Original Research Paper

Dermatology

A STUDY OF CHANGING GEOGRAPHICAL DISTRIBUTION OF LEPROSY CASES IN A COASTAL DISTRICT OF KARNATAKA, TALUK WISE (2014-2017)

Dr. Vasantmadhav Hegadekatti	M.D. Consultant Physician & Associate professor Department of Medicine Karwar Institute of Medical Sciences Karwar -581301 India
Dr. Shruthi H N*	Assistant Professor of Dermatology Karwar Institute of Medical Sciences Karwar - 581301 India. *Corresponding Author

ABSTRACT The present study was undertaken to study the varying geographical distribution of Leprosy cases, over a period, in Uttara Kannada district, which is backward and situated in Karnataka.

KEYWORDS : Leprosy, Uttara Kannada, Karnataka.

1. INTRODUCTION

Health and diseases are very important aspects of human life. Good health or ill health are related in several ways to different environmental situations. Geography, amongst other disciplines also deals with various aspects of man and his relationship with the environment. There are several geographical factors that influence and sometimes even determine the health and reproductive capacity of living beings including man. The systematic study of the spatial distribution of diseases, health and ill health and the causes thereof and their analysis falls within the field of what we call the Medical Geography

Park has defined that "medical geography is a scientific discipline joining with geography"[2]. Medical geography is the application of the geographical concept and the techniques to health-related problems.

The object of medical geography is to study systematically the geographical distribution of diseases and relating them with the environmental phenomenon.

Medical geography is concerned with the distribution and comparison of various indices of diseases arising in the living population and co-paring them with other elements of physical, biological and cultural environment.

2. MEDICAL GEOGRAPHY IN INDIA

the finest period of Indian Medicine was 600 BC to 400 A.D. Varanasi and Taxila were celebrated centers of medical research. During this period, Atreya the physician and Sushrutha the surgeon, made everlasting contributions to medical science in ancient India. the scientific basis of medical science was laid by them. The medical geography in India is yet to evolve in its full form.

3.1. EPIDEMIOLOGY OF LEPROSY-

3.1.1. Epidemiological situation, burden and distribution of Leprosy

According to official reports from WHO, the global prevalence of Leprosy at the end of 2015 was 1,76,176 cases (0.2 cases per 10,000 people). The number of new cases reported globally in 2015 was 2,11,973 (2.9 new cases per 1,00,000 people) and 2,13,899 new cases were reported in 2014[3].

In 2016, Global statistics showed that 1,99,992 (94%) of new Leprosy cases were reported from 14 countries reporting over 1000 new cases each and only 6% of new cases were reported from the rest of the world.

The countries with the highest number of new diagnoses are India, Brazil and Indonesia followed by some African nations. More than half of all new cases of Leprosy are from India which houses a third of the world's poor.

In 2016 there were 12 countries reporting over 1,000 new cases of Leprosy. These were Bangladesh, Brazil, DR Congo, Ethiopia, India, Indonesia, Madagascar, Mozambique, Myanmar, Nepal, Nigeria and Tanzania[1].

3.1.2. Problem in India

There were 0.88 lakh Leprosy cases on record as on 1st April 2015, with PR 0.69/10,000. Till then 34 States/ UTs had attained the level of Leprosy elimination. 551 districts (82.36%) out of total 669 districts also achieved elimination by March 2016.

Every year around 400000 new cases of Leprosy occur in India and India contributes about 80% of the global Leprosy case load.

There are thirteen states and union territories in India which have already eliminated Leprosy. About 70% of the cases detected in India are paucibacillary which are less or non-infectious. Ever since the start of National Leprosy Eradication Program in 1983, the number of new cases detected every year has not shown significant change.

3.1.3. Problem in Karnataka

Although Karnataka is considered a low Leprosy endemic State, the prevalence rate in the five districts of Raichur, Ballari, Uttara Kannada, Dharwad, and Chamarajanagar continues to be higher than the national average of 0.69%. Ballari has the highest rate with 0.97% and Hassan and Kodagu have the lowest with 0.03% [4].

Karnataka is one of the 19 States/Union Territories that are covered under the campaign launched by the Ministry of Health and Family Welfare. According to the department's data, Karnataka has 2501 cases detected and under treatment till September 30, 2016.

According to the World Health Organization (WHO), multibacillary (infectious) Leprosy is a more severe form of the disease and Karnataka has a significant proportion of such cases (74%). The State also has seen a significant number of woman patients (37%) and children (5.98%) [4].

