Characteristics and perspectives of newly diagnosed sputum smear positive tuberculous patients under DOTS strategy in River Nile State – Sudan

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ABSTRACT

Setting: Tuberculosis (TB) remains a public health problem in Sudan, with a high prevalence despite the ongoing control efforts. **Objective:** The aim of this study was to determine the socio-economic factors and health seeking behavior of newly diagnosed TB patients and to evaluate the availability, accessibility and patients' satisfaction with the provided control services in River Nile State (RNS). **Design:** A descriptive cross-sectional health-facility based study in which 107 newly diagnosed sputum-smear positive pulmonary TB cases were recruited from all TB Management Units (n=16) in RNS. Socio-demographic data, knowledge, health seeking behavior, stigma and patients' satisfaction were obtained through a questionnaire. Information about TBMUs capacity was collected through a checklist. **Results:** Most patients were middle aged (56%). Male to female ratio 2.5:1.Most patients (94.4%) were non-employed. Thirty nine (36.4%) of patients were illiterate. Forty five (42.1%) sought health services more than 6 weeks following symptoms onset. Almost all 102(95.3%) patients were not aware of the DOTS strategy and 42(39.3%) recognized accurately the period needed to complete treatment. Patients' satisfaction with the TBMUs services was high. **Conclusion:** Pulmonary TB patients in RNS are mostly poor males. DOTS strategy needs to be implemented properly to produce the intended outcomes.
Key words: DOTS strategy, smear-positive cases.

INTRODUCTION

Tuberculosis (TB) is a public health priority in Sudan[(1)]. Although the Sudan National Tuberculosis Control Program (NTP) was established 1993[(1)] and the directly observed short treatment strategy (DOTS) was declared all over the country in 2002, yet the magnitude of TB is still enormous. Sudan, alone, accounts for 15% of the TB burden in the WHO Eastern Mediterranean Region (EMRO)[(1)]. The estimated prevalence of TB during 2009 is 209 cases per 100,000 of the population and the incidence is 50,000 cases per year[(2)]. In 2011 the indicators of case detection rate and successful treatment rate in Sudan were 79.5% and 85% respectively[(1)].

The sputum smear-positive (SS+) cases are the source of infection for the community[(3, 4)]. It is estimated that for each one SS+ case there are 10-20 TB cases in the community[(5)]. Contacts of SS+ are at high risk of infection[(6)]. Socio-economic factors of patients and their treatment-seeking behavior, as well as availability and accessibility of health services are among the most crucial factors for the success of the NTP control activities[(7)].

In River Nile State (RNS), to our best knowledge, no up-to-date published data about TB patients or control activities are available. Therefore, we aimed by this study to describe the socio-economic factors and health seeking behavior of SS+ patients and to evaluate availability, accessibility and patient's satisfaction with NTP services in RNS.

PATIENTS AND METHODS

Study area and Setting:

This study was conducted in RNS, north of Sudan. RNS lies between latitudes 16° - 22° and longitudes 32° - 36°, covering an area of about 122,000 km^2. The population is about 1,250,000. More than two thirds of the population are resident in the rural

areas. The state is divided into 7 Municipalities/ Localities and about 24 Administrative Units. The NTP operates as an integral part of the public health system with control program structures at national, state and locality levels. In the year 2010, there were 16 Tuberculosis Management Units (TBMUs) distributed all over the state, consisting of public hospitals and Primary Health Care (PHC) centers. TBMUs provide diagnostic and treatment and counseling services through a clinical laboratory, a pharmacy, and an outpatient clinic; there is also a statistical unit for registration and reporting. TBMUs in hospitals are managed either by a specialist physician or a medical officer, while those in PHC centers are managed by medical assistants. There is a referral system for those who need further investigations and care. NTP in RNS was first inaugurated in1997.The TBMUs are considered sentinel sites for TB surveillance system. At the time of this study the NTP treatment policy was for an intensive phase of rifampicin, isoniazid, pyrazinamide and streptomycin daily under direct supervision for two to three months until the patient became smear negative followed by eight months of isoniazid and ethambutol[8]. Patients unable to attend on a daily basis were put on a 12-month regimen excluding rifampicin. Smear-negative pulmonary patients and non severe extra-pulmonary cases were given isoniazid and ethambutol daily for twelve months, supplemented by daily streptomycin injections during the initial phase[9]. The usual practice for patients in our settings, once diagnosed, is to receive the anti-tuberculous dose for the whole month, use it at home and re-visit the TBMU every month for the new dose. There is no direct supervision for compliance, and the regular attendance is on voluntary basis. Sputum samples are tested initially and then consecutively according to the NTP guidelines. Reports are submitted quarterly from the TBMUs to the NTP at state then national levels.

