



CODEN [USA]: IAJ PBB

ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES<http://doi.org/10.5281/zenodo.3836433>Available online at: <http://www.iajps.com>

Research Article

**CORRELATION BETWEEN SERUM LIPID FRACTIONS AND
RADIOLOGICAL SEVERITY IN PATIENTS WITH
DRUG-RESISTANT PULMONARY TUBERCULOSIS: A
CROSS-SECTIONAL PILOT STUDY**¹Dr.Farzeen Safdar, ²Dr.Irum Tariq, ³Dr.Muhammad Kaleem Abbas Gurmani¹Quaid-e-Azam Medical College Bahawalpur, University of Health Sciences Lahore.

Article Received: March 2020

Accepted: April 2020

Published: May 2020

Abstract:

Objective- The aim of this study is to determine that either body mass index and serum cholesterol that are very significant in maintaining immunity have any impact on serum lipid fraction and radiological severity in patients with TB.

Methodology- This is a cross sectional study which was conducted in Bahawalpur Victoria hospital over the period of two years in patients who was newly diagnosed with drug-resistant tuberculosis. To determine the radiological severity chest X-ray scoring formula was used. Using the coefficient of Pearson's correlation in chest X-ray, BMI and lipid fraction level was determined.

Result-For this study 35 patients were selected. In this study between chest X-ray and BMI ($P = 0.044$, $r = -0.352$), low-density lipoprotein-cholesterol ($P = 0.012$, $r = -0.431$), high-density lipoprotein-cholesterol ($P = 0.005$, $r = -0.479$) and total cholesterol ($P = 0.001$, $r = -0.546$) significant negative relation was found.

Conclusions- An increased radiological severity is associated with the low BMI and low serum cholesterol level that in return can increase the infectivity. This severity can be potentially decreased by using the proper nutrients supplements in diet and by this prevalence of drug resistant tuberculosis and transmission of this can also be decreased.

Keywords: Radiography, infection transmission, drug-resistant tuberculosis, cholesterol

Corresponding author:**Dr. Farzeen Safdar,**

Quaid-e-Azam Medical College Bahawalpur,

University of Health Sciences Lahore.

QR code



Please cite this article in press Farzeen Safdar et al, *Correlation Between Serum Lipid Fractions And Radiological Severity In Patients With Drug-Resistant Pulmonary Tuberculosis: A Cross-Sectional Pilot Study.*, Indo Am. J. P. Sci, 2020; 07(05).

INTRODUCTION:

It was believed that due to improper treatment of drug sensitive TB, drug-resistant TB increases. But some recent studies have shown that 61% of drug resistant TB in previously treated cases and 95% new drug resistant TB are normally due to transmission of person to person. In spreading of TB cell mediated immunity plays a very significant role and in spreading of this infection lymphocytic is also responsible. Because of the rigid ring of cholesterol, it maintains the cell membrane structure. Low cholesterol have destructive effect in the lymphocytes and this is very important in maintaining the immunity. So, body mass index and serum cholesterol that are very significant in maintaining immunity have any impact on serum lipid fraction and radiological severity in patients with TB.

In TB patients one of the main investigations is TB, the severity of the infection can be graded directly by the chest radiography. There is a significant positive correlation in the indiscriminate sputum disposal and chest radiography. TB is very severe disease that can even spread from infected person to healthy person. Malnutrition is also a very come reason behind the infection of tuberculosis, with the help of BMI the status of nutrients can be determined in body and body mass index is also a very important parameter in the assessment of drug resistant tuberculosis.

METHODOLOGY:

This is a cross sectional study which was conducted in Victoria Hospital Bahawalpur over the period of two years in patients who was newly diagnosed with drug-resistant tuberculosis. In this study no specific sample size was taken and no calculation was performed. Likewise, no exclusion criteria were specified, all enrolled patients were selected for this study. First of all, written consent paper was signed by all the patients. All the selected patients had the age greater than 18 years. For this all those patients were selected who had normal chest radiogram. The basic medical history of all the patients was obtained and complete blood analysis was performed and all those were excluded who were on medication (diuretics,

amiodarone, prednisolone, beta-blockers, aspirin, niacin, fibrates, statins), hyperlipidemias, pancreatitis, hypothyroidism, liver disease, kidney disease, hypertension, diabetes mellitus, and any viral infection. To determine the radiological severity chest X-ray scoring formula was used. Using the coefficient of Pearson's correlation in chest X-ray, BMI and lipid fraction level was determined.

