



ISSN: 0976-3376

Available Online at <http://www.journalajst.com>

ASIAN JOURNAL OF
SCIENCE AND TECHNOLOGY

Asian Journal of Science and Technology
Vol. 09, Issue, 02, pp.7468-7471, February, 2018

RESEARCH ARTICLE

PREVALENCE OF PULMONARY TUBERCULOSIS AMONG PTB SUSPECTED PATIENTS VISITING LUMBINI ZONAL HOSPITAL

*Sita Paudel and Mahendra Maharjan

Central Department of Zoology, Tribhuvan University, Kirtipur, Kathmandu, Nepal

ARTICLE INFO

Article History:

Received 18th November, 2017
Received in revised form
26th December, 2017
Accepted 10th January, 2018
Published online 28th February, 2018

Key words:

Pulmonary Tuberculosis,
Sputum, Prevalence.

ABSTRACT

Pulmonary tuberculosis is one of the most common communicable and continue to be a serious infectious disease in the world. Tuberculosis is still a major public health problem in developing countries like Nepal. A total of 400 sputum samples from 200 TB suspected patients were collected and tested using Z-N staining method. The study was carried out from March-September 2014 at DOTS Plus Clinic of Lumbini Zonal Hospital. Data were reported, structured and analyzed using SPSS 21 version. By screening 400 sputum samples from 200 TB suspected patients, 24 (12%) cases were found to be AFB positive. Prevalence of PTB in male and female was 14.50% and 7.25% respectively. Similarly, higher infection was found among the people of age group 41-50 years (16%). Prevalence of PTB was more among males than in females and people of age group 41-50 years showed higher infection.

Copyright © 2018, Sita Paudel and Mahendra Maharjan. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Tuberculosis is a specific infectious disease caused by *Mycobacterium tuberculosis*. The disease primarily affects the lungs and causes pulmonary tuberculosis. It can also affect intestine, meninges, bones, joints, lymph gland, skin and other tissues of the body (Park 2002). Pumonary tuberculosis is a common worldwide infection with medical and social problem causing high mortality and morbidity, especially in developing countries (Jeong 2008). About 9 million cases of active TB are reported annually; however one- third of the world's population are infected with *Mycobacterium tuberculosis* and remains asymptomatic but only 5-10% of these latent individuals develops active TB in their lifetime (Garra *et al.* 2013). TB incidence is falling at a rate of 2% per year and global TB deaths decreased from 1.4 million in 2011 to 1.3 million deaths in 2012 (WHO, 2013). When people with active pulmonary TB cough, sneeze, speak, sing or spit, they expel infectious aerosol droplets of 0.5 to 5.0 µm in diameter (Konstantinos, 2010). A single sneeze can release up to 40,000 droplets (Cole and Cook, 1998). Each one of these droplets may transmit the disease, since the infectious dose of tuberculosis is very small (Nicas *et al.* 2005). Healthy people with prolonged, frequent or close contact with TB patients are particularly at high risk of being infected, with an estimated 22% infection rate (Ahamed and Hasnain 2011). Transmission should occur from only people with active TB but those with latent infection are not thought to be contagious. DOTS is a short course of chemotherapy given to tuberculosis patients

under the direct supervision of the health workers that involves atleast six months antibiotic regimen. Patients should take TB drugs in front of health care workers making that sure patients have swallowed the drugs. This strategy can cure more than 90% of new smear positive patients and reduces spread of infection by breaking the chain of the transmission (WHO 1999).

MATERIALS AND METHODS

Study area

The study was carried out at DOTS Plus Clinic of Lumbini Zonal Hospital which lies in Butwal, Rupandehi from March-September 2014. Butwal is a small city of about eight thousand hector square in area, situated on the low-altitude land (Terai) near the border side to India. It is situated at the latitude of 2741'60.000"N and longitude of 8327'0.000"E.

Study design

General screening of TB suspected patients visiting DOTS Plus Clinic to determine the prevalence of PTB was done to fulfill the objective.

