4 : BMI according to presence of grade 2 disability among leprosy patient

WHO grade 2	No.	BMI < 18.5		Mean (SD)
		No.	%	
Present	108	42	38.9	20.0(3.39)
Absent	42	7	16.7	21.5 (2.93)
Total	150	49	32.7	

considered taken as a single group in the results and discussion.

The mean (SD) BMI and percent below 18.5 among the males and females are shown in Table 2, for leprosy and general patients. The percent below 18.5 was 33% among leprosy patients but only 8% for the general patients, the difference statistically highly significant ($p < 0.0001$). These differences are maintained by sex. It is also worth noting that women have significantly greater under nutrition, especially among the leprosy patients ($p < 0.05$). There were no statistically significant differences by age in the BMI among leprosy or general patients. While

there was no difference in percent below BMI 18.5 by age, the differences between leprosy and general patients were highly significant statistically ($p < 0.0001$) in both age groups.

The BMI among leprosy and non-leprosy patients by hemoglobin level is shown in Table 3.

The proportion of patients, both leprosy and general, with hemoglobin less than 10 gm%, was quite small, about 7%. However, the BMI less than 18.5 was significantly higher in this group (Hb < 10 gm%) compared to those whose hemoglobin level was more than 10 gm%.

Further, analyses were done among the leprosy patients comparing the BMI between those with and without WHO grade 2 disability. The findings are shown in Table 4. Among those with grade 2 disability there was a significantly higher proportion of under-nutrition ($p < 0.01$) compared to those who didn't. On the other hand, there were no statistically significant differences in percent less than BMI 18.5, by number of skin lesions or bacterial index (BI) or reported duration of leprosy.

Discussion

The findings from this study clearly demonstrate the utility of BMI as a simple, relatively accurate and convenient measure of nutrition. It is also a more acceptable and robust measure of nutrition than general physical examination, mid upper-arm circumference or height to weight ratio etc. and has been used in other studies (Montenegro et al 2011, Vaz et al 2001) to assess nutritional status of leprosy affected people. A more detailed nutritional assessment of food security issues and daily intake of nutrients and micro nutrients can be done prospectively but is possibly unreliable in a retrospective study. Under-nutrition in leprosy affected people is probably multi-factorial, developing as the result of a combination of physio/pathological, psychological and socio-economic factors.

Reddy et al (2003) found that leprosy patients suffer from severe oxidative stress due to malnutrition and poor immunity. This stress shown by levels of lipid peroxidation products and important free radical scavenging enzymes was higher in MB leprosy patients decreasing with treatment and clinical improvement as the disease subsided. In contrast, there was no significant variation of these indicators between normal human volunteers and PB leprosy patients. This finding emphasizes the special significance of nutrition in leprosy and shows that it is not only socio economic factors which lead to the under-nutrition in leprosy.

Leprosy may also bring with it the psychological problems of depression (Tsutsumi et al 2004) and so lead to lack of interest in life and anorexia, so that even if food is available the person affected neglects their diet and so becomes under nourished and weak. Apart from these factors in the case of leprosy, there are always the socioeconomic aspects due to the associated stigma of the disease. Our study subjects, both leprosy and non leprosy patients, came mostly from lower middle and lower socio-economic backgrounds in which under-nutrition is more common than among affluent or middle class backgrounds. But, our findings show that people with leprosy were likely to be more undernourished than people of the same socio-economic level who did not have leprosy. Our findings corroborate the findings of another study by Oh et al (1998) who found, that even among the poor, leprosy affected people suffer greater disadvantage nutritionally than people suffering from general illnesses.

The reasons for this are likely to be the socio-economic restrictions leprosy affected people face due to enacted stigma, especially when they have deformity. People with deformity have less opportunities and are not employed for as many days a year as their peers. They may also lose their means of livelihood due to frequent hospital

admissions and suffer the effect of stigma even while living in society with their families or alone. These factors all contribute to lower spending on food and nutrients.

Women across the spectrum of leprosy and non-leprosy patients are more undernourished than men. This is expected as women are at disadvantage compared to men especially India (Nubé and van Den Boom 2003). It has been suggested that there is a relationship between poor nutrition and incidence of leprosy (Sommerfelt et al 1985). Deformity and disability intensify the problems and result in further dehabilitation and under-nutrition. This finding is corroborated by the study on the effect of leprosy induced deformity on the nutritional status of index leprosy cases (Diffey et al 2000).

It is important to assess the nutritional state of a leprosy affected person, not only for the physical requirements but also because of the social and psychological benefits of well balanced and nutritious diet. Leprosy is a disease with so many negative repercussions, it is our duty to provide every positive intervention possible. Our study is cross-sectional, but it may be of interest to study the effect of the progress of the disease on nutritional status, through a cohort study, by following patients from diagnosis, during treatment and subsequently to provide more insights into the mechanism of nutritional deprivation and how to provide appropriate support. However, such studies may not be practical or cost-effective.

