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PREVALENCE OF INTESTINAL PARASITIC INFESTATION IN RELATION TO ECONOMIC STATUS IN A VILLAGE POPULATION OF HOWRAH DISTRICT, WEST BENGAL

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ntroduction

Intestinal parasitic infestations are generally known to be high in many parts of Asia including India, Africa and Latin America. (May, 1958, Misra, 1970; Howe, 1977). The differential but generally high helminthic prevalences in pre-1947 India, particularly in the then undivided Bengal province was reported over 50 years ago by Chandler(1925, 1926, 1927). Several repons on intestinal parasitic prevalence in different areas/populations appeared since then(Saxena and Prasad, 1971; Sengupta and Bhattacharya, 1975; Brar and Sing, 1980) which, along with Chandler's data, suggested generally high but variable prevalence of different protozoal and helminthic infestation in major parts of India, particularly in West Bengal.

Both physical environmental factor (e.g. temperature, humidity, rainfall, soil type, etc) and socio-cultural factors(e.g. economic status, living conditions, public health facilities, personal hygiene practices, concept of health and disease, etc.) are known to affect intestinal parasitic prevalence (May, 1958; Misra, 1970; Howe, 1977). Brar and Sing (1980) have shown the prevalence to be related to ' Social class" , although they have not defined "social class" in specific terms. Bhattacharya et al .(1981) have recently shown difference in respect of these prevalences between the northern hill and southern deltaic zones of West Bengal, as well as among populations within each zone and suggested that some, differences may be socio-culturally determined.

The present study is part of a comprehensive research project being conducted on the agricultural Mahishya caste population of Chakpota village in Howrah district, deltaic West Bengal. Following the suggestion of Bhattacharya et al. (1981) about the possible effects of socio-cultural differences on intestinal parasitic prevalence, the purpose of the present report is to investigate (a) whether any difference occurs among the three economic subgroups of the Chakpota population in respect of these prevalences; and (b) if so, the nature and extent of these differences, and their possible socio-cultural correlates (e.g. economic status, living condition, dietary status, etc. which are most probably highly correlat-

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ed among themselves). the possible age differentials in prevalence were also investigated. Obviously, physical environmental factors could be ruled out in this case, as all the three economic subgroups live in close vicinity to one another in the same village.

Material And Methods

Faeces specimens collected from 382 subjects in the morning, after administering a laxative the evening before, were brought to our laboratory in Calcutta within a few hours of collection. The specimens were examined for protozoa/protozoal cysts in saline/iodine smears, and for helminthic ova by the floatation technique. The methods of collection and examination of specimens have been described in details by Bhattacharya (1980) and are not repeated here. A statistical sample of individuals based on demographic data collected earlier by Bharati (1981) was selected for this study, but this sampling design could not be strictly adhered to under the field situation : on the one hand, some individuals selected by us were away from the village at the time of this study or did not respond to our request to cooperate, and on the other, some individuals not selected were eager to get their feaces tested and could not be refused. Thus, essentially those individuals who could be persuaded, and those who volunteered, constitute the sample. The economic sub-classification of the village population was done using the following criteria: Low—per capita income per year upto Rs.600, Medium—per capita income per year Rs. 601 to Rs. 1200, and High—per capita income per year Rs. 1201.

Collection of survey data on household income is generally known to be difficult and the chances of inaccurate reporting cannot be ruled out unless considerable methodological precautions are taken in collecting the information. A word of explanation on our method of data collection is, therefore, given here. The socio-economic data of which those on income (and expenditure) were a part, were collected by one of us (PB), using a carefully designed questionnaire - schedule, after developing a personal rapport with virtually each household through several years of continuing contact and prolonged periods of stay in the village. Each informant was asked to report his income from different sources separately, e. g. land and cultivation, animal husbandry, various occupations rents, others (transport, etc.), for a given period instead of asking for a total figure, to minimise reporting error. Information on expenditure was also collected, separately for different items e, g. food and fuel, housing, clothings, agricultural and other occupational expenditures, animal husbandry, education, medicine, transport, socio-religious function, and others (financial assistance, repairing, etc.) to check the income reporting, since there should be some correspondence between income and expenditure. As further checks, information was collected on landholding, other household assets, type of house (kachcha, pukka, with/without latrine, etc.), savings loans, etc. Most of these information, e.g. landholding, savings, loans, etc. were verified from other knowledgeable sources within and outside (e.g. governmental bodies) the village. Repeated visits to the village till date provided further opportunities for cross checking the income data, and it is hoped that through all these precautionary measures the chances of misreporting

