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MORBIDITY PATTERN AND TRENDS IN FILARIA INCIDENCE IN NAGPUR CITY
A Geographic Analysis

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ABSTRACT : The upshot of the intensive and expansive industrialization leading to rapid urbanization and growth of big cities has become source of a lot of diseases. Filaria is one of such diseases. It is mosquito borne disease and is endemic in nature. Therefore, its distribution – both temporal and geographical – forms an important problem for analysis. The study is made with special reference to City of Nagpur which has a population over ten lakh and a city where filaria eradication programme has been started since 1961. The rate of incidence of filaria in this city showed an upward trend for the period 1973-78. Its seasonal trend and distribution can be correlated with geographical phenomena. The number of cases of this disease are found during January and February and its concentration is in the localities where number of ponds and nalas with stagnant and dirty water is found. Nagpur Corporation has taken up the task of eradication of this disease on a systematic line with good success.

Introduction

Problem of Urban Public Health

Urbanization is taking place at a fast rate in India. Cities are growing in size creating complex environmental problem through air pollution, water pollution and soil pollution. Dr. Atma Ram (1971) has rightly pointed out that the upshot of the intensive and expansive industrialization leading to rapid urbanization and growth of big cities, has become source of a lot of diseases. Malaria, filaria, cholera, typhoid, enfluenza, tuberculosis are epidemic and endemic diseases. Their spread in cities has created most complex public health problem.

The pattern of these public health problems is to be studied for major cities. What is their distribution–both geographical and temporal? What are the localities of their concentration? What are the causes of these diseases? What steps are taken by the Public Health Department to eradicate them? Such questions are to be attempted. World Health Organization (WHO) is actively engaged in the research on these questions and has programmed eradication of such diseases. In most of the major cities in India, Public Health Department has been established with specific programme for eradication of these diseases. Nagpur city with 10,40,583 inhabitants is subjected to above mentioned diseases. However, only one disease i. e. filaria has been selected here to study its morbidity pattern in this city.

Filaria

Filariasis is one of the major public health problems in India. As early as 600 B. C. Susruta, a physician, mentioned about this disease. Later in 700 A. D. Madhavakara described its signs and symptoms. In 1709 A. D. Clark classified the elephantoid legs in Cochin as ' Malabar legs. '

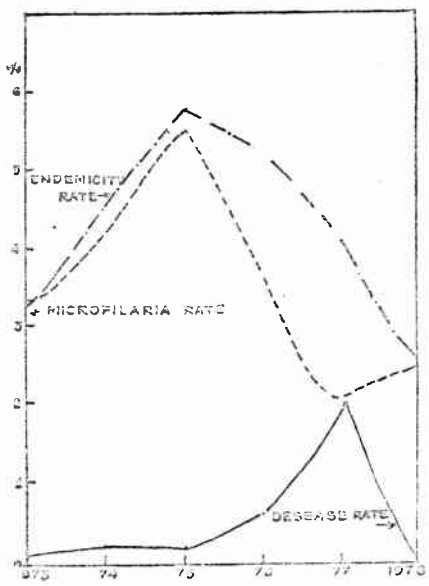

Fig. 1 Trend in Filaria Incidence in Nagpur City

Filaria is slender, threadlike worm of the family filaritidal and related families, narastic when adult in the blood or tissues of vertebrates, and developing as a larva in certain blood-sucking anthropods. Acute attacks of filariasis cause temporary disability. It is a chronic disease and its chronic manifestations are irreversible. Hence it has got social, economic and physical hazards.

Need for its eradication

This being a mosquito born disease, the feasibility of control of filariasis apparently is by attacking the vector and the parasites in the microfilaria carriers.

The national filaria control programme was started during 1955–56, with the purpose of controlling the Bancrofilian filariasis after an agreement between Government of India and U. S. A. Technical Co-operation Mission.

