Tuberculosis Prescription Practices In Private And Public Sector In India

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Abstract: Introduction: India has the highest burden of tuberculosis in world, accounting for 20% of global incidence of TB (Tuberculosis). TB treatment is available both in private and public sector in India. Aim & objectives: The current study was carried out to study and compare the prescribing practices of anti-tuberculosis medications by private practitioners and healthcare providers in public sector (under RNTCP-Revised National Tuberculosis Control Programme). Material and Methods: 105 anti TB prescriptions of private practitioners and 105 RNTCP (Revised National Tuberculosis Programme) treatment cards were analysed. Results: 9.52% prescriptions by private practitioners and 4.76 % RNTCP prescriptions were correct. Factors for drug resistance were present in 67.62 % of prescriptions by private practitioners and 28.57 % of RNTCP prescriptions whereas overdosing was present in 53.33 % of prescriptions by private practitioners and 68.57 % of RNTCP prescriptions. Conclusion: The anti TB treatment offered in private and public sector in India is not satisfactory at present and needs to be improved.[Mishra G et al NJIRM 2013; 4(2) : 71-78]

Key Words: Tuberculosis, TB, TB treatment, TB prescriptions, RNTCP, Private Practitioners

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Introduction: India has the highest burden of tuberculosis in world, accounting for 20% of global incidence of TB (Tuberculosis). This is due to the neglect of TB as a public health problem and mismanagement of TB patients in both public and private sectors. Thus the success of any global effort to control tuberculosis is critically dependent on the success of such an effort in India.[1]

Inspite of a significantly strengthened RNTCP (Revised National Tuberculosis Control Programme) and the progress made, 50-80% of TB patients in India still seek care at private clinics and TB treatment offered in the private health sector remains substandard.[2] Thus even though, RNTCP had covered the whole of India by March 2006, the majority of the population still prefer the private practitioners for anti tuberculosis treatment.

In 2008-2009, India had the largest relative sales volume of first line anti TB drugs annually. The private market in India sold enough first line TB drugs to provide 117% of India's estimated annual incident cases with a standard 6–8 month regimen.[3]

In a study on the role of private practitioners in National Tuberculosis Control Programme, it was found that 90% of them prescribe drugs that are used in short course chemotherapy and 67% depend upon the advice of representatives of pharmaceutical firms about current treatment of tuberculosis.[4] Apart from causing prolonged morbidity and increased mortality from the disease, poor prescribing practices also fuel the emergence and spread of drug resistant organisms, and are most certainly one of the reasons why India accounts for over a fifth of the global MDR-TB (Multi Drug Resistant Tuberculosis) burden, with indicators showing a rising trend.[1]

Aim & Objectives: The current study was carried out to study and compare the prescribing practices of anti-tuberculosis medications by private practitioners and healthcare providers in public sector (under RNTCP).

Review of literature: Various studies on anti-tuberculosis prescriptions in India have shown the proportion of faulty anti-tuberculosis prescriptions to range from 50% to 100%. (Table no. 1).

Uplekar et al. in their study among private doctors practicing in Mumbai slums found that 53% of the anti-tuberculosis prescriptions were faulty. Also the study revealed that 100 private doctors prescribed 80 different regimes, most of which were inappropriate and inexpensive.[6]

Two decades later, a similar study was reported by Udwadia et al. regarding prescribing practices of private practitioners in treatment of tuberculosis in the same geographical area (Mumbai). This time 106 doctors prescribed 63 different regimes and

94.3% of the anti-tuberculosis prescriptions were faulty. The study concluded that "with a vast majority of private practitioners unable to provide a correct prescription for treating TB & not approached by the national TB programme, little seems to have changed over years".[2]

During the above period, various other studies were done on anti-tuberculosis prescription practices but with almost similar results.[7-12] While the studies have been done on anti-tuberculosis prescription practices in private sector, there is paucity of literature on similar studies being done in public health sector which is expected to follow RNTCP guidelines for treatment of tuberculosis. World Health Organisation has time and again come up with evidence based guidelines for both daily and intermittent chemotherapy in tuberculosis. The most recent guidelines on treatment of tuberculosis was published by World Health Organisation in 2010.[5]