have been minimised, if not altogether eliminated. The cut-off point of Rs.600/- was chosen because it is the conventional "poverty line" defined by the World Bank(1978) and generally used, and that of Rs. 1200/- was chosen as it was considered to be the "sufficiency line (i.e. an amount sufficient for an average individual to live reasonally well) by the people of Chakpota itself.

Results And Discussion

Data on the types of infestation in adults and children as well as economic subg qups are presented in table 1, which shows that the overall frequency of individuals with 'nothing abnormal detected' (NAD) is about 20%. NAD has the highest frequency in the high and lowest in medium economic subgroups. While in both low and medium economic subgroups NAD has very similar frequencies in adults and children, in the high economic subgroup children have higher frequencies of NAD.

The Chi^2 test for significance of difference (table 2) among the three economic subgroups (total samples, including adults and children) show that the difference is significant at 1% level; Chi^2 tests performed among the three subgroups, separately for adults and children, however show that while in cases of adults the difference is non-significant in case of children it is significant at 5% level, suggesting that the significant difference among the total (adult+children) samples may be due to that among children samples. Further, it was found that differences between high and medium, as well as between high and low subgroups in the case of children were significant, at 5% level while that between medium and low subgroups was non-significant suggesting that the significant difference among the three children samples was due to the former two significant differences. The data thus indicate that the children are probably more vulnerable to the microcultural differences occuring among the three economic subgroups, or are more exposed to them than the adults. We are unable to distinguish between these two possiblities with the data at our disposal. The data also suggest that while the high economic subgroup stands out in relation to both medium and low subgroups, the distinction between the latter rwo is less clear.

Considering some major infestations, singly or in association with others (table 3) we find that of all the helminthic and protozoal infestations identified, in general the protozoal infestations are less prevalent than the helminthic once in all the three economic subgroups. Of the several helminthic infestions identified, hookworm infestation is the most prevalent in all the subgroups: Trichuris infestation is completely absent in the low economic subgroup: The roundworm, Oxyuris, Hymenolepis and Giardia prevalences are higher in children than in adults in the total as well as the three subgroup samples, while the hookworm and E coli prevalences are higher in adults. The roundworm and E.coli prevalences decrease with increasing income (from low to high economic subgroup); the hookworm prevalence is the lowest in the high but similar between medium and low economic subgroups, and the Giardia prevalence increases with increasing income.

The overall prevalences of major helminthic and protozoal infestations (table 3) are

well w ithin the range found in other Indian populations (Saxena and Prasad, 1971: Saxena 1982), particularly in case of E.histolytica.

Thus the data presented above suffice to indicate that socio-cultural differences of even very small magnitude, as for example income differences within a village population and the associated micro-cultural factors, may indeed affect intestinal parasitic prevalences. The exact mechanisms of such micro-cultural effects have not been investigated in the present study but a few tentative suggestions can be offered.