Study design and sample size:
This was a descriptive cross-sectional facility-based study. A total of 589 TB patients were registered in the 16 TBMUs in RNS during the study period (1st of July 2009 up to 30th of June 2010). Newly diagnosed SS+ patients who were regularly attending the TBMUs during February 2010 were included. One hundred and seven out of the 153 (70%) of the newly diagnosed SS+ adults in the 16 TBMUs participated in this study. Home visits were made to some cases.

Data collection:
Data was collected through an interviewer-administered, pretested questionnaire that was modified from the NTP validated questionnaire. The questionnaire consisted of 5 sections. Besides the socio-demographic data and accessibility to health services, knowledge, health seeking behavior and patient satisfaction were assessed.
TBMUs infrastructure and fitness-for-purpose capacity was assessed using an NTP-validated checklist[10].

Statistical methods:
Obtained data was cleaned, double-checked, validated, entered and analyzed using the Statistical Package for Social Sciences (SPSS) version 16 computer program. Frequencies, means, Standard Deviations and cross-tabulations were calculated. P values less than 0.05 were considered statistically significant.

Ethical approval:
Verbal informed consent was obtained from each participant prior to enrollment. The following information was given during data collection to ensure they had the information needed to make the informed consent: the participation was optional; there would be no penalty for refusal; a complete description of the aims of the study; potential benefits and risks; assurance of confidentiality of any information given. Any other additional information requested by participants was provided during data collection. All information obtained was kept confidential. An ethical clearance of the research was obtained from the Ethical Committee of the Faculty of Medicine - Nile Valley University and the State Ministry of Health.

RESULTS
Of the 107 newly diagnosed smear-positive pulmonary TB patients, males were 76 (71%). The male to female ratio was 2.5:1. The age range was 15 to 72 years, mean 41 years. The most common age group was 15 – 24 years (22.4%),
Most patients were of low educational level, low economic status and most had a big family size. Nineteen percent of patients had a positive family history of pulmonary TB. Table 1 shows the socio-economic characteristics of the study group.

Table (1): The socioeconomic and demographic characteristics of TB patients in RNS, 2010 n=107

Parameter	Frequency
Age (years)	
15-24	24 (22.4%)
25-34	17 (15.9%)
35-44	19 (17.8%)
45-54	16 (15.0%)
55-64	22 (20.6%)
56 and above	9 (8.4%)
Gender	
Male	76 (71%)
Female	31 (29%)
Occupation	
Idle	27 (25.2%)
Free worker	38 (35.6%)
Subsistent Farmer	17 (15.9%)
House wife	19 (17.8%)
Employee	6 (5.6%)
Educational level	
Illiterate	39 (36.4%)
Khalwa* & Primary	41 (38.3%)
Secondary	22 (20.6%)
College	5 (4.7%)
Family members	
1-3	12 (11%)
4-6	45(42%)
More than 7	50 (47%)
Family history of TB	
Positive	20 (19%)
Negative	74 (69%)
Don't know	13 (12%)

*Khalwa is an informal religious education

Table 2 summarizes patients' knowledge regarding the infectious nature of the disease, availability of medications and awareness about the DOTS strategy. Seventy two (67.3%) of patients recognized the contagious nature of the disease. Seventy eight (72.9%) knew that anti-tuberculous medications were provided free of charge in TBMUs. Almost all 102(95.3%) patients didn't hear about DOTS strategy. Only 42(39.3%) of patients recognized the exact duration needed to complete their treatment regimen.

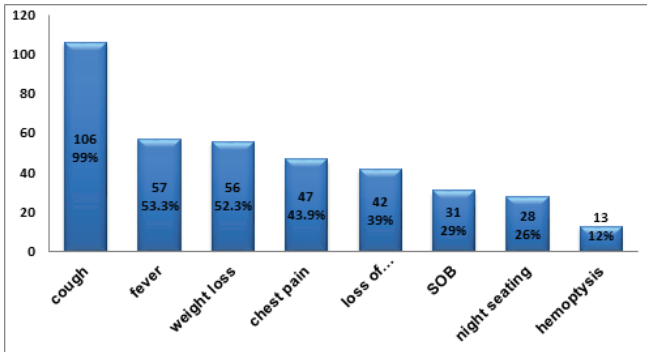
Stigma of the disease was not uncommon as 27(25.2%) of patients were stigmatized, while 19(17.8%) were completely isolated by their communities.