Table 1. Various studies on Anti TB prescriptions in India

Author	Year	Study group (Cohort)	Place	Prescriptions*	% of Faulty Prescriptions
Uplekar MW et al.6	1991	Private doctors, practicing in slums	Mumbai	102	53%
R.F.Jain7	1998	Allopathic Postgraduate physicians	Amravati	101	70%
N. Singla et. al8	1998	Primary doctors	Delhi	187	62.3%
A. Bhalla9	2001	Residents and Faculties of a Medical institute	Chandigarh	40	50%
Prasad et al10	2002	Allopathic primary physicians	Lucknow	449	75% **
R.K.Baxi et al.11	2006	General Practitioners	Vadodra	19	100%
Nimisha Vandan et al12	2008	Medical Physicians	Lucknow	141	At least 71%
Udwadia Z.F. et al.2	2010	General practitioners	Mumbai	106	94.33%
Current Study	2012	Private Practitioners	Nagpur	105	90.48%
		RNTCP regimes from Medical College TB Unit (TU)	Nagpur	105	95.24%

* Number of prescriptions studied (directly or in questionnaire based study).
**30% due to wrong doses, 64.5% treatment duration.

Table 2. Recommended doses of first-line anti-tuberculosis drugs for adults

Drug	Recommended dose			
	Daily		3 times per week	
	Dose & range (mg/kg body weight)	Maximum (mg)	Dose & range (mg/kg body weight)	Daily maximum (mg)
Isoniazid	5 (4-6)	300	10 (8-12)	900
Rifampicin	10 (8-12)	600	10 (8-12)	600
Pyrazinamide	25 (20-30)	-	35 (30-40)	-
Ethambutol	15 (15-20)	-	30 (25-35)	-
Streptomycin	15 (12-18)		15 (12-18)	1000

The International Standards for Tuberculosis Care (ISTC) describes a widely accepted level of care that all practitioners, public and private should seek to achieve in managing patients who have or are suspected of having tuberculosis. Standards 8 of the ISTC states that, "The doses of anti-tuberculosis drugs used should confirm to international recommendations".[13] The recent World Health Organisation guidelines recommends the doses of anti-tuberculosis drugs (Table no. 2) and further states that the daily regime be preferred over thrice weekly regime.[5]

Material & Methods: All the patients attending the Department of Pulmonary Medicine Outdoor Patient Department at Government Medical College & Hospital, Nagpur, who gave history of previous treatment with anti tuberculosis drugs by private practitioners, were requested to deposit a Xerox of their prescriptions for this study. 105 patients agreed to deposit their prescriptions. Similarly during the same period the details of treatment of patients registered under RNTCP programme at the Tuberculosis unit in the Medical College were studied. 105 prescriptions under RNTCP (as per RNTCP treatment card) were included in the study. The 1st recent prescription of anti TB drugs of each patient was enrolled in the study. Any modification in the regime on account of adverse reactions or co morbidities excluded the prescription from the studies. Any case of diagnosed drug resistant tuberculosis was excluded from the study.

The data from these prescriptions along with the demographic data of the patients taking treatment in both groups (viz. Taking treatment from private practitioners or RNTCP) was then entered into a Microsoft excel programme especially designed for the study and then subsequently analysed. Proportion method was used for data analysis and comparison of parameters among the two groups. The two proportion Z test was utilized for comparing parameters among the two independent groups (Viz. RNTCP prescriptions and Private Practitioner prescriptions). Significance was measured at the level of $p < 0.05$ and $p < 0.01$ was considered highly significant. The prescriptions were then evaluated by the software programme as per the recent WHO guidelines and a prescription was labelled to be correct if it fulfilled all of the following criteria: [5]

- At least 4 first line anti TB drugs were prescribed.
- All the drugs were in doses as per weight as per WHO recommendations.
- All the drugs were prescribed to be taken at once or at the same time.
- The prescription did not contain any second line ant TB drug since all diagnosed drug resistant TB patients were excluded from the study

Results : A total of 105 prescriptions from private practitioners and 105 treatment cards from RNTCP were included in the study. The various parameters of anti TB prescription in private and public sector are presented in table no. 3.