The lowest frequency of total infestation, in general (i.e. h ghest frequency of NAD) and of roundworm, hookworm and E. coli, in particular, in the high economic subgroup may intuitively be ascribed to its better living condition and relatively better use of latrines. For instance, 43. 28% of the households in the high economic subgroup were found to have pukka houses with concrete roof and pukka floor contrasted to 8. 33% and 0%, respectively In the medium and low economic subgroups, Further, 50. 75% of the households in the high economic subgroup contrasted to 8. 33% and 2. 50%, respectively in the medium and low economic subgroups. had latrines ot some kind. As calorie-protein malnutrition is generally known to be synergistic with infection (Alleyne et al., 1977) the highest calorie-protein intakes of the high economic subgroup (Majumder et al., 1984) may also provide an explanation. The same explanation, however, does not hold in case of the Trichuris prevalence which is completely absent in the low economic subgroup but increases from medium to high ones, nor in case of Giardia prevalence which increases from the low to h gh economic subgroup. we are unable to offer any explanation of such increasing previaence with increasing economic status. However, our data indicate that the common notion that high economic condition is associated with reduced morbidity risks (whi ch may be generally trua) may not be valid for intestinal parasitic prevalence.

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Summary

Studies on intestinal parasitic prevalences inbicate that they are affected by both physical environmental and sociocultural factors. Such studies conducted recently by the I.S.I. revealed differences in intestinal parasitic prevalences, both between and within northern, sub-Himalayan and southern coastal ecological zones of West Bengal. The present study is intended to investigate whether these prevalences differed in relation to micro-cultural differences prevailing among economic subgroups within a single village population.

The results show that such inter-economic subgroup differences do exist. Tentative interpretations of these results have been offered.

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ditorial Observation

In respect of intestinal parasitic infestations more economic correlation is not considered enough to influence the prevalence. Use of latrine and safe water supply play most important role.

Table- 1. Prevalences of intestinal parasitic infestations

Absence/presance and, if present types of infestation	Low						Medium						High					
	Adult		Child		total		Adult		Child		Total		Adult		Child		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Nothing abnormal detected (NAD)	9	20.93	9	20.45	18	20.69	12	13.79	11	12.58	23	13.69	18	25.35	17	30.36	35	27.56	76	19.90
Helminth only																				
Ascaris only	3	6.98	7	15.91	10	11.49	6	6.90	11	13.58	17	10.12	3	4.23	1	1.79	4	3.15	31	8.12
Trichuris only	—		—		—		1	1.15	—		1	0.60	1	1.41	—		1	0.79	2	0.52
Hookworm only	14	32.56	10	22.73	24	27.59	40	45.98	24	29.63	64	38.10	25	35.21	10	17.86	35	27.56	123	32.20
Oxyuris only	—		1	2.27	1	1.15	—		2	2.47	2	1.19	1	1.41	2	3.57	3	2.36	6	1.57
Hymenolepis only	—		1	2.27	1	1.15	2	2.30	1	1.23	3	1.79	—		1	1.79	1	0.79	5	1.31
Multiple helminth(s)	5	11.63	7	15.91	12	13.79	7	8.05	10	12.35	17	10.12	3	4.23	6	10.71	9	7.09	38	9.95
Subtotal	22	51.16	26	59.09	48	55.17	56	64.37	48	59.26	104	61.90	33	46.48	20	35.71	53	41.73	205	53.66
Protozoa only																				
Giardia only	1	2.33	1	2.27	2	2.30	4	4.60	9	11.11	13	7.74	9	12.68	7	12.50	16	12.60	31	8.12
Ent. coli only	3	6.98	—		3	3.45	3	3.45	1	1.23	4	2.38	1	1.41	1	1.79	2	1.57	9	2.36
Ent. his. only	—		—		—		1	1.15	—		1	0.60	2	2.82	—		2	1.57	3	0.79
Multiple protozoa	—		—		—		—		1	1.23	1	0.60	—		—		—		1	0.26
Subtotal	4	9.30	1	2.27	5	5.75	8	9.20	11	13.58	19	11.31	12	16.90	8	14.29	20	15.75	44	11.52
Multiple protozoa and helminths																				
Giardia & helminth(s)	—		3	6.82	3	3.45	2	2.30	3	3.70	5	2.98	4	5.63	7	12.50	11	8.66	19	4.97
Ent. coil & helmi.(s)	4	9.30	3	6.82	7	8.05	8	9.20	5	6.17	13	7.74	2	2.82	1	1.79	3	2.36	23	6.02
Ent. his. & helmi.(s)	4	9.30	2	4.55	6	6.90	1	1.15	3	3.70	4	2.38	2	2.82	2	3.57	4	3.15	14	3.66
Giardia Ent. his and helminth(s)	—		—		—		—		—		—		—		1	1.79	1	0.79	1	0.26
Subtotal	8	18.60	8	18.18	16	18.39	11	12.64	11	13.58	22	13.10	8	11.27	11	19.64	19	14.96	57	14.92
Total	43	99.99	44	99.99	87	100.00	87	100.00	81	100.00	168	100.00	71	100.00	56	100.00	127	100.00	382	100.00