FIG 1 -OCCURRENCE OF LEPROSY IN KARNATAKA IN YEAR 2016-2017									
S. No	State/UT	Census Population as on 03/17	Cases on record as on March 2016	Cases on record as on March 2017	Prevalence Rate per ppln. as on March 2017	No. of new cases detected during the year 2016-17			ANCDR per 100,000 ppln. for the year 2016-17
						PB	MB	Total	
1	Karnataka	66724504	2649	2500	0.37	810	2087	2897	4.34

3.2 LEPROSY

It is also known as Hansen's disease (HD), is a prolonged infection by the bacterium Mycobacterium leprae or Mycobacterium lepromatosis. Infections are without symptoms Initially and stay this way for 5 to 20 years. Symptoms include granulomas of the respiratory tract, nerves, eyes and skin. This may cause the inability to feel pain. Subsequently causing loss of extremities parts because of frequent injuries wounds or infections which go unnoticed.

A. AGENT:

M. leprae and M. lepromatosis

M. leprae, one of the causative agents of Leprosy: It is an acid-fast bacterium and appears red with Ziehl-Neelsen stain.

M. leprae and M. lepromatosis are the contributing agents of Leprosy.

M. lepromatosis is a relatively newly identified mycobacterium isolated in 2008[5].

M. leprae is an intracellular, acid-fast bacterium, rod-shaped and aerobic. It is surrounded by a waxy cell membrane coating[6].

Due to loss of independent growth genes, M. leprae and M. lepromatosis are obligate intracellular pathogens, and unculturable in the laboratory. Using nonculture-based techniques such as molecular genetics has allowed for alternative establishment of causation.

Though the causative organisms were impossible to culture in vitro, They could be grown in animals like mice and armadillos.

B. RISK FACTORS

The main risk factor for getting Leprosy is contact with another case of Leprosy. Contacts of people with Leprosy are five to eight times higher to develop Leprosy than the general population. Leprosy is more common among the poor living with bad hygiene [7].

Other risk factors include, reduced immunity, as in malnutrition, illnesses, or genetic. Infection with HIV does not appear to increase the risk of developing Leprosy [8].

C. TRANSMISSION

The skin and the upper respiratory tract are most likely entry routes

Transmission of Leprosy is by close contact with the infected. Transmission is said to be by nasal droplets.

People are generally no longer infectious after the first month of standard multidrug therapy.

Leprosy may also be transmitted to humans by armadillos.

D. DIAGNOSIS

As per World Health Organization, diagnosis is based on one of these main signs:

A]. Skin lesion consistent with Leprosy and with definite sensory loss
B]. Positive skin smears

Skin lesions are single or multiple, usually hypopigmented, and sometimes reddish or copper-colored. The lesions are macules (flat), papules (raised), or nodular. The sensory loss at lesion is important to differentiate it from other causes of hypopigmented skin lesions. Thickened nerves are associated with Leprosy.

Presence of, acid-fast Leprosy bacilli in skin smears are diagnostic.

E. CLASSIFICATION

The World Health Organization system differentiates "paucibacillary" and "multibacillary" depending upon the quantity of bacteria present in the skin lesion[10]. (pauci = a low quantity.)

F. PREVENTION

Medications can decrease the risk of those living with people with Leprosy. The WHO recommends that persons who live with Leprosy cases should be examined for Leprosy and be treated if symptoms are present.

G. TREATMENT

Multidrug therapy (MDT) with dapsone, rifampicin, and clofazimine remains highly effective, and makes people non-infectious after the first monthly dose. It is safe and easy to use under field conditions. Relapse rates are low, and no resistance to the combined drugs develops.

H. AGE & SEX

Generally peak of Leprosy prevalence and incidence occurring the age group 35–44 years. Some sex differential in Leprosy, are related to sex differences in social contact, as sex ratios of Leprosy vary widely among different populations.

I. GENETICS

Several genes are with a predisposition to Leprosy. A defect in cell-mediated immunity may cause vulnerability to Leprosy. Not all people who are infected with M. leprae develop Leprosy, and genetic factors have been thought to participate, because of grouping of Leprosy in certain families. Moreover, certain individuals develop lepromatous Leprosy while others develop other types of Leprosy.

4.1 THE PROBLEM

In Uttara Kannada, the syndrome has a wide spread prevalence and most affected region is coastal belt of Honnavar, Bhatkal, Kumata, and Ankola. The reason being this coastal belt of Karnataka has fishing and agriculture as most important occupations.and people are poor and hygiene is minimu. Lot of developmental works like Project Sea Bird and Kaiga Nuclear projects are going on with a huge number of floating population with Leprosy infections arriving from various regions of the country. The present study is confined to trace Geographical distribution of Leprosy and what is the trend over a time from 2014 to 2017.