Table 3. Comparison of Anti TB treatment parameters between Private and Public Sectors

Sr. No.	Prescription Dosing	Private Practitioners		Public Sector (RNTCP)		P value	
1	Correct	10	(9.52 %)	5	(4.76 %)	0.1804	NS*
2	Faulty	95	(90.48 %)	100	(95.24 %)	0.1804	NS*
3	Suboptimal	56	(53.33 %)	30	(28.57%)	0.0003	HS***
4	Overdose	56	(53.33 %)	72	(68.57 %)	0.0236	S**
5	Factors for drug resistance	71	(67.62 %)	30	(28.57%)	<0.0001	HS***
*NS= Not significant, **S= Significant, *** Highly Significant							

Prescription by private practitioners: Out of the 105 prescriptions made by private practitioners, only 10 (9.52%) were correct. The remaining 95 (90.48%) were faulty. (Figure 1)

Suboptimal dosing was present in 36 (34.29%) prescriptions, overdosing was present in 36 (34.29%) prescriptions and both suboptimal dosing as well as overdosing was present in 20 (19.05%) prescriptions. Thus overall suboptimal dosing was present in 56 (53.33%) prescriptions and overdosing was present in 56 (53.33%) prescriptions. (Figure 2)

As per individual drugs, faulty prescriptions (suboptimal or overdoses/ split dosing) were found in 64 of 104 prescriptions (61.54 %) in respect of INH, in 40 of 103 prescriptions (38.84 %) in respect of Rifampicin, in 58 of 93 prescriptions (62.37 %) In respect of Pyrazinamide, in 48 of 101 prescriptions

(47.53 %) in respect of Ethambutol and in 1 of 10 prescriptions (10 %) in respect of Streptomycin. Anti tuberculosis treatment was initiated with a minimum 4 drugs in 91 patients (86.67 %), with 3 drugs in 9 patients (8.57 %), with 2 drugs in 3 patients (2.86 %) and monotherapy with one drug (Ethambutol) in 1 patient (0.95 %). Second line drugs were started in 24 (22.86%) cases in addition to the 1st line drugs. The drugs being as follows: Prescriptions containing Kanamycin (1), Ethionamide (1) & Ofloxacin/ levofloxacin (24). First line anti TB drugs were prescribed in split dosing in 25 (23.81%) patients rather than once a day dosing.

Factors for drug resistance (i.e. suboptimal dosing, split dosing, lesser number of drugs & prescription of second line anti TB drugs to non MDR TB cases) were present in 71 (67.62%) prescriptions. (Figure 3)

Prescription under RNTCP: Out of the 105 prescriptions studied under RNTCP, only 5 (4.76 %) were correct for doses as per body weight of the patient. The remaining 100 (95.24 %) were faulty in respect of doses of drugs as per body weight (Figure 1)

Suboptimal dosing was present in 28 prescriptions, overdosing was present in 70 prescriptions and both suboptimal dosing as well as overdosing was present in 2 prescriptions. Thus overall suboptimal Dosing was present in 30 prescriptions and overdosing was present in 72 prescriptions (Figure 2).