Table 2 Significance of difference

Comparisons	Chi^2 values		
	Child	Adult	Total (Ch. + Ad.)
Low and Med.	6.03	2.44	5.15
	(3)	(3)	(3)
Low and High	7.84*	2.47	7.75
	(3)	(3)	(3)
Med. and High	9.02*	6.86	13.86*
	(3)	(3)	(3)
Low, Med. and High	13.55*	8.59	18.12*
	(6)	(6)	(6)

* Significant at 5% level

d. f. in parentheses below Chi^2 value

Table 3 Prevalences of infestations (helminthic and protozoal) by economic groups

Economic Subgroup	No. Examined		Number and percent affected							
			Helminths				Protozoa			
			Ascaris*	Trichuris*	Hookworm*	Oxyuris*	Hymenolepis*	Giardia*	Ent.coli*	Ent.Hist*
Low	Adult	43 No	8		27		1	1	7	4
		%	18.60	—	62.79	—	2.33	2.33	16.28	9.30
,,	Child	44 No	18	—	22	2	1	4	3	2
		%	40.91	—	50.00	4.55	2.27	9.09	6.82	4.55
,,	Total	87 No	26	—	49	2	2	5	10	6
		%	29.89	—	56.32	2.30	2.30	5.75	11.49	6.90
Medium	Adult	87 No	11	1	58	1	4	6	11	2
		%	12.64	1.15	66.67	1.15	4.60	6.90	12.64	2.30
,,	Child	81 No	24	1	40	5	4	13	7	3
		%	29.63	1.23	49.38	6.17	4.94	16.05	8.64	3.70
,,	Tota	168 No	35	2	98	6	8	19	18	5
		%	20.83	1.19	58.33	3.57	4.76	11.31	10.71	2.98
High	Adult	71 No	6	3	35	1	1	13	3	4
		%	8.45	4.23	49.30	1.41	1.41	18.31	4.23	5.63
,,	Child	56 No	8	1	23	5	1	15	2	3
		%	14.29	1.79	41.07	8.93	1.79	26.79	3.57	5.36
,,	Total	127 No	14	4	58	6	2	28	5	7
		%	11.02	3.15	45.67	4.72	1.57	22.05	3.94	5.51
Total	Adult	201 No	25	4	120	2	6	20	21	10
		%	12.44	1.99	59.70	1.00	2.99	9.95	10.45	4.98
,,	Child	181 No	50	2	85	12	6	32	12	8
		%	27.62	1.10	46.96	6.63	3.31	17.68	6.63	4.42
	Total	382 No	75	6	205	14	12	52	33	18
		%	19.63	1.57	53.66	3.66	3.14	13.61	8.64	4.71

* Single or multiple infection involving this one

COMPARATIVE MORTALITY RATIO- A HEALTH INDEX

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Introduction

In community health practice the use of various health indices is considered necessary for allocation of health resources in most equitable manner, The selection of index of health is generally based on the following criteria;-(1) *availability* i. e. records should be available for a large number of territory and countries. (2) *coverage* i.e. indicator should relate as far as possible to each country or territory as a whole not any selected area or population only, (3) *quality of the basic data* i.e. needed to estimate the indicators should be of good quality and should not be affected by the deficiency arising from under ragistration etc. (4) *comprehensiveness*: the indicator should possess the comprehensive character implying thereby that as far as possible the various factors affecting the health in the entire life span of an individual should be taken into account, (5) *simplicity* i.e. the compilation indicator should be simple enough to command international acceptance and (6) *discriminatory power* i. e. the indicator should possess high discriminatory power so as to distinguish between countries on various levels of health and to indicate the changes occurring from time to time. Research workers in these fields are trying to develop various comprehensive health indicators so as to achieve the above criteria.