General screening of TB suspected patients

TB suspected patients with the clinical history of two or more weeks continuous cough, haemoptysis, fever and marked weight loss visiting Lumbini Zonal Hospital were included in this study. Sputum samples of two consecutive days were collected from 200 TB suspected patients. The samples were examined for Acid Fast Bacilli (AFB) after staining by Z-N

*Corresponding author: Sita Paudel,

Central Department of Zoology, Tribhuvan University, Kirtipur, Kathmandu, Nepal.

method in the laboratory of Lumbini Zonal Hospital. TB was diagnosed by the microscopic examination of acid-fast bacilli.

Sample collection

The patients were asked to submit sputum samples of two consecutive days i.e. spot and morning samples. During the collection of sputum samples, patients were instructed to inhale deeply 2-3 times and coughed up deeply from the chest and spit closer to mouth. It was made sure that the collected sample is of good quality i.e. thick, purulent and avoid of saliva. About 5ml of sputum sample was collected in disposable container.

Laboratory Examination of Sputum Decontamination of sputum sample

Sputum samples were transferred into a centrifuge tube and equal volume of NAOH was added. Samples were centrifuged after tightening of cap. Then tube was filled to within 2 cm of the top with phosphate buffer and was again centrifuged for about 15 minutes. Supernatant was poured off into a discard container containing 5% phenol.

Smear preparation and fixation

Disposable container was opened carefully and small portion of sputum was separated from the container with the help of bamboo stick and transferred to the slide where the sputum specimen number was written. Smear was dried at room temperature and was fixed by passing through the flame 2-3 times.

Staining of fixed smears by Ziehl-Neelsen (Z-N) method

The fixed slides were placed on the staining bridges. The smear was flooded with Carbol-fuchsin stain and heated from below with spirit cotton until the vapour just begins to rise. It was noted that, carbol-fuchsin was not allowed to boil. Heated Carbol-fuchsin was allowed to remain on the slide for about 10 minutes. The smear was covered with 20% sulphuric acid solutions for about 5 minutes or until the smear was sufficiently decolorized. Smear was covered with 0.1% methylene blue solution for about 2 minute. Then smear was washed off by tap water and tipped to drain off the water. Backside of the slide was wiped out by cotton and placed at the draining rack.

Observation of stained smear

Immersion oil was put on the smear and examined by magnifying to thousand times. The interpretation of the AFB stain of microscopic examination was done according to WHO protocol.

Data collection, analysis and Interpretation

Data collection was done through structured interviews with the patients during visits to the DOTS Plus Clinic. After data collection, data were checked for the completeness. Statistical Package for Social Sciences (SPSS) version 21 for windows was used to analyze the data. Then, the association between categorical variable was assessed by chi-square (χ^2) test (Marahatta *et al.* 2010).

RESULTS

Prevalence of PTB among suspected patients visited at Lumbini Zonal Hospital

During the study period, sputum sample of 200 TB suspected patients were collected for the identification of *Mycobacterium tuberculosis* among which 24 (12%) patients were found to be AFB positive.

Age and Sex wise prevalence of PTB

Age-specific prevalence was highest among suspected patients of age group 41-50 years accounting for 16% and least of age group 31-40 accounting for 7.89%. Statistically, age-specific prevalence was found to be insignificant ($\chi^2 = 2.833$, $P > 0.05$). (Table no.1) Similarly, sex wise prevalence of PTB among suspected patients showed maximum (14.50%) in males as compared to females (7.25%) which showed insignificant association ($\chi^2 = 2.25$, $P > 0.05$) of PTB with sex group. (Table no.2)

Table 1. Age wise prevalence of PTB

Age	Total cases examined	Positive cases (%)	P - value
11-20	32	3 (9.37)	0.94
21-30	39	6 (15.38)	
31-40	38	3 (7.89)	
41-50	25	4 (16.0)	
51-60	24	2 (8.33)	
61-70	21	3 (14.28)	
70 +	21	3 (14.28)	
Total	200	24	

Table 2. Sex wise prevalence of PTB

Sex	Total cases examined	Positive cases (%)	P - value
Male	131	19 (14.50)	0.13
Female	9	5 (7.25)	
Total	200	24	

