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ORIGINAL ARTICLE

Informal allopathic provider knowledge and practice regarding control and prevention of TB in rural Bangladesh

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Background: BRAC (formerly Bangladesh Rural Advancement Committee), in collaboration with the National Tuberculosis Control Programme, provides one full-day training on TB to make informal allopathic providers knowledgeable for managing TB in rural Bangladesh. This study explored the knowledge and practices of the providers receiving the above training in the control and prevention of TB.

Methods: The study was conducted in 30 subdistricts, with 30 trained and 30 untrained providers randomly selected from each subdistrict. Approximately 3% (49/1800) did not provide complete information. Pre-tested structured and semi-structured questionnaires were used.

Results: TB was commonly perceived as a disease of only males (66.1%, 1157/1751). Only one-quarter knew about the bacterial cause of TB. Very few providers (2.1%, 36) had adequate knowledge regarding prevention of TB. They also lacked knowledge about TB treatment duration (71.6%, 1253), the meaning of DOTS (directly observed treatment, short course) (26.0%, 455) and multidrug resistance (20.6%, 360). Antibiotics (79.7%, 1396) and cough syrup (75.0%, 1313) were commonly prescribed by providers despite symptoms suggestive of TB. However, 70.2% (613) and 74.5% (650) of trained providers' knowledge and practice scores were equal to or more than the mean scores ($\geq$6.97 and $\geq$6.6, respectively), whereas they were only 49.5% (435) and 64.2% (563), respectively, among untrained providers ($p<0.0001$).

Conclusions: Misperception, lack of knowledge and irrational use of antibiotics are challenges that need to be addressed for controlling and preventing TB efficiently.

Keywords: Bangladesh, BRAC, DOTS, Informal healthcare providers, TB

Introduction

A large private sector is actively engaged in health service delivery in Bangladesh. In rural areas, unqualified and unregistered informal private providers (traditional healers and allopathic providers such as village doctors and drug shop attendants) are the dominant healthcare providers.[1] They provide 60% of healthcare services in rural areas in the informal sector.[2] Informal healthcare providers are deeply embedded in the local community and culture, with easy accessibility, and provide inexpensive services to villagers. They manage patients mostly with drugs and advice, sometimes with advice only. These unqualified practitioners rarely give advice for laboratory investigation, but irrational use of prescription of antibiotics by them is very common.[3]

TB is a major public health problem in Bangladesh, which is sixth among the 22 high-burden TB countries in the world.[4] However, Bangladesh has been successful in controlling TB, and the National Tuberculosis Control Programme (NTP) has achieved its targets in case detection (70%) and treatment success rate (85%).[5] However, the TB control programme still has some challenges to overcome to sustain the current momentum. A significant number of patients having a cough for $\geq$3 weeks in rural areas sought care from informal allopathic providers, but the majority of providers do not notify the patients or refer them to appropriate places for case detection owing to their lack of knowledge on TB, its diagnosis and treatment.[6] These inappropriate practices pose a great threat to the efforts of controlling TB efficiently.[7]

The NTP in partnership with non-governmental organisations (NGOs) implements the TB control strategy across the country. The NTP of the Government of Bangladesh launched the DOTS (directly observed treatment, short course) strategy in 1993.[5] The Bangladesh NTP has recently shown considerable interest in exploring various options to involve the private sector, including informal providers, in controlling TB. BRAC (one of the largest NGOs) in collaboration with the NTP started a 1-day orientation training (one of the activities of the TB control programme) for village doctors, drug shop attendants, medical professionals and NGO workers in BRAC's TB control programme areas since 2005 to enable providers to play an informed role in preventing and controlling TB. Through this orientation training, the programme aims to create awareness among providers about the symptoms, transmission and prevention of TB. Consequently, providers are expected to refer presumptive TB patients to appropriate places with proper amenities and expertise. So far, no independent evaluation has been conducted to see how far the objectives of the training have been translated into practice. Thus, this study focused on exploring the current knowledge and practice of the trained and untrained (no training on TB) informal healthcare providers with respect to TB.

