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"A Study of Clinical Profile and In Hospital Mortality of Miliary Tuberculosis''

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Abstarct:
Background*;Manget, is credited to have coined the term "military TB" in 1700. Miliary TB is a fatal form of disseminated TB that results from a massive lymphohematogenous dissemination from a mycobacterium tuberculosis-laden focus. Radiologically, the miliary pattern has been defined as "a collection of tiny discrete pulmonary opacities that are generally uniform in size and widespread in distribution, each of which measures 2 mm or less in diameter. Tuberculosis (TB) persists as a global public health problem of serious magnitude requiring urgent attention. India accounts for one fourth of global burden. Global incidence of tuberculosis is 10.0 million(9.0-11.3) million[28]. Globally, there were 1.2 million(1.1-1.3) million TB deaths among HIV-negative people in 2019 and 2.51 lakh deaths among HIV-positive patients. TB has been the single leading cause of death from single infectious agent, ranking above HIV/AIDS. Geographically, most TB cases in 2018 were in the regions of South-East Asia (44%), Eight countries accounted for two thirds of global total, India(27%), china(9%), Indonesia(8%), Philippines(6%),Pakistan(6%),Nigeria(4%),Bangladesh(4%),and South Africa(3%).*

Materisl And Methods*: The study subjects were patients with Miliary TB. After obtaining a detailed history, general physical examination and systemic examination, the patients were subjected to relevant investigations. Data was collected as per a clinical, prospective and observational study requirement. Purposive sampling technique was used for selection of cases. Inclusion criteria:Miliary pattern on chest X-ray and one or more:1.Sputum smear positive for AFB.2.Xpert MTB/Rif positive For Mycobacterium Tuberculosis3.Histopathological evidence of TB on FNAC of enlarged Lymph node or Bone marrow biopsy and or CSF/Pleural fluid /Ascitic fluid findings characteristics of TB.4.Clinical presentation consistent with diagnosis of TB, such as Pyrexia with evening rise of temperature, weight loss, anorexia, tachycardia, night sweats greater than 6 weeks duration responding to Anti TB treatment.Exclusion criteria:1.Children <14 years of age.2.Xpert MTB/Rif Negative Cases.*

Results : *The study includes 30 patients ranging from 15-70 yrs with mean age of 41 yrs , males 21(70%) and females 9(30%). Highest number of patients were in the (15- 30yrs) age group (33%).Most of the patients presented with symptom of fever (86.6%) and majority of patients presented with cough (73.4%),weight loss (66.7%), dyspnea (53.3%) and vomiting (46.7%).Mean duration of commonest symptom in our study is 10 weeks with range (6 days – 24weeks).Predisposing conditions existed in 15(50%).Only 10%&6.67% of patients had h/o Diabetes & Hypertension respectively, where as 40.0%& 23.3% of patients had h/o HIV and TB respectively.Considering drug history, 16.6%, 13.3% & 3.3% had h/o ART, steroids and immunosuppressive drugs consumption. Only 13.3% of patients had family h/o TB.About 46.7% of patients are smokers, 43.34% are alcoholics.Majority of patients had pallor (63.3%) and 26.7% had lymphadenopathy.The abnormal respiratory system findings were found in 27(90%) of patients and among them, 14 had rales, 8 had rhonchi and 5 had pleural effusion.The abnormal per abdomen findings were found in 15 (50.0%) patients and among them, 7 had hepatomegaly, 5 had hepatosplenomegaly, 2 had splenomegaly and 1 had ascites.The abnormal CNS findings were found in 13 (43.3%) patients and among them, 10 had neck stiffness,1 had CVA and 1had drowsiness.Only 3.3%&6.7% of patients had shock and choroids tubercles respectively.The common hematological abnormalities noted in our study are anemia and raised ESR. Hyponatremia and Hypoalbuminemia are common biochemical abnormalities noted.All the 30(100%) patients had military shadows on chest X-ray with 5 patients having pleural effusion in addition.*

•About 16% the study subjects were positive for PPD test and only 13.3% were positive for AFB. Abnormal USG found in 53.8%.Total 11(36.7%) patients were reactive for HIV.Method of diagnosis by inclusion criteria is ,by Sputum for AFB in 2(6.6%) patients , FNAC of enlarged Lymph node in 4(13%) patients , CSF/Pleural fluid/Ascitic fluid in 16(53.3%), Clinical presentation in 8(26.6%),Bone marrow biopsy in 1(3.3%),and XpertMTB/Rif in 3(10%) of patients.Total Number of deaths in the study are 6 (20%). In Hospital mortality is 20%.Anorexia, weight loss, Hypotension, cyanosis and abnormal CNS findings (neck stiffness and altered mental status) Anemia, Neutropenia, severe lymphocytopenia, hypoalbuminemia, hypocholesterolemia, Low BMI (high nutrition risk score) were significant risk factors associated with in hospital mortality

Conclusion: *Young adult Males are more commonly affected.Predisposing conditions are present in half of the patients.Miliary TB is common in HIV infection.Clinical symptoms are constitutional and non specific with fever, weight loss and anorexia being most common.Clinical signs are non specific and includes pallor, lymphadenopathy, rales, hepatosplenomegaly, neck stiffness and altered mental status.Anemia, raised ESR ,Hypoalbuminemia and Hyponatremia were common lab findings.Miliary pattern on chest x-ray is important in suspecting diagnosis.High index of clinical suspicion, use of FNAC of enlarged Lymph node , Genexpert MTB(CBNAAT) for sputum negative patients, analysis of CSF/pleural fluid/Ascitic fluid, Bone marrow biopsy yields in diagnosis of miliary TB .In hospital Mortality is 20%, with one (3.3%) patient was HIV reactive and 2(6.6%) were elderly among 6 patients who died. Anorexia, weight loss, Hypotension, cyanosis and abnormal CNS finding (neck stiffness and altered mental status) Anemia, Neutropenia, severe lymphocytopenia, hypolabuminemia ,hypocholesterolemia ,Low BMI,(high nutritional risk score) were significant risk factors associated with in hospital mortality.*

Keywords:*Miliary Tuberculosis, Disseminated Tuberculosis,Mycobacterium Tuberculosis,Clinical profile,CBNAAT.*

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I. Introduction

Tuberculosis (TB) persists as a global public health problem of serious magnitude requiring urgent attention. India accounts for one fourth of global burden. Global incidence of tuberculosis is 10.0 million(9.0-11.3) million[28]. Globally, there were 1.2 million(1.1-1.3) million TB deaths among HIV-negative people in 2019 and 2.51 lakh deaths among HIV-positive patients. TB has been the single leading cause of death from single infectious agent, ranking above HIV/AIDS. Geographically, most TB cases in 2018 were in the regions of South-East Asia (44%), Eight countries accounted for two thirds of global total, India(27%), china(9%), Indonesia(8%), Philippines(6%),Pakistan(6%),Nigeria(4%),Bangladesh(4%),and South Africa(3%).

Incidence rate of tuberculosis in India 199 (133-273) cases per Lakh per year population. Prevalence of TB in India is 2.5 million(195 cases per Lakh per year population).HIV-negative TB mortality rate in India is 32(30-35) per 1 lakh population. India has highest burden of TB and MDR is second highest TB and HIV which is most of the time associated with Global burden[28][25].

Manget, is credited to have coined the term "military TB" in 1700. Miliary TB is a fatal form of disseminated TB that results from a massive lymphohematogenous dissemination from a mycobacterium tuberculosis-laden focus. Radiologically, the miliary pattern has been defined as "a collection of tiny discrete pulmonary opacities that are generally uniform in size and widespread in distribution, each of which measures 2 mm or less in diameter". Disseminated TB refers to concurrent involvement of at least two non- contagious organ sites of the body or involvement of blood or bone marrow by tuberculosis process. Miliary TB accounts for less than two percent of all cases of TB and up to 20% of all extra pulmonary TB cases in various clinical studies in immune competent individuals. Due to varied clinical manifestations, atypical radiographic findings and difficulties in establishing TB as the etiological diagnosis, even today, miliary TB remains a formidable diagnostic and therapeutic challenge. In this review, we have attempted to provide an overview regarding the changing clinical picture of miliary TB and issues related to diagnosis and management. Miliary TB continues to be a diagnostic problem even in areas endemic to TB, where clinical suspicion is very high. Mortality from miliary TB disease has remained high despite effective therapy being available. In patients with Human immunodeficiency virus(HIV) infection, and Acquired immunodeficiency syndrome (AIDS), miliary TB is common[3]. Miliary TB is often the consequence of primary infection in children but in adults it may be due to either recent infection or reactivation of old disseminated bacilli. HIV infection has significantly influenced the clinical presentation and caused resurgence of miliary TB. As the clinical features of disease are non specific, if it goes unrecognized miliary TB is lethal[4].

Hence the present study is taken up to study the demographic, clinical, radiographic & laboratory features,In Hospital Mortality,method of diagnosis and factors associated with in hospital mortality in patients with Miliary TB prospectively.

II. Materials And Methods

Source of Data: The study was conducted at MNR Medical College, Sangareddy District Population. The source for this study consisted of 30 patients either hospitalized or actively attended Pulmonary medicine out-patient department with Miliary TB as per inclusion criteria and exclusion criteria.