Table (2): Knowledge of, and stigma among TB patients in RNS, 2010(n=107)

Parameter	Frequency
Knowledge about the contagious nature of TB	
Yes	72 (67.3%)
No	35 (32.7%)
Knowledge about the availability of free-of-charge medications	
Yes	78 (72.9%)
No	29 (27.1%)
Hearing about DOTs strategy	
Yes	5 (4.7%)
No	102 (95.3%)
Accurate knowledge about the duration of TB treatment regimen	
Yes	42 (39.3%)
No	65 (60.7%)
Stigmatized by the community	
Yes	27 (25.2%)
No	80 (74.8%)

Figure 1 depicts frequencies of the most common symptoms among TB patients.

Figure (1): Frequency of the symptoms of TB patients in RNS, 2010 (n=107)



*SOB: shortness of breath.

Table 3 summarizes the treatment seeking behavior of patients. Forty five (42.1%) patients had been complaining of their symptoms for more than 6 weeks before consulting health personnel. Public health facilities were preferred by most patients, 70(65.4%) visited hospitals and 33(30.8%) went to PHC centers. Most patients 80(75.1%) were diagnosed within 2 to 7 days, and 96 (89.8%) started medications within 2 to7 days following diagnosis.

Table (3): Treatment seeking behavior of TB patients in RNS,2010(n=107)

Parameter	Frequency
Duration of TB symptoms before consultation	
2 weeks or less	11 (10.3%)
3-4 weeks	20 (18.7%)
5-6 weeks	30 (29.0%)
More than 6 weeks	45 (42.1%)
Person first consulted for symptoms	
Doctor	76 (71.0%)
Medical assistant	25 (23.4%)
Traditional healer	4 (3.7%)
Pharmacist	2 (1.9%)
Health facility sought for treatment	
Public hospital	70 (56.4%)
PHC center	33 (30.8%)
Private clinic	4 (3.7%)
Time needed to establish diagnosis:	
2-3 days	47 (43.9%)
4-7 days	34 (31.8%)
14-21days	21 (19.6%)
22-30days	5 (4.7%)
Time needed to start medications following diagnosis:	
2-3 days	74 (69.2%)
4-7 days	22 (20.6%)
14-21days	10 (9.3%)
22-30days	1 (0.9%)

Table 4 displays the accessibility of patients to TBMUs as well as their affordability for treatment. Most patients 69(64.5%) used public transportation to access the TBMUs. The estimated distance was more than 5 kilometers for (61.7%) of patients. More than halve 60(56%) considered the overall cost of treatment was high.

Table (4): Accessibility to TBMUs and affordability of TB patients in RNS , 2010(n=107)

Parameter	Frequency
Distance to health facility (km)	
5	41 (38.3%)
6-9	20 (18.7%)
10-20	14 (13.1%)
>21	32 (29.9%)
Time needed to reach health facility (hours)	
<0.5h	29 (27.1%)
0.5-1h	33 (30.8%)
>1h	45 (42.1%)
Type of transportation	
Public	69 (64.5%)
Private	23 (21.5%)
On foot	9 (8.4%)
Cost of transportation in SDG per visit	
1-10 (Low)	71 (66.3%)
11-20 (Medium)	23 (21.5%)
More than 20 (High)	4 (3.7%)
Payment by patients to some TBMUs services	
Yes	28 (26%)
No	79 (74%)
Patients' evaluation of the overall cost of visits to TBMUs	
Expensive	60 (56%)
Reasonable	47 (44%)

patients' satisfaction with TBUMs in RNS is shown in table 5. Most patients 66(61.7%) were satisfied with the attitude of health personnel, 53(49.5%) with the services provided and 74(69.2%) with the preparedness of the TBMUs to meet their needs.

Table (5): TB patients' satisfaction with TBMUs in RNS, 2010 (n=107)

Parameter	Degree of satisfaction			Total
	Fully satisfied	Satisfied	Not satisfied	
Attitude of health workers towards TB patients	38 (35.5%)	66 (61.7%)	3 (2.8%)	107 (100%)
Services provided by health works	52 (48.6%)	53 (49.5%)	2 (2.9%)	107 (100%)
Preparedness of TBMUS	23 (21.5%)	74 (69.2%)	10 (9.3%)	107 (100%)

Table (6): Evaluation of the fitness-for-the-purpose capacity of the TBMUs in RNS 2010(n=16)

