ORIGINAL RESEARCH PAPER
Volume - 15 | Issue - 02 | February - 2026 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

A RISK EVALUATION OF ANAEMIA IN TB PATIENT USING DOTS THERAPY

Pharmaceutical Science

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ABSTRACT

To evaluate the risk of anaemia in Tb patients while using DOTS therapy. An observational Retro study was carried out in in multi-speciality unit where patients were admitted and diagnosed with Tb disease. In this study patients demographical and occupational information, medical examination records which includes laboratory investigation, past medical history, past illness history, medicals records were examined. This systematic data was documented and has been computerized. A total of 200 IP- patients were observed according to their co-morbid condition like diabetics, thyroid, hypertension, and past TB, and social habits like smoking, alcohol, tobacco chewing etc in which anaemia was a major risk factor. As per the result the prevalence of Normochromic Normocytic Anaemia was seen more at the older population among age group of 51-60 years in which men were more prone to Tb than females. This study proved a strong correlation between anaemia and Tb patients. According to the study's findings, the patients who are infected by mycobacterium tuberculosis are at high risk of developing anaemia while using DOTS therapy. It indicates that the prevalence of Normochromic Normocytic anaemia is more prevalent in TB patients. In addition, gender and age have a greater impact in developing anaemia.

KEYWORDS

Tuberculosis, DOTS, Anaemia, Malnutrition, Mycobacterium.

INTRODUCTION

Lungs play a vital role in our respiratory system. There are two lungs present one on each side. Right Lung present on right side have the different lobes such as superior lobe, middle lobe, and inferior lobes. When compare, the right-side lung is broad than the left side lung, whereas the left side lung has two lobes such as superior lobe and inferior lobes and they are shorter in size due to Prescence of heart.

Mycobacteria:

These are the slender bacilli which shows subsection filamentous forms which are similar to Fungal mycelium. Mycobacteria organism is mostly aerobic, immotile, encapsulated and non- sporing. These mycobacteria get differentiated and tuberculosis remains the major type. They consist of cell wall which have several lipids complex called as Mycolic acid because presence of long chain fatty acids. they are mainly non-obligatory intracellular pathogen which infect mainly mononuclear phagocytes [e.g., macrophages]. The most common mycobacterium infect human is “Tuberculosis”.

Mycobacterium Tuberculosis:

Mycobacterium tuberculosis is a thin curved bacillus with rounded terminal ends in shape which are mainly in pairs or singly or are in small groups. The transmission of Tuberculosis occurs when a normal human inhale these airborne particles which then carry from the mouth to nasal cavity and then to the upper respiratory tract to bronchi and alveoli which finally reaches to lungs. [1-2]

Types Of Tuberculosis:

There are two types of tuberculosis such as 1. Pulmonary tuberculosis 2. Extrapulmonary tuberculosis.

1. Pulmonary tuberculosis: It is a most significant infection which is caused by bacterium mycobacterium tuberculosis [MTB] which affect the lungs and can expose to different organs [11-14].

2. Extrapulmonary tuberculosis:
It is a serious transmissible disease caused by MTB that takes place in different organ system except lungs. This extrapulmonary tuberculosis is also called as generalized hematogenous.[3]

Etiology:

Tuberculosis is trigged by bacteria called as Mycobacterium tuberculosis, which is slightly built bacillus which has a smooth outer layer which is of 1 to 4micron in length when seen under the microscope. Out of all mycobacteria, M. tuberculosis is only a human pathogen. This tuberculosis infection normally arises when a patient inhale airborne molecule that contain mycobacterium tuberculosis. These molecules mainly called as droplet nuclei. Mostly this infection causes cold or flu-like symptoms. When a patients experience coughs, sneezes, speak, laughs, the bacteria transfer a tiny empirical that consist of germs molecules, that leads to development of active pulmonary tuberculosis. [4]

Epidemiology:

Tuberculosis was the global revival disease in the last decade of 20th century. The World Health Organization [WHO] inaugurated that there were 7.96 million cases of tuberculosis since 1997 in the overall world in which half of the population were highly infectious. The tuberculosis is the fifth main reason of death with a single infectious agent named as Mycobacterium tuberculosis. Globally 95% or more cases of tuberculosis arise in Asian country, Africa, and Latin America.