Method of data collection: The study subjects were patients with Miliary TB. After obtaining a detailed history, general physical examination and systemic examination, the patients were subjected to relevant

investigations. Data was collected as per a clinical, prospective and observational study requirement. Purposive sampling technique was used for selection of cases.
The complete data was collected in a specially designed case recording form/proforma.The data collected was transferred to a Master Chart which was subjected to statistical analysis. Before submitting the patients for investigation and treatment, informed /written consent was obtained from the patient or legal guardian in the local vernacular language. The patients were selected with following inclusion /exclusion criteria
Duration Of Study: December 2017 To September 2019.
Study Type: Prospective Observational Study.

Inclusion criteria:
Miliary pattern on chest X-ray and one or more:
1. Sputum smear positive for AFB.
2. Xpert MTB/Rif positive For Mycobacterium Tuberculosis
3. Histopathological evidence of TB on FNAC of enlarged Lymph node or Bone marrow biopsy and or CSF/Pleural fluid /Ascitic fluid findings characteristics of TB.
4. Clinical presentation consistent with diagnosis of TB, such as Pyrexia with evening rise of temperature, weight loss, anorexia, tachycardia, night sweats greater than 6 weeks duration responding to Anti TB treatment.

Exclusion criteria:
1. Children <14 years of age.
2. Xpert MTB/Rif Negative Cases.

Following investigations were done. Mandatory investigations:
1. Chest X-Ray PA view
2. Sputum for AFB (two samples, spot and early morning)
3. Complete hemogram
4. Tuberculin skin test (PPD test)
5. Liver function tests
6. RBS, Blood Urea and serum creatinine
7. HIV through ICTC
8. USG Abdomen

Optional investigations:
1. FNAC of enlarged Lymph node
2. Bone marrow biopsy.
3. CT Scan Brain (plain and or contrast)
4. CSF/Pleural fluid/Ascitic fluid Analysis
5. Serum electrolytes (Na+,K+,Cl-)
6. HRCT chest

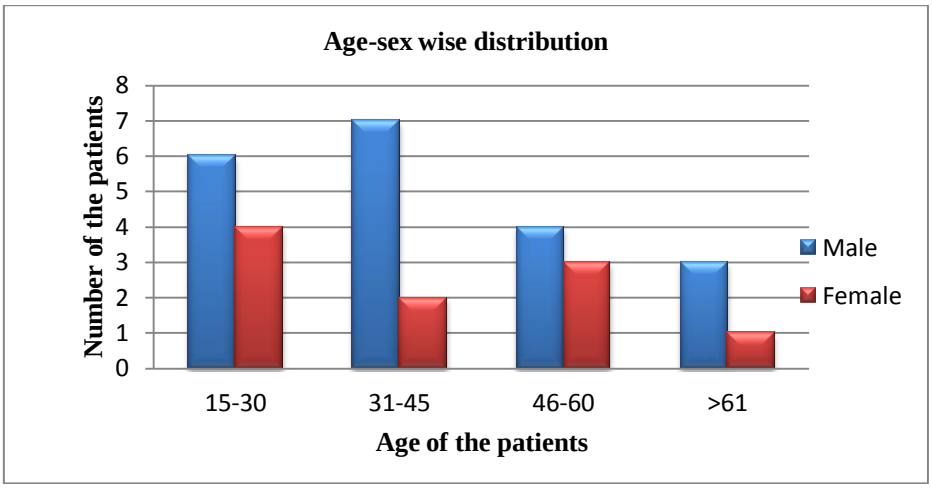
III. Results And Analysis

The following were the observations made from the study of 30 cases of Miliary Tuberculosis at MNR medical college and Sangareddy district of Telangana state.

Table 10: **Age-sex wise distribution of patients**

Age- group	**Male**	**Female**	**Total**
15 – 30	6 (20.00%)	4 (13.35%)	10 (33.35%)
31 – 45	7(23.33%)	2 (6.67%)	9 (30.00%)
46 – 60	4 (13.35%)	3(10.00%)	7 (23.35%)
> 61	3 (10.00%)	1 (3.30%)	4 (13.30%)
Total	20 (66.66%)	10 (33.34%)	30 (100.00%)

The study subjects (patients) included both males (66.66%) and females (33.34%). Majority of patients belong to (15-30) years age group (33.35%). Total 13.30% of patients are more than 60 years[elderly]. Mean age of study patients is 41.3 yrs, Males (41.3 yrs) and Females (41.4 yrs). Age range in study patients is 15 – 70 yrs.

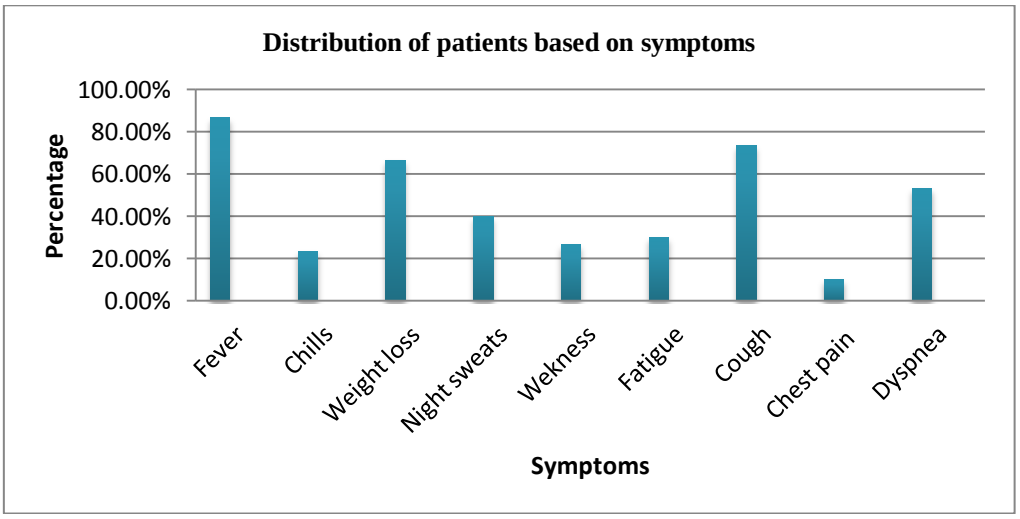


Graph 1: Age-sex wise distribution of patients

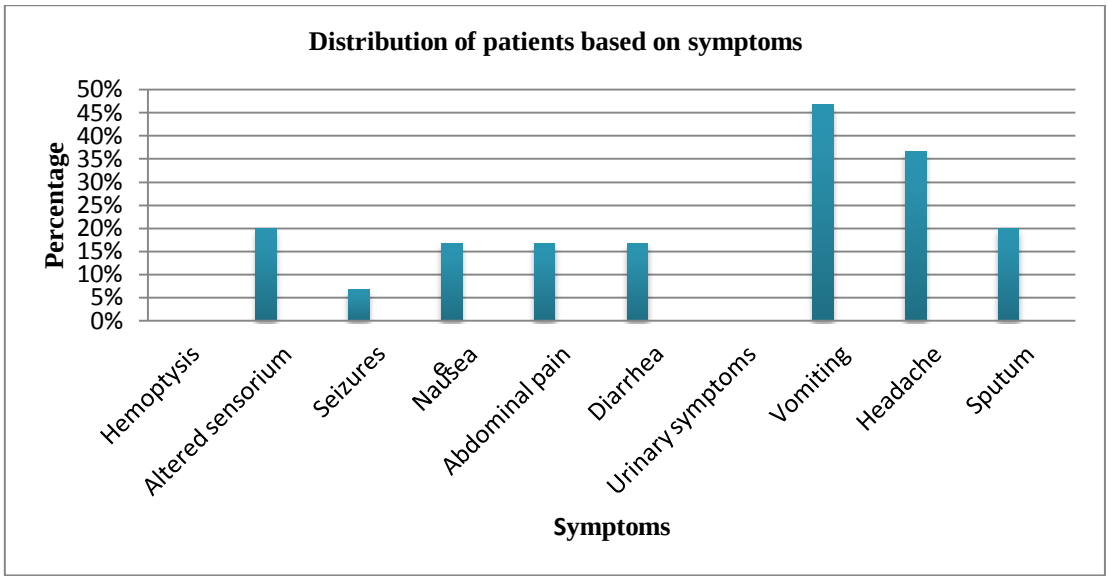
Table.no.11: Distribution of patients based on symptoms

Symptoms	Present	Absent	Total
Fever	26 (86.6%)	04 (13.34%)	30
Chills	07 (23.33%)	23 (76.67%)	30
Weight loss	20(66.6%)	10(33.4%)	30
Night sweats	12 (40.0%)	18 (60.0%)	30
Weakness	08 (26.6%)	22 (73.4%)	30
Fatigue	09 (30.0%)	21 (70.0%)	30
Cough	22 (73.4%)	08(26.6%)	30
Chest pain	03(10.0%)	27 (90.0%)	30
Dyspnea	16 (53.3%)	14 (46.6%)	30
Hemoptysis	00	30 (100%)	30
Altered sensorium	06 (20.0%)	24 (80.0%)	30
Seizures	02 (6.7%)	28 (93.3%)	30
Nausea	05(16.7%)	25 (83.3%)	30
Abdominal pain	05 (16.7%)	25 (83.3%)	30
Diarrhea	05 (16.7%)	25 (83.3%)	30
Urinary symptoms	00	30 (100%)	30
Vomiting	14 (46.7%)	16 (53.3%)	30
Headache	11 (36.6%)	19 (63.4%)	30
Sputum	06 (20.0%)	24 (80.0%)	30

Most of the patients presented with symptom of fever (86.6%) and majority of patients presented with weight loss (66.6%), cough (73.4%), dyspnea (53.4%) and vomiting (46.7%). The least common presentations are abdominal pain (16.7%), chest pain (10%), and seizures (6.7%). No patient had presented with h/o hemoptysis or urinary symptoms.