Materials and methods

Study setting

BRAC, a non-governmental development organisation, in collaboration with the NTP of the Government of Bangladesh is currently implementing a community-based TB control programme in 297 subdistricts in 42 districts of Bangladesh.[5] The BRAC TB control programme actually started in 1984 as a pilot project in one subdistrict and was extended to 10 other subdistricts in 1992. BRAC was the first NGO to sign a Memorandum of Understanding with the Government of Bangladesh in 1994 to expand DOTS services. Community health workers of BRAC provide door-to-door TB care in rural areas.[8] They identify patients who have had a cough for ≥3 weeks and refer these presumptive TB patients to a sputum testing laboratory for TB detection. In addition, BRAC is involved in giving 1-day training on TB to informal providers at the subdistrict level under the guidelines of the NTP by the formal providers. It is an ongoing process and has yet to cover all informal allopathic providers in each subdistrict. These informal providers (village doctors and drug shop attendants) mainly consult patients at their work places/chambers in local markets. All providers for this study were selected from local market places in 30 subdistricts (receiving and not receiving training).

Study population and sample size

Trained informal allopathic providers were found in local markets using the participation lists (in the orientation programme) obtained from the local BRAC office. Untrained providers were selected through informal discussion with the trained providers from the same markets. From the 42 districts of the BRAC TB control programme areas, 30 subdistricts were selected using a probability proportional to size strategy, i.e. more subdistricts

Table 1. Sociodemographic characteristics of healthcare providers

Characteristic	Provider type			p-value
	Trained n=873 (%)	Untrained n=878 (%)	All n=1751 (%)	
Male gender	867 (99.3)	(871) (99.2)	1738 (99.3)	NS
Mean (SD) age (years)	40.7 (11.2)	37.2 (11.4)	38.9 (11.4)	<0.001
School education				
Secondary (6–10 years)	334 (38.3)	325 (37.0)	659 (37.6)	NS
Above secondary (≥11 years)	539 (61.7)	553 (63.0)	1092 (62.4)	
Mean (SD) years	11.7 (1.9)	11.7 (2.0)	11.7 (1.9)	NS
Mean (SD) working hours/day	10.7 (2.4)	10.7 (2.6)	10.7 (2.5	NS
Mean (SD) working years	15.6 (10.4)	11.9 (9.8)	13.9 (10.3)	<0.001
Monthly income (%)				
BDT <2500	16 (1.8)	19 (2.2)	35 (2.0)	
BDT 2500–5000	116 (13.3)	133 (15.1)	249 (14.2)	NS
BDT 5001–7500	126 (14.4)	123 (14.0)	249 (14.2)	
BDT 7501–10 000	267 (30.6)	247 (28.1)	514 (29.4)	
BDT >10 000	348 (39.9)	356 (40.5)	704 (40.2)	
Mean (SD) monthly income in BDT[a]	11 607 (8557)	12 690 (12 590)	12 099 (10 836)	
Self-rated poverty status of households in last year				
Deficit (%)	118 (13.5)	125 (14.2)	243 (13.9)	NS
No deficit (%)	755 (86.5)	753 (85.8)	1508 (86.1)	

NS: not significant; BDT: Bangladeshi Taka.
[a] US$1=78.00 BDT.

were selected from bigger districts. The sample size for informal healthcare providers was determined on the basis of maximum proportioning (0.5) with a 5% significance level and a 5% precision. The minimum calculated sample size for each category of informal healthcare providers was approximately 400. To capture the variations in the 30 subdistricts, the sample size was increased to 900 (400×2.25) considering design effect 2.25. Thus, the study proposed to include 900 trained and 900 untrained providers. In total, 60 informal allopathic providers (30 trained and 30 untrained) were selected from each subdistrict. A total of 873 trained and 878 untrained providers participated.