Objective

The study of the distribution of disease in a given population helps to assess the nature and amounts of preventive, diagnostic and treatment services which are required and where they are most needed. A modest attempt is made here :

i) to analyse the trend and incidence of filaria in Nagpur city;

ii) to identify the areas of significant occurrences of filaria in Nagpur city;

iii) to attempt to correlate trend of spatial distribution with geographical phenomenons, and

iv) to observe attempt in eradication of this disease in Nagpur city

Source of Data

The study is based on one source of information and that is the Annual Records

Table I – Nagpur : Trend in Number of Positive Cases of Filaria

Year	Total blood collection	Total Population	Positive for filaria	Microfilaria rate	Postive for disease	Disease Rate	Endemicity rate (5 + 7)
1	2	3	4	5	6	7	8
1973	8367	9,00000	274	3.27	8	0.09	3.36
1974	2955	9,30000	126	4.26	8	0.27	4.53
1975	5839	9,52691	329	5.63	9	0.15	5.78
1976	9365	9,80396	346	3.69	149	0.59	5.28
1977	20634	10,00000	432	2.09	437	2.11	4.20
1978	13264	10,40583	325	2.45	15	0.11	2.56

Compiled from Records of PHD, N. C., Nagpur

available in Filaria Unit of the Public Health Department of Nagpur Corporation. The data are available from 1973 onwards for the various zones in the city. Thus the study is limited to the use of available data from Public Health Reports, even though research investigations indicate that such records of disease are still inconsistent, incomplete, and often inaccurate, as in many of the developing countries. Therefore, sickness and mortality statistics must be looked upon as relative, and as an index of frequency of disease. Observations are studied over a period of five years to minimise errors in assessment. The data may appear biased in favour of areas best served by health facilities as well as those with better registration systems.

Trend in Filaria Incidence in Nagpur city :

General

The trend of incidence of this disease is observed for the period from 1973 to 1978. Figures for parasitological indices are compiled and tabulated in Table I and represented in Fig 1.

Number of cases

It has been observed that every year approximately 9 to 10 thousand cases are investigated in Nagpur city. Out of these cases, quite a small number is found to be positive for the disease. But in relation to a unit of city this number also proves important and needs our attention.

Microfilaria Rate

Microfilaria rate (Table I ; column 5) is the percentage of persons showing microfilaria in their peripheral circulation in the persons examined, one slide being taken from each person. It is found that the rate was 3·27 in 1973, which rose to 4·76 in 1974 and to 5·63 in 1975. Then onward there was a declining trend. In 1978 rate was only 2·45.

Filaria Disease Rate

Filaria disease rate (Table I; column 7) is the percentage of persons manifesting filarial diseases, in the persons examined

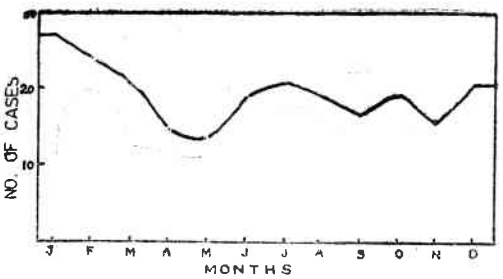

Fig. 2 Seasonal Trend in Incidence of Filaria in Nagpur City

each person being examined once. This rate tends to be quite low being 0.09 in 1973. However, it is found to be rising with fluctuations throughout the period under review. In 1977 there seems to be unusual rise of 2.11, which can be attributed to increase in the number of cases for examination.

Filaria Endemicity Rate

Filaria endemicity rate (Table I; column 8) is the percentage of persons examined showing microfilaria in their blood, or disease manifestation or both. In 1973 this rate for Nagpur was 3.36. It rose to 4.53, 5.78, 5.28, 4.20 in consecutive years. However, in 1978 it was low being dropped to 2.56. This rate indicates that the incidence of this disease in Nagpur city is not very high.

Zonewise Rate of Incidence

Zonewise cases for the period under review are tabulated in Table II. It is observed that the number of cases in Inamwada zone is increasing. The number was increased to 177 in 1978 from 53 in 1974. In Gandhibagh zone number increased to 181 in 1975 from 13 in 1974. In Dharampeth zone number was increased to 54 in 1978 from 18 cases in 1975. In Sadar zone incidence of this disease is quite low. The positive cases recorded in 1975 were 11 while the same was only 12 in 1978. In Kadbichauk zone number was increased to 40 in 1978 from 24 in 1974. In Jagnath Budhawari the number rose to 48 in 1978 from 8 in 1975.