4.2. AIMS AND OBJECTIVES:

The aim of the study is to analyze Leprosy in Uttara Kannada. To achieve the above-mentioned aim, the following objectives are taken to consideration.

A]. To finds the Geographical Distribution of Leprosy in Uttara Kannada district during 2014-2017. And to analyze, the Age group wise, place of Residence, and occupational wise affected patients.
B]. Monitor the trends of Leprosy epidemic.
C]. Provide the impact of preventive and control activities of Leprosy epidemic.

4.3 METHOD

Study of Geographical Distribution of Leprosy in Uttara Kannada 2014-2017 done by using GIS technique. The relation between population and Leprosy prevailing patients determined by using Time series and moving average techniques, and Pie chart are used to Identify and analyze Leprosy in Uttara Kannada.

4.4. STUDY AREA

FIG 2. Geographical Map of Uttara Kannada District in Karnataka
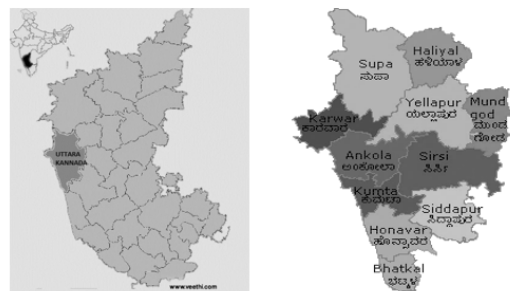
The study area district covers an area of 10,291 sq.km equivalent of 5% of the total area of Karnataka. The main geographic feature of the district is the Western Ghats or Sahyadri range, which runs from north to south through the district. Between the Sahyadri and the sea is a narrow coastal strip, known as the Lower Ghats, which varies from 8 to 24 kilometers (5.0 to 14.9 mi) in width. Behind the coastal plain are flat-topped hills from 60 to 100 meters in height, and behind the hills are the ridges and peaks of the Sahyadris. East of the Sahyadris is the Upper Ghat, part of the vast Deccan plateau. The district's high rainfall supports lush forests, which cover approximately 70% of the district. Agriculture in general and fishing in coastal belt are the main occupations. Vide Figure 2.

4.5. GEOGRAPHICAL DISTRIBUTION OF LEPROSY CASES IN UTTARA KANNADA TALUK WISE

A. GEOGRAPHICAL DISTRIBUTION OF LEPROSY CASES IN UTTARA KANNADA TALUK WISE–April, 2014 -March, 2015

FIG 3. GEOGRAPHICAL DISTRIBUTIONS OF LEPROSY IN UTTARA KANNADA DISTRICT IN 2014-15

Taluk	Males	Females	Total	% Males	% Females	Overall %
Honnavar	28	7	35	80	20	23.33
Bhatkal	15	14	29	51.72	48.28	19.33
Kumata	14	14	28	50	50	18.67
Haliyal	12	9	21	57.14	42.86	14
Ankola	6	6	12	50	50	8
Sirsi	7	5	12	58.33	41.67	8
Karwar	4	4	8	50	50	5.33
Mundgoad	3	1	4	75	25	2.67
Siddhapur	1	0	1	100	0	0.67
Yellapur	0	0	0	0	0	0
Joida	0	0	0	0	0	0
Total	90	60	150	60	40	100

In the ABOVE Fig 3, we look at the geographical distribution of Leprosy cases in Uttara Kannada in the year of 2014-15; the prevalence of Leprosy was very high in Honnavar 35 [23.33%], Bhatkal 29 [19.33%] Kumata 28 [18.67%] Haliyal 21 [14%], Ankola 12 [8%], Sirsi 12 [8%], Karwar 8 [5.33%],Mundgoad 4 [2.67%], Siddapur 1 [0.67%], Yellapur 0, Joida 0

The Uttara Kannada during the 2014-15 the total Leprosy patients were in 150. In this Male Patients was 90 and Female was in 60.

