Short Review

Active Case Finding of Tuberculosis in India: A Review

Running Title: Active Case Finding of Tuberculosis

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Abstract

*Introduction***:** Tuberculosis (TB) is one of the major public health problems in India. India is marching towards TB elimination by 2025 with various strategies. Among these strategies, active case finding (ACF) is considered as an important key strategy. Presently, there is a paucity of proper reviews on this topic. *Methods***:** We reviewed various electronic sources and published articles related to active case finding of TB in India, for the past 10 years. A total of 138 articles were line-listed from various electronic sources. After initial screening, 31 articles were retrieved for a full review. *Results***:** Most of the studies have identified a large number of new cases with variations in number needed to screen (median 140 (inter quartile range of 65-1,111)). Different studies adapted different methodology on implementing ACF. ACF has proved to be highly useful among vulnerable population and is cost effective. Major advantage of ACF is early detection and prompt treatment of TB, which in-turn prevent further transmission in the community. Major challenges were improper follow-up of diagnosed cases and sputum-negative cases. Sample related challenges were collection of early morning sputum samples, transport of samples, and performing X-rays for presumptive cases. *Conclusion***:** ACF has proved to be a vital strategy in TB elimination in India. Challenges should be seriously considered before implementing ACF depending upon the ground reality for better results.

Key words: Screening, RNTCP, NTEP, ACF

Introduction

It is estimated that globally 10.4 million new cases of Tuberculosis occur every year and it is one of the top 10 causes of morbidity and mortality. Among these cases, in 2016 alone - 6.1 million cases were notified, 4.3 million cases were missed (including 600,000 children), and 1.7 million deaths occurred [1–3]. Nearly 95% of TB deaths occur in low- and

middle-income countries. Worldwide, seven countries account for nearly 65% of the total TB cases, and India is leading the count followed by Indonesia, China, Philippines, Pakistan, Nigeria and South Africa [1, 4]. One of the major challenges in these countries are cases missing from notification. Recently estimated missing cases in each year are around - 27% in India, 9-10% each in China and Indonesia, 5% each in Nigeria, Pakistan and South Africa [1, 5]. The main reasons for missing TB cases are geographic or financial barriers, and under-reporting of detected cases especially in countries with inadequate public health coverage [6]. Furthermore, many individuals delay in seeking health care for their illnesses, which leads to poor health outcomes, financial burden for patients and their families, and more transmission of the disease in the community [6]. Therefore, intensifying efforts to increase early case detection is a key component of improving TB diagnosis, care and prevention [7]. On these lines, the World Health Organization (WHO) rolled out an 'ACF guideline' in 2013, to encourage the member states adapt and follow the ACF strategy. In response to this global development, India rolled out its national guideline on ACF in 2016 and started implementing ACF in all districts in a phased manner. Presently, India is working hard towards elimination of Tuberculosis by 2025 and has recently renamed the RNTCP (Revised National Tuberculosis Control Programme) in to NTEP (National Tuberculosis Elimination Programme) [8]. At present there are few information available on ACF, so we intended to do a detailed review on this topic to help the policy makers and programme implementers.

Methods

We searched PubMed, Google Scholar and official websites of WHO, MoHFW (Ministry of Health and Family Welfare, Government of India), and RNTCP (Revised National Tuberculosis Control Programme/ NTEP – National Tuberculosis Elimination Programme) between 1st Jan 2020 to 20th Jan 2020. Articles were restricted to Indian context and for the past 10 years (2010 to 2019). Key words used for search were – active case finding, Tuberculosis, and India, in the title and abstract. Back reference searches were also done. A total of 138 articles were line-listed after complete search, among these - 68 articles were excluded based on the title screening and excluding duplication; 39 articles were excluded after abstract screening. Finally, 31 articles were included for review. The review has been organized in the sequence - outcome of ACF, methodology of ACF, advantages and challenges.

Outcome of ACF

ACF has been successfully carried out in various places of India, especially among vulnerable population, with the median value of number needed to screen being 140 persons to diagnose one case (inter quartile range of 65 to 1, 111). Brief details of studies and their key outcomes are given in Table 1.

Methodology of ACF

Methodology of conducting ACF changes from time to time with the availability modern diagnostic tools such as CBNAAT (Cartridge Based Nucleic Acid Amplification test), and the change in diagnostic algorithm by the RNTCP/NTEP. ACF also differs by type of field investigators carrying out the programme. In general, ACF was conducted by training staff in interview techniques and sample collection procedures (sputum collection) [10, 14, 15, 21, 23, 29]. In almost all the studies, vulnerable population were identified and screened [9, 12, 13, 16, 18, 22, 25, 27, 30]. While diagnosing tuberculosis different algorithms and strategies were adopted by different groups, based on their feasibility. Some used only sputum microscopy, whereas others used sputum CBNAAT

and/or sputum microscopy, while some used X-ray [9, 12, 13, 16, 18, 22, 25, 27, 30]. TOUCH (Targeted Outreach for Upliftment of Community Health) workers used a strategy where they visited house to house to identify the presumptive cases and referred them to the designated centre for screening instead of collecting sputum at their home [26]. A study by Vyas et al. has shown that in a tribal community, referral over a period of time by Asha Kalp (Community workers) who were residing in the same community gave promising results in finding out missing cases [18]. In a study by Dolla C et al., among homeless people in Chennai, MMR (mass miniature radiography) was done and sputum were collected from the presumptive patients at the point of contact itself [24]. In some studies chest x-ray was predominantly used as a diagnostic tool [31–33]. A step ahead from other studies, Sohn H et al. conducted a time and motion study (Travelling by motorbikes varied distances over a period of time to actively find cases of TB) to evaluate operations and workload. They studied the costs from the program perspective using both the bottom-up and top-down costing methods, excluding the routine TB care cost [34]. Other researchers have created awareness using loud speaker mounted on top of vans, videos, flipcharts, question and answer games at the time of ACF [14, 19].

