ORIGINAL ARTICLE

Accessibility of Finding Tuberculosis Case Actively, Separate Safely and Treat Effectively (FAST) Strategy for Early Detection of Suspected and Symptomatic Tuberculosis Patients: A Hospital Based Quantitative Study

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ABSTRACT

Introduction: Tuberculosis is a contagious disease which has always been a challenge over the course of human history. It is known to spread mostly from persons with undiagnosed and suspected tuberculosis cases. Diagnosing tuberculosis in an early stage with effective treatment is one of the best ways to reduce the burden of tuberculosis. Finding cases Actively, Separate safely and Treat effectively (FAST) Strategy in Nepal, is a rapid diagnostic tool for rapid tuberculosis case detection. **Aims:** To access tuberculosis case Actively, Separate safely and Treat effectively (FAST) strategy for suspected and symptomatic tuberculosis patients coming to the hospital for early case detection and also to identify patient's health care behaviour, technical barrier during surveillance. **Methods:** An observational quantitative study of active cough surveillance was carried at an entry point of FAST corner of Nepalgunj Medical College Teaching Hospital, Banke from April 2023 to December 2023. Scrutinized data was obtained by purposive sampling method with sample size 128 from FAST corner. **Results:** Maximum cases belonged to the aged group 65 and above having lower middle to lower socioeconomic status. Most of them were from joint family with contact history of tuberculosis in 35 (27.3) % of total cases. Out of total cases, 72 (56.25) % were confirmed with tuberculosis. Among those confirmed tuberculosis cases, multi drug resistance TB was found in 6 (4.7) %. Uses of mask was found significant (P< 0.05) in our study although number of these health care behaviour were less appropriate. Pneumonia was a significant association 17 (P = 0.004) with tuberculosis patient. Insufficient volunteers, and limited Gene xpert machine were major barriers to implement FAST strategy screening in Hospital. **Conclusion:** FAST strategy is feasible tool in high tuberculosis burden healthcare settings in Nepal. However, the technical and behavioral factors should be managed to ensure an effective approach.

Keywords: FAST strategy, Gene xpert machine, Multi drug resistance (MDRtb), Tuberculosis (TB)

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INTRODUCTION

Tuberculosis is one of the most contagious diseases and is second leading cause of deaths worldwide, yet it is preventable and curable. The mode of transmission of the tuberculosis is through droplet infection from patients suffering from pulmonary tuberculosis.[1] An estimated data of more than ten million people is living with tuberculosis globally. According to an epidemiological survey done in Nepal, in 2019, annual TB incidence of 245 per 100,000 population is noted, which is relatively 1.6 times higher than in previous estimated years. National tuberculosis programme Nepal has established various tuberculosis surveillance programme which significantly reduced the burden of disease and number of tuberculosis related deaths.[2]

FAST (find actively separate safely and treat effectively) strategy is one of the modest surveillance methods, collaborated by Ministry of Health and Population Nepal, USAID and Kapilvastu integrated development services project (KIDS), Nepal.[3] FAST strategy is used to reduce tuberculosis cases or drug resistant TB transmission in in-patient and out- patient healthcare settings.[4] A Study conducted in Bangladesh shows that FAST implementation revealed a high frequency of unsuspected TB in hospitalized patients.[5] The aim of the study is to access FAST

strategy among suspected, symptomatic tuberculosis patients and also identifying the status of health care behaviour and technical barriers for proper implementation of FAST strategy in Nepalgunj medical college teaching hospital. Hence, aiming on reduction of tuberculosis transmission significantly by early detection and prompt DOTS regime. It also fulfills the gap among researchers for further analyzing qualitative study on FAST surveillance.

METHODS

A prospective observational quantitative design was conducted for active cough surveillance of symptomatic and suspected tuberculosis patients. Three sets of informant interviews were taken at entry point i.e. in- patient, out- patient, billing counters, pharmacies and FAST corner of Nepalgunj Medical College Teaching Hospital, Banke. Similarly, focal person of FAST strategy were also interviewed purposively about indoor settings at FAST corner. The study period was carried out for nine months from April 2023 to December 2023 after obtaining ethical clearance from institutional review board of Nepalgunj Medical College. Verbal and written consent has been taken from each patient and also from designated FAST corner. A purposive sampling technique was utilized to recruit study participants. The sample size was estimated by using prevalence in proportion method of smear-positive cases in pulmonary tuberculosis aged >15 years. With the assumption that positive to negative ratio (PN ratio) was 2 and case notification rate was 93 in province number 5[5] and so the estimated prevalence of smear positive PTB (p) would be: smear-positive case notification x 2 = 93x 2 = 186 per 100,000 population.[6] Therefore, the estimated prevalence in proportion (p) was 0.18. Hence the approximated sample size was 128 with 7% absolute precision at 95% confidence interval (CI) and 10% non response rate. This survey has estimated prevalence of smear-positive pulmonary tuberculosis to determine the sample size, though the primary outcome was the Gene Xpert positive pulmonary tuberculosis. All those patients or clients aged more than 15 years coming to the hospital with symptomatic cough and suspected tuberculosis were included for active cough surveillance in the study. The instrument tool consists of semi structured questionnaire as interview tool of three sets consisting of set I as individual's profile and sociodemographic profile, set II as health care behavior and set III as indoor setting after carefully reviewing terminology and constructs associated with published theories of consolidated framework for advancing implementation research (CFIR).[7] The main screening tool was Gene Xpert test CBNAAT (cartridge based nucleic acid amplification test), a widely accepted rapid diagnostic test for Tuberculosis detection as well as Rifampicin resistance in direct smear negative cases to confirm the diagnosis.[8] Pre testing was done among ten percent of population to ensure the completeness of methodology and questionnaire sets.