Graph 2: Graph showing distribution of patients based on symptoms

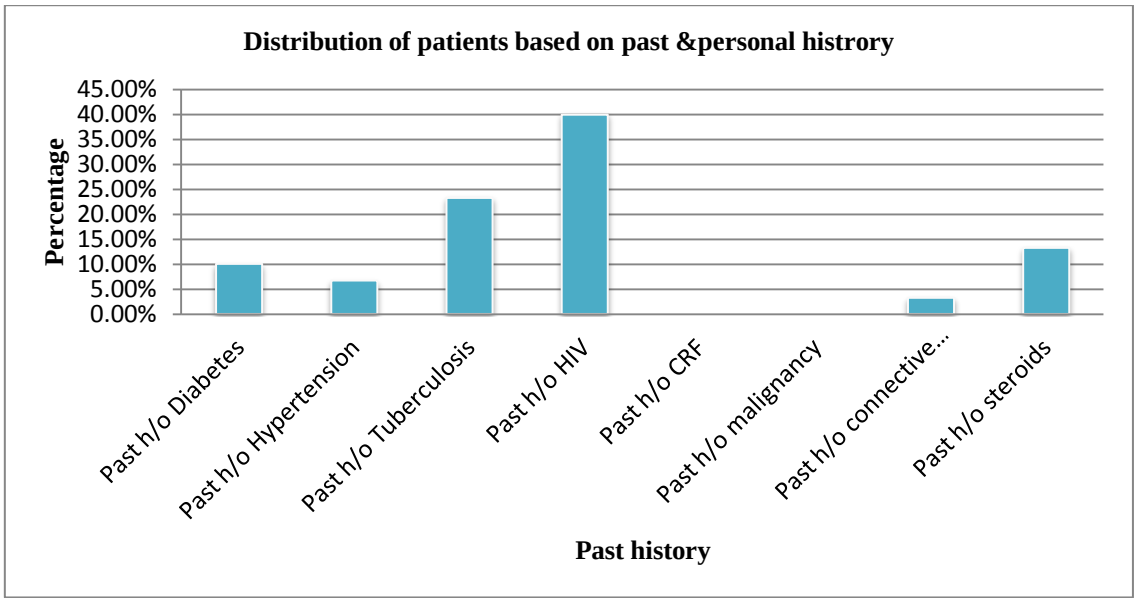


Graph 3.Graph showing distribution of patients based on symptom

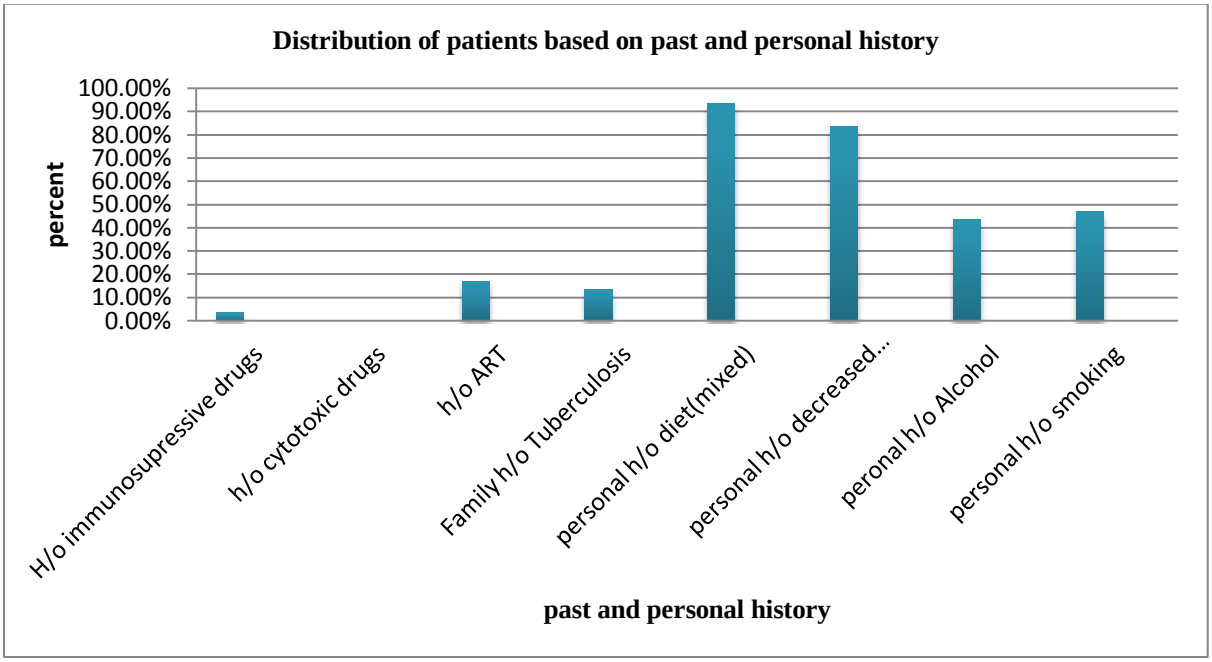
Table.no.12: Distribution of patients based on past & personal history

Parameters	**Present**	**Absent**	**Total**
Past h/o Diabetes	03 (10.0%)	27 (90.0%)	30
Past h/o Hypertension	02 (6.67%)	28 (93.3%)	30
Past h/o Tuberculosis	07 (23.3%)	23 (76.7%)	30
Past h/o HIV(IDV)/AIDS	12 (40.0%)	18 (60.0%)	30
Past h/o CRF	00	30 (100%)	30
Past h/o malignancy	00	30 (100%)	30
Past h/o connective disorders	01 (3.3%)	29 (96.7%)	30
Drug h/o steroids	04(13.3%)	26 (86.7%)	30
h/o immunosuppressive drugs	01 (3.3%)	29 (96.7%)	30
h/o cytotoxic drugs	00	30 (100%)	30
h/o ART	05 (16.6%)	25 (83.4%)	30
Family h/o Tuberculosis	04 (13.3%)	26 (86.7%)	30
Personal h/o smoking	14 (46.7%)	16 (53.3%)	30
Personal h/o decreased appetite	25 (83.4%)	05 (16.6%)	30
Personal h/o bowel & bladder	04 (13.3%)	26 (86.7%)	30
Personal h/o diet (mixed)	28(93.34%)	02 (6.66%)	30
Personal h/o alcohol	13 (43.34%)	22 (56.6%)	30

Among study population 10 % of patients had h/o Diabetes, 6.67% patients had h/o Hypertension, whereas 40.0 % & 23.3% of patients had h/o HIV/AIDS and TB respectively. No patient had h/o CRF and malignancy. Considering drug history, 16.6%, 13.3%&3.3% were taking medication of ART, steroids and immunosuppressive drugs consumption respectively. Only 13.3% of patients had family h/o TB. About 46.7% of patients are smokers 43.34 % are alcoholics. Majority of patients (83.4%) had h/o decreased appetite. Predisposing conditions for Miliary TB were present in 50%.



Graph 4: Distribution of patients based on personal and past history



Graph 5: Distribution of patients based on personal and past history

Table.no.13: Mean values of vital parameters

Parameters	Mean	Standard deviation
Pulse	90.93	14.04
Systolic BP	100.67	15.70
Diastolic BP	65.40	11.83
Respiratory rate	20.47	7.38

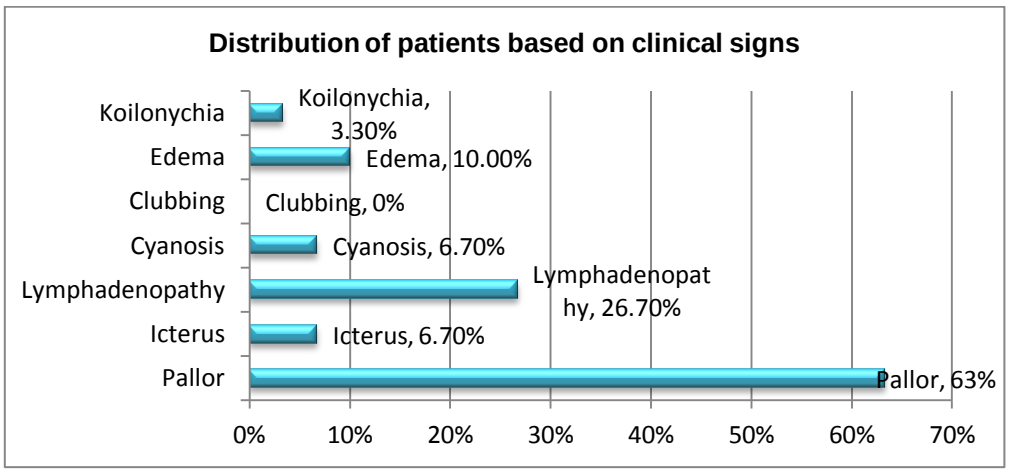
The mean BP of patients are 100/65 mmHg and mean pulse is 90.93.