Parameter	Overall performance of listed indictors				
	1	2	3	4	5
Infrastructure :					
Indicators: Physical status, safety, sanitary services and regular maintenance.		2			
Health workers :					
Indicators: Qualification, training, counseling and handling patients with dignity.			3		
Laboratory :					
Indicators: Physical presence, training, resources and registration.			3		
Statistics and reporting system:					
Indicators: Accuracy and completeness of records.			3		

1= very satisfactory or excellent 5=very unsatisfactory or poor

DISCUSSION

The WHO goal for TB control is to detect 70% of new SS+ TB cases, and cure 85% of these cases[11]. This goal may be achieved if NTP is properly implemented. Implementation of the stated guidelines requires adjustments to suite the local circumstances of the community, as well as patient characteristics. In this study we explored TB patients' characteristics, their perception and satisfaction with the services provided by the NTP. Males were more commonly affected than females, a finding that is similar to that reported in other studies[12, 13]. Illiteracy and poverty are common among TB patients as in other reports[14]. Whether these are predisposing factors or consequences of the disease, or both, needs to be elaborated. These factors are old associates of the disease, but little may be done by the NTP to break this association. TB affects the productive age group in RNS as seen also in some African countries[14]. This fact may, partially, be explained by the fact that most populations of developing nations are among the young age groups. Most patients in this study have a big family size, a factor that may contribute to poverty in many ways; and may also facilitate spread of the disease to other family members. Therefore, not astonishing that one fifth of our study group reported a positive family history of TB.

Despite the assumption that TB patients should be treated under DOTS strategy, almost all patients did not hear about it and were not aware of its exact nature. This simply means inadequacy of communication between health personnel and patients and may indicate improper implementation of the strategy. As we stated previously, anti-tuberculous medications are prescribed for the whole month and patient's compliance is not checked. So the condition of the "directly observed" component of the strategy is not fulfilled. Practical reasons of accessibility and affordability may explain this improper implementation of DOTS. The NTP in RNS adopts strategies to improve this situation through supervision by a family member. Another incentive offered to patients so as to attend their monthly visit was through provision of dry food ration together with anti-tuberculous medications in TBMUs. A substantial proportion of patients spent more than 6 weeks before seeking health consultation. This duration is crucial for

progression of the disease, and infectivity to others. This period is higher than that reported in Gezira state[15].

Transportation difficulties, far distances and high costs are expected to impose negative consequences on health seeking behavior as well as adherence and compliance to medications.

The relatively short duration for establishing diagnosis and receiving treatment reflects the standard recommended practice, and is better than that reported from some countries with similar settings[16, 17].

A considerable number of patients were stigmatized by their disease in the community, some were totally isolated. This would negatively affect case detection rate and health-seeking behavior. However, in some countries the situation is worse[12].

Most patients in this study were satisfied with the health workers attitude, services provided, and preparedness of TBUMs to meet their needs. However, a few complained of lack of privacy, as they are managed in the outpatient or the general referral medical clinics, and usually once per week. This may cause unnecessary delay in diagnosis and treatment; and would negatively affect the heath education sessions ought to be provided for TB patients. This is against the proper implementation of the DOTS strategy.

The infra-structure of the TBMUs needs consideration. As there were no places for hand washing, no waste management system and no infection control measures. These findings may increase the risk of infection for health workers as well as other non-TB patients and co-patients in the health facility and the community as a whole.

The laboratory diagnostic capacity was good in terms of human resources, equipment and reagents. Only one of the 16 TBMUs had no laboratory services. In some TBMUs, the laboratory services were available only one or two days per week, this may contribute to delays or patients default and is against DOTS strategy.

The health care providers were well trained and they were available during the working hours. But, as we noticed, there was lack of counseling services; a missing corner stone in DOTS strategy.

The recording and reporting system needs more strengthening, as information was inadequate and had a poor quality. Missing and incomplete data were common, as well as inconsistency between laboratory data and final statistical reports.

The absence of contact investigation system and defaulter tracing system increases the missed opportunities for discovering more TB cases, along with the increased public health risk and development of multidrug resistance (MDR).

The limitations of this study include, among others, the cross-sectional design and the small sample size that may not allow generalizations to be made. The high illiteracy rate among patients as well as recall bias may not allow fair evaluation of the effectiveness of the NTP, that has definitely achieved a lot in TB control. However, the findings of this study may reflect, to some extent, the real situation of TB in our state and may constitute a database for policy makers and future researches that would help disease control and management.

CONCLUSION

Poverty and illiteracy were common factors among SS+ TB patients in RNS. DOTS strategy was not properly implemented: no direct observation for treatment, poor health education for patients and inadequate days for TB clinics. However, patients were satisfied with the services provided. TBMUs were fairly equipped to achieve their intended mission.

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