B. GEOGRAPHICAL DISTRIBUTION OF LEPROSY CASES IN UTTARA KANNADA TALUK WISE –April 2017-March 2018

FIG 4. GEOGRAPHICAL DISTRIBUTIONS OF LEPROSY IN UTTARA KANNADA DISTRICT IN 2017-18

Taluk	Males	Females	Total	% Males	% Females	Overall %
Kumata	20	12	32	62.5	37.5	24.81
Bhatkal	16	9	25	64	36	19.38
Ankola	12	6	18	66.67	33.33	13.95
Honnavar	12	4	16	75	25	12.4
Haliyal	5	5	10	50	50	7.75
Karwar	5	4	9	55.56	44.44	6.98
Mundgoad	6	1	7	85.71	14.29	5.43
Sirsi	5	2	7	71.43	28.57	5.43
Yellapur	2	2	4	50	50	3.10
Siddapur	1	0	1	100	0	0.78
Joida	0	0	0	0	0	0
Total	84	45	129	65.12	34.88	100

The Fig 4 shows that the geographical distribution of Leprosy in Uttara Kannada in the year of 2017-2018. The Leprosy Prevalence as highly in Kumata-32- [24.81%], Bhatkal-25- [19.38%], Ankola-18-[13.95%], Honnavar-16- [12.4%], Haliyal-10- [7.75%], Karwar-9-[6.98%], Mundgoad-7- [5.43%], Sirsi-7- [5.43%], Yellapur-4-[3.10%], Siddapur-1- [0.78%], Joida-0- [0%], Total number cases-129- [100%]

In this we looked in to the geographical distribution of Leprosy cases in Uttara Kannada the central place of Uttara Kannada concentrated high in HIV/AIDS affected patients. Mundgod Taluk of Uttara Kannada is very low level.

C. AGE-GROUP WISE LEPROSY DISTRIBUTION 2014-2017
In the year 2014 the proportion of Leprosy prevalence high in 30-49 year age Group was 51 [34%] cases followed by 15-25 years age group 43 [28.67%] cases. The prevalence rate among the Female in 0-49 age group was high compared the Male. Which was higher in 15-29 age group. Vide Fig5.

FIG 5. AGE WISE DISTRIBUTION OF LEPROSY IN UTTARA KANNAD ADISTRICT

	Age	2017-2018				2014-2015			
		Male	Female	Total	overal %	Male	Female	Total	overal %
1	0-14	12	4	16	12.40	7	8	15	10.00
2	15-29	21	13	34	26.36	31	12	43	28.67
3	30-49	31	17	48	37.21	30	21	51	34.00
4	Above 50	20	11	31	24.03	22	19	41	27.33
				129				150	

In 2017 the proportion of Leprosy prevalence high in 30-49 years age Group 48 cases [37.21%] followed by above 15-25 age group 34 [26.36%] cases as in year 2014-15.

D. EDUCATIONAL STATUS WISE LEPROSY PATIENTS

FIG6. EDUCATIONAL STATUS OF LEPROSY PATIENTS

	Education	2017-2018				2014-2015			
		Male	Female	Total	overal %	Male	Female	Total	overal %
1	illeterate	21	9	30	23.26	20	11	31	20.67
2	5th std	28	20	48	37.21	73	35	108	72.00
3	5-12th std	34	15	49	37.98	6	5	11	7.33
4	Graduation & above	2	0	2	1.55	0	0	0	0.00
				129				150	

The Leprosy prevalence in 2014 was high among the population who had studied till 5th standard i.e. 72% percent and 20.67% were illiterates. Fig 6. The Leprosy prevalence in 2017 was high among the population who studied 5th to 12th standard i.e. 49% percent followed by those studied up to 5th standard 37.21%. The Graduates and above percentage level is 1.55%. Population who had studied till 5th standardd had a high prevalence of Leprosy in Uttara Kannada district. So, the difference is not statistically significant, and monitoring the trend over the years provides an important clue regarding influence of education in prevention of transmission of Leprosy infection.

E. OCCUPATION WISE LEPROSY PATIENTS

FIG 7. OCCUPATIONWISWE DISTRIBUTION OF LEPROSY

	Occupation	2017-2018				2014-2015			
		Male	Female	Total	overal %	Male	Female	Total	overal %
1	Agriculture & fisheries	56	18	74	57.36	22	5	27	18.00
2	Drivers	2	0	2	1.55	4	0	4	2.67
3	Industrial workers	1	1	2	1.55	0	0	0	0.00
4	Hotel staff	0	0	0	0.00	0	0	0	0.00
5	Services	0	2	2	1.55	5	4	9	6.00
6	Unemployed	10	18	28	21.71	40	40	80	53.33
7	Children & Students	10	11	21	16.28	19	11	30	20.00
				129				150	

Fig7 shows the occupational distribution of Leprosy prevalence in the year 2014-15 and 2017-18. Agriculture & fisheries group had a higher prevalence of Leprosy infection compared with other groups. About 57.36% in 2017-18 whereas unemployed had a higher prevalence-53.33% in 2014-15.