Educational and Occupational status of PTB patients

Maximum TB infected patients (19.05%) had attained education upto lower secondary level. But statistically, educational level was found to be insignificant ($\chi^2 = 2.733$, $P > 0.05$) (Table no.3). Maximum number of PTB infected patients were service holder (18.37%) and farmer (14.29%). But, none of the housewives were reported for the PTB infection ($\chi^2 = 5.733$, $P > 0.05$). (Table no.4)

Table 3. Education wise prevalence of PTB

Education	Total cases examined	Positive cases (%)	P - value
Illiterate	71	9 (12.68)	0.74
Primary level	51	6 (11.76)	
Lower secondary level	21	4 (19.05)	
Secondary level	25	3 (12)	
Higher Secondary level	20	2 (10)	
Above Higher Secondary level	12	0(0)	
Total	200	24	

Table 4. Occupation wise prevalence of PTB

Occupation	Total cases examined	Positive cases (%)	P - value
Farmer	56	8 (14.29)	0.22
Service	49	9 (18.37)	
Bussiness	35	3 (8.57)	
Student	37	4 (10.81)	
Housewife	23	0 (0)	
Total	200	24	

DISCUSSION

Tuberculosis is a major global public health problem particularly in developing and undeveloped countries (Lifson *et al.* 1999). Nepal is a high-burden country for TB. About 45% of the total population is infected with TB and an estimated 20,000 new infectious cases of TB are reported each year (NTC 2001). An estimated nine million new cases occurred in 2013 with associated deaths between 1.3 to 1.5 million globally (WHO 2014). During the study period, a total of 400 sputum samples were collected from 200 TB suspected patients and examined in the Laboratory of Lumbini Zonal Hospital by using Z-N staining method. Twenty-four (12%) individuals were found to be positive for acid-fast bacilli (AFB). The higher prevalence of tuberculosis in the study area might be due to the lack of adequate knowledge and awareness on disease. Similar study carried out by Smith (1996) found that out of 1,630 samples, 78 (4.8%) were positive for AFB which was less than the present study. In a similar study conducted by Amgain *et al.* (2013), out of 200 TB suspected patients, 9% were found to be AFB positive. Sex wise prevalence of PTB showed that males (14.50%) were infected more than females (7.25%) in Butwal. Smith (1996) also reported that as in most countries of the world, in Nepal also there was higher incidence of TB in men than in woman. Similar study done by Tamrakar (2002) in Ramechhap district Nepal, Sharma (2008) in Gorkha district Nepal and Amgain *et al.* (2013) in Chitwan district Nepal also found higher prevalence of pulmonary tuberculosis among male as compared to female.

It was possibly because Nepali men are more frequently exposed to infection than woman as they stay out of house for longer time for the employment. Age-specific prevalence of pulmonary tuberculosis was highest among the age group 41-50 years (16%). Sharma (2008) revealed higher prevalence of TB among the economically productive age group of 20-49 years. A study conducted by Nayak *et al.* (2013) reported that the maximum number of TB patients (40.91%) were from age group 25-34 years followed by age group 35-49 years (36.36%). Maximum infection was found among age group 15-49 years i.e. 80.65% in productive age group than above 49 years (16.13%) in the survey conducted by Joshi (2004). In the study conducted by Amgain *et al.* (2013) majorities of the respondents (49.1%) were employed in the agricultural sector as farmer and 16 (28.1%) of the respondents were illiterate. Similarly, in the present study prevalence of PTB was highest among service holder (18.37%) and individual with lower secondary level educational attainment (19.05%). Occupation of the individual also plays a major role in the prevalence of TB. Lack of the financial resources and proper knowledge on disease might be associated with TB occurrence.

Conclusion

Tuberculosis is a chronic or acute bacterial infection, caused by *M. tuberculosis*. Most of the people in the world has been infected with TB causing bacteria. Pulmonary tuberculosis is the most common form of TB. In order to assess TB burden and KAP assessment the present study was carried out. Higher prevalence of pulmonary tuberculosis (12%) has been reported among 200 PTB suspected patients visiting DOTS Plus Clinic of Lumbini Zonal Hospital. Further maximum number of AFB positive were observed in male (14.50%) as compared to female (7.25%).

