Comparison of Pulmonary TB DOTS clinic medication before and after the introduction of daily DOTS treatment and attitudes of treatment defaulters in the Western Division of the Gambia

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Abstract

Background: Over a third of the world's population is infected with the tuberculin bacteria. In 1993 WHO launched the DOTS-strategy to enhance treatment compliance. Despite Gambia's adaption in 1985 it falls below WHO target of 85% cure rate. The defaulter rate was 14% in 2001, which reached 16% in the urban areas of the Western Division in 2003.

Objectives: This study aimed to compare TB treatment and outcomes before and after the introduction of daily directly observed therapy (DOTS) medication and the perceptions/attitudes of defaulters in the Western Division of the Gambia.

Methods: The study employed a mixed study design; a quantitative cross sectional study that reviewed the clinic records of pulmonary TB patients before and after the introduction of daily TB-DOTS medication and an in-depth interview of defaulters on the daily medication. The study was conducted at the Brikama TB-clinic in Gambia, located at the main hospital of Brikama serving all satellite villages. It registers on average 110/100 000 new smear-positive pulmonary TB-cases per annum.

The quantitative arm compared clinic-based records of TB-DOTS medication before and after the introduction of daily medication. The qualitative arm explored the perceptions of daily medication defaulters.

Results: There was no statistically significant difference between the treatment outcomes of the two medication policies. However patients were less likely to have had three sputum tests reviewed in the daily medication period (22% v 72% Odds Ratio 6.2 (p <0.001). However, they reported that daily medication with its fixed-dose combination was more convenient.

Conclusion: Patients' full compliance with daily medication was hindered by socio-economic factors. The daily medication with its increased workload undermines the proper implementation of fundamental DOTS-elements, particularly follow up and sputum review.

Key word: Tuberculosis, Medication policies, Gambia

Introduction

Pulmonary TB is a transmittable airborne infection. Approximately 20 000 people contract TB, and 5000 die from it daily. Each patient can infect 10 – 15 healthy people[1]. Full compliance with treatment increases cure rates and reduces the number of resistant cases. However premature interruption of treatment can cause an increase in transmission rates and cost to the programme[2]. This can result in increases in relapse rate 5 – 6 times and the emergence of resistant strains[3].

In 1993 WHO launched the DOTS-strategy to enhance treatment compliance. Despite Gambia's adaption in 1985 it falls below WHO target of 85% cure rate[4]. The defaulter rate was 14% in 2001[5], which reached 16% in the urban areas of the Western Division in 2003[4].

In response to an increase in defaulting rates, the TB programme and the Gambia government changed the DOTS medication policy in June 2005 from 3-times weekly to a daily fixed-dosed combination in the intensive phase. The decision follows success stories of daily treatment in Ghana and Nigeria two years previously (personal communication with the TB-inspector who piloted the daily treatment in his catchment area before being rolled out nationally). Although the treatment is daily the dose has been reduced such that, daily dose of medication for seven days of anti-TB drugs is equivalent to previous 3-times weekly dosage.

There is a danger that the more frequent days of medication may have an adverse effect on

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compliance. This study aimed to compare and contrast the treatment and outcome rates between 3-times weekly and the current daily medication and to highlight reasons for defaulting from daily-DOTS medication.

Methods

The study adopted a mixed methodology because it had two arms; quantitative and qualitative arms in order to address the research objectives. Whilst the quantitative arm compared the medication attendance and treatment outcomes between 3-times weekly DOTS and daily medication, the qualitative arm used a semi structured interview to explore the attitudes of medication defaulters towards the daily medication policy. The sources of the information used were; TB clinic register that contained patients' diagnoses and treatment outcomes and patients' record cards which contained their treatment; attendance, progress and addresses.

In the quantitative arm of the study a 12-month medication period was chosen for each of the two medication periods compared the periods were defined using two date-blocks; 21st June 2004 to 20th June 2005 for 3-times weekly medication and 1st July 2006 to 31st August 2006 for daily medication which was introduced in June 2005.

Due to lack of routinely collected data on defaulting rates at the clinic. It was estimated that at least 25% of pulmonary TB patients would default. A two group Chi-squared test with a two sided significance level of 0.05 would have 80% power to detect a difference between group 1 proportion of defaulters of 0.2 and group 2 proportion of 0.35 (Odds ratio of 2.154) when the sample size in each group was 138. The quantitative data were analysed using the epidemiological software Epi Info 2000. All the tests were Yates corrected with 1 degree of freedom.