F. TIME SERIES ANALYSIS:

FIG 8. NEW CASES OF LEPROSY DETECTED YEAR WISE

2013-14			2014-15			2015-16			2016-17			2017-18		
Total New Case	ANCDR	PR	Total New Case	ANCDR	PR	Total New Case	ANCDR	PR	Total New Case	ANCDR	PR	Total New Case	ANCDR	PR
177	11.09	0.98	130	8.53	0.70	146	9.47	0.73	112	7.34	0.58	165	10.4	0.98

We have to conclude the Average Trend with the help of moving average curve, Leprosy patients in Uttara Kannada during the period of 2013-2017. The maximum patients are shown in 177 in 2013-14. Gradually, Leprosy patients were decreasing year by year but in 2017-18 it shows an increase in number of new cases detected. This may indicate the altering demographic profile of the Uttara Kannada district with influx of external population.

FIG 9. NEW CASES OF LEPROSY DETECTED YEAR WISE

Year	New Cases
2017-18	165
2016-17	112
2015-16	146
2014-15	130
2013-14	177
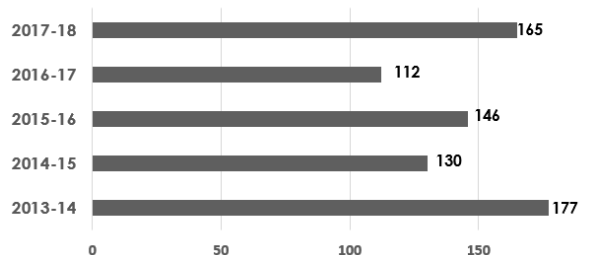
4.6. CONCLUSION
The present study indicates the downward trend in the occurrence of

Leprosy cases in Uttara Kannada District in Karnataka, over the years, though it is possible that there may be several Leprosy cases which might have remained unreported or unregistered. This falling trend can be attributed to the vigorous mass education efforts, effective implementation of National Leprosy Eradication Program in the District, dedicated services with free distribution of medicines.

It is also clear that the disease is more prevalent in the coastal part due to the high exposure of those areas to massive developmental activities. Those with lower education standards are the most exposed due to unawareness, and lower quality of living.

The main objectives of mass awareness drives are to update the public about the epidemic and its implications, to create awareness about manner of spread of the epidemic, and the means to protect oneself, to activate support to involvement programmers and to create a positive setting to increase the efficiency of the eradication program. People with lower education status, those live below poverty lines, and slum dwellers should be focused more to educate regarding the disease. They should be shown how good hygienic habits and good nutrition are important.

High risk groups should be advised not to have deep physical contacts. At present there is no definite vaccine for of Leprosy infection. It is important to inform how Leprosy infection does not spread through social contact so that Leprosy Positive persons are not discriminated.

4.6. REMARKS:
Apart from specific chemotherapy,
1. Try to resolve the patient's problems and situations compassion and care.
2. Counselling and psychological support for Leprosy Patients is important.
3. Respect and receive the patient as he or she is.
4. Love and Mental support to the patients by their family and society are needed.
5. It is the duty of every citizen to actively participate and promote National Leprosy Eradication Program and help eliminate this stigmatic disease from our country.

5. REFERENCE
[1] https://www.Leprosymission.org.uk/about-us-and-Leprosy/faqs/which-countries-is-Leprosy-found-in-the-world-today/
[2] Park: Preventive and Social Medicine
[3] http://www.searo.who.int/entity/global_Leprosy_programme/topics/factsheet/en/
[4] http://www.thehindu.com/news/national/karnataka/Leprosy-rate-in-five-districts-higher-than-national-average/article19994486.ece
[5] "New Leprosy Bacterium: Scientists Use Genetic Fingerprint to Nail 'Killing Organism'". ScienceDaily. 2008-11-28. Archived from the original on 2010-03-13. Retrieved 2010-01-31.
[6] Baron's Medical Microbiology (4th ed.). Univ of Texas Medical Branch. ISBN 0-9631172-1-1
[7] Schreuder, P.A.M.; Noto, S.; Richardus J.H. (January 2016). "Epidemiologic trends of Leprosy for the 21st century". Clinics in Dermatology. 34 (1): 24–31
[8] Lockwood DN, Lambert SM (January 2011). "Human immunodeficiency virus and Leprosy: an update". Dermatologic clinics. 29 (1): 125–8. doi: 10.1016/j.det.2010.08.016. PMID 21095536.
[9] WHO. 2009-08-01. Archived from the original on 2010-02-09. Retrieved 2010-01-31.
[10] Smith DS (2008-08-19). "Leprosy: Overview". eMedicine Infectious Diseases. Archived from the original on 2010-02-18. Retrieved 2010-02-01.