Table.no.14: Distribution of patients based on clinical signs

Parameters	Present	Absent	Total
Pallor	19(63.3%)	11 (36.7%)	30

Icterus	02 (6.7%)	28 (93.3%)	30
Lymphadenopathy	08 (26.7%)	22(73.33%)	30
Cyanosis	02 (6.7%)	28 (93.3%)	30
Clubbing	00	30 (100%)	30
Edema	03 (10.0%)	27 (90.0%)	30
Koilonychia	01 (3.3%)	99 (96.7%)	30

Majority of patients had pallor (63.3%) and 26.7% had lymphadenopathy whereas only 6.7% had icterus and cyanosis but only 3.3% had koilonychia .

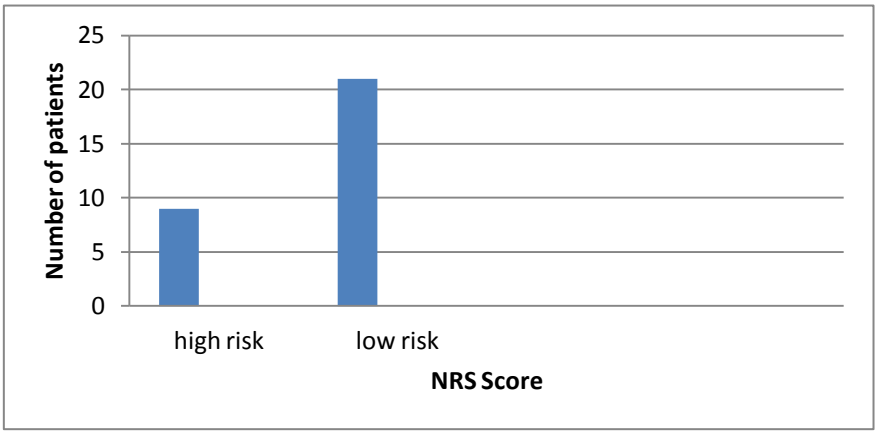


Graph 6: Distribution of patients based on clinical signs

Table.no.15: Distribution of patients based on clinical signs

Variables	NRS score	Number of patients
BMI(<18.5 kg/m^2)	>3	09
Hypoalbuminaemia(<30.g/L)	2	11
Hypocholesterolemia(<2.33mmol/L)	1	09
Total lymphocyte count(<76105)cell/cumm	0	01

Nutritional assessment with NRS score revealed 09 patients had high risk (>3) nutritional risk score, 21 had less than 2, 3 had score 1 and 1 patient had zero NRS score.



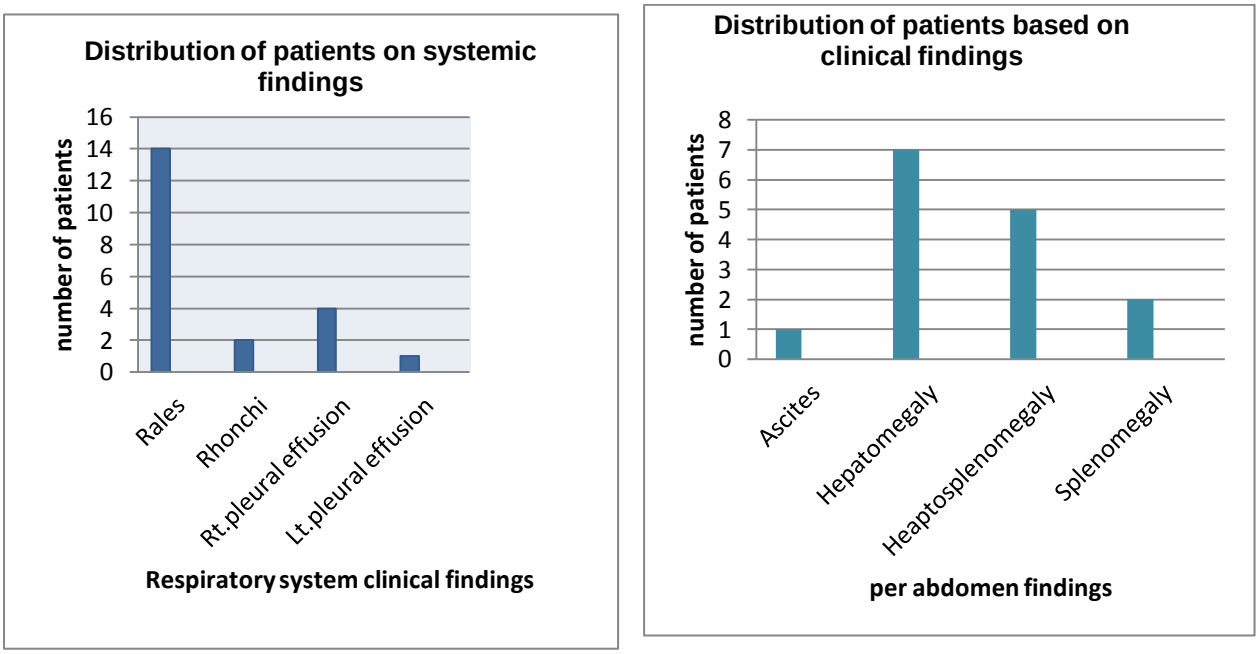
Graph 7: Distribution of patients based on nutritional assessment by NRS score.

Table.no.16: Distribution of patients based on systemic examination findings

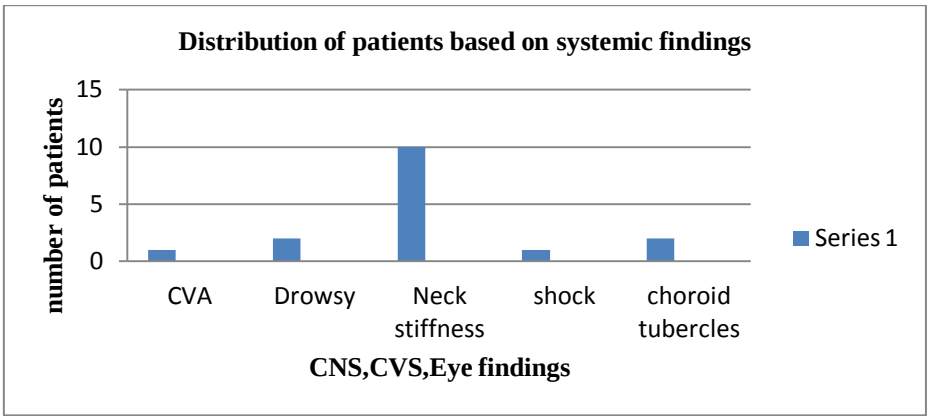
Parameters	Present	Absent	Total
Respiratory system finding Rales (14) Rhonchi (8) Rt.pleural effusion (4) Lt.pleural effusion (1)	27 (90.00%)	3(10.0%)	30
Abdomen findings Ascites (1) Hepatomegaly (7) Hepatosplenomegaly (5) Splenomegaly (2)	15 (50.0%)	15(50.0%)	30
CNS finding CVA (1) Drowsy (2) Neck stiffness (10)	13 (43.34%)	17 (56.66%)	30
CVS finding (shock)	01 (3.3%)	29 (96.7%)	30
Eye finding (choroid tubercles)	02 (6.7%)	28 (93.3%)	30

The abnormal respiratory system findings were found in 27(90 %) of patients and among them, 14 had rales, 8 had rhonchi and 5 had pleural effusion. The abnormal per abdomen findings were found in 15 (50.0%) of patients and among them, 7 had hepatomegaly, 5 had hepatosplenomegaly, 2 had splenomegaly and 1 had ascites.

The abnormal CNS findings were found in 14 (46.7%) of patients an among them, 11 had neck stiffness, 2 had drowsiness and 1 had CVA. Choroidal tubercles were present in 2 (6.7 %) patients, and 1 (3.3%) of patient had shock.



Graph 8: Distribution of patients based on systemic finding



Graph 9.Distribution of patients based on systemic findings.

Table.no.17: Blood counts and Biochemistry

Parameters	Mean	Standard deviation
Hb	9.12	2.94
TC	8560	4219
N	57.50	20.14
L	33.07	15.90
E	0.80	2.12
M	0.30	1.15
ESR	45.53	30.66
RBS	94.80	73.71
Urea	29.67	22.73
Creatinine	0.99	0.61
Na	67.10	64.23
K	2.08	2.03
Cl	49.90	47.97

Mean Hemoglobin in the study patients is 9.12gm/dl. Most patients were anemic with nomochromic ,normocytic anemia being the common type. Mean Total cell count is 8560. Mean Neutrophils count is 57.50%, Lymphocytes 33%. Mean ESR value is 45.53mm/ hour.

Table.no.18: Liver function test values of patients

Parameters	Mean	Standard deviation
Albumin	1.92	1.20
SGOT	44.50	44.62
SGPT	38.10	46.95
Total bilurubin	0.69	0.65
Direct bilirubin	0.40	0.42
Alkaline phosphate	56.79	70.60

Liver function tests are normal in the study except hypoalbuminemia with mean Albumin level of 1.92gm/dl.