Statistical Analysis:

Using the Kolmogorov-Smirnov test was done for the confirmation of data distribution. Using the Pearson's correlation radiological severity and serum lipid fraction was determined with the partial correlation to serum creatinine, total proteins, hemoglobin, BMI and age. All the statistical analysis was performed in SPSS version 11.

RESULTS:

For this study 35 patients were selected. In which 16 were already under treatment for tuberculosis but at the time of enrolment they were not on anti-tuberculosis medication for at least past six months while 17 patients were never diagnosed for tuberculosis before but had the symptoms of cough greater than two months. Out of selected 33 patients, 10 i.e. 30.3% were females and 23 that is 69% were males. Around In this study between chest X-ray and BMI ($P = 0.044$, $r = -0.352$), low-density lipoprotein-cholesterol ($P = 0.012$, $r = -0.431$), high-density lipoprotein-cholesterol ($P = 0.005$, $r = -0.479$) and total cholesterol ($P = 0.001$, $r = -0.546$) significant negative relation was found. Around 39.4% of patients had the age less than 30 years old and 15% had the age greater than 50 years while 45% of patients ere between the age of 30 to 50 years. Baseline characteristics of control group are in table 1. In control mean BMI is 21.04 (± 4.5) kg/m² and in cases 15.06 (± 3.4) kg/m². Based on CXR score mean radiological severity of drug resistant tuberculosis was 51%. The score of CXR in 16 patients was greater than 50%, while in 3 patients the SCR score is less than 25% and 14 had CXR greater than 25% and less than 50%.

Table 1: Baseline laboratory parameters of the drug-resistant tuberculosis patients and controls

Laboratory parameters	Mean \pm SD		P
	Cases (n=33)	Controls (n=66)	
Hemoglobin (g/dL)	10.55 \pm 1.75	12.4 \pm 1.8	<0.0001
Total leukocyte count (10 ⁹ /L)	9.58 \pm 3.44	8.40 \pm 2.45	0.0522
Platelet count (10 ⁹ /L)	3.22 \pm 1.38	3.44 \pm 1.4	0.3786
Urea (mg/dL)	19.33 \pm 9.50	20.04 \pm 4.5	0.6141
Serum creatinine (mg/dL)	0.72 \pm 0.28	0.7 \pm 0.30	0.7500
Total bilirubin (mg/dL)	0.39 \pm 0.23	0.38 \pm 0.30	0.8668
AST (U/L)	24.07 \pm 11.55	28.04 \pm 4.44	0.0156
ALT (U/L)	14.79 \pm 11.20	14.50 \pm 10.86	0.9016
ALP (U/L)	84.97 \pm 36.50	90.04 \pm 24.48	0.4142
Albumin (g/dL)	3.58 \pm 0.55	3.6 \pm 0.44	0.8452

Table 2: Levels of serum lipid fractions in drug-resistant tuberculosis patients and controls

Lipid fraction	Mean \pm SD		P
	Cases (n=33)	Controls (n=66)	
TC (mg/dL)	129.76 \pm 33.695	207.18 \pm 42.567	<0.001
TG (mg/dL)	76.09 \pm 22.774	223.41 \pm 132.914	<0.001
HDL-C (mg/dL)	35.22 \pm 13.474	45.58 \pm 8.302	<0.001
LDL-C (mg/dL)	86.058 \pm 29.9429	125.742 \pm 37.0481	<0.001
VLDL-C (mg/dL)	15.297 \pm 4.5233	43.727 \pm 26.7637	<0.001

Table 3: Levels of serum lipid fractions in drug-resistant tuberculosis patients categorized based on the radiological severity