In the developing countries the mortality curve is generally U shaped indicating that the mortality rates are higher in the two extremes of age structure whereas in the developed countries with the sustained efforts of the health workers, mortality rate at childhood could be reduced considerably tending to change the mortality curve to J shaped.

Infant mortality and proportional mortality indicators (Swaroop,1960) are considered to be the most sensitive health indicators reflecting health status and measureing the mortality forces in the community at the two extreme ages of the life span.

In some studies the use of standarised mortality rates have been proposed as a basis of allocation of health resources (Knox, 1978). It has also been observed that mortality and morbidity rates are not generally correlated (Forster, 1977). In order to obviate these problems several workers in the field have tried to develop comprehensive health index taking into consideration several factors and also tried to combine more than one such index. Level of living index (UN Report No. 4, 1966), Mean healthy after life time (Senet al, 1972), Changes in health index (US Models Series, 1965) are some of the outcomes of such effortts.

Objectives

Keeping in view the above facts the authors have made an attempt in the presents study to develop a simple health index based on mortality data combining the mortality rates at two extremes of age structure i.e. infant mortality rate and proportional mortality indicator, with the objective of providing a simple comprehensive health index viz "Comparative

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Mortality Ratio" (CMR) so that the new index could have greater discriminatory power to distinguish between places with regard to the health status and could be used for evaluation of health services rendered to the community and also to allocate the health resources in most equitable manner.

Material And Methods

For the purpose of this study the fertility and mortality data of different districts of West Bengal, as collected by the Enumerators and Supervisers under the Sample Registration Scheme (Rural) for 1978 were adopted from the relevant records. So far as mortality data of different countries are concerned, the relavant information were collected from the different published records.

On the basis of these data, various health indicators such as birth rate, infant death rates mortality rate & perecentage of deaths below one year and proportional mortality indicator were worked out for different districts of West Bengal as well as for some of the developed and developing countries of the world. For combining the mortality rates at two extreme ages, correlations between different health indicators were studied by working out the Rank correlation coefficients. Appropriate statistical tests were applied to test the newly developed health index with regard to its discriminatory power. (Snedecor et al, 1967)

Findings:

Table 1- shows important health indicators such as crude birth rates (CBR) crude death rates (CDR), infant mortality rates (IMR), percentage of deaths under one year to total deaths and proportional mortality indicator (percentage of deaths aged 50 yrs. & above to total deaths) with regard to fifteen (15) districts of rural west Bengal. It was found that correlation between crude birth rates and % of deaths under one year was not significant ($r=0{\cdot}44$, $t=1{\cdot}8$). whereas a significant correlation was observed between % of deaths under one year and infant mortality rates. ($r=0{\cdot}80$, $t=15{\cdot}1$).

The new index is the ratio of percentage of deaths under one year to proportional mortality indicator and termed as "Comparative Mortality Ratio" (CMR).

$$C.M.R. = \frac{\%\text{ of deaths under one year}}{\%\text{ of deaths aged 50 years and above}} \times 100$$

The reason for considering the percentage of death under one year instead of IMR as numerator for the present index is that this index can easily be worked out on the basis of mortality data alone and is independent of fertility rates;whereas the IMR is affected very much by the extent of under registration especially in birth data, which forms its denominator. Secondly, the IMR was found to be highly correlated, as stated earlier, with the pcentage of death below one year and hence could safely be substituted by the later index.

The values of comparative mortality ratio (CMR) for fifteen districts of west Bengal are shown in the last column of table 1.

