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Original Research Article

Prevalence and morphological patterns of tuberculosis in various organs

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ABSTRACT

Background: Tuberculosis (TB) is a common and often deadly infectious disease caused by various strains of mycobacteria, usually *Mycobacterium tuberculosis* in humans. A third of the world's population is thought to be infected with M. tuberculosis and new infections occur at a rate of about one per second. The present study aimed to study the prevalence of TB in various organs.
Methods: This was both prospective and retrospective study and a total of 14,472 patients of all ages and both the sexes were included in the study. All prospective cases during this period and retrospective cases of past one year i.e. total of 14,472 cases were included in the study. Data was entered in MS-Excel sheet and statistical analysis was done.
Results: Out of 14,472 patients maximum number of cases received in the department were of female genital tract (FGT) infections 3634 (25.11%) followed by gastrointestinal tract (GIT) 2246 (15.51%) and then reticuloendothelial system (RES) 1807 (12.48%). 9471 (65.44%) cases were observed with non-neoplastic lesions and 5001 (34.56%) with neoplastic lesions. The number of inflammatory and tubercular cases with non-neoplastic lesions was 4338. Out of 4338 inflammatory cases, 284 cases were reported with TB in various systems. The maximum cases 86 (30.28%) were seen in the third decade followed by fourth decade 55 (19.36%). Youngest patient was 2 year old while the oldest was 80 years old. Incidence of TB was low in 6th and 7th decade of life.
Conclusions: The incidence of pulmonary and extrapulmonary TB in our study population was significantly high. Hence further investigation was required to determine a proper diagnostic approach of its morphological pattern so that accurate treatment can be opted.

Keywords: Extra-pulmonary TB, Pulmonary TB, Tuberculosis

INTRODUCTION

Tuberculosis (TB) has plagued mankind since before recorded history. The story of mankind's battle against TB parallels that of the development of the practice of medicine in general. Although, largely controlled in developed countries, TB remains a significant worldwide health problem.[1] Despite optimistic predictions of the eradication of TB in developed nations, the disease continues to pose a major worldwide health problem. In 2004, the World Health Organization estimated that one third of the world's population either was infected or had been infected with TB and 2 million deaths annually could be attributed to TB.[2] In India according to World

Health Organization (WHO) estimates, incidence of tuberculosis (per 100,000 populations per year) is 168 and prevalence (per 100,000 populations) is 299. The mortality due to TB is 28 per 100,000 population per year and 5.3 % of all TB cases are HIV positive.[3]

Tuberculosis can involve any organ system in the body. While pulmonary tuberculosis is the most common presentation, extrapulmonary tuberculosis is also an important clinical problem.[4-6] Extrapulmonary TB can occur as part of a primary or late generalized infection or as a reactivation site that may coexist with pulmonary reactivation. The most common sites of extrapulmonary disease are mediastinal, retroperitoneal, and cervical lymph nodes, vertebral body, adrenals, meninges, and the gastrointestinal tract. Pathology of these lesions is similar to those in the lungs. Lymphadenitis, characteristically involving cervical chain, is the most common form of extrapulmonary tuberculosis.[7]

However, when an extrapulmonary focus is evident in a patient with pulmonary tuberculosis, such patients have been categorized under pulmonary tuberculosis as per the guidelines of the WHO.[8] In the recently formed state of Uttarakhand, poverty, illiteracy and lack of medical facilities are the main reasons for high incidence of communicable diseases like TB. Also there is lack of adequate data about incidence and pattern of this disease in various organs. This study was therefore aimed at, determining the prevalence of TB in various organs.

METHODS

This study was carried out in the Department of pathology, Himalayan Institute of Hospital trust, University, Swami Ram Nagar, Dehradun, India over a period of 12 months. All prospective cases during this period and retrospective cases of past one year i.e. total of 14,472 cases were included in the study. Retrospective cases of past one year were retrieved from the records.

Statistical analysis

All the data related to prevalence of TB in various systems was entered in MS-Excel sheet and statistical analysis was done.

RESULTS

Table 1: Distribution of all cases according to various systems involved.