Data collection

Structured and semi-structured questionnaires were used to collect information from the providers through face-to-face interviews. The questionnaires were pre-tested outside the study areas to ascertain consistency, appropriateness of language and sequencing of questions and to gain an insight into the field operation procedures needed. The final questionnaires were modified and updated on the basis of field testing. Adept interviewers were recruited to take information from the respondents. A 5-day intensive training course was organised for the interviewers. A total of 1800 informal allopathic healthcare providers were invited for participation. Among them, 873 trained and 878 untrained participated. All interviews were held at the chambers/work places or drug shops/pharmacies. The duration of each interview was 30–45 min. Effective and supportive supervision was ensured on a continual basis at all levels of the study.

Data processing and analysis

All available data were edited, coded and cleaned using SPSS Statistics for Windows v.16.0 (SPSS Inc., Chicago, IL, USA) for analysis. The sample mean was computed for continuous variables such as age, years of schooling, years of professional experiences, and knowledge and practice scores. Age groups were constructed on the basis of the mean. TB knowledge and reported standard practice towards TB were determined by a score based on the answers given to questions. One point was given for each correct answer for constructing knowledge scores. Similarly, one point was given for each practice related to TB management. A respondent was rated as having adequate knowledge if he/she gave more correct answers than the mean correct answers for all the

Table 2. Proportion of respondents giving correct answer to each knowledge question

Knowledge variable	Provider type			p-value
	Trained n=873 (%)	Untrained n=878 (%)	All n=1751 (%)	
TB is a disease both of males and female [1]	239 (27.4)	237 (27.0)	476 (27.2)	NS
Main cause of TB is a bacterium [2]	260 (29.8)	189 (21.5)	449 (25.6)	<0.001
Main suggestive symptom of TB is persistent cough [3]	838 (96.0)	842 (95.9)	1680 (95.9)	NS
Main transmission route of TB is sneezing/coughing (airborne) [4]	700 (80.2)	646 (73.6)	1346 (76.9)	<0.01
Prevention of adult pulmonary TB: early detection and starts TB treatment without delay	20 (2.3)	16 (1.8)	36 (2.0)	NS
Had knowledge about the relationship between TB and malnutrition [5]	432 (49.5)	375 (42.8)	807 (46.1)	<0.001
Had knowledge about the duration of cough that might indicate TB (≥3 weeks) [6]	712 (81.6)	671 (76.4)	1383 (79.0)	<0.004
Had knowledge about BRAC facility/laboratory for sputum testing [7]	837 (95.9)	714 (81.3)	1551 (88.6)	<0.001
Had knowledge about times of testing sputum of individual for detecting TB bacterium (three times) [8]	426 (48.8)	359 (40.9)	785 (44.8)	<0.01
Had knowledge about free treatment policy [9]	857 (98.2)	825 (94.0)	1682 (96.1)	<0.001
Had knowledge about standard TB treatment duration (6 months) [10]	681(78.0)	572 (65.2)	1253 (71.6)	<0.01
Had knowledge about the meaning of DOTS [11]	333 (38.1)	123 (13.9)	455 (26.0)	<0.001
Had knowledge about multidrug resistance [12]	205 (23.5)	155 (17.7)	360 (20.6)	<0.004
Mean (SD) knowledge score [1–12]	7.5 (1.7)	6.5 (1.8)	6.97 (1.8)	<0.001
Proportion with knowledge score ≥6.97	613 (70.2)	435 (49.5)	1048 (59.9)	<0.001

NS: not significant; DOTS: directly observed treatment, short course.
Square brackets indicate the serial number of knowledge variables for constructing knowledge score.

respondents. Furthermore, a respondent was rated as having adequate practice if he/she gave more correct answers than the mean correct answers related to TB management for all the respondents. A χ^2 test and independent t-test were calculated to assess statistical significance. Multiple regression analysis was performed to capture the significant association demonstrated.