Table 2 indicates the Ranks of the 15 districts of W. Bengal according to percentage

of deaths under one year, proportional mortality indicator and new index i. e. comparative mortality ratio (C.M.R.), It was observed that the Rank correlation between percentage of deaths under one year and proportional mortality indicator was not statistically significant significant (R= -·10, t=0·37) whereas the rank correlation bettween the new index (CMR) and the percentage of deaths below one year as well as the proportional mortality indicators was found to be significant (R=0·757, t=4·178, & R=-·675, t=-3·3 respectively). It is obvious because of the fact that the new index (CMR) is the combined index based on both the above indicators i.e. percentage of death under one year and proportional mortality indicator.

An attempt was made to evaluate each of the health indicators shown in table 1 (i.e. CBR, C D.R., I.M.R., percentage of death under one year to total deaths and proportional mortality indicator with regard to its discriminatory power.) It was observed that the new index has greater discriminatory power than other indicators,

Hence all the fifteen districts of W. Bengal were arranged according to the values of the new index in ascending order as shown in the last column of table 1, since the health status of a place is judged to be better when the comparative moratality ratio of that place is lower than other places. In other words, lower the comparative mortality ratio, the better is the health status of the place.

In order to test the validity of this health index (CMR), various health indicators were also worked out for some of the developed and developing countries as shown in table 3. It was found that the comparative mortality ratio had greater discriminatory power to distinguish between developed and developing countries.

It is interesting to note from table 3, that the comparative mortality ratio of the developed countries are significantly lower than the developing countries. The values of the CMR in the developed countries are within 10 (ten) whereas the values of this index in respect of doveloping countries are much higher.

Summary:

It is imparative to allocate health resources equitibly on the basis of suitable comprehensive health index which indicate the health needs of the entire life span. In absence of detailed morbidity data, a comprehensive health index viz. comparative mortality ratio (CMR) has been worked out combining the mortality forces (rates) at two extreme ages in percentage of deaths under one year and proportional mortality indicator (percentage of deaths at age 50 years and above). In absence of reliable data on morbidity it seems that the new index could form the basis for allocation of health resources as it has greater discriminatory power to distinguish between different places with regard to health status of the community, than other indices. This also indicates that this particular health index may be used for evaluation of health services of a community.

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Table - 1 ; Important health indicators in 15 districts of west Bengal under S. R. S. (Rural) during 1978.

Distct	Crude birth Rate	Crude death Rate	Infant morta lity	%of death under 1 yr to total deaths	proportional mortality indicator	Comparative mortaliiy ratio
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1. Hooghly	28.9	12.7	42.7	9.7	47.7	20 3
2. Howrah*	20.2	6.3	45.0	14.5	48.4	29.9
3. Darjeeling	28.9	11.8	53.3	13.1	39.3	33.3
4. Jalpaiguri	32.9	15.5	63.3	13.5	33.6	40.1
5. Purulia	27.7	9.6	79.3	22.8	45.5	50.1
6. Midnapore	29.3	13.2	102.4	22.7	42.9	52.9
7. Bankura	28.1	13.6	124.7	25.6	47.4	54.0
8. Birbhum	27.1	11.1	66.6	16.2	27.0	60.0
9. Nadia	30.3	10.8	88.7	24.7	40.4	61.1
10. Cooch Behar	34.4	15.9	95.7	20.6	31.9	64.6
11. 24-Parganas	31.1	10.2	80.1	24.5	36.8	66.6
12. W.Dinajpur	30.5	13.6	75.7	16.9	25.0	67.5
13. Malda	27.3	15.6	129.8	23.1	32.3	71.4
14. Burdwan	34.5	11.3	97.4	29.7	35.7	83.1
15. Murshidabad	40.6	14.8	98.5	27.0	32.2	83.8

* Low birth rate and death rate may be due to Howrah being largely an industrial town

Table-2 :

Ranking of 15 districts of West Bengal under S. R. S. (Rural) in order of % of death under 1 yr. proportional mortality indicator and comparative mortality ratio,