Organs	Total no. of cases (%)
Reticuloendothelial system	1807 (12.48%)
Bone and joints	412 (2.84%)
Gastrointestinal tract	2246 (15.51%)
Soft tissue	884 (6.10%)
Respiratory system	1335 (9.22%)
Skin	433 (2.99%)
Female genital tract	3634 (25.11%)
Urogenital tract	590 (4.07%)
Breast	851 (5.88%)
Hepatobiliary	1081 (7.46%)
Endocrine	713 (4.92%)
Central nervous system	288 (1.99%)
Ear	115 (0.79%)
Eye	16 (0.11%)
Cardiovascular system	67 (0.46%)
Total	**14472**

Table 2: Distribution of all cases into neoplastic and non-neoplastic lesions

Organ	Neoplastic	Non-neoplastic	Total no. of cases
Reticuloendothelial system	704	1103	1807
Bone and joints	152	260	412
Gastrointestinal tract	907	1339	2246
Soft tissue	387	497	884
Respiratory system	627	708	1335
Skin	142	291	433
Femal genital tract	578	3056	3634
Urogenital tract	228	362	590
Breast	595	256	851
Hepatobiliary	224	837	1081
Endocrine	213	500	713
Central nervous system	202	86	288
Ear	16	99	115
Eye	06	10	16
Cardiovascular system	00	67	67
Total	**5001 (34.56%)**	**9471 (65.44%)**	**14472**

A total of 14472 patients attended to Himalayan Institute of Medical Sciences between the periods March 2008 to 2009, were included in this study. Table 1 shows distribution of all cases according to various systems involved. The maximum number of cases received in the department were of female genital tract (FGT) infections 3634 (25.11%) followed by gastrointestinal tract (GIT) 2246 (15.51%) and then reticuloendothelial system (RES) 1807 (12.48%).

Table 2 demonstrates number of cases with presence of neoplastic and non-neoplastic lesions. Among the total number of cases involved 9471 (65.44%) were observed with non-neoplastic lesions and 5001 (34.56%) with neoplastic lesions. Out of total 14472 cases included in this study, 1393 (9.62%) were benign, 3608 (24.93%) were malignant, 5133 (35.46%) were non-inflammatory, 4054 (28%) were inflammatory and 284 (1.96%) were tubercular as shown in Figure 1.

Table 3 shows distribution of non-neoplastic lesions into inflammatory and non-inflammatory conditions. The maximum number of non-neoplastic cases were FGT 3056 (32.26%) followed by GIT 13396 (14.13%) and RES 1103 (11.64%). The maximum number of inflammatory cases with non-neoplastic lesions were noted in FGT was 1439 (33.17%) followed by GIT 835 (19.25%) and then hepatobiliary system 435 (10.02%).

Table 3: The division of non-neoplastic lesions into inflammatory and non-inflammatory lesions.

Organs	Non-inflammatory	Inflammatory and tubercular	Total
Reticuloendothelial system	824	279 (6.43%)	1103 (11.64%)
Bone and joints	110	150 (3.46%)	260 (2.74%)
Gastrointestinal tract	504	835 (19.25 %)	1339 (14.13%)
Soft tissue	231	266 (6.13%)	497(5.24%)
Respiratory system	451	257 (5.91%)	708 (7.47%)
Skin	86	205 (4.73%)	291 (3.07%)
Female genital tract	1617	1439 (33.17%)	3056 (32.26%)
Urogenital tract	258	104 (2.40%)	362 (3.82%)
Breast	160	96 (2.21%)	256 (2.70%)
Hepatobiliary	402	435 (10.02%)	837 (8.83%)
Endocrine	380	120 (2.77%)	500 (5.27%)
Central nervous system	53	33 (0.76%)	86 (0.90%)
Ear	02	97 (2.24%)	99 (1.04%)
Eye	08	02 (0.05%)	10 (0.10%)
Cardiovascular system	47	20 (0.50%)	67 (0.70%)
Total	**5133 (54.19%)**	**4338 (45.81%)**	**9471**

Table 4: System wise distribution of inflammatory and tubercular cases.