Health programmes and service providers caring for leprosy affected people need to focus on dietary and nutritional aspects along with other socio-economic parameters, so that proper nutrition is facilitated. This will help in improving the general health and immunity, as well as in coping with infections and/or lepra reactions during the course of the disease. This is an integral part of high quality services with a holistic approach.

Calculation of BMI should be mandatory for all patients coming for care; and this should be followed by a qualitative diet assessment if he/she is under-nourished. This should lead to the provision of appropriate dietary advice and nutritional assessment at subsequent visits. This simple cost effective intervention will go a long way in improving the care for leprosy affected people. Further, studies are also needed for a better understanding of the relationship between nutritional status and leprosy.

Conclusion

This study demonstrates that people affected by leprosy are at a definite disadvantage nutritionally in comparison with non leprosy patients from a similar background. So, it becomes imperative that nutritional aspects should be incorporated into the care of leprosy affected people.

Acknowledgements

We are indebted to all the patients and their families for their cooperation in this study. We acknowledge the contribution of Dr. Ruchika Chandna in the concept and initial phases of the study; Mr. Rakesh Singh, Physiotherapist, in data collection and Ms. Irine Shaim for data management.

References

1. Bainson KA and Van den Borne B (1998). Dimensions and process of stigmatization in leprosy. *Lepr Rev*. **69**: 341-350.
2. Das M (1993). Health in Bihar (1993) - an overview. *Soc Sci Med*. **37**: 445-456.
3. Diffey B, Vaz M, Soares MJ et al (2000). The effect of leprosy-induced deformity on the nutritional status of index cases and their household members in rural South India: a socio-economic perspective. *Eur J Clin Nutr.* **54**: 643-649.
4. Ferro-Luzzi A, Sette S, Franklin M et al (1992). A simplified approach to assessing adult chronic energy deficiency. *Eur J Clin Nutr.* **46**: 173-186.

5. Karmakar PS, Pal J, Maitra S et al (2010). Prevalence of malnutrition and its correlation with various diseases in elderly patients in a tertiary care centre in eastern India. *J Indian Med Assoc.* **108**: 754-756.
6. Montenegro RM, Molina MD, Moreira M et al (2011). The nutritional and dieting profiles of patients diagnosed with leprosy treated in the primary healthcare units of Greater Vitória, State of Espírito Santo, Brazil. *Rev Soc Bras Med Trop*. **44**: 228-231.
7. Muller O and Krawinkel M (2005). Malnutrition and health in developing countries. *CMAJ*. **173**: 279-286.
8. Nubé M and van Den Boom GJ (2003). Gender and adult undernutrition in developing countries. *Ann Hum Biol.* **30**: 520-537.
9. Oh SY, Paik HY and Ju D (1998). Dietary habits, food intake and functional outcomes in those with a history of Hansen's disease in Korea. *Int J Lepr Other Mycobact Dis*. **66**: 34-42.
10. Rao KS (1989). Nutrition: an essential element in primary health care. *Nurs J India*. **80**: 39-42.
11. Reddy YN, Murthy SV, Krishna DR et al (2003). Oxidative stress and anti- oxidant status in leprosy patients. *Indian J Lepr*. **75**: 307-316.
12. Shetty PS and James WPT (1994). Body mass index. A measure of chronic energy deficiency in adults. *FAO Food Nutr Pap*. **56**: 1-57.
13. Sommerfelt H, Irgens LM and Christian M (1985). Geographical variations in the occurrence of leprosy: possible roles played by nutrition and some other environmental factors. *Int J lepr Other Mycobact Dis*. **53**: 524-532.
14. Srinivasan TN (1983). Measuring malnutrition. *Ceres*. **16**: 23-27.
15. Stommel M and Schoenborn CA (2009). Accuracy and usefulness of BMI measures based on self-reported weight and height: findings from the NHANES & NHIS 2001-2006. *BMC Public Health.* **9**: 421.
16. Tambalis KD, Panagiotakos DB, Psarra G et al (2011). Inverse but independent trends in obesity and fitness levels among Greek children: a time-series analysis from 1997 to 2007. *Obes Facts*. **4**: 165-174.
17. Tsutsumi A, Izutsu T, Akramul Islam MD et al (2004). Depressive status of leprosy patients in Bangladesh: association with self-perception of stigma. *Lepr Rev*. **75**: 57-66.
18. Vaz M, Diffey B, Jacob AJ et al (2001). Should nutritional status evaluation be included in the initial needs assessment of leprosy patients with disability prior to socio-economic. *Lepr Rev*. **72**: 206-211.

How to cite this article : Rao PSS and John AS (2012). Nutritional status of leprosy patients in India. *Indian J Lepr.* **84** : 17-22.