Table II – Nagpur : Zonewise Trend of Positive Cases

Zone	1974			1975			1976			1977			1978			Total		
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
1 Inamwada	30	23	53	39	16	55	36	26	62	90	69	159	79	38	117	274	112	446
2. Gandhi bagh	10	3	13	3	4	7	19	6	25	58	33	91	30	15	45	120	61	181
3. Dharam-Peth	–	–	–	13	5	18	41	1	42	17	5	22	44	10	54	115	21	136
4. Sadar	–	–	–	9	2	11	11	4	15	69	21	90	8	4	12	97	31	128
5. Kadoi Chauk	17	7	24	0	3	3	26	6	32	19	11	30	22	18	40	84	45	129
6. Jagnath Budhwari	7	1	8	18	9	27	22	12	34	11	9	20	28	18	46	86	49	135
Total	64	34	98	82	39	121	155	55	210	264	148	412	211	103	314	776	331	1155

Compiled from Records PHD, N. C., Nagpur

Table III – Nagpur : Trend in Rate of Positive Cases for Filaria

Sr. No.	Zone	Rate per Ten Thousand Population					
		1974	1975	1976	1977	1978	Average
1.	Inamwada ...	3.03	3.08	3.39	8.54	6.02	4.81
2.	Gandhibagh ..	0.66	0.34	1.22	4.37	2.10	1.74
3.	Dharampeth ...	– –	1.33	3.00	1.53	3.66	1.90
4.	Sadar ..	– –	1.17	1.53	8.97	1.08	2.55
5.	Kadbichauk ...	2.42	0.29	2.96	2.69	3.43	2.36
6.	Jagnathbudhwari ..	0.33	1.11	1.37	0.79	1.78	1.07
Total for Nagpur ..		1.05	1.27	2.14	4.12	3.01	2.32

Compiled from Records PHD, N. C , Nagpur

Table IV – Nagpur : Seasonal Trend in Filaria Cases

Year	J	F	M	A	M	J	J	Au.	Sept.	Oct.	Nov.	Dec.
1973	6	10	4	6	6	7	5	2	9	13	7	–
1974	11	7	2	10	6	6	8	13	13	9	14	–
1975	18	36	30	16	9	14	17	28	17	20	15	32
1976	40	35	35	21	18	36	30	24	17	11	17	17
1977	59	32	31	19	28	21	44	28	26	44	23	54
Average	27.0	24.0	21 04	14.4	13.4	18.8	20.8	19.0	16.4	19.4	15.6	20.6

Compiled from Records PHD, N. C., Nagpur

Taking average for all the years under review, Inamwada zone has the highest number (i.e. 446) of cases, Gandhibagh has 181–the second highest. All other zones range between 128 and 136.

From the table it is observed that the disease is common both in male and female population, but the number of males affected is comparatively more than that of females in all the zones throughout the period under review.

When we consider the rate of positive cases in different zones (Tabl III), it becomes clear that in all the zones, except Sadar zone, rate is increassing.

For the entire Nagpur city the rate was 1.05 in 1974, rising to 1·22 in 1975, to 2·14 in 1976, to 4·12 in 1977 and to 3.01 in 1978.

Findings

The trend in filaria incidence in Nagpur city for the period 1973 to 1978, reveals that cases of filaria are on the increase and particularly so in Inamwada zone.