Organs	Inflammatory	Tuberculosis	Total
Reticuloendothelial system	124	155 (55.55%)	279
Bone and joints	117	33 (22%)	150
Gastrointestinal tract	806	29 (3.47%)	835
Soft tissue	248	18 (6.76%)	266
Respiratory system	246	11 (4.28%)	257
Skin	195	10 (4.87%)	205
Female genital tract	1430	09 (0.63%)	1439
Urogenital tract	96	08 (7.69%)	104
Breast	91	05 (5.20%)	96
Hepatobiliary	433	02 (0.45%)	435
Endocrine	118	02 (1.66%)	120
Central nervous system	31	02 (6.06%)	33
Ear	97	00 (00.00%)	97
Eye	02	0 0(00.00%)	02
Cardiovascular system	20	0 0(00.00%)	20
Total	**4054 (93.45%)**	**284 (6.55%)**	**4338**

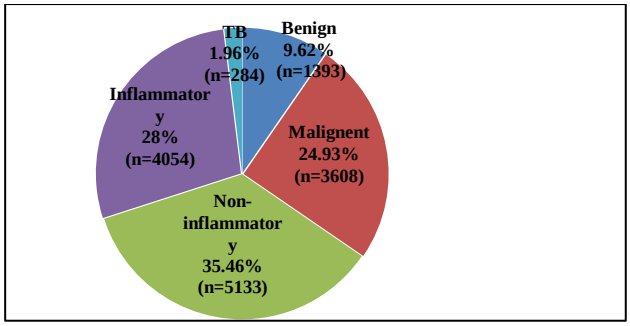

Figure 1: Break up of total cases included in the study.

Out of 4338 inflammatory cases, 284 cases were reported with TB in various systems. Table 4 shows that total inflammatory lesions were 4054 (93.45%) and total cases of TB were 284 (6.55%). TB of RES formed the biggest group comprising of 155 (55.55%). This was followed by bone and joint 33 (22%) and then GIT 29 (3.47%). TB of CNS, endocrine and hepatobiliary accounted for 6.06%, 1.66%, and 0.45% cases respectively.

Figure 2 shows age wise distribution of 284 patients included in the study. The maximum cases 86 (30.28%) were seen in the third decade followed by fourth decade 55 (19.36%). Youngest patient was 2 year old while the oldest was 80 years old. Incidence of TB was low in 6th and 7th decade of life.

Table 5 shows that no significant difference was found in incidence of TB in both genders in different organs. male:female ratio was nearly 1:1.

Table 6 shows distribution of cases of tuberculosis according to site in different systems. The most commonly involved lymph nodes were cervical group 91 (58.70%). Endometrium is the major site affected with TB 5 (45.46%) of FGT.

About 4 (50%) cases are with TB of male genital tract. Knee joint and wrist 2 (16.66%) cases in each are the sites affected majorly with TB in bone and joint system. Abdominal TB was seen in ilio-caecal region in majority 12 (41.37%) of cases.