Results

The sociodemographic profile of the study sample is shown in Table 1. Informal allopathic providers who received training were older (mean age 41 years vs 37 years) and more experienced (mean working years 16 vs 12 years) than their counterparts. Both trained and untrained providers had around 12 years of schooling (mean) and had a mean monthly income of 11 000–12 000 Bangladeshi Taka (US$140–155). The majority of providers (86.1%,1508) self-rated their household poverty status as having no deficit. Around 3% (49) of the selected providers did not participate in the study.

Less than one-third of providers (27.2%,476) were aware of TB as a disease of males and females (Table 2). TB was commonly perceived as a disease of only males (66.1%,1157) (data not shown). Knowledge on the bacterial cause of TB was inadequate among trained (29.8%,260) and untrained providers (21.5%, 189) ($p<0.001$). Moreover, factors such as tobacco smoking and filthy environments were known as causes of TB by 75.0% (1313) and 53.0% (928) of respondents, respectively (data not shown). The main suggestive symptom of TB (chronic cough) was well known both to trained and untrained providers (95.9%,1680). Knowledge about the main transmission route of TB (sneezing/coughing) was equally conspicuous among trained (80.2%,700) and untrained providers (73.6%, 646; $p<0.01$). Simultaneously, trained and untrained providers did not show adequate knowledge on early detection and treatment start with no delay (2.0%,36) as the best strategy for prevention of adult TB (Table 2). They mainly focused on refraining from smoking/quitting (60.0%, 1051) and maintaining a healthy environment (48.0%, 840) as the prime strategy for prevention of TB (data not shown). Knowledge about the relationship between TB and nutrition was low (49.5% vs 42.8%, 432 vs 375) for trained and untrained providers, respectively; $p<0.001$). Knowledge regarding a duration of cough for ≥3 weeks being the main suggestive symptom of TB was found to be adequate among trained providers (81.6%, 712) compared with untrained providers (76.4%, 671; $p<0.004$) (Table 2). Furthermore, more comprehensive knowledge of trained providers was observed in the case of knowledge about the BRAC laboratory for sputum testing (95.9% vs 81.3%; 837 vs 714; $p<0.001$), the free TB treatment policy (98.2% vs 94%; 857 vs 825; $p<0.001$) and the standard duration of TB treatment (6 months) (78% vs 65.2%; 681 vs 512; $p<0.01$). However, knowledge regarding the meaning of DOTS (i.e. taking medicine in front of health workers) was found to be inadequate (38.1% vs 13.9%; 333 vs 123; $p<0.001$). Knowledge about multidrug resistance was also found to be very low (20.6%, 360).

Table 3. Proportion of respondents giving answers to each practice question

Practice variable	Provider type			p-value
	Trained n=873 (%)	Untrained n=878 (%)	All n=1751 (%)	
Mean presumptive TB cases seen in last month [n (SD)]	15.4 (26.9)	15.9 (34.5)	15.6 (30.9)	NS
Mean TB patients seen in last month [n (SD)]	4.7 (9.6)	4.5 (10.37)	4.5 (9.9)	NS
Looked for other associated TB symptoms when suspecting TB [1]	867 (99.3)	859 (97.8)	1726 (98.6)	<0.02
Prescribed sputum test when suspecting TB [2]	851 (97.5)	836 (95.2)	1687 (96.3)	<0.02
Prescribed medicines despite having suggestive symptom of TB	759 (87.0)	694 (79.0)	1453 (83.0)	<0.001
Prescribed cough syrup when suspecting TB	646 (74.0)	667 (76.0)	1313 (75.0)	NS
Prescribed antibiotics when suspecting TB	698 (80.0)	698 (79.5)	1396 (79.7)	NS
Referred TB suspects to appropriate places for further management [3]	869 (99.6)	871 (99.2)	1740 (99.4)	NS
Most usual places				
BRAC	812 (93.0)	666 (75.9.)	1478 (84.4)	<0.001
Public hospital	611 (70.0)	667 (76.0)	1278 (73.0)	<0.004
Advised full course of TB treatment [4]	871 (99.8)	870 (99.1)	1741 (99.4)	NS
Informed about adverse effects of TB medicines [5]	712 (81.6)	655 (74.6)	1367 (78.1)	<0.001
Advised TB patients to spit sputum at certain places to prevent spreading TB bacterium [6]	826 (94.7)	804 (91.6)	1630 (93.1)	<0.05
Advised about nutritious food and nutrition management [7]	841 (96.3)	799 (91.0)	1640 (93.7)	<0.001
Mean (SD) practice score [1–7]	6.7 (0.60)	6.4 (0.84)	6.6 (0.73)	<0.001
Proportion with practice score ≥6.6	650 (74.5)	563 (64.2)	1213 (69.3)	<0.002