In the qualitative arm using date-blocks defined for those who received daily medication. Thirty-one defaulters were identified of which 12 interviews were achieved (see figure 1 below). A defaulter was defined as any smear-positive pulmonary TB patients who missed two consecutive days of medication[6]. The inclusion criteria for participants were;
-Pulmonary smear-positive TB patients who defaulted from treatment during the period 1st July 2005 to 31st August 2006.
-TB patients of legal adult age of 18 and over.
All interviews were tape recorded on interviewees' consent, scripts transcribed verbatim and analysed using the qualitative software Nvivo7.

Figure 1: Case selection schematic diagram
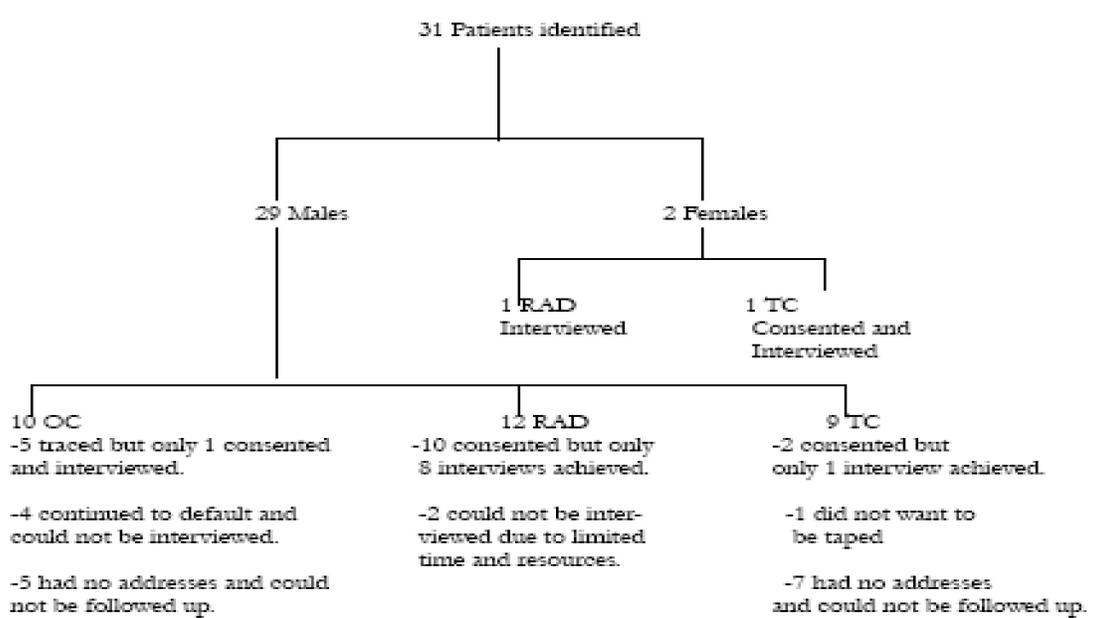
Key:
OC: Out of Control
RAD: Return after Default
TC: Treatment Complete

Ethical approval

This study received full ethics approval by the joint Gambia Government/MRC-scientific coordinating ethics committee.

Results

During the 3-times weekly treatment period, 173 smear-positive pulmonary TB-patients were registered. For the twelve months considered in the daily policy 189 were registered. The treatment outcomes are shown below in Table 1.

Table 1: Treatment outcomes

Treatment outcomes	Daily medication No (%)	Thrice Weekly Medication No (%)	Odds Ratio (95% CI)	P value
Out of Control	10 (5.3)	11 (6.4)	0.82 (0.31 to 2.15)	0.835
Cured	130 (68.8)	122 (70.5)	0.92 (0.57 to 1.48)	0.807
Treatment Complete	26 (13.8)	24 (13.9)	0.99 (0.52 to 1.88)	0.904
Treatment Failures	4 (2.1)	3 (1.7)	Not available	
Died	19 (10.1)	13 (7.5)	1.38 (0.62 to 3.06)	0.506
Total	189 (100)	173 (100)		

Treatment Outcome Difference

There was no statistical significant difference between the medication policies in terms of treatment outcomes as described by the programme; cure rates, treatment completion rates, out of control rates, treatment failures and deaths in table 1. Odd ratios were not presented in the table for treatment failures because the numbers were small. The effectiveness of the medication policies could not be assessed qualitatively by interviewing a comparable group of patients who received the 3-times weekly medication. The qualitative arm comprised only one group of patients on the daily medication in order to explore their attitudes towards daily medication policy. However all defaulters interviewed said the daily medication was effective.

Gender Difference

Table 2 below shows the sex distribution of the number of patients registered at the clinic during the two periods. A total of 362 records were reviewed, 103 were females and 259 males giving an average sex ratio of 1:2.5. However the sex ratio during the daily medication policy was 1:3.5. The male TB population was over 3 times higher than their female counter-parts (table 2). This gender ratio had been reflected in the qualitative arm with two females and ten males in the study sample.