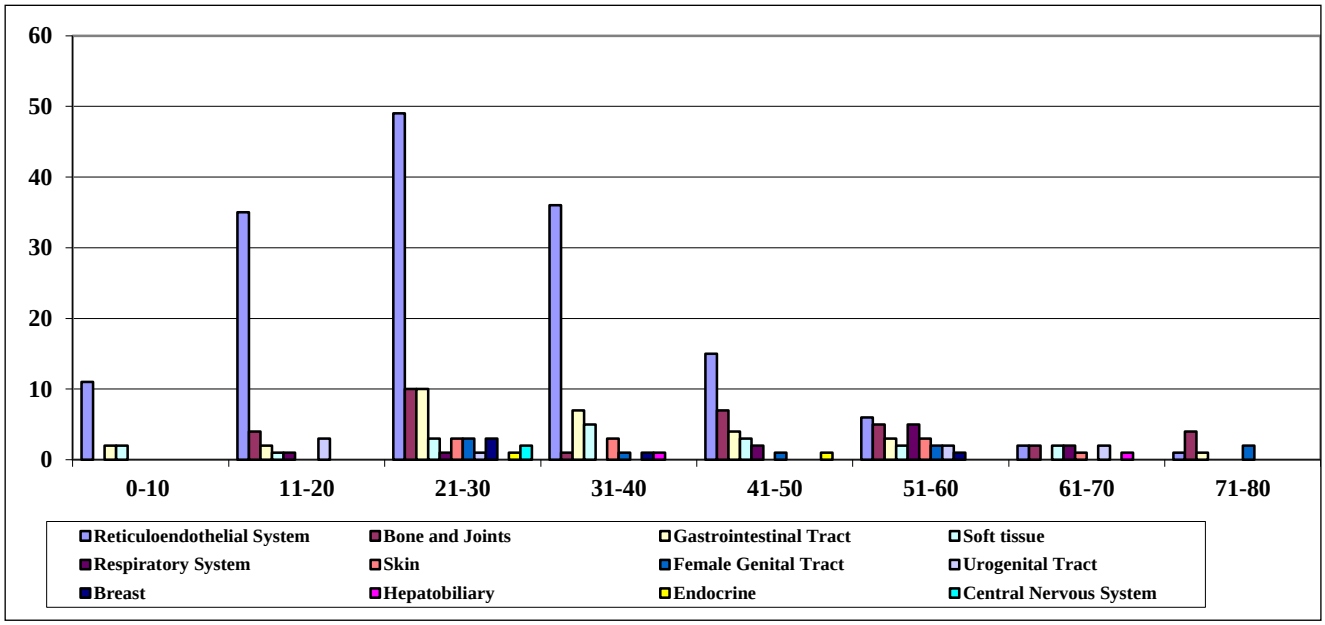

Figure 2: Age-wise distribution of patients with TB in different systems.

DISCUSSION

A total of 14472 cases were included in this study, of which 5001 (34.56%) were neoplastic and 9471 (65.44%) were non neoplastic. Non-neoplastic lesions were further divided into inflammatory and non-inflammatory. Inflammatory lesions formed were seen in 5133 (54.19 %) cases and non-inflammatory lesions in 4338 (45.81%) cases. TB was accounted for 284, (6.5%) cases of inflammatory lesions and 1.9% of total diseases of all systems.

In India incidence of TB per 100,000 populations per year is 168 and prevalence is 299. Similar figures were not calculated in this study as it did not include population as a whole. The prevalence of TB was 1.9 %. This was calculated in patients coming to pathology department for investigation.[9-11]

Table 5: Male and female ratio.

Organs	Male	Female
Reticuloendothelial system	84	71
Bone and Joints	21	13
Gastrointestinal tract	14	15
Soft tissue	10	8
Respiratory system	7	4
Skin	6	4
Female Genital tract	-	9
Urogenital tract	7	1
Breast	1	4
Hepatobiliary	1	1
Endocrine	-	2
Central nervous system	1	1
Total	**152**	**132**
Percentage	53.53%	46.47%

The age of patients in this study ranged from 2-80 years. The youngest patient was one year old while oldest patient was eighty years old. 152 (53.52%) of patients were male while 132 (46.47%) were females. Most of the other studies in literature are system wise. Tuberculosis has been reported in all age groups and both sexes. No predilection for either sex or any age group was found in tuberculosis of any organ.

In the present study out of 246 cases with inflammatory lesions in respiratory system 11 (4.28%) cases were found of having pulmonary tuberculosis, Similarly Chakma et al reported 142 cases of pulmonary tuberculosis out of 625.[12] Other studies done by Ariel et al, Vinokuro et al, and Das et al showed similar findings as seen in the present study and above mentioned studies.[13-15]

In this study, extrapulmonary tuberculosis accounted for 273 (96.12%) cases. In a study by sharma et al extrapulmonary was TB found to account for 15-20% of the cases.[16] This figure was 50% in HIV positive patients. The high incidence of extrapulmonary TB in the present study can be explained by the fact that this hospital is a referral centre and patients are often referred from other centers for confirmation of diagnosis.

In the present study RES was found to be the commonest system involved by TB which accounted for 155 (8.5%) of total diseases of this system. It also accounted for 14.05% of non-neoplastic lesions and 15.5% of inflammatory lesions involving this system. In a study done by Jha et al incidence of tuberculosis in lymph nodes (LN) was found to be 63.8 %.[17] In a similar study by Bhatt et al, incidence of tuberculosis was 51.87%.[18]

In the present study the lymph nodes involved were cervical LN 91 (58.70%), followed by supraclavicular LN 19 (12.25%), axillary LN 16 (10.32%), submandibular LN 13 (8.38%), submental LN 4 (2.58%), mesenteric LN 10 (0.65%), inguinal LN 1 (0.64%) and retroperitoneal LN 64 (0.64%). This was similar to the reports of Maharjan et al.[19]

2256 cases of gastrointestinal tract lesions were included in this study. Of these 29 (1.3%) showed tuberculosis. Sites of involvement of GIT were ileo-caecal region 12 (41.37%), omentum 5 (17.24%), ileum 3 (10.3%), colon 2 (6.8%), jejunum 2 (6.8%), salivary gland 2 (6.8%), oral cavity 2 (6.8%), and tonsil 1 (0.003%). In a similar study of 59 cases of GIT tuberculosis by Singhal et al, ileocaecal region was found involved in 40% and peritoneum in 32% cases.[20]

Table 6: Distribution of cases of TB according to site in different systems.