Figure 1: Anti TB Prescriptions among Private Practitioners and RNTCP

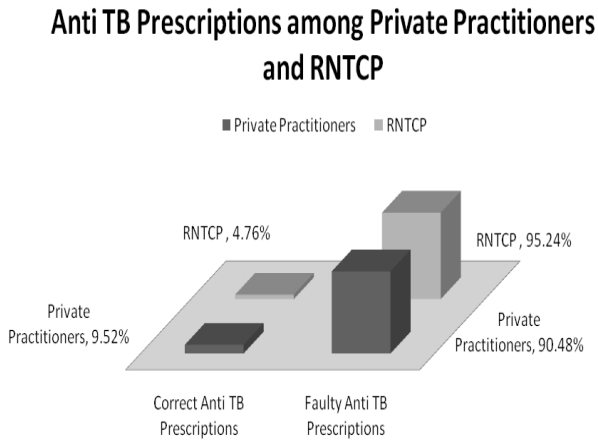


Figure 2: Anti TB Prescriptions with Overdoses

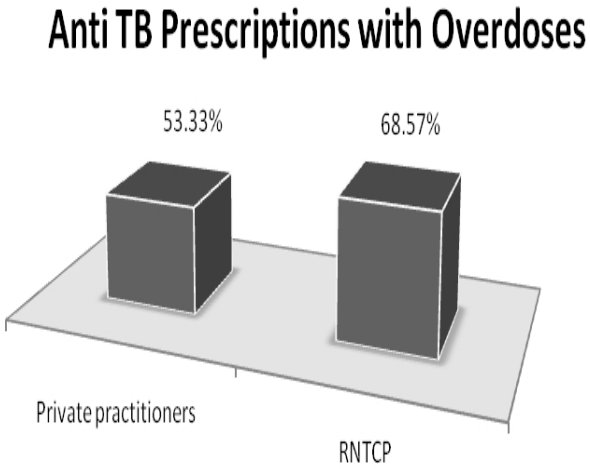
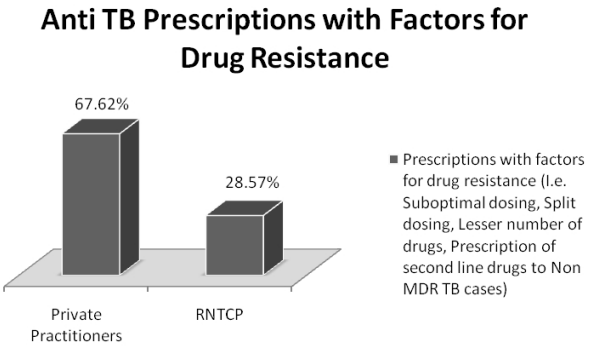


Table 4. Specialty wise Anti TB prescription practices in Private sector

Specialist	% of patients initiated on Anti TB Treatment	% of correct Anti TB Prescriptions among those initiated
General Practitioner Non MBBS	1.91	0
General Practitioner MBBS	16.19	5.88
General Physician (Medicine Specialist)	44.76	12.77
General Surgeon	6.67	0
Chest Physician	19.05	15
Orthopedician	2.86	0
Paediatrician	8.57	0

As per individual drugs, faulty prescriptions were found in 51 of 105 (68.57 %) in respect of INH, in 34 of 105 (32.38 %) in respect of Rifampicin, in 51 of 105 (48.57 %) in respect of Pyrazinamide, in 44 of 105 in respect of Ethambutol and in 1 out of 17 (5.88%) in respect of Streptomycin.

Figure 3: Anti TB Prescriptions with Factors for Drug Resistance



Anti tuberculosis treatment was initiated with a minimum 4 drugs in all 105 (100 %) patients. Thus overall a prescription regime of a minimum of 4 drugs in once a day/ alternate day dosing (without split dosing), without any second line drugs was initiated in 105 (100%) prescriptions. Overall factors for drug resistance were present in 30 (28.57 %) prescriptions (Figure 3).

Comparison of anti TB treatment parameters between private and public Sectors: The comparison of various anti TB treatment parameters between private and public Sectors is shown in table 3.