Table 2: Sex distributions and number of smear positive pulmonary tb cases registered in each period

	Total (N)	Males (N)	%	Females (N)	%
Daily medication(01/8/05-31/7/06)	189	147	77.8	42	22.2
3/Week medication(21/6/04-20/6/05)	173	112	64.7	61	35.3

Sputum Review Records

In both medication policies each patient on six-month anti-TB medication has to be reviewed bi-monthly by microscopic sputum test 3-times by the time they completed treatment to determine their treatment outcome status. The number of times patients were reviewed between the two medication policies were therefore assessed to determine if the change to daily clinic medication has impacted on staff ability to effectively review patients' sputa bi-monthly. A highly statistical significant difference was found between the two medication periods. Patients who received the 3-times weekly medication were over six-times more likely to be reviewed than those on daily medication as shown in table 3. With only one trained TB inspector at this clinic, it was not surprising that the opinions of at least half of those interviewed suggested that more staff were needed to be able to conduct the daily clinic medication effectively.

Table 3: Reviews of records of sputum review tests

	Total (n)	Number reviewed thrice	odds ratio (95% confidence interval)	p-value
Daily medication	189	42 (22%)	6.20 (3.86 to 10.00)	<0.001
3/Week medication	173	124 (72%)		

Interview Data

Analysis of the interview data identified the following factors as contributing to defaulting.

Drugs side-effects

Hunger due to drug side-effects, which many described as *"burrowing one's stomach"* was cited by many as a potential deterrent to medication compliance. Four patients associated their defaulting to the side-effects of drugs; hunger, dizziness and weakness in their legs. *"In the first few weeks of treatment I could not come for medication because I was always feeling dizzy and uncomfortable"*

Effectiveness of the treatment

All interviewees expressed satisfaction with effectiveness of anti-TB drugs. They said the medications have improved their health state. As one acknowledges, *"this treatment has improved my sickness than alternative treatments I had received"*.

Knowledge of TB, its treatment and transmission

There was clear deficiency in knowledge about TB even after being on treatment. They had differing knowledge about the cause of TB, with one expressing a belief *"I was poisoned as a boy"*. None of them knew what caused TB. Only two expressed a patchy knowledge of its infectious nature, *"TB is a disease which transfers from infected person to healthy person, one needs take preventive measures to avoid further spread in the family"*.

The majority of patients described their early signs and symptoms as constant coughing, difficulty in breathing, sleeplessness due to coughing, weight loss and chest pain. Despite this, there appeared to be continuous misdiagnosis by doctors. Nine of the ten defaulters who had no knowledge of TB in their families or friends said they had previously sought treatment from the health facility and private-pharmacies. It should be noted that in the Gambia, due to the lack of basic drugs at health centres, patients are prescribed drugs to buy at pharmacies in town, reducing patients' confidence in government health facilities. This could lead to delays before patients are referred to the TB clinic to be diagnosed. The time delay before diagnosis reported by patients varied from three weeks to over a year. However the majority indicated three weeks as the overall time before diagnosis. During this period large sums of money or personal belongings could be sacrificed, *"during the one year I spent in my sick bed trying to get treatment, I followed many treatments including health facility which used up the money I had and I resorted to selling my personal clothes in order to pay for treatment not knowing it was TB and a cure is available"*, said one patient.

The notion that indirect costs especially transport fares to access and continue treatment constrain patients was expressed by four patients. Ten defaulters said it had been a threat to their business when they had to attend medication daily or stay out of work till the sputum was negative. Amongst these, the majority continued to run their business because they had no other source of income. Some even denied being advised not to work during the intensive phase, *"I was not advised to stop work till my sputum tested negative but I was told I could transfer it to others"*.

Health education

In assessing patients' knowledge of the disease and current treatment, TB health counseling/education and its consequences, none knew the cause of TB. However, all patients demonstrated satisfactory knowledge about the treatment. A perfect illustration given by a patient who stole two-days of medication from the medication box, only to be thought to have defaulted on his return. *"because I wanted to travel they refused my request and I knew the dosage. Then I snatched the medication"*.

Eight said they received health advice at registration on the "dos" and "don'ts" of the treatment. When probed if they put the advice into practice, two admitted not. However all of them said, during their first two months they used their own drinking cups, eating bowls and bought water from shops when visiting friends or families and did not share cigarettes or "hataya" (locally brewed tea). It was not clear if patients were being defensive,

as this conflicted with some patients' admission that they had not told their entire family about the diagnosis. As one confesses, *"I have hidden it from anyone besides my mum because the leprosy and TB inspector (LTI) asked me to be accompanied by escort at registration then I informed her"*.