RESULTS

Among symptomatic and suspected pulmonary tuberculosis cases from in-patient, out-patient, emergency, billing counter, brought by volunteers of FAST corner during study period, 128 cases were selected as a sample study for active cough surveillance and sent for Gene Xpert test. Thirty cases were male and eighteen cases were female belonged to aged group 65 and above as shown in figure 1.

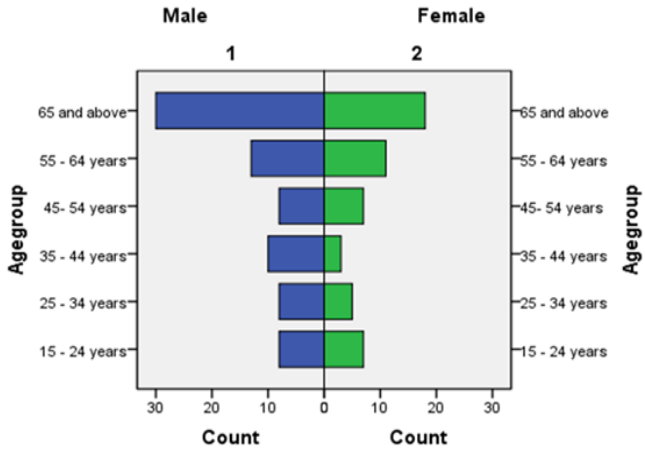

Figure 1: Histogram chart showing distribution of age group and gender

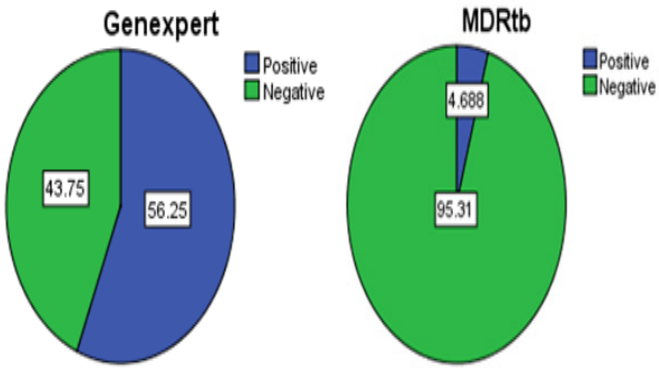

Figure: i ***Figure: ii***

Figure 2: Pie diagram showing total number of TB and MDR TB cases

Among 128 Gene xpert tested cases, 72 (56.25) % were tested positive for tuberculosis and 56 (43.8) % were tested negative for tuberculosis. Similarly, among those confirmed tuberculosis cases, 6 (4.7) % cases were found to have multi drug resistance tuberculosis as given in figure 2. Out of total cases, 90 (70.3) % cases were from joint family having lower middle class in 53 (41.4) % and lower class in 57 (44.5) %. It was also found that 29 (40.3) % had history of contact TB in confirmed tuberculosis cases while 50 (89.3) % had neither history of contact TB nor tested positive for tuberculosis. Thus, it revealed that contact history of tuberculosis within family members was highly significant factor for TB transmission in joint family (P <0.05) as shown in table I.

Variable		Gene xpert		P value
		Positive	Negative	
Contact history of TB	Yes	29 (40.3) %	6 (10.7) %	0.001*
	No	43 (59.7) %	50 (89.3) %	

Table I: Association between tested cases and contact history of tuberculosis

Out of total sample population, 59 (46.1) % had co morbid conditions like pneumonia, hypertension, diabetes, heart disease etc. However, out of those tested and confirmed cases of tuberculosis by Gene xpert, seventeen TB positive cases were significantly associated with pneumonia ($p < 0.5$) as shown in table II. While no case of HIV has seen with confirmed TB during study period.