NS: not significant.
Square brackets indicate the serial number of practice variables for constructing practice score.

Table 4. Mean TB knowledge[a] and practice[b] score by sociodemographic characteristics (n=1751)

Characteristic	n (%)	Mean (SD) knowledge score	p-value	Mean (SD) practice score	p-value
Religion					
Muslim	1209 (69.0)	6.8 (1.8)		6.6 (0.80)	
Non-Muslim	542 (31.0)	7.4 (1.8)	<0.001	6.6 (0.70)	NS
School education					
Secondary (6–10 years)	659 (37.6)	7.0 (1.7)		6.6 (0.68)	
Above secondary (≥11 years)	1092 (62.4)	6.9 (1.8)	NS	6.6 (0.76)	NS
Work experience >10 years					
No	863 (49.3)	6.7 (1.9)		6.5 (0.90)	
Yes	888 (50.7)	7.2 (1.7)	<0.001	6.7 (0.60)	NS
Age					
<39 years	965 (55.1)	6.7 (1.8)		6.5 (0.80)	
≥39 years	786 (44.9)	7.2 (1.7)	<0.001	6.6 (0.65)	<0.002
Knowledge about TB programme					
Yes	1607 (91.8)	7.1 (1.7)		6.4 (1.01)	
No	144 (8.2)	5.3 (1.8)	<0.001	6.6 (0.70)	<0.005
Exposure to BRAC community health worker for TB information					
No	851 (48.6)	6.6 (1.8)		6.5 (0.80)	
Yes	900 (51.4)	7.4 (1.7)	<0.002	6.6 (0.67)	NS
Perceived household economic status in last year					
Deficit	243 (13.9)	6.9 (1.7)		6.4 (0.88)	
No deficit	1508 (86.1)	6.9 (1.8)	NS	6.6 (0.70)	<0.001
Distance between TB programme office and provider's workplace					
<1 km	772 (44.1)	7.1 (1.7)		6.59 (0.75)	
≥1 km	979 (55.9)	6.8 (1.8)	<0.003	6.58 (0.73)	NS
Willingness of provider to disclose their TB (if they get it)					
Yes	1287 (73.5)	7.1 (1.8)		6.7 (0.64)	
No	464 (26.5)	6.6 (1.6)	<0.001	6.4 (0.92	<0.001

NS: not significant.
[a] Mean knowledge score [1–12] and practice score [1–7] were constructed from Table 2 and Table 3, respectively.

Each provider consulted around 16 presumptive TB patients and five TB patients on average in the last month (Table 3). Both trained and untrained providers reported that they usually (97.8–99.3%, 859–867) looked for other associated symptoms related to TB when suspecting its presence. Advice for sputum testing (96.3%, 1687) and for referring presumptive TB cases elsewhere was universal (99.4%, 1740). The most common place of referral was BRAC by trained providers (93%, 812; p<0.001) and the government hospital by untrained providers (75.9%, 667; p<0.004). However, a great majority of presumptive TB patients (79–87%, 694–759) were treated with medicines on first consultation by trained and untrained providers. Antibiotics (79.7%, 1396) and/or cough syrup (74–76%, 646–667) were commonly prescribed. Besides, trained providers advised on adverse effects of TB drugs, against spitting sputum indiscriminately, and taking food of appropriate quality and quantity in greater proportion than untrained providers.