Clinical Presentation

When mycobacteria tuberculosis bacteria enter in lungs they live and multiply which leads to development of tuberculosis infection. Depending upon the stages of infection signs and symptoms are differentiated [5-7].

Clinical Presentation In Pulmonary Tuberculosis:

1.**Primary TB infection:** They do not possess any signs and symptoms. Some patients with primary tuberculosis have flu-like symptoms such as i). low fever ii). tiredness iii). cough.

2.**Active TB infection:** This infection takes places when immune system fails to fights against bacteria. It occurs after primary infection. The Symptoms develops after few weeks and get worsen which includes i. dry cough ii. cough with expectorants or with sputum or blood iii. chest pain [both side or only at one side] iv. SOB grade [I, II, III, IV] v. high fever vi. chills vii. loss of weight viii. loss of appetite ix. fatigue x. pain while coughing or breathing xi. orthopnoea xii. night sweats.

Diagnosis Investigation:

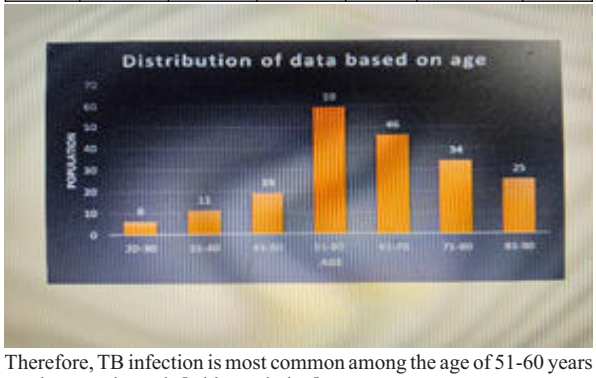
Bacteriological laboratory diagnosis can be confirmed by three steps A. Collection of samples or specimens B. Microscopical and Cultural examination. A. Collection of sample or specimens – These are the main step for diagnosis of tuberculosis. The specimens or samples are collected based on infection site. For pulmonary tuberculosis specimens are collected from lungs and for extrapulmonary tuberculosis specimens are collected from the sites other than lungs[8-9].

Pulmonary tuberculosis:

The most common sample or specimen involved is sputum. These sputa are collected in clear mouthed wider container. In some patients where sputum is absent laryngeal swab or bronchial washing are used. Where as in children sputum trend to be swallowed so gastric washing can be used for examination[10].

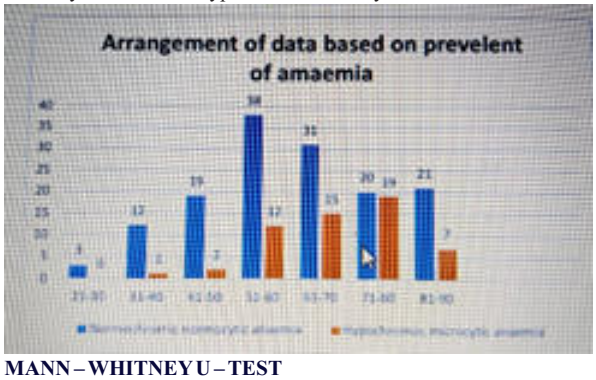
RESULTS

20-30	31-40	41-50	51-60	61-70	71-80	81-90
6	11	19	59	46	34	25



Therefore, TB infection is most common among the age of 51-60 years aged grouped people [old population]

Arrangement of data based on prevalence of normochromic normocytic anaemia & hypochromic microcytic anaemia



MANN – WHITNEY U – TEST

Age	Normochromic normocytic anaemia	Hypochromoc microcytic anaemia
21-30	3	0
31-40	12	1
41-50	19	2
51-60	38	12
61-70	31	15
71-80	20	19
81-90	21	7

Systemically Given Ranks

RANK 1	RANK 2
4	1
6.5	2
9.5	3
14	6.5
13	8
11	9.5
12	5
70	**35**

H0 = Prevalence of normochromic normocytic anaemia = prevalence of hypochromic microcytic anaemia.

H1 = Prevalence of normochromic normocytic anaemia ≠ prevalence of hypochromic microcytic anaemia.

U1= n1.n2 + n1[n1+1] - R1 2

U2= n1.n2 + n1[n2+1] - R2 2

R1= Sum of the rank for normochromic normocytic anaemia.