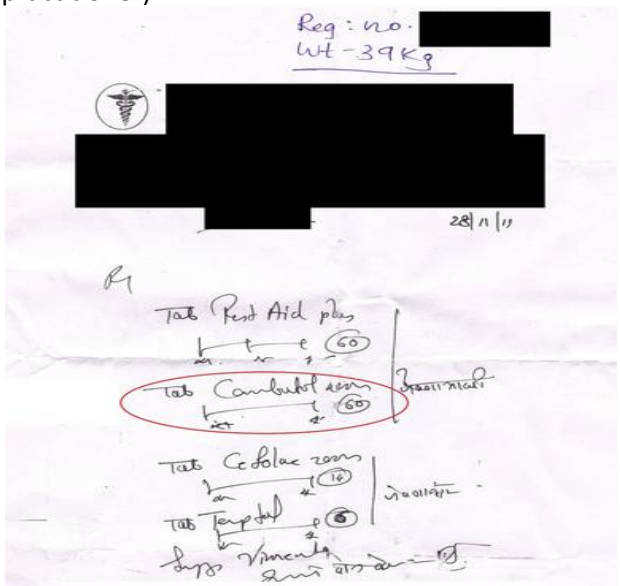
Specialty wise Anti TB prescription practices in Private sector: The distribution of specialty wise anti TB prescription practices in private sector is shown in table 4. The % of correct anti TB prescription was maximum among chest physicians (15%).

Discussion: In the present study, anti tubercular prescriptions were faulty in 90.48% of prescriptions made by private practitioners and 95.24% of RNTCP prescriptions. This data is in accordance with results found in similar other Indian studies.[2, 6-2]

Factors for emergence of drug resistant tuberculosis include suboptimal dosing, split dosing, inadequate number of anti tubercular drugs and prescription of second line anti TB drugs to non drug resistant tuberculosis patients.[14]

In the current study, when comparing individual parameters, the suboptimal dosing as well as overall factors for drug resistance were high in prescription of private practitioners, when compared to RNTCP prescriptions and this difference was statistically highly significant.

Thus factors for treatment failure and emergence of drug resistance were high in prescriptions by private practitioners as compared to RNTCP practitioners. Inadequate regimes which are most commonly prescribed in private clinical practice increase the risk of treatment failure and relapse.14 This can be exemplified by one of the prescriptions in this study (Photograph 1: Anti tuberculosis prescription by a private practitioner).



Photograph 1: Anti tuberculosis prescription by a private practitioner

The prescription has only one anti tubercular drug viz. ethambutol prescribed in a dose of 400 mg twice a day. Thus in today's era also there are

prescriptions of monotherapy of anti TB drugs. Even this single drug was not prescribed in the correct dose and was prescribed in split dosing. The correct dose of ethambutol for this adult patient weighing 39 kg would have been 585 mg to 780 mg per day single once a day dose as per the WHO guidelines. Thus the inadequate number of anti tubercular drugs (monotherapy) & incorrect dosing (split and inadequate dosing) make this regime faulty. This prescription is very high risk factor for development of drug resistant tuberculosis in the patient. It needs to be stressed here that the combination of drugs prevents the appearance of resistance, because it avoids the selection of naturally resistant mutants, hence always adequate number of anti-tubercular drugs should be prescribed. Single dose administration of all anti tubercular drugs in the recommended doses is important so as to achieve the desired serum concentration of these drugs. Both these factors are extremely important to prevent emergence of drug resistant tuberculosis. [14]

On the other hand, overdosing of anti-tubercular drugs was high in RNTCP prescriptions, which is a risk factor for drug toxicity, intolerance and hence defaults due to such adverse effects of anti-tubercular drugs. Drug toxicity can result in treatment failure and sometimes death if adequate care is not provided promptly. Also, changes in treatment necessitated by toxicity can prolong duration of treatment especially in older patients.[14]

A major cause of this drug toxicity is the absence of weight bands in patients weighing more than 30 kg. The current study revealed that in the RNTCP, the majority of faulty prescriptions were for INH. This can be explained from the fact that all patients weighing more than 30 kg receive the same 600 mg of INH thrice weekly under RNTCP. [15] The current WHO guidelines recommend an INH dose of 10 mg/kg (8 to 12 mg/kg).[5] According to these guidelines the 600 mg dose of INH would be considered appropriate only for patients with weight >50 kg.