Both the mean (7.5) knowledge score of the trained providers and the proportion (70.2%, 613) of these with a knowledge score higher than the mean were higher than the population average (6.97 and 59.9%,1048 respectively; p<0.001) (Table 2). Furthermore, the mean (6.7) practice score of the trained providers and the proportion (74.5%, 650) of these with a practice score higher than the mean were higher than the population average (6.6 and 69.3%, 1213 respectively; p<0.002) (Table 3). The higher knowledge and practice scores were observed by informal providers who knew about the TB programme and had work experience of >10 years (Table 4). The results of multiple regression analysis (Table 5) shows that informal providers who had training showed a significant association with increased knowledge and practice scores. Further investigation reveals that as the informal providers became more aware about the TB programme, progressed in age and had regular exposure to BRAC community health workers, their knowledge scores increased significantly (p<0.05).

Discussion

A large proportion of presumptive TB cases in Bangladesh often go to rural informal allopathic providers[6] despite the availability

Table 5. Multiple regression analysis for knowledge and practice scores of providers

Variable	For knowledge score					For practice score				
	B	SE	β	t	p-value	B	SE	β	t	p-value
Constant	0.160	0.061		2.615	<0.001	0.459	0.059		7.73	<0001
Untrained vs trained	0.126	0.025	0.129	5.093	<0.001	0.095	0.025	0.104	3.96	<0.001
Muslim vs non-Muslim	−0.052	0.025	−0.049	−2.125	<0.04	−0.001	0.024	−0.001	−0.055	NS
Secondary vs above secondary education	0.002	0.023	0.002	0.017	NS	0.003	0.023	0.004	0.151	NS
Years of work experience group	0.003	0.026	0.003	0.105	NS	0.058	0.026	0.063	2.267	<0.03
Age (<39 years vs ≥39 years)	0.086	0.026	0.087	3.27	<0.002	0.026	0.025	0.028	1.011	NS
Knowledge about TB programme (no vs yes)	0.283	0.044	0.159	6.423	<0.001	0.008	0.043	0.005	0.189	NS
Exposure to BRAC community health workers regularly (no vs yes)	0.073	0.024	0.075	2.993	<0.004	−0.023	0.024	−0.024	−0.950	NS
Perceived household economic status (deficit vs no deficit)	0.007	0.033	0.005	0.216	NS	0.080	0.032	0.060	2.527	<0.02
Distance between workplace of provider and TB programme office <1 km vs ≥1 km	0.018	0.024	0.018	0.754	NS	−0.003	0.023	−0.003	−0.116	NS
Willingness of provider to disclose their TB if they get it (no vs yes)	0.079	0.026	0.071	3.094	<0.003	0.113	0.025	0.108	4.459	<0.001

B: unstandardized coefficient; β: standardized coefficient' NS: not significant; SE: standard error of coefficient; t and p-value for significance.

of formal allopathic providers or formal healthcare facilities such as public hospitals. Thus, the TB programme in a given area cannot reach the goal of universal coverage without the involvement of informal healthcare providers.[9,10] The NTP of Bangladesh has already taken initiative to involve informal allopathic providers in the TB control programme under a public–private mix approach. The NTP started a 1-day training programme all over the country that began in 2005[11] to increase awareness among informal allopathic providers regarding the importance of TB control and of referring patients to appropriate places. This study aimed to understand how effective this orientation programme has been in improving the management of presumptive TB cases in the community. The findings reveal that trained providers still had misperceptions (i.e. TB is a disease of only males) as well as a lack of knowledge on the bacterial cause of TB, the best strategy for prevention of adult TB, the standard duration of TB treatment, the meaning of DOTS and multidrug resistance. Also, irrational use of antibiotics for relieving the cough symptom was very common among informal healthcare providers. The programmatic implications of these findings are discussed below.