Lipid fraction	Radiological severity (CXR score %), mean \pm SD			P	Pearson's correlation (r)	P
	<25% (n=3)	25%-50% (n=14)	>50% (n=16)			
TC (mg/dL)	168.67 \pm 13.43	143.86 \pm 31.68	110.13 \pm 25.08	0.001	-0.546	0.001
TG (mg/dL)	87.67 \pm 8.08	74.43 \pm 25.79	75.38 \pm 22.16	0.663	-0.141	0.434
HDL-C (mg/dL)	47.90 \pm 4.00	42.59 \pm 11.81	26.39 \pm 9.91	<0.001	-0.479	0.005
LDL-C (mg/dL)	113.43 \pm 13.23	93.64 \pm 33.56	74.29 \pm 23.71	0.038	-0.431	0.012
VLDL-C (mg/dL)	17.53 \pm 1.62	15.071 \pm 5.10	15.08 \pm 4.43	0.682	-0.143	0.426

DISCUSSION:

In this study by using the chest radiography of a patients of drug resistant tuberculosis the severity of radiological severity can be determined. It was believed that due to improper treatment of drug sensitive TB, drug-resistant TB increases. But some recent studies have shown that 61% of drug resistant

TB in previously treated cases and 95% new drug resistant TB are normally due to transmission of person to person. In spreading of TB cell mediated immunity plays a very significant role and in spreading of this infection lymphocytic is also responsible.

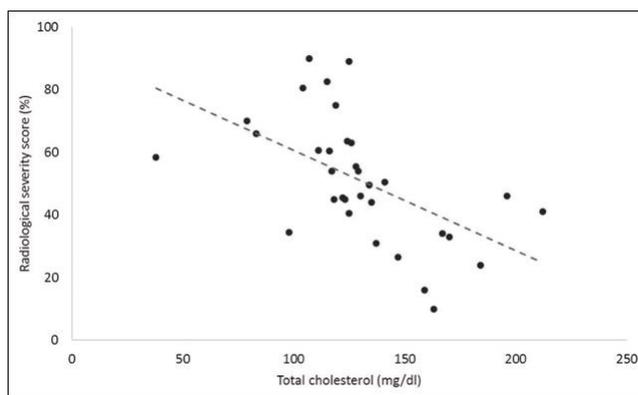


Figure 1: Correlation between total cholesterol levels and the radiological severity of the disease in patients with drug-resistant tuberculosis

Because of the rigid ring of cholesterol, it maintains the cell membrane structure. Low cholesterol has destructive effect in the lymphocytes, and this is very important in maintaining the immunity. So, body mass index and serum cholesterol that are very significant in maintaining immunity have any impact on serum lipid fraction and radiological severity in patients with TB.

To determine the radiological severity chest X-ray scoring formula was used. Using the coefficient of Pearson's correlation in chest X-ray, BMI and lipid fraction level was determined. In TB patients one of the main investigations is TB, the severity of the infection can be graded directly by the chest radiography. There is a significant positive correlation in the indiscriminate sputum disposal and chest radiography. TB is very severe disease that can even spread from infected person to healthy person.

This study has some limitations as in this the sample size was very small and due to inherit it is difficult to differentiate fibrosis from pneumonic as this is drawback of chest radiography severity. In this study it was considered that the overall disease severity is correlated with the CXR score but this scenario is not true in all cases.

CONCLUSION:

An increased radiological severity is associated with the low BMI and low serum cholesterol level that in return can increase the infectivity. This severity can be

potentially decreased by using the proper nutrients supplements in diet and by this prevalence of drug resistant tuberculosis and transmission of this can also be decreased.

REFERENCES:

1. Revised National Tuberculosis Control Programme, Annual Status Report 2017. Central Tuberculosis Division, Government of India; 2017. Available from: <https://www.tbcindia.gov.in/WriteReadData/TB%20India%202017.pdf>. [Last accessed on 2019 Mar 08].
2. Dheda K, Gumbo T, Maartens G, Dooley KE, McNerney R, Murray M, et al. The epidemiology, pathogenesis, transmission, diagnosis, and management of multidrug-resistant, extensively drug-resistant, and incurable tuberculosis. *Lancet Respir Med* 2017. pii: S2213-2600(17) 30079-6.
3. Cooper AM. Cell-mediated immune responses in tuberculosis. *Annu Rev Immunol* 2009;27:393-422.
4. Cooper GM, Hausman RE. *The Cell: A Molecular Approach*. 3rd ed. Washington DC: ASM Press; 2004.
5. Dabrowski MP, Peel WE, Thomson AE. Plasma membrane cholesterol regulates human lymphocyte cytotoxic function. *Eur J Immunol* 1980;10:821-7.