Table.no.19: Distribution of patients based on investigation results

Parameters	Present	Absent	Total
Miliary shadows on CX-Ray	30 (100%)	00	30
AFB positive sputum	02 (13.3%)	15 (86.7%)	17
Xpert MTB/Rif in sputum positive -MTB detected	02 (13.3 %)	00	02

Xpert MTB/Rif in sputum negative-MTB detected	01(6.66 %)	14(93.4 %)	15
Positive Bone marrow biopsy	01	00	01
Positive PPD	03 (16.0%)	18(83.4%)	21
Abnormal USG	07 (53.8%)	13	20
Reactive HIV	11 (36.7%)	19 (63.3%)	30
Positive FNAC	04 (13 %)	0	04
Abnormal CT scan	12	0	12
Military shadows on HRCT	02	0	02
CSF/PF s/o TB	16	0	16

All the 30(100%) patients had military shadows on chest X-ray. Xpert MTB/RIF Assay positive in all sputum positive and 6.6 % of sputum negative patients with, 5 patients having pleural effusion in addition. About 16% the study subjects were positive for PPD test and only 13.3% were positive for AFB. Abnormal USG found in 53.8% . Total 36.7% patients were reactive for HIV. 4 (13%) Patients were subjected to FNAC of Lymph Node and all shown features s/o TB. CT Scan Brain was done in 12 (40%) patients in whom clinically CNS abnormal findings were present. Most common abnormality noted was cerebral edema (40%).

CSF and Pleural fluid analysis done in 16 patients (53%) to establish diagnosis by characteristic fluid findings s/o TB. Only in 2 (6.7%) patients HRCT was done to confirm miliary mottling on chest x-ray. One patient underwent Bone marrow biopsy to evaluate pancytopenia which revealed features s/o TB.

In our study, method of diagnosis by inclusion criteria is ,by Sputum for AFB in 2(6.6%) patients ,Genexpert MTB/Rif in 5(16.67 %), FNAC of enlarged Lymph node in 4(13%) patients , CSF/Pleural fluid/Ascitic fluid in 16(53.3%), Clinical presentation in 8(26.6%) ,and Bone marrow biopsy in 1 (3.3%) patients

Table.no.20: Relation between variables and Outcome (In hospital mortality)

Parameters	**Living(n=24)Mean**	**Dead (n=06)Mean**	**P –value***
Pulse	90.50	92.67	0.74
Systolic BP	103.67	88.67	**0.03**
Diastolic BP	67.58	56.67	**0.04**
Respiratory rate	19.75	23.33	0.29
Hb	9.73	6.68	**0.02**
TC	8991.67	6835	0.27
N	62.21	38.67	**0.00**
L	35.17	24.67	0.15
M	0.29	0.33	0.92
ESR	47.88	36.17	0.40
RBS	99.67	75.33	0.47
Urea	27.42	38.67	0.28
Creatinine	0.97	1.05	0.79
Na	63.54	81.33	0.55
K	1.92	2.70	0.41
Cl	46.67	62.83	0.47
Albumin	2.10	1.21	0.11
SGOT	41.88	55.00	0.52
SGPT	32.79	59.33	0.22
Total bilirubin	0.67	0.73	0.86
Direct bilirubin	0.34	0.63	0.13
Alkaline phosphate	62.96	32.10	0.34

*Student't' test p value < 0.05 - significant

Systolic BP of 88.67 mmHg, Diastolic BP of 56.67 mmHg, respiratory rate of 23.33 and neutrophil count of 38.67 found to be significantly associated with death in miliary TB. Total number of deaths in the study are six(6).

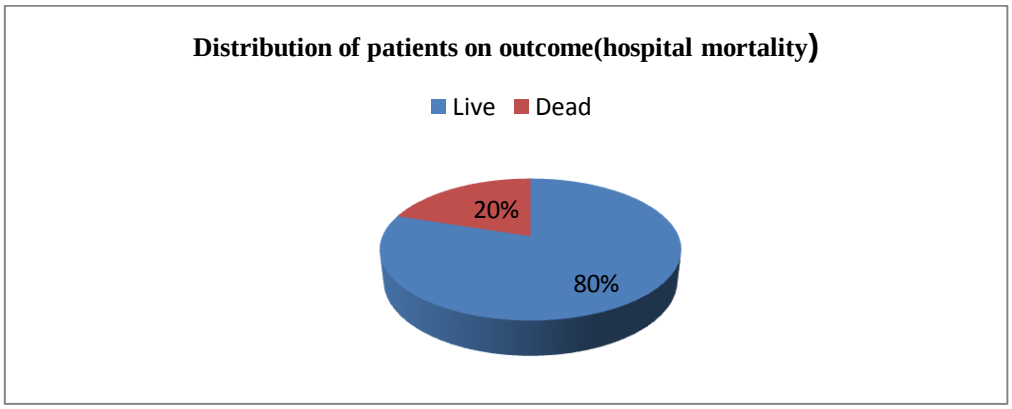
Table.no.21: Relation between variables and Outcome (In hospital mortality)

Parameters	**Living (n=24)**		**Dead (n=06)**		**P – value***
	N	%	N	%	
Fever present	21	87.50	05	83.33	1.00
Chills present	05	20.83	02	33.33	0.60
Weight loss present	20	83.00	00	0.00	**0.00**
Night sweats present	10	41.66	02	33.33	1.00
Weakness present	08	33.33	00	0.00	0.15
Fatigue present	09	37.50	00	0.00	0.14
Cough present	20	83.33	02	33.33	**0.029**
Chest pain	03	12.50	00	0.00	1.00
Dyspnea present	12	50.00	04	66.67	0.65
NRS score >3(nutritional assessment)	04	16.00	05	83.34	**0.01**
Altered sensorium present	02	83.34	04	66.67	**0.00**
Seizures present	01	4.17	01	16.67	0.36
Nausea present	04	16.67	01	16.67	1.00
Abdominal pain present	05	20.83	00	0.00	0.55
Diarrhea present	04	16.67	01	16.67	1.00
Vomiting present	09	37.50	05	83.33	0.07
Diabetes present	02	8.33	01	16.67	0.50
Hypertension present	02	8.33	00	0.00	1.00
Past h/o TB	07	29.16	00	0.00	0.29
Past h/o HIV/AIDS	11	45.83	01	16.67	0.35
Past h/o Connective tissue disorders	01	4.16	00	0.00	1.00
Drug h/o steroids	04	16.67	00	0.00	0.55
Drug h/o ART	04	16.67	01	16.67	1.00
Drug h/o immunosuppressive drugs	01	4.17	00	0.00	1.00
Family h/o TB	03	12.5	01	16.67	1.00
Personal h/o alcohol	13	54.16	00	0.00	**0.02**
Personal h/o smoking	13	54.16	01	16.67	0.17
Personal h/o decreased appetite	23	95.83	02	33.33	**0.00**
Pallor	15	62.50	04	66.67	1.00
Icterus	01	4.17	01	16.67	0.36
Lymphadenopathy	08	33.34	00	0.00	0.15
Cyanosis	00	0.00	02	33.33	**0.03**
Edema	03	12.50	00	0.00	1.00
Koilonychia	01	4.17	00	0.00	1.00
Respiratory system finding	16	66.67	05	83.33	0.63
Organomegaly	11	45.83	03	50.00	1.00
CNS finding	08	33.33	05	83.33	0.06
Choroids tubercles	01	4.16	01	16.67	0.36
Military shadows on CX-R	21	87.50	05	83.33	1.00
XpertMTB/RIFAssay positive in sputum positive	01	4.16	01	16.67	0.35

XpertMTB/RIFAssay positive in sputum negative	02	8.33	01	16.67	0.50
AFB^{+}	02	8.33	00	0.00	1.00
PPD^{+}	03	12.50	00	0.00	1.00
Abnormal USG abdomen	07	29.17	00	0.00	0.29
Reactive (HIV)	11	45.83	01	16.67	0.35
FNAC^{+}	04	16.67	00	0.00	0.55
Abnormal CT	08	33.33	04	66.67	0.18
CSF/PF abnormality	11	45.83	05	83.33	0.17
Miliary shadows on HRCT^{+}	01	4.17	01	16.67	0.36
Abnormal Bone biopsy	01	4.17	0.0	0.0	1.00

*Fischer exact test p value < 0.05 – significant

Presence of h/o weight loss, cough, decreased appetite, past h/o alcohol, clinical findings cyanosis and altered sensorium are significantly associated with death among military TB patients.
Total Number of deaths in the study: 6 (20%). In Hospital mortality is 20%



Graph 10: Distribution of patients based on outcome

IV. Discussion

This study describes the clinical characteristics, radiographic and laboratory features, method of diagnosis and factors associated with in hospital mortality of 30 Miliary TB patients. Mean age of study patients is 41.3yrs and range (15-70yrs) with highest number of patients 10(33.35%) in the age group (15-30)yrs. Our study showed adult predominance in agreement with study by Sharma et al[16]. The study patients include Males (66.66%) and Females (33.34%). Males seem to be more frequently affected by Miliary TB. Similarly, 119 of the 164 patients (73%) reported by Wang et al[17] were men. Only13% of elderly patients affected by this TB, against 24% reported in study by Hussain SF et al [18].

Most of the patients,96.6% presented with typical symptoms of fever (86.6%) and majority of patients presented with cough (73.4%),weight loss (66.6%), dyspnea (53.3%) and vomiting (46.7%). The least common presentations are abdominal pain (16.7%), chest pain (10%), and seizures (6.7%). Most common symptoms are fever (86.6%) Anorexia(83.4%), cough (73.4%), weight loss (66.7%), dyspnea (53.3%) and vomiting (46.7%). 3.3% of patients presented with atypical, predominant symptoms of weight loss, without fever, lymphadenopathy ,Nobody had presented with h/o hemoptysis or urinary symptoms. These findings are similar to published series in studies by Sharma et al [16] and Kim et al [19].