It is interesting to observe that TB was still perceived as a disease of males after so many years of TB programme implementation. Whatever the underlying reasons, such misperception could interfere with the proper diagnosis of presumptive TB cases by rural informal allopathic providers. For example, in Afghanistan, TB is perceived as a disease of only females[12] and the detection rate of TB among females is higher in Afghanistan.[13] Another widely held perception among providers was that TB was primarily caused by smoking, similar to that among communities in Ethiopia and Tanzania.[14,15] The practical implication of this is that providers would not give due emphasis to non-smokers when suspecting TB cases.

Bangladesh adopted the DOTS strategy in 1993 for TB control and this currently covers the whole nation.[5] DOTS is important to ensure patient adherence to treatment until completion. Previously, knowledge of DOTS was totally absent among these providers.[6] However, findings from this study show that the situation has started to change for the better. This is commendable as lack of appropriate knowledge on DOTS was observed even among qualified practitioners in Kenya and Nigeria.[16,17]

Knowledge of providers on suggestive symptom of TB (chronic cough for ≥3 weeks) and transmission of TB was highly comprehensive, better than that observed for qualified practitioners in Pakistan.[18] This will ultimately help informal allopathic providers to detect suspected cases early and to send them for sputum testing. These providers were found to be familiar with the national policies on TB, such as free-of-cost treatment for TB patients. Similar findings were observed in China and India.[19,20] This knowledge improvement can be attributed to the orientation training, besides the role of mass media and BRAC's health workers in disseminating priority information in BRAC's TB control programme areas.

Although there was an improvement in initiating sputum testing for presumptive TB cases and appropriate referral from previous years,[6] irrational/improper use of antibiotics remains a very common practice and a matter of concern. Several reasons may be responsible: usual practice by rural providers for many years; lack of knowledge that inappropriate use of antibiotics is harmful; and pressure from patients for immediate relief. Such use of antibiotics by providers should be abandoned to prevent antibiotic resistance and to reduce the delay in TB diagnosis. If there is a delay in initiating diagnosis and treatment, there is a

probability of spreading the causative bacteria from the source. On the other hand, advice by providers to patients on continuing the full course of TB medicine and adverse reactions to TB drugs, as observed in this study, is welcome as this will help to prevent the emergence of multidrug resistance. Even the providers' advice on nutrition can be tapped for future nutritional management programme for TB patients.

Conclusions

It can be said that the 1-day orientation training imparted by BRAC in collaboration with the NTP of the Government of Bangladesh has had some positive impact on improving the knowledge and practices of informal allopathic providers towards TB management. However, such short training is inadequate in allaying misperceptions and increasing the depth of knowledge and should be addressed by expanded training with a scaled-up curriculum. In training, irrational use of antibiotics should be discouraged and attempts should be made to disseminate proper drug information to informal healthcare providers.

The main limitation of this study is that the responses of the providers were not validated by observations of their practice pattern. Another limitation of this study is that the randomness in recruiting the respondents of the training was not guaranteed. Therefore, it is possible that the 'trained providers' had better knowledge and practice or had favourable background characteristics prior to the training, thus biasing the comparison with the 'untrained' favouring the 'trained'.

Authors' contributions: QSI, SMA and MAI conceived the study; QSI, SMA, MAI, ASC and MAH designed the study protocol; QSI, ASC and BNS implemented the study; QSI analysed the data and drafted the manuscript; QSI, SMA and MAI critically revised the manuscript for intellectual content. All authors read and approved the final manuscript. QSI is guarantor of the paper.

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