Individuals of age group 41-50 years were found to be highly affected (16%). Higher prevalence of PTB was observed among service holder (18.37%) and individual with lower secondary level educational attainment (19.05%).

Acknowledgement

We would like to thank Mr. Satya Raj Shakya, Incharge of DOTS Plus Clinic of Lumbini Zonal Hospital, for his constant help during sample collection from the patients arriving at DOTS Plus Clinic and lab work. Special thanks to all the patients who supported and contributed their valuable time for providing the sample.

REFERENCES

- Ahamad, N. and Hasnain, S. 2011. Molecular epidemiology of tuberculosis in India: Moving forward with a systems biology approach. *Tuberculosis* 91(5): 403-407.
- Amgain, K. 2013. Prevalence of pulmonary tuberculosis in Jutpani V.D.C. Chitwan, Nepal. M.sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.
- Amgain, K., Paudel, D.P., Paneru, D.P., Dhital, M. and mgain, G. 2013. Gender differences on case detection of pulmonary tuberculosis among the suspected cases attending in Jutpani Primary Health Center of Chitwan, Nepal. *SAARC Journal of Tuberculosis, Lung Diseases and HIV/AIDS* 10(1): 7-12.
- Cole, E. and Cook, C. 1998. Characterization of infectious aerosols in health care facilities: an aid to effective engineering controls and preventive strategies. *American Journal of Infectious Control*, 26(4): 453-464.
- Garra, A. D., Redford, P.S, Menab, F.W., Bloom, C.I., Wilkinson, R.J. and Berry, M.P.R. 2013. The Immune response in tuberculosis. *Annual review of Immunology*, 31: 475-527.
- Jeong, Y.J. and Lee, K.S. 2008. Pulmonary tuberculosis: up to date Imaging and Management. *American Journal of Roentgenology*, 191: 834-844.
- Joshi, R.S. 2004. Prevalence of pulmonary tuberculosis in relation to socio-behavioural aspect among the suspected patients visiting in Patan Hospital. M.sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.
- Konstantinos, A. 2010. Testing for tuberculosis. *Australian Prescriber* 33(1): 12-18.
- Lifson, A.R., Halcon, L.L., Johnston, A.M., Hannan, P., Hayman, C.R., Miller, C.A., et al. 1999. Tuberculosis skin testing among economically disadvantaged youth in a federally funded job training program. *American Journal of Epidemiology* 149(7): 667-678.
- Marahatta, S.B., Kaewkungwal, J., Ramasoota, P. and Singhasivanon, P. 2010. Risk factors of multidrug-resistant tuberculosis in Central Nepal: a pilot study. *Kathmandu University Medical Journal*, 9(32): 392-397.
- Nicas, M., Nazaroff, W.W. and Hubbard, A. 2005. Towards understanding the risk of secondary airborne infection: emission of respirable pathogens. *Journal of Occupational and Environmental Hygiene*, 2(3): 143-154.
- NTC. 2001. Annual report of National Tuberculosis Control Programme, National Tuberculosis Center, Kathmandu, Nepal.

- Park, K. 2002. Textbook of preventive and social medicine 14th ed. M/S Banarsidas Bhanot Publishers, India, 131-140p.
- Sharma, S.K. 2008. A study on prevalence of pulmonary tuberculosis among the suspected cases visiting Gorkha District Hospital and Tuberculosis awareness among them. M.sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.
- Smith, I. 1996. Gender and tuberculosis in Nepal. *Journal of the Nepal Medical Association*, TB special 24: 49-58.
- Tamrakar, D.K. 2002. Prevalence of pulmonary tuberculosis in-relation to economical and socio-behavioural aspects in Ramechhap district of Nepal. M.sc. Thesis. Central Department of Zoology, Tribhuvan University, Kathmandu, Nepal.
- WHO. 1999. Global TB control, World Health Organization, Geneva.
- WHO. 2013. Global Tuberculosis report, World Health Organization, Geneva.
- WHO. 2014. Improved data reveals higher global burden of tuberculosis, World Health Organization, Geneva.