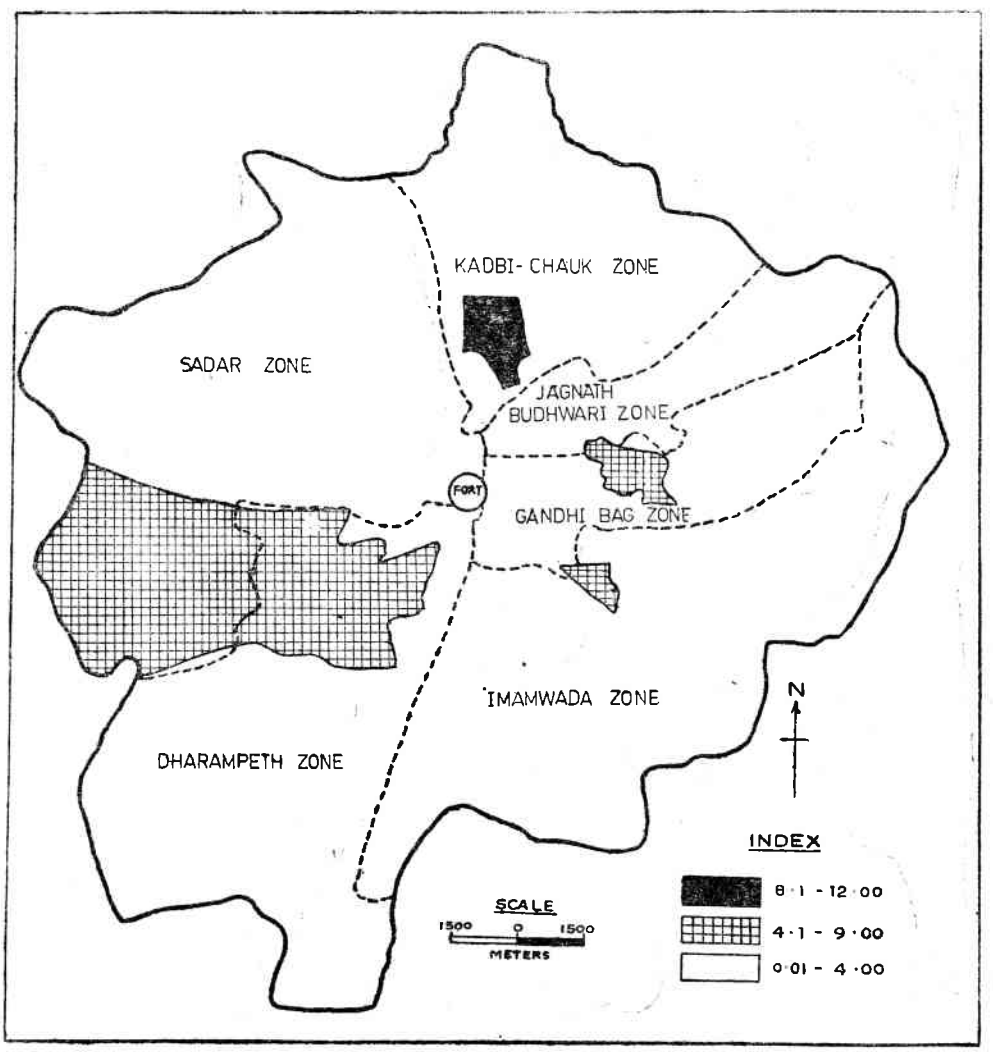

Fig. 3 Zonal Distribution of Filaria Incidence in Nagpur City

Table V – Nagpur : Disease Ratio in Different Wards (1974–78)

Sr. No.	Ward	Ratio	Sr. No.	Ward	Ratio
1.	Sitabuldi	0.23	39.	Naik Talao	2.62
2.	Sangam	–	40.	Nai Mangalwari	0.59
3.	Dhantoli	–	41.	Binaki	–
4.	Jain	1.31	42.	Pillin mado	–
5.	Indira Nagar	–	43.	Maskasath	0.90
6.	Ganeshpeth	–	44.	Jagnath	1.89
7.	Model Mill	1.09	45.	Lendi talao	–
8.	Rambagh	1.31	46.	Golibar chouk	0.66
9.	Medical College	0.16	47.	Timki	–
10.	Chandan Nagar	0.64	48.	Bhankheda	–
11.	Raghuji Nagar	2.65	49.	Mominpura	0.77
12.	Ajni	0.95	50.	Takiya	0.81
13.	Parwati Nagar	0.16	51.	Boriapura	–
14.	Nani; Ijeda	0.60	52.	Motibagh	1.81
15.	Sakardara	2.77	53.	Lakhkaribagh	1.29
16.	Nagar Bhawan	1.25	54.	Balabhau peth	3.52
17.	Chitnispura	–	55.	Guru Nanak ward	–
18.	Tulsibagh	–	56.	Juni Managalwari	–
19.	Siraspeth	4.27	57.	Indora	2.63
20.	Shukrawari	2.93	58.	New Indora	1.06
21.	Omnagar	–	59.	Jaripatka	11.16
22.	Bhandewadi	2.07	60.	Mekosabagh	2.11
23.	Shanti Nagar	1.01	61.	Chhawani	–
24.	Haripar Mandir	1.50	62.	Gorewada	3.84
25.	Garoba Maidan	2.95	63.	Borgaon	–
26.	Mangalwari ...	1.54	64.	Gaddigudan	1.54
27	Chiteshwar Mandir	–	65.	Khalasi line	–
28.	Budhwar Bazar	1.18	66.	Sadar	1.26
29.	Nikalas Mandir	1.20	67.	Civil lines	–
30.	Itwari	4.00	68	Telankhedi	–
31.	Juna Motor Stand	4.41	69.	Goukulpeth	4.75
32.	Mahal	–	70.	Dharampeth	1.94
33.	Namak Ganj	–	71.	Ramdaspeth	5.99
34.	Gandhibagh	2.57	72.	Shivaji Nagar	6.61
35.	Hansapuri	—	73	Ambazari	6.31
36.	Ganjipeth	1.61	74.	Shraddhanand peth	4.67
37.	Santra Market	–	75.	Khamla	3.26
38.	Bastarwari	0.92	76.	Sonegaon	1.52