Mean duration of commonest symptom in our study is 10 weeks with range (6 days – 24weeks). This is in contrast to mean duration of symptoms in Munt[20] study 15.7 weeks and while that of Biehl was 7.5 weeks[21].Predisposing conditions [reference table 1] existed in 15(50%). Sharma et al [16] reported predisposing conditions in 34% and Hussain SF et al[18] reported associated conditions in 47% of patients. The highest number of predisposing conditions in our study can be attributed to HIV cases 12 (40.0%). Swaminathan et al [22] reported an incidence of 6% of Miliary TB in HIV patients against S.K Sharma, Alladi Mohan and Tamilarasu Kadhiravan [6] who reported Miliary TB in immunocompetent individuals is 8% and in HIV/AIDS is 35% , our study agrees with this as most patients in our study presented in late stage with 5 patients already on ART. From our study we can conclude that, inspite of global incidence of TB has been slowly decreasing ,

miliary TB incidence will relatively increase owing to widespread use of immunosuppressive drugs and HIV/AIDS pandemicity.

Only 6.67% of patients had h/o Hypertension, 10 % had h/o Diabetes whereas 23.3% of patients had h/o TB. No patient had h/o CRF and malignancy. Considering drug history, 16.6%, 13.3% & 3.3% had h/o ART, steroids and immunosuppressive drugs consumption respectively. Only 13.3% of patients had family h/o TB. About 46.3% of patients are smokers, 43.34% are alcoholics.

The mean BP of patients are 100/65 mmHg and mean pulse is 90.93. Most patients respiratory rate of 20. Majority of patients had pallor (63.3%) and 26.7% had lymphadenopathy whereas only 6.7% had icterus and cyanosis but only 3.3% had koilonychia. The abnormal respiratory system findings were found in 21 (70%) of patients and among them, 14 had rales, 8 had rhonchi and 5 had pleural effusion. The abnormal findings were found in 15 (50%) of patients and among them, 7 had hepatomegaly, 5 had hepatosplenomegaly, 2 had splenomegaly and 1 had ascites.

The abnormal CNS findings were found in 13 (43.3%) of patients and among them, 10 had neck stiffness, 1 had CVA and 2 had drowsiness. Only 3.3% of patients had shock and 6,67% had choroids tubercles. Lymphadenopathy reported in Sharma et al[16] is 26% and Kim et al [19] 16% against 26.7% in our study. Hepatomegaly, splenomegaly and Neck stiffness reported in studies [16,19] were 70%,31%,10% and 16%,13%,3% respectively against 43%, 6.6%, 33.4% in our study . Increase number of patients with neck stiffness can be explained by the more number of patients presented with TB meningitis with Miliary TB in our study.

The common hemotological abnormalities noted in our study are anemia and raised ESR. Hyponatremia and Hypoalbunemia are common biochemical abnormalities noted, similar to studies by Sharma et al[3]. All the 30(100%) patients had miliary shadows on chest X ray with 5 patients having pleural effusion in addition. Abnormal USG found in 53.8%

About 16% the study subjects were positive for PPD test against 21% in Kim et al [19]. Only 13.3% were positive for AFB against 36% reported by Kim et al [19] .Gene xpert MTB was detected in all sputum positive (13.3%) patients and 1(3.3% %) patients of sputum negative. The reason could be due to more number of HIV/AIDS patients with profound immune deficiency.

CT Scan Brain was done in 12 (40%) patients in whom clinically CNS abnormal findings were present. Most common abnormality noted was cerebral edema (40%).CSF and Pleural fluid analysis done in 16 patients (53.3%) to establish diagnosis by characteristic fluid findings s/o TB. Only in 2 (6.7%) patients HRCT was done to confirm miliary mottling. Bone marrow biopsy to evaluate pancytopenia which revealed features s/o TB.

Total 4 patients were subjected to FNAC of Lymph Node and all shown features s/o TB.

Lau et al reported their experience with 108 patients whose FNAC samples showed granulomatous inflammation suggestive of TB.They reported the sensitivity and specificity of FNAC in the lymph node TB to be 77 percent and 93% respectively [23].

A study by Maissa ben jemaa et analyzed 22 patients with Mliry TB median age was of 41 years comparable to present study 41.3 years, Six patients (27.3%) had extra-pulmonary locations with lymph nodes (n = 1), meninges (n = 2), bones and joints (n = 1), abdominal cavity (n = 1), and pleura (n = 1),present study had extrapulmonary location with lymph node(n=4), abnormal CT with neck stiffness(n=11) ,abdominal utrasound abnormality in (n=7),pleural effusion (n=5),and 6 patients died compare to 1 patient (4.5%) died within 8 months after (IQR = [6–15 months]) in Maiss ben jemaa et al [29]. A study by swaminathan et al of 498 patients with miliary TB and HIV, 31(6.2%) patients met the criteria for miliary TB, compared to 11(36.7%) in present study[22].

A study by Mert,Ali MD et al, mean age 44 years,(17%) patients died, most common symptom fever(100%), fatigue(91%), anorexia (85%), and weight loss (66%),lymphadenopathies (21.3%), hepatomegaly (20%), and splenomegaly (19%), choroid tubercles (12%),and Meningitis(17%)[30], similar to our study with fever, weight loss, hepatomegaly, differ in choroid tubercle, splenomegaly, meningitis.

Study by ''Ali Mert'' predisposing conditions were present in 24%,they were fever, weakness, night sweats, anorexia/weight loss (100% for each), hepatomegaly (37%), splenomegaly (32%), choroidal tubercles (13%), neck stiffness (11%), altered mental status (8%), anaemia (76%), leukopenia (26%), thrombocytopenia (16%), lymphopenia (76%), pancytopenia (8%) and hypertransaminasemia (55%). Miliary infiltrates were found on chest X- rays of 32 of 38 cases (84%) compare to 100% in present study ,In six case s without miliary infiltrates, the diagnosis was made by laparotomy in four cases, compare to and autopsy in two cases. Tuberculin skin test was positive in 32% of cases. Acid- fast bacilli were demonstrated in 37% (16/43), and cultures for M. tuberculosis were positive in 90% (9/10) of tested specimens (predominantly sputum and bronchial lavage). Granulomas were found in 85% (11/13) of lung, 100% (15/15) of liver, and 56% (9/16) of bone marrow tissue specimens. Acid- fast bacilli staining was negative in all (0/21), while PCR was positive in 47% (7/15) of specimens with granulomata. Mortality was 18%. altered mental status (P = 0.002) and failure to

treat for TB (P = 0.00001) as independent predictors of mortality[31], similar to present study.

A study by Praveen kumar ,Niranjan et al, in clinical profile of tuberculosis in HIV/AIDS, observed miliary pattern and intra-thoracic lymphadenopathy were observed in seven (16.8%) patients each. Chest radiographs also revealed pleural effusion in three (7.3%) patients and bilateral hydro-pneumothorax in one (2.4%) patient, in present study of miliary tuberculosis patients HIV was reactive in 36.6%, lymphadenopahty in 26.6%[32].

A study by Husaam alsoub et al of total 32 miliary tb patients, mean age of 33.3 years (range 16-80) ,contrast to 41.3(15-70) years in present study, most of them young males like present study (66.6%) ,Clinical Features, Fever (90%), cough(53%), night sweats (50%), and weight loss (47%) were the most frequent symptoms almost similar to present study, mean duration of symptoms at presentation was 10.5 weeks (range 1-104 weeks) similar to present study 10.0 weeks, The most frequent physical signs recorded on admission included, fever (88%), rales (28%), lymphadenopathy (22%), and altered mental status (15.6%) almost similar to present study except altered sensorium was present in 6.6% in present study. 4 had a predisposing condition for TB, 3 had diabetes mellitus, and the fourth was a renal transplant patient on immunosuppressive treatment contrast to HIV was major predisposing condition in present study. Laboratory and Radiologic data Anemia was seen in 39% and leukocytosis in 27.5% of patients, but none had leukopenia similar to present study except anemia was present in majoriity of the patients(66.6%).Tuberculin skin test (PPD) was positive in 15 of 31 recorded cases (48.5%) contrast to 16% in present study. None of these had HIV ELISA test positive contrast to this study had 40%.Diagnostic Investigations In sputum examination which was done in 31 patients, acid-fast bacilli (AFB) smear was positive in only 2 patients, similar to present study, however, culture for M. tuberculosis was positive in 17 patients (54.8%),not performed in present study due to limited resources. Bronchial wash for AFB smear was negative in all 9 patients in whom the test was done, and culture was positive in 3 of the 9 patients (33%).Lymphnode FNAC showed granulomas in 22% patients, contrast to 16% in present study[32].

Method of diagnosis

Diagnosis was established in our study by Miliary pattern on chest X-ray and one or more, 1. Sputum smear positive for AFB.2. Xpert MTB/RIF Assay positive for mycobacterium tuberculosis 3.Histo pathological evidence of TB on FNAC of enlarged Lymph node or Bone marrow biopsy and or CSF/Pleural fluid /Ascitic fluid findings characteristics of TB. 4.Clinical presentation consistent with diagnosis of TB, such as Pyrexia with evening rise of temperature, weight loss, anorexia, tachycardia, night sweats greater than 6 weeks duration responding to Anti TB treatment.

In our study, method of diagnosis by above criteria is ,by Sputum for AFB in 2(6.6%) patients , FNAC of enlarged Lymph node in 4(13%) patients , CSF/Pleural fluid/Ascitic fluid in 16(53.3%), Clinical presentation in 8(26.6%) and Bone marrow biopsy in 1(3.3%) ,in 3 (10%) Xpert MTB/RIF Assay. The above diagnostic criteria is also suggested by Sharma et all [3]also. Thus miliary pattern on chest x-ray is helpful in suspecting diagnosis of MTB.