Presence of co morbidity	Gene xpert		P-Value
	Positive	Negative	
Pneumonia	17	3	0.004*
Hypertension	12	11	0.41
Diabetes mellitus	13	9	0.47
Heart disease	4	9	0.49
HIV/AIDS	0	0	-

P ≤ 0.05

Table II: Association between Gene xpert confirmed cases and co morbid status

Regarding health care behaviour of patient, out of those confirmed TB cases, thirty four patients had habit of wearing mask. Although use of mask was statistically significant (P = 0.01), thirty eight patients had never put on mask also tested TB positive as presented on table III. Hence it was depicted that use of mask has not found to be a potential health care behaviour tool to prevent droplet infection. Instead, we must rule out proper use of mask, contact history of TB and over crowding within health facilities and in family members too.

Health care behaviour		Gene xpert		P-Value
		Positive	Negative	
Use of mask	Yes	34	11	
	No	38	45	0.001*
Hospital admission	Yes	15	1	0.001*
	No	57	55	
Follow up	Yes	22	6	0.006
	No	50	50	

P ≤ 0.05

Table III: Association between Gene xpert tested case and health care behaviour of patient

Meanwhile, during interview taken with the health care provider at FAST corner, they were concerned about the inadequate supply of Information Education Communication (IEC) material related tuberculosis, limited Gene xpert machine and late maintenance of Gene xpert machine. However, FAST service was provided promptly even though health care volunteers were still on deficit. All Gene xpert positive cases were reported by program coordinators and relayed to DOTS in charge to ensure immediate initiation of effective DOTS treatment and provide awareness to family members for potential TB threats.

DISCUSSION

Our study is one of the rigorous measurement of FAST services in Nepalgunj medical college teaching hospital, Banke for continuation of effective FAST tuberculosis services and anti-tuberculosis treatment. Active surveillance for tuberculosis should be performed in high risk communities in combination with active case-finding in health care facilities. Gene xpert is the primary investigation tool in our study, had a distinct advantage over smear microscopy test in identifying suspected and drug resistance tuberculosis efficiently. Over total 128 sample population, 72 (56.25)% were confirmed with tuberculosis, 6 (4.7)% were multi drug resistance TB cases which were immediately sent for DOTS therapy in the same day without any delay. It represents that Gene xpert test is one of the advanced diagnostic tool for tuberculosis screening in the hospital. This study is similar to prospective study conducted by L. Gabelaia[1] et al in the similar way of early TB detection.[8] Since our study concurs that 90 (70.3)% of cases had joint family and belonged to lower middle and lower classes, there could be a chance of intra house hold transmission on the basis of history of contact TB cases in family members. Similar type of study revealed in 150 patients by Jember T et al, where 138 cases were tuberculosis positive on the basis of analysis confirmed by transmission of tuberculosis among members of 53 families.[9]

Studies done in hospitals of Miami and Florida, concurrent TB and pneumonia cases were found in HIV infected patients.[10] However, our study exhibited seventeen cases of pneumonia and zero HIV case among confirmed tuberculosis patients. Health care behaviours were equally important factor to reduce the incidence of pulmonary tuberculosis cases in other studies.[11,12] In contrast, our study revealed that uses of mask, hospital admission and timely follow ups were significantly less common factor. For continuous use of gene xpert machine, uninterrupted supply of cartridge is required, and the number of machine should be increased. Our study identified that the Gene Xpert module failure at a time and delayed in maintenance, which significantly produced the gap in FAST strategy implementation. The result is similar to the study conducted in Bangladesh and Nepal which identified that the machinery capacity is important for the sustainability and expandability for FAST strategy programme.[3, 13] Besides Gene xpert test, FAST strategy must carry a chest radiograph examination (irrespective of symptoms) to identify additional individuals with transmissible extra pulmonary TB disease in future research.

LIMITATION

Since it is single centered study, thus, may not represent the study of whole population of Banke District.

CONCLUSION

FAST, as an effective strategy for preventing transmission of TB, should be considered as a primary investigation tool and incorporated into the National Health Service for all government and private hospitals through health policy. It reduces tuberculosis prevalence by early case detection and initiation of effective TB treatment. Effective tuberculosis diagnosis and treatment also represents a measurable improvement in quality of care for patients, meeting the target of End TB strategy.

In high burden of tuberculosis and low resource settings, health care provider may face various challenges like limited infrastructure, inadequate volunteers on floor, and minimum supply of information education communication material (IEC) for proper counselling. These reported barriers in indoor settings may hinder on successful implementation of FAST approach. Therefore, regular monitoring and timely supervision are mandatory in clear policy making at national level for FAST tuberculosis surveillance.

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