R2= sum of the rank for hypochromic microcytic anaemia.

n1=number of observed normochromic normocytic anaemia.

n2= number of observed on hypochromic microcytic anaemia.

U1= n1.n2 + n1[n1+1] - R1 2

U1= 7.7 + 7(7+1/2) -70

49 + 7(8/2) - 70

49 + 56 / 2 -70

= 77- 70

U1= 7

U2= n1.n2 + n1[n2+1] - R2 2

U2 = 7.7 + 7 (8/2) - 35

49 + 56 / 2 – 35

49 + 28 – 35

77 – 35

U2 = 42

Therefore, U1= 7 & U2 = 42

The lowest value is U1

Ucal = 7

Critical value = 11

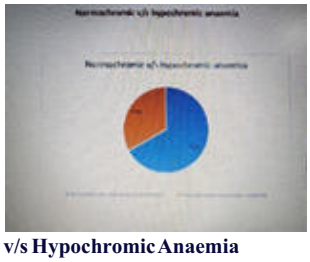
The u calculate value is less than the critical value

Ucal < critical value.

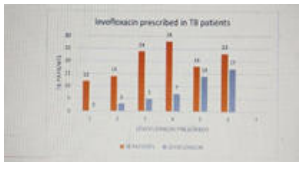
H0 is rejected

Prevalence of normochromic normocytic anaemia ≠ prevalence of hypochromic microcytic anaemia.

As per the result prevalence of Normochromic Normocytic anaemia is more in TB patients.



Normochromic v/s Hypochromic Anaemia



Arrangement Of Data Correspondent Levofloxacin Prescribed

Paried T Test

TB Patients	Levofloxacin	X1-X2=d	$(X1-X2)^2 = d^2$
12	0	12	141
14	3	11	121
24	5	19	361
28	7	21	441
18	14	4	16
23	17	4	16
∑X1 = 119	∑X2= 46		

Significant different between TB patients and levofloxacin prescribed

~ Ed \ n = 71 \ n

= 71 \ 6

= 11.8

$Sd^2 = Ed^2 – (Ed)^2/n/n-1$

$= 1099-(94)^2/6/6-1$

= 1099 – 5041/ 6/ 5

=1099 – 840.16/ 5

= 258.84/ 5

$Sd^2 = 51.768$

$\therefore SD^2 = \sqrt{SD^2}$

$= \sqrt{51.768}$

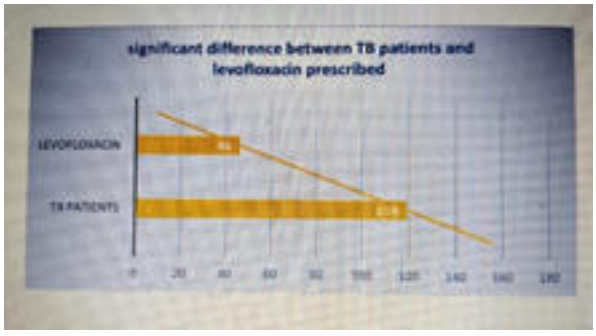
$SD^2 = 7.19$

$\therefore SED = Sd \setminus \sqrt{n}$

$= 7.19 \setminus \sqrt{6}$

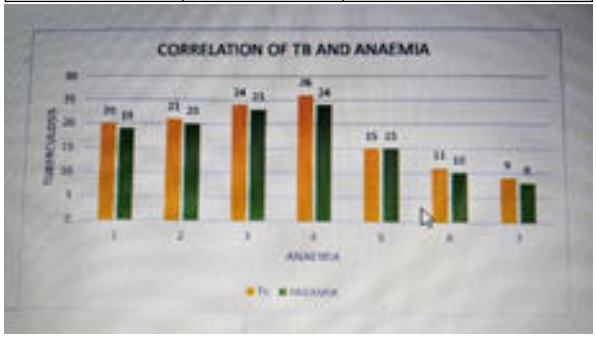
$= 7.19 \backslash 2.45$
$SED = 2.93$
$\therefore t = d \backslash SED$
$= 11.8 \backslash 2.93$
$= 4.02$
$\therefore Tcal = 4.02$ and $Ttab = 2.01$
$\therefore Tcal > T tab$
$\therefore$HYPOTHESIS IS REJECTED
H0 ≠ SIGNIFICANT DIFFERENCE BETWEEN TB PATIENTS AND LEVOFLOXACIN PRESCRIBED