In an article on drug toxicity, published in 1986, the TRC (Tuberculosis Research Center Chennai) concluded that: “There is a tendency for Indian patients to receive high drug doses in terms of body weight, as fixed doses which have been fixed for heavier western patients are transferred without adjustment to light weight Indian patients.”[16] The RNTCP view on this issue can be gauged from the fact that, the RNTCP in its recommendation in 1997 had stated: “For adults, drugs will be given in the recommended number of pills/capsules irrespective of body weight.”[17] Later, the RNTCP recommended that adult patients weighing <30 kg be given regimes according to body weight and subsequently separate weight bands were instituted for this group.[15] Also DOTS Plus programme (National TB programme for management of Drug Resistant Tuberculosis) currently has 5 weight bands (<16 kg, 16 to 25 kg, 26 to 45 kg, 46 to 70 kg, > 70 kg).[18] On similar lines, separate weight bands in patients >30 kg of weight need to be constituted for RNTCP patients.

High dosage increases toxicity without a commensurate increase in efficacy and low dosages may reduce efficacy and allow emergence of resistance. First line drugs should be taken as a single dose. Splitting first line drugs into several doses per day lowers the peak concentration and therefore reduces efficacy and may increase the risk of emergence of drug resistance.[14]

In private sector, the specialty wise distribution of the anti-tubercular prescriptions revealed that correct proportion of anti TB prescription was maximum in prescriptions prescribed by Chest Physicians. It is therefore desirable that specialist opinion be sought in all cases for initiation of anti TB drugs, as far as possible.

If a patient develops drug resistance because of incorrect ingestion of medication, this is the legal and ethical fault and responsibility of the treatment system for failing to organize treatment, including direct observation effectively.[14]

It needs to be mentioned here that nobody prescribes wrong doses deliberately; it may

happen due to oversight, heavy rush of patients, lack of communication, etc.[7] Also lack of update or upgradation of existing knowledge or not keeping pace with correct evidence based scientific principles of management as per current guidelines are further contributing factors.

Programmatic constraints in field conditions are also a factor that needs to be considered in programmatic management of TB in the public sector during assessment of correctness of TB prescriptions in the public sector.

Possible solutions to correct the high amount of faulty anti TB prescriptions could be as follows:

In Private sector: Mandatory training/ Continuing Medical Education (CME) programmes (duly accredited) should be given at regular intervals to all doctors treating tuberculosis in any form. In absence of such training, the patients need to be referred to specialists/ institutes accredited for treating such patients. Thus knowledge update and upgradation regarding correct and rationale anti TB prescription guidelines be made mandatory for all doctors prescribing anti TB medications.

There should be separate accreditation for prescribing anti TB drugs. Over the counter sale of anti TB drugs (without prescription) should not be allowed.

Compulsory notification of all TB cases: This step has recently been initiated. However a further provision of rectification of any prescription if found faulty, should be included.

In Public sector: The RNTCP programme needs to be updated as per the existing international guidelines. Also, creation of more weight bands in patients weighing more than 30 kg needs to be done. Where specialists are available, there services should be utilized and the doses should be individualized by them.

Non-maleficence – "first, do no harm" (*primum non nocere*) is one of the basic principles of medical ethics.[19] Prescribing faulty treatment regimes which lead to the development of risk factors that worsen the disease condition (tuberculosis in the present context) does not conform to this basic principle of medical ethics. All the prescribing doctors should be aware of this.

The present study highlights the current state of treatment of tuberculosis in both private and public sector in India. The treatment offered in both the sectors still has many lacunae in them. Today in the era of evidence based medicine, treatment based on principles backed up by well-established scientific evidence is the need of the day. Guidelines are in place for individualized and standardized treatment of tuberculosis and they need to be followed and implemented at the national level.

Acknowledgement: The authors thank all the Resident doctors in the Department of Pulmonary Medicine for their help in data collection.

Conflict of interest: None
Funding: None

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