District	% of death under 1 year	Rank according to	
		Proportional Mortality Indicator	Comparative Mortality Ratio
(1)	(2)	(3)	(4)
1. Malda	10	5	13
2. W. Dinajpur	6	1	12
3. Midnapore	8	11	6
4. Hooghly	1	14	1
5. Bankura	13	13	7
6. Purulia	9	12	5
7. Nadia	12	10	9
8. Birbhum	5	2	8
9. Howrah	4	15	2
10. Cooch Behar	7	3	10
11. Darjeeling	2	9	3
12. 24-Parganas	11	8	11
13. Burdwan	15	7	14
14. Jalpaiguri	3	6	4
15. Murshidabad	14	4	15

Table 3 :

Important health indicators in some of the developing and developed countries

	Name of the Country (1)	Crude birth rate (2)	Crude death rate (3)	Infant mortality rate (4)	% of death under 1 yr to total death (5)	Proportional mortality indicator (6)	Comparative mortality ratio (7)
Developed Countries	1. U. S. A.	15.6	9.4	18.5	4.59	87.24	5.26
	2. Austria	13.9	12.7	24.8	3.95	88.70	4.45
	3. Bulgaria	15.3	12.8	31.7	5.80	85.10	6.81
	4. Japan	19.4	6.5	14.9	3.91	80.65	4.85
	5. G, D, R,	12.1	13.9	17.9	3.07	91.95	3.34
	6. F, R, G,	11.4	11.8	20.4	3.68	88.56	4.15
	7. Cyprus	22.0	6.0	28.2	4.11	84.68	4.85
	8. Switzerland	14.3	3.9	13.1	3.59	88.34	4.06
	9. U. K.	15.0	12.1	17.5	2.99	90.98	3.28
	10. Italy	16.3	9.6	27.0	6.89	85.01	8.10
	11. Norway	16.3	9.8	12.2	3.15	90.35	3.48
Developing Countries	1. Angola	23,1	2.6	132,0	20,05	19,85	101,03
	2. Guatamala	44,2	13'3	79,0	24,89	22,68	109,73
	3. Maxico	44,7	9,0	60,9	28,97	34,02	85,15
	4. India	38,9	16,4	85,7	18,44	34'89	52,78
	5. Venizuela	36,8	6,6	49,7	28,61	41,14	69,55
	6. Philippines	24,8	7,3	67,9	24,68	34,15	72,26
	7. Thailand	32,8	6,9	22,3	16,11	37,15	43,36
	8. Chile	27,0	8,5	78,8	30,99	52,98	58,49
	9. Equader	38,7	10,2	77,7	34,98	27,44	127,49
	10. Jordan	15,9	16,0	23,5	33,81	40.54	83,78

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A STUDY OF TETANUS CASES IN A HOSPITAL AT MANIPAL SOUTH KANARA DISTRICT KARNATAKA

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Introduction

Tetanus is an important endemic infection causing more deaths in the world than rabies, plague, poliomyelitis or many other infections or parasitic diseases (Bytchenko, 1966). According to an estimate, as many as half a million people are reckoned to die of this disease each year, mostly in developing countries, despite the existence of a highly effective vaccine against it (Bildhaiya, 1983).

Tetanus is one of the major health problems in India. In 1979 there were a total of 30,446 cases of tetanus reported in India (W.H.O. 1981). In 1971, the incidence in Calcutta was found to be 24 per 100,000 of population (Mazumder and Chakraborty, (1974). On an average the fatality rate of tetanus in India is between 46 and 56 percent (Bhatt and Anwikar, 1962).

The present study was undertaken to highlight some of the features of tetanus among cases admitted to Kasturba Medical College Hospital, Manipal.

Material And Methods

Case records of tetanus cases admitted to Kasturba Medical College Hospital, Manipal during the period 1973-1982 have been scrutinized and the data so collected was tabulated and analysed to high-light certain features of the disease.

In all 174 cases of tetanus were studied. Out of these, 150 cases with full details were analysed to find out seasonal variations, incubation period, occupational status and mode of transmission.

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