There Is A Significant Difference Between TB Patients And LEVOFLOXACIN Prescribed For Patients



DISTRIBUTION OF DATA BASED ON CORRELATION

AGE	ANAEMIA	TB
20-30	19	20
31-40	20	21
41-50	22	24
51-60	23	26
61-70	15	15
71-80	10	11
81-90	8	9



Arranging The Data Depending Upon Ranks

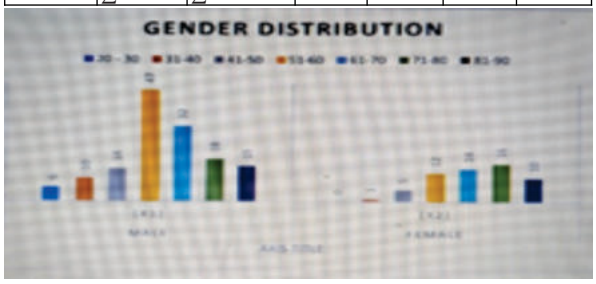
Anaemia	TB	Rank 1	Rank 2	d	d^2
19	20	7	8.5	1.5	2.25
20	21	8.5	10	1.5	2.25
23	24	11	12.5	1.5	2.25
24	26	12.5	14	1.5	2.25
15	15	5.5	5.5	0	0
10	11	3	4	1	1
8	9	1	2	1	1

$Ed^2 = 11$
$R = 1 - 6\,Ed^2 / 7(7^2 - 1)$
$R = 1 - 6 \times 11 / 7(49 - 1)$
$R = 1 - 66 / 7(48)$
$R = 1 - 66 / 336$
$R = 1 - 0.19628$
$R = 0.80372.$

THERE IS A STRONG CORRELATION BETWEEN TB AND ANEAMIA PATIENTS.

Unpaired T- TEST On Gender Distribution In Patients

Age	Male[x_1]	Female [x_2]	(x1-x1)	$(x1-x1)^2$	(x2-x2)	$(x2-x2)^2$
20-30	6	0	-15	225	-7.5	56.25
31-40	10	1	-11	121	-6.5	42.25
41-50	14	5	-7	49	-2.5	6.25
51-60	47	12	26	476	4.5	20.25
61-70	32	14	11	121	7.5	42.25
71-80	18	16	-3	9	8.5	72.25
81-90	15	10	-6	36	2.5	6.25
	$\sum x1=142$	$\sum x2=58$				



DISCUSSION

In this study we found that anaemia has been identified as a major risk factor for the determination of tuberculosis. As tuberculosis is mainly caused by bacteria called as mycobacteria tuberculosis[11-13].

In this study we have observed that the most cases of Tuberculosis in which anaemia is a risk factor and are more common in a male. Data of patients having tuberculosis in which anaemia becomes a risk factor were examined and data source were calculated and different graphs were plotted. According to the study the common aged group in which TB infection are common is 51- 60 years which is in older population.Through, Mann – Whitney U Test prevalence of normochromic normocytic anaemia and hypochromic microlytic anaemia is calculated based on total number of patients. It represents that Ucal < critical value [7 < 11] Therefore, Null Hypothesis is Rejected. The result found out that prevalence of Normochromic Normocytic Anaemia is more than Hypochromic Microcytic Anaemia.

By t-test, significant difference between Tb patients and levofloxacin prescribed has been calculated. Therefore, Tcal > Ttab [4.02 > 2.01] hence Null Hypothesis is Rejected. It was concluded that a major difference occurred between Tb patient and levofloxacin prescribed to patients. By distributing the data, the correlation between anaemia and tb patients was found out to be strong. Through, Unpaired – t test number of male and female patients' data was distributed and was calculated. Therefore, Tcal > Ttab [2.270 > 1.782] hence Tcal is greater than the Ttab. Null Hypothesis is Rejected. The results found that men are more prone of tuberculosis.

CONCLUSION

Based on the study's findings, the patients who are infected by mycobacterium tuberculosis are at high risk of developing anaemia while using DOTS therapy. In this study, Anaemia has become a conventional complication in tuberculosis patients, were malnutrition and malabsorption which enhance the risk and severity of anaemia in TB patients. As a result, there was strong correlation between anaemia and tuberculosis patients.

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