System and site	No.of cases (%)
Lymph node	
Cervical	91 (58.7%)
Supraclavicular	19 (12.25%)
Submandibular	13 (8.38%)
Mesenteric	10 (6.45%)
Submental	04 (2.60%)
Inguinal	01 (0.65%)
Retroperitoneal	01 (0.65%)
Female Genital Tract	
Endometrium	05 (45.46%)
Fallopian tube	02 (18.18%)
Cervix	02 (18.18%)
Ovary	01 (9.09%)
Vulva	01 (9.09%)
Male Genital Tract	
Kidney	04 (50%)
Prostate	01 (12.5%)
Epididymis	01 (12.5%)
Testis	01 (12.5%)
Urinary bladder	01 (12.5%)
Bone and Joint	
Knee joint	02 (16.66%)
Wrist	02 (16.66%)
Femur	01 (8.33%)
Humerus	01 (8.33%)
Mandible	01 (8.33%)
Interphalangeal joint	01 (8.33%)
Metatarsal	01 (8.33%)
Ankle	01 (8.33%)
Hip joint	01 (8.33%)
Sternum	01 (8.33%)
Gastrointetinal system	
Tonsil	01 (0.003%)
Oral cavity	02 (6.8%)
Salivary gland	02 (6.8%)
Colon	02 (6.8%)
Jejunum	02 (6.8%)
Ilium	03 (10.3%)
Omentum	05 (17.24%)
Ilio-caecal region	12 (41.37%)

590 cases of urogenital tract diseases were included in this study of which 8 (0.014%) were of tuberculosis. 4 (50%) these patients had renal tuberculosis while 1 case each (12.5%) were of prostate, epididymis, testis and urinary bladder respectively. Urogenital system proved to be the 7th commonest extrapulmonary site to be involved by tuberculosis. It accounted for 3.3% cases of extrapulmonary tuberculosis. Majority of the cases involved the kidney. Single cases of tuberculosis in prostate, epididymis, testis and urinary bladder were found. Which is comparable to results in other studies.[21,22]

In this study out of 3634 cases of female genital tract lesions, 9 were of tuberculosis. The commonest site of involvement was endometrium in 45.46%, fallopian tube was involved in 2 (18.18%) cases and cervix in 2 (18.18%). Only one case showed tuberculosis of ovary 1 (9.09%) and vulva 1 (9.09%). One patient showed involvement of more than one site. FGT was the 6th most common site involved in extrapulmonary tuberculosis and accounted for 3.2% of extrapulmonary tuberculosis cases. Findings in this study on tuberculosis of FGT are in concordance with studies by Sutherland.[23]

In the present study, bone and joint is the second commonest organ involved by tuberculosis. Out of total 412 cases of bone and joint 33 (8.0%) were tubercular. Mehrotra et al published a case report of tuberculosis in skull.[24] No case of tuberculosis of skull was found in the present study.

In the present study out of total 433 cases of skin TB was present in 10 (0.02%) cases as also observed by Patra et al.[25] In this study out of 284 cases of CNS, 2 were tubercular. Tuberculosis of CNS accounted for 0.7% of extrapulmonary tuberculosis as opposed to 10-15% in other studies of Liu et al.[26]

In this study out of 713 cases of endocrine, 2 were tubercular. In a similar study done by Coller et al in a series of 1200 cases of thyroid disease operated, five cases of thyroid tuberculosis were described.[27]

CONCLUSIONS

This study discovered a huge burden of pulmonary and extrapulmonary TB in this Uttarakhand region. There is a need to maintain and strengthen the TB control measures on a sustained and long term basis in this area. And also appropriate diagnostic approach had to be selected for further investigation of its morphological pattern so that accurate treatment can be opted.

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