6. Gatfield J, Pieters J. Essential role for cholesterol in entry of mycobacteria into macrophages. *Science* 2000;288:1647-50.
7. Ralph AP, Ardian M, Wiguna A, Maguire GP, Becker NG, Drogumuller G, et al. A simple, valid, numerical score for grading chest x-ray severity in adult smear-positive pulmonary tuberculosis. *Thorax* 2010;65:863-9.
8. Wells WF, Ratcliffe HL, Grumb C. On the mechanics of droplet nuclei infection; quantitative experimental air-borne tuberculosis in rabbits. *Am J Hyg* 1948;47:11-28.
9. Riley RL, Wells WF, Mills CC, Nyka W, Mclean RL. Air hygiene in tuberculosis: Quantitative studies of infectivity and control in a pilot ward. *Am Rev Tuberc* 1957;75:420-31.
10. Sahin F, Yildiz P. Distinctive biochemical changes in pulmonary tuberculosis and pneumonia. *Arch Med Sci* 2013;9:656-61.
11. Deniz O, Gumus S, Yaman H, Ciftci F, Ors F, Cakir E, et al. Serum total cholesterol, HDL-C and LDL-C concentrations significantly correlate with the radiological extent of disease and the degree of smear positivity in patients with pulmonary tuberculosis. *Clin Biochem* 2007;40:162-6.
12. Gostynski M, Gutzwiller F, Kuulasmaa K, Döring A, Ferrario M, Grafnetter D, et al. Analysis of the relationship between total cholesterol, age, body mass index among males and females in the WHO MONICA project. *Int J Obes Relat Metab Disord* 2004;28:1082-90.
13. Boelaert JR, Gordeuk VR. Protein energy malnutrition and risk of tuberculosis infection. *Lancet* 2002;360:1102.
14. Bailey KV, Ferro-Luzzi A. Use of body mass index of adults in assessing individual and community nutritional status. *Bull World Health Organ* 1995;73:673-80.
15. Wáng YXJ, Chung MJ, Skrahin A, Rosenthal A, Gabrielian A, Tartakovsky M. Radiological signs associated with pulmonary multi-drug resistant tuberculosis: An analysis of published evidences. *Quant Imaging Med Surg* 2018;8:161-73.
16. Guidelines on Programmatic Management of Drug Resistant TB (PMDT) in India 2012. Central Tuberculosis Division, Government of India; 2012. Available from: <https://www.tbcindia.gov.in/WriteReadData/1892s/8320929355Guidelines%20for%20PMDT%20in%20India%20-%20May%202012.pdf>. [Last accessed on 2019 Mar 08].
17. Pérez-Guzmán C, Vargas MH, Salas-Mártir C, Trejo-Santacruz T, Gallegos-Discua C, Flores-López F. Lipid profile in household contacts of patients with pulmonary tuberculosis. *Rev Med Inst Mex Seguro Soc* 2008;46:247-52.
18. Olsson AG, Angelin B, Assmann G, Binder CJ, Björkhem I, Cedazo-Minguez A, et al. Can LDL cholesterol be too low? Possible risks of extremely low levels. *J Intern Med* 2017;281:534-53.
19. Roy K, Ghosh M, Pal TK, Chakrabarti S, Roy S. Cholesterol lowering drug may influence cellular immune response by altering MHC II function. *J Lipid Res* 2013;54:3106-15.
20. Sakhno LV, Shevela EY, Tikhonova MA, Nikonov SD, Ostanin AA, Chernykh ER. Impairments of antigen-presenting cells in pulmonary tuberculosis. *J Immunol Res* 2015;2015:793292.