Mortality

Total number of deaths in the hospital, in study are 6 (20%). Thus in hospital Mortality is 20%, with one (3.3%) patient was HIV reactive and 2(6.6%) were elderly among 6 patients who died. This is comparable to that (10-38%) in previous studies [16, 18] Factors associated with mortality [Reference table 9]

Several studies in past have attempted to identify factors associated with mortality for predicting outcome in patients with Miliary TB[16,17,18,19]. In our study, to know the factors associated with mortality, we have analysed the data statistically using student 't' test and Fischer exact test and P values< 0.05 were considered significant. The following were the factors associated significantly with mortality in our study, which are comparable to previous studies[16,17,18,19]. Analysis for the nutritional factors revealed that severe lymphocytopenia, hypocholesterolemia and high nutritional risk score, poor nutritional status(low BMI) were significant risk factors for in hospital mortality comparable to previous study by D.K.kim, and H.J.kim study.

Anorexia ($p<0.01$), Hypotension ($p<0.03$), cough ($p<0.03$) Cyanosis ($p<0.03$) and altered sensorium P(<0.04) , Anemia ($p<0.02$), severe lymphocytopenia, hypolabuminemia ,hypocholesterolemia ,Low BMI,(high nutritional risk score) ($p<0.01$) were the factors associated with significantly in hospital mortality

Follow up:

Most of the patient loss to follow up ,out come was favourable in 21 in them 11 patients declared cured at the end of ATT were followed up for 2 years post treatment. Six patients died due to a variety of reasons including diarrhea, wasting, neurological complications and/or non-tuberculosis pulmonary infections, similar to study by Swminathan et al[22]. Among them 2 patient developed recurrence of TB at different time points during follow-up: 1 between six and 12 months and 1 between 12 and 24 months of completion of ATT. Of

these 2 recurrences, 1 died subsequently during re-treatment who was diagnosed as MDRTB subsequently started on MDR regimen.1 patient developed elevated liver enzymes and hyperbilirubinemia due to ATT induced toxicity. The median survival time after diagnosis was 17 months, similar to previous study by swaminathan et al[22]. Limitations and future directions ,missing and incomplete records were the major limitations of our study .

Miliary tuberculosis remains a serious form of tuberculosis which may compromise the quality of life. Miliary tuberculosis was mainly seen in young non vaccinated children but currently, except among HIV-infected persons, it is more common among older persons who experience more an endogenous reactivation. These findings emphasize the high efficacy of BCG vaccination in developing countries to prevent miliary tuberculosis.[29] Present study had 40% HIV/AIDS as predisposing condition could lead to endogenous activation secondary to reactivation of old tubercular focus and hematogenous spread as miliary tuberculosis similar to study by Erica esteve and August supervia[42]. According to study by Ted cohen and Caroline colijn[43],exogenous re-infection is only possible if individual with latent infection(16%) in present study are linked to infectious individuals as contacts of family history(13%) in present study.

Limitations of the Study:
•Small sample size.
•Most patients were lost to follow up.
•Lack of culture for confirming diagnosis.
•Bronchoscopic alveolar lavage(BAL),Liver biopsy not done as a diagnostic approach for MTB.

V. Conclusion

- Young adult Males are more commonly affected.
- Predisposing conditions are present in half of the patients.
- Miliary TB is common in HIV infection.
- Clinical symptoms are constitutional and non specific with fever, weight loss and anorexia being most common.
- Clinical signs are non specific and includes pallor, lymphadenopathy, rales, hepatosplenomegaly, neck stiffness and altered mental status.
- Anemia, raised ESR ,Hypoalbuminemia and Hyponatremia were common lab findings.
- Miliary pattern on chest x-ray is important in suspecting diagnosis.
- High index of clinical suspicion, use of FNAC of enlarged Lymph node , Genexpert MTB(CBNAAT) for sputum negative patients, analysis of CSF/pleural fluid/Ascitic fluid, Bone marrow biopsy yields in diagnosis of miliary TB .
- In hospital Mortality is 20%, with one (3.3%) patient was HIV reactive and 2(6.6%) were elderly among 6 patients who died.
- Anorexia, weight loss, Hypotension, cyanosis and abnormal CNS findings (neck stiffness and altered mental status)

Anemia, Neutropenia, severe lymphocytopenia, hypolabuminemia ,hypocholesterolemia ,Low BMI,(high nutritional risk score) were significant risk factors associated with in hospital mortality.

VI. Summary

- The study includes 30 patients ranging from 15-70 yrs with mean age of 41 yrs , males 21(70%) and females 9(30%). Highest number of patients were in the (15- 30yrs) age group (33%).
- Most of the patients presented with symptom of fever (86.6%) and majority of patients presented with cough (73.4%),weight loss (66.7%), dyspnea (53.3%) and vomiting (46.7%).
- Mean duration of commonest symptom in our study is 10 weeks with range (6 days – 24weeks).
- Predisposing conditions existed in 15(50%).
- Only 10%&6.67% of patients had h/o Diabetes & Hypertension respectively, where as 40.0%& 23.3% of patients had h/o HIV and TB respectively.
- Considering drug history, 16.6%, 13.3% & 3.3% had h/o ART, steroids and immunosuppressive drugs consumption. Only 13.3% of patients had family h/o TB.
- About 46.7% of patients are smokers, 43.34% are alcoholics.
- Majority of patients had pallor (63.3%) and 26.7% had lymphadenopathy.
- The abnormal respiratory system findings were found in 27(90%) of patients and among them, 14 had rales, 8 had rhonchi and 5 had pleural effusion.
- The abnormal per abdomen findings were found in 15 (50.0%) patients and among them, 7 had hepatomegaly, 5 had hepatosplenomegaly, 2 had splenomegaly and 1 had ascites.The abnormal CNS findings were found in 13 (43.3%) patients and among them, 10 had neck stiffness,

1 had CVA and 1had drowsiness.

- Only 3.3%&6.7% of patients had shock and choroids tubercles respectively.
- The common hematological abnormalities noted in our study are anemia and raised ESR. Hyponatremia and Hypoalbuminemia are common biochemical abnormalities noted
- All the 30(100%) patients had military shadows on chest X-ray with 5 patients having pleural effusion in addition.
- About 16% the study subjects were positive for PPD test and only 13.3% were positive for AFB. Abnormal USG found in 53.8%.
- Total 11(36.7%) patients were reactive for HIV.
- Method of diagnosis by inclusion criteria is ,by Sputum for AFB in 2(6.6%) patients , FNAC of enlarged Lymph node in 4(13%) patients , CSF/Pleural fluid/Ascitic fluid in 16(53.3%), Clinical presentation in 8(26.6%),Bone marrow biopsy in 1(3.3%),and XpertMTB/Rif in 3(10%) of patients.
- Total Number of deaths in the study are 6 (20%). In Hospital mortality is 20%.
- Anorexia, weight loss, Hypotension, cyanosis and abnormal CNS findings (neck stiffness and altered mental status) Anemia, Neutropenia, severe lymphocytopenia, hypoalbuminemia, hypocholesterolemia, Low BMI (high nutrition risk score) were significant risk factors associated with in hospital mortality.