Compiled from Records PHD, N. C., Nagpur

Seasonal trend in incidence of filaria

General

Seasonal trend in filaria incidence can explicit the possibility of its relationship with seasonal weather. Data compiled is tabulated in Table IV and represented in Fig. 2.

Trend and correlation

It has been observed that months of January, February and March showed maximum cases of filaria. Summer months of April, May show the lowest number of cases. Then June onward again their number increases. This means in summer when the dirty water ponds are dried up, the number of cases of disease is decreased.

Endemic Nature of Filaria in Nagpur city

General

To find out endemic nature of filaria, ward wise data for 1974 to 1978 was collected. The disease ratio in different wards is calculated and tabulated in Table V and represented in Fig. 3.

Categorization and analysis

The analysis indicated that there is variation in intensity of disease in different parts of the city. For the purpose of analysis an arbitrary categorization is made based on simple arithmetic of percentage. They are :

A. High Disease Ratio -- 8.1 to 12.0
B. Medium ,, ,, -- 4.1 to 8.0
C. Low ,, ,, -- 0.1 to 4.0

A. Area of High Disease Ratio

The disease is found to be concentrated in one ward namely Jaripatka where morbidity ratio is 11.16.

B. Area of Medium Disease Ratio

Siraspeth (4.27), Juna Motor Stand (5.49), Shivaji Nagar (6.61), Ambazari (6.31), Shraddhanand peth (4.03)–these wards come under this category.

C. Area of Low Disease Ratio

Rest of the region of Nagpur city has a low disease ratio.

Correlation

The geographic distribution of this disease can be correlated with some geographica phenomena. This disease is caused by cylisive type of mosquitoes. There are approximately 250 sub–type of these mosquitoes. They grow in dirty water of nalas, bathroom waste water etc. In Nagpur city, mainly this type of mosquitoes are found. These mosquitoes receive microfilaria from sources of stagnant dirty water. On observation it has been found that the areas of high incidence corresponds with the areas of water–logging such as Jaripatka, Ganjipeth and Ramdaspeth.

Eradication

During the year 1955–56, 19 survey units were established on National level to identify highly filaria endemic areas so as to initiate control measures in such areas on priority basis. The filaria control programme was started in Nagpur in 1961 with the purpose of controlling filariasis. Accordingly filariasis surveys in different parts of Nagpur where problem was known to exist has been carried out and through geographical reconnaissance survey of mosquitogenic conditions have been marked. The professional and ancillary personnel required for the programme have been trained. In each zone one dispensary for the treatment of this disease has been started. As a result of this eradication programme carried out by Public Health Department of Nagpur Corporation, filaria spread has been checked to a considerable degree.

Conclusion

Filaria is endemic disease and it is found to be distributed in Nagpur city. Its rate of incidence showed an upward trend for the period 1973–1978. The seasonal trend in incidence of filaria indicates that the cases of this disease are found more during January and February as compared with other months. It is during this period that the water logging of dirt is present. The disease is found to be concentrated more in localities–in particular in Inamwada–having water logging. Nagpur Corporation has taken up the task of eradication of this

disease on a systematic line with good success.

Acknowledgement

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References

Atma Ram, (1971) : Inaugural Address to the Conference on Public Health Engineering Research and Development. CPGERI.

Health Department Nagpur Corporation, Filaria, 1974, P.1

Ibid, P.2

Hyma, B. and *A. Ramesh,* (1977) : The Geographic Distribution and Trends in Malaria Incidence in Tamil Nadu, NGJI, XXIII, 1 and 2, pp. 40–60.

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