Advantages

ACF has proved to have the following advantages, first is early case detection of TB [9–15, 19–21, 23, 29–31, 35]. Second, an increased detection of missed TB cases [17, 25], and the third, this is a cost effective approach [14, 22]. Vulnerable and hard to reach populations having a very high prevalence of TB, were benefitted much with this strategy such as slums, tribal populations, and prisoners, [17, 18]. A study among pregnant women has also been done [27]. Another advantage in ACF is the location of point of contact. House to house sputum collection, utilising mobile van for chest radiography, while otherwise presumptive patients' need to travel a long distance to avail these services [33]. Some of the studies were done in a research mode with quality control and structured supervision which provided valuable data for policy makers [36, 37]. One of the important finding was, ACF proved to be implemented efficiently by community volunteers such as ASHAs (Accredited Social Health Activists), with adequate training and supportive supervisory structure in place [32].

Challenges

The common challenges faced by the studies include, failure to follow up of diagnosed cases, [23, 25, 35, 37] Patient non-availability [10, 37, 38], less coverage and refusal of consent or cooperation due to social stigma, disbelief, which eventually leads to missing of cases [20, 25, 26]. Less motivation among presumptive cases to go for X-ray examination is one of the common observations [18, 25]. Other challenges were collection of early morning sample, which is important for diagnosis, transfer of samples to laboratory, and additional workload for laboratory technicians, especially in tribal areas [18, 25]. Treatment could not be started effectively even after diagnosis in families or individuals where even day to day living and food were their biggest problem, further there is not much information regarding homeless people in our health system, to carry out a survey [24]. In few studies, chest x-ray was not included due to operational reasons [12]. Sometimes cross-checking of screening were not done and follow-up of smear-negative patients with symptoms of TB were not done [23, 36]. Actual sensitivity of screening tools would be marginally lower if we collect sputum specimen from all participants irrespective of being screened positive or negative [39]. When cough frequency , cough duration, and other symptom related

information were not collected, there was a chance of misclassification by the staff, and so many patients may get excluded from the study [35]. Only identification and referral of presumptive pulmonary TB to the nearby health centre is unlikely to be helpful (only 22% reach microscopy centre) and in most places TB cases were diagnosed only by Ziehl-Neelson staining and other sensitive methods were not used [32]. There is also paucity of published literature on case detection among prisoners and the data about turn over in most prisons are poorly reported [17, 19]. Many of the studies done on a relatively small sample size which precludes the application of any statistical test to the data and evaluation of significance of individual risk factors for transmission of disease [16].

ACF and cost

Two studies, one by Shewede et al., and another study by Muniyandi M et al., have shown that ACF has significantly reduced the catastrophic cost when compared to PCF (passive case finding) [22, 37]. A study by Datta B et al. in Haryana found that the cost of finding one smear-negative TB was $38, while the cost of finding one TB case (any case) $8, using a mobile X-ray van [40]. Another study by Sohn H et al., in a tribal Indian community and another multi-country study also proved ACF is a highly cost-effective study [34, 41]. Another study by Daftary A et al., wherein pharmacists were person for referral, showed that approximate cost of finding one ACF case was $100 [21]. Most of the studies calculated the cost of finding a case, while only few estimated the effectiveness in terms of DALY (Disability Adjusted Life Years). Moreover, cost effectiveness depends on the number needed to diagnose a case. Number needed to diagnose depends on various factors such as study design, socio demographic variations, study population, type of investigators and the study setting. In a country with more than 1.3 billion population, a wide variation in number needed to diagnose is expected. The ACF program at two years may show only a little reduction in prevalence (11%), but a 10 year evaluation of the same intervention program would show a reduction of 33%; thus ACF has proved to be the best preventive tool in the current scenario [41]. Although there is limited evidence available on cost and effectiveness of ACF, nevertheless available studies support ACF as highly cost-effective [21, 22, 34, 37, 40, 41].

Conclusion

ACF is a vital strategy to India's march towards elimination of tuberculosis by 2025, provided the stakeholders implementing ACF take care of the challenges beforehand.

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Table 1: Outcome of ACF done in the past 10 years in India (2010 to 2019)

Project	Year	Sample size	Presumptive cases	New cases	Number needed to screen
North East [9]	2008-2010	4371	1439	24	182
Chattisgarh [10]	2011	1556	148	11	141
Tamil Nadu Brick kiln [11]	2011-2012	4002	377	0	0
Andra – Telangana [12]	2011-2013	4771	793	34	140
Refugees [13]	2011-2013	27714	3830	96	288
Odisha [14]	2012	30000	8052	240	125
Mumbai slum [15]	2012	529452	278	33	16,044
Maharashtra [16]	2013-2014	521	18	6	87
India Prisons [17]	2013	2000000	1142	80	25000
Gwalior Tribal [18]	2014	65230	8723	964	67
Central India Prisons [19]	2014	16199	1348	124	130
Mumbai slum [20]	2015	9000	315	3	3000
Patna - pharmacy [21]	2015-2017	DK	1674	255	0
Thiruvallur ACF PCF [22]	2016-2018	82000	336	110	754
Agra [23]	2016	3940	382	7	562
Chennai homeless [24]	2017	301	19	5	60
Puducherry [25]	2018	6,606	55	2	3303
Kolkata slum [26]	2018	3,86,242	1132	177	2182
Puducherry Pregnant [27]	2018	4203	77	0	0
Puducherry slum [28]	2018	2766	31	0	0

DK-Don’t Know

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