References

[1]. D. Behera. Expanding DOTS-New strategies for TB control . Indian J Tuberc 2010; 57: 63-66.
[2]. V K Arora and K.K.Chopra. Extra pulmonary Tuberculosis. Indian J Tuberc 2007; 54: 165-167.
[3]. SK Sharma, Alladi Mohan. Disseminated and Miliary Tuberculosis, in: SK Sharma,A.Mohan Editors, Tuberculosis. New Delhi: Jaypee Brothers medical publishers: 2nd edition 2009 : 34:493-518.
[4]. Maria C, Raviglion, Richards,O;Brien, Tuberculosis in: Fauci, Braunwald. .editors: Harrison's principles of Internal medicine: Mc Graw Hill:17th edition,2008 : 158:1013.
[5]. Stephen N.Baker, Jeffray Glassroth. Miliary Tuberculosis, in: William N. Rom, Stuart M. Garay editors, Tuberculosis. Lippincot Williams and Wilkins publishers: 2nd edition 2004: 27:427-444.
[6]. S.K.Sharma, Alladi Mohan and Tamilarasu Kadhiravan. HIV-TB co-infection: Epidemiology, diagnosis and management . Indian J Med Res 121, April 2005 : 550-567.
[7]. Divinagracia R,Harris HW. Miliary Tuberculosis, in: Schlossberg D, editors, Tuberculosis and Nontuberculosis mycobacterial infection, Philadelphia: W.B.Sounders company: 1999: 26: 271-284
[8]. Rajendra Prasad. Pulmonary Tuberculosis Pulmonology, in: Siddharth N. Shah, M.Paul Anand editors, API Text book of Medicine. Association of Physicians of India publishers: 8th edition 2008: 9:378-383.
[9]. VK Arora . Miliary Tuberculosis, in: VK Arora and Raksha Arora , editors, Manual on Tuberculosis, HIV and Lung Diseases: A Practical Approach. Jaypee Brothers Medical Publishers: 13:197-206.
[10]. S Datta Gupta, Rkuma Ray, SS Gill. Pathology. in: SK Sharma,A.Mohan Editors, Tuberculosis. New Delhi: Jaypee Brothers medical publishers: 2nd edition 2009 : 5: 66-101.
[11]. Aravind Kumar. Lymph Node Tuberculosis. in: SK Sharma, A.Mohan Editors, Tuberculosis. New Delhi: Jaypee Brothers medical publishers: 2nd edition 2009: 26:397-409.
[12]. VK Chadha, VK Challu. The Tuberculin Skin Test. in: SK Sharma,A.Mohan Editors, Tuberculosis. New Delhi : Jaypee Brothers medical publishers: 2nd edition 2009 :11:173-185.
[13]. Madhukar Pai, Rajnish Joshi, Shriprakash Kalantri.Dianosis of Latent Tuberculosis infection: Recent Advances and Future directions. In: SK Sharma, A.Mohan, Editors, Tuberculosis. New Delhi: Jaypee Brothers Medical Publishers: 2nd edition 2009: 12:186-199.
[14]. Norman Horne, Disseminated Tuberculosis, Tuberculosis and other mycobacterial diseases, in: Gordon Cook editors, Manson's Tropical diseases: 20th edition: 57: 981-983.
[15]. Larry I.Lutwick. Miliary Tuberculosis,in: Larry I Lutwick editor ,Tuberculosis: 1995: 4:71-74.
[16]. Sharma SK, Mohan A, Pande JN, Prasad KL, Gupta AK, Khilnani GC. Clinical profile, laboratory characteristics and outcome in miliary tuberculosis. Q J Med 1995; 88:29-37.
[17]. Wang JY, Hsueh PR, Wang SK, Jan IS, Lee LN, Liaw YS, et al. Disseminated tuberculosis: a 10 year experience in a medical center. Medicine [Baltimore] 2007;86:39-46.
[18]. Hussain SF, Irfan M, Abbasi M, Anwer SS, Davidson S, Haqqee R, et al . Clinical characteristics of 110 miliary tuberculosis patients from a low HIV prevalence country. Int J Tuberc Lung Dis 2004;8:493-9
[19]. Kim, JH, Langston, AA, Gallis, HA. Miliary tuberculosis: epidemiology, clinical manifestations, diagnosis,and outcome [see comments]. Rev Infect Dis 1990; 12:583.
[20]. Munt, PW. Miliary tuberculosis in the chemotherapy era: with a clinical review in 69 American adults. Medicine (Baltimore) 1972; 51:139.
[21]. BIEHL, JP. Miliary tuberculosis; a review of sixty-eight adult patients admitted to a municipal general hospital. Am Rev Tuberc 1958; 77:605.
[22]. Swaminathan S, Padmapriyadarsini C, Ponnuraja C, Sumathi CH, Rajasekaran S, Ameranandam VA, et al. Miliary tuberculosis in human immunodeficiency virus infected patients not on antiretroviral therapy: Clinical profile and response to short course chemotherapy. J Postgrad Med 2007; 53:28-31.
[23]. Lau SK, Wei WI, Hsu C, Engzell UC. Efficacy of fine needle aspiration cytology in the diagnosis of tuberculous cervical lymphadenopathy. J Laryngo Otol 1990; 104:24-7.
[24]. Matsushima T. Miliary tuberculosis or disseminated tuberculosis. Int Med. 2005;44:687.
[25]. Revised national tuberculosis programme, Technical operational guidelines, 2016.
[26]. https://www.cdc.gov/tb/publications/factsheets/pdf/xpertmtb-rifassayfactsheet_final.pdf
[27]. Tuberculosis Clinical diagnosis and management of tuberculosis, and measures for its prevention and control, incorporating PH37 Tuberculosis -Hard to reach Groups NICE NGxxxx Methods, evidence and recommendations Issue date: xxxx 2015
[28]. World Health Organization. Global Tuberculosis Report 2018, Geneva: ,RNTCP 2016 ,TOG
[29]. Maissa Ben Jemaa,MD,Makram koubaa,Mdouda ben ayed,MD,,HOpen Forum Infectious Diseases, Volume 5, Issue suppl_1,

November 2018, Pages S275–S276, https://doi.org/10.1093/ofid/ofy210.775,Published: 26 November 2018.
[30]. Mert, Ali MDa; Arslan, Ferhat MDb,*; Kuyucu, Tülin MDc; Koç, Emine Nur MDc; Yilmaz, Mesut MDd; Turan, Demet MDe; Altin, Sedat Mde, doi: 10.1097/MD.0000000000005875.
[31]. 31. Miliary tuberculosis: Clinical manifestations, diagnosis and outcome in 38 adults Ali Mert Muammer Bilir Fehmi Tabak Resat Ozaras Recep Ozturk Hakan Senturk Hilal Aki Nur Seyhan Tuncer Karayel Yildirim Aktuglu published: 23 December 2001 https://doi.org/10.1046/j.1440-1843. 2001. 00328.x
[32]. Praveen Kumar, Niraj Sharma, N.C. Sharma1 and Sudhakar Patnaik Rajan Babu T.B. Hospital and Infectious Diseases Hospital1, G.T.B. Nagar, Delhi. [Indian J Chest Dis Allied Sci 2002; 44 : 159-163]
[33]. MILIARY tuberculosis in Qatar. A review of 32adult cases by Hussam Alsoub MD, Annals of Saudi Medicine, Vol 21,Nos1-2 July4, 2000.
[34]. WHO Expert Consultation, Appropriate body-mass indexfor Asian populations and its implications for policy and intervention strategies. Lancet 2004; 363: 157–163.
[35]. Obesity: preventing and managing the global epidemic.Report of a WHO Consultation. WHO Technical Report Series 894. Geneva, World Health Organization, 2000.
[36]. Goldwasser P, Feldman J. Association of serum albuminand mortality risk. J Clin Epidemiol 1997; 50: 693–703.
[37]. Omran ML, Morley JE. Assessment of protein energymalnutrition in older persons, Part II: Laboratory evaluation. Nutrition 2
[38]. Bagby GC Jr. Leukopenia and leukocytosis. In: Goldman L,Ausiello D, eds. Cecil Textbook of Medicine. 22nd Edn. Philadelphia, Saunders, 2004; pp. 979–990.
[39]. Nutritional deficit as a negative prognosticfactor in patients with miliary tuberculosis D.K. Kim*, H.J. Kim#, S-Y. Kwon", H-I. Yoon", C-T. Lee", Y.W. Kim#, H.S. Chung*,S.K. Han#, Y-S. Shim# and J-H. Lee" Eur Respir J 2008; 32: 1031–1036DOI: 10.1183/09031936.00174907.
[40]. Multi-Drug-Resistant Tuberculosis Cases in Arkansas in 2017: A Tale of Two Threats Emily Weldon, BS; Naveen Patil, MD MHSA MA; Jan Voyles, BS; Sandra Chai,MD; Marsha Majors, BSN, RN and Leonard Mukasa, MBChB PhD1; 1ArkansasDepartment of Health, Little Rock, Arkansas
[41]. Prevalence, Clinical Profile, and Treatment Outcomes of Adult Patients Diagnosed with Disseminated Tuberculosis seen at University of the Philippines Manila-Philippine General Hospital Tuberculosis Directly Observed Treatment Short Course (TB-DOTS) Clinic.
[42]. Miliary Tuberculosis Coinfection with Human Immunodeficiency Virus,Erika Esteve, MD,* August Supervía, MD, PhD,† Oriol Pallàs, MD,† María T. Martínez, MD,† María M. Montero, MD,* and Francisco del Baño, MD†, West J Emerg Med. 2010 Dec; 11(5):
[43]. Exogenous re-infection and the dynamics of tuberculosis epidemics: local effects in a network model of transmissionTed Cohen,1,2,*† Caroline Colijn,2,† Bryson Finklea,2,† and Megan Murray1, doi: 10.1098/rsif.2006.0193
[44]. Challenges in the diagnosis & treatment of miliary tuberculosis Surendra K. Sharma, Alladi Mohan* & Abhishek Sharma**Indian J Med Res 135, May 2012, pp 703-730.
[45]. Clinical Profile of Tuberculosis in Patients with HIVInfection/AIDSPraveen Kumar, Niraj Sharma, N.C. Sharma1 and Sudhakar Patnaik Rajan Babu T.B. Hospital and Infectious Diseases Hospital1, G.T.B. Nagar, Delhi
[46]. A Study of Miliary Tuberculosis in the Coastal Andhra PradeshDr Bharavi Chunduri1, Dr Surya Kumari2, Dr Kalyan Kumar PV31Assistant Professor, Department of Respiratory Medicine, Mamatha Medical College, Khammam India2Post Graduate, Department of Respiratory Medicine, Katuri Medical College, Guntur India. Sch. J. App. Med. Sci., 2017; 5(11C):4528-4533
[47]. CLINICAL PICTURE ,MiliarytuberculosisQJM: An International Journal of Medicine, 2017, 683doi: 10.1093/qjmed/hcx131Advance Access Publication Date: 4 July 2017Clinical picture
[48]. Tuberculosis Guy Thwaites, in Manson's Tropical Infectious Diseases (Twenty-third Edition), 2014
[49]. Miliary Tuberculosis Induced Acute Liver FailureTayfur Toptas,1 Birkan Ilhan,2 Huseyin Bilgin,3 Elif Dincses,21Department of Hematology, Van Training and Research Hospital, 65300 Van, Turkey, Accepted 21 June 2015
[50]. Frequency and predictors of miliary tuberculosis in patients withmiliary pulmonary nodules in South Korea: A retrospective cohortstudy Sang-Man Jin1, Hyun Ju Lee2, Eun-Ah Park2, doi:10.1186/1471-2334-8-160

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