Stigma

The belief that women are disproportionately affected by stigma seemed to be supported by the two females interviewed. Both admitted being physically isolated, gossiped about, and accused of infecting a neighbour's child, *"unfortunately because I had TB my neighbours gossiped that I infected their child because he was coughing, that was later confirmed not TB"*, whilst *"community health nurse and a local pharmacist refused to supervise my treatment"* reported another.

Likely stage of defaulting

The stage at which the majority of patients defaulted was in the continuation phase (after first two-months of medication). Ten out of twelve defaulted when they thought they were cured as their main symptom of cough disappeared and they could breath and sleep normally, *"I now do not feel so am fine no coughing/breathlessness so am fine that is why I stopping coming"*.

Opinions about TB Treatment compliance

In terms of personal opinions on how the programme could help achieve full compliance with treatment from patients, five suggested that drug supplies should be given to patients if they live distant from the clinic.

Five others said the programme needed to employ more doctors so that they can take drug supplies or visit patients immediately when they default, whilst some blamed LTI's impatience.

Discussion

It was not possible to test the hypothesis of no difference in defaulting rates between the two policies, because profiles of current defaulters were not being kept.

The analysis showed that despite the change of treatment policy to daily medication no significant difference was observed between the medication policies in terms of treatment outcomes. However the likelihood of patients not being reviewed 3-times in the daily medication was over 6 times higher than in the 3-times weekly medication with P-value <0.001 and 95% CI (3.86-10.00). This finding might have increased the workload and and staff had

become understaffed. During pre daily-DOTS, patients had to attend medication 3-times/week; Monday, Wednesday and Friday. Registration of new patients, sputa reviews and defaulter tracing were conducted on Tuesdays and Thursdays. Now medication is daily and the registration, sputum review and defaulter tracing, might had increased the workload and staff has become overstretched and not able to review patients properly. Therefore, for effectiveness of the clinic in light of the daily medication with its many responsibilities should be balanced with the staff. With no systematic defaulter tracing being done at the Brikama chest clinic, this confirms defaulters' opinion in the qualitative in-depth interviews that the programme needs more doctors/workers to reach out to patients.

It was reported in Harper et al[5] that the female/male ratio of TB in the Gambia was 1:2.5 in 1999. This gender ratio is consistent with the periods before introduction of the daily medication. However the female/male ratio of the daily medication at Brikama chest clinic is now 1:3.5 which had been reflected in the qualitative arm with just two females and ten males. This quantitative analysis showed TB male population in the daily medication is about four times more than their female counter-parts. This could be due to the social life style of most men. It is true that TB spreads through inhalation of the tubercle bacilli. It is speculated that drinking from the same glass/cup and eating from same bowl with an infected person could cause transmission.

To reduce transmission risk, patients are advised to stop sharing personal items from the rest of the family once they have been diagnosed tuberculous until their sputa test negative. Therefore men who happen to socialise more plus their habit towards a locally brewed tea called "hataya" may increase their likelihood of TB due to the nature of its sharing whereby everyone drinks from the same glass without being washed after every use. Smoking, which is male gender related in the Gambian society may be implicated. Most young men smoke but, due to lack of affordability, tend to share cigarette with their mates at "hataya" vows. Unlike women whose movements are restricted at home although some drink "hataya". They do not have that opportunity to indulge in such social life-style and it is also a taboo for them to drink "hataya" outside the home. Alternatively, it may be that the introduction of the daily medication has exacerbated women's under-diagnoses or under-reporting of their TB

status relating to social stigma and discrimination. Besides the biological differences between the genders, Diwan et al[7] suggested that differences in gender could relate to under diagnosing or under-reporting of TB in women due to cultural and behavioural factors/discrimination. These possible ways of increasing the likelihood of gender with TB were reflected in the in-depth qualitative interviews when four men blamed their infection on indiscriminately smoking and "hataya" drinking. An important finding of the qualitative interviews was the reported refusal of two health staff at village level to supervise medication of the patient. It clearly raises concerns about the effectiveness of community/home level supervision. This is not an isolated finding as such was the conclusion of a social studies conducted in Pakistan by Khan et al[8] where TB patients despite being seriously ill were left by the community/family health-workers to visit them in order to have their medication.

This study showed that the most likely reasons for patients to default on medication are travelling back to the village, not being able to forgo their businesses for medication attendance, living far away and medication side-effects. Family emergencies are important occasions of the family which must be attended by members of the family, this finding was also reported in a study in Delhi, India "Adherence to tuberculosis treatment"[9]. Those engaged in businesses could not attend daily medication because their best opportune time for sales coincided with medication as their most opportune time. This is consistent with a social survey by Khan et al[10]. Medication side-effects have also been reported to have affected patients' compliance with treatment, ten defaulters defaulted in their continuation phase when presumably they had fewer tablets to take with less drug side-effects. However some reported that drug side-effects could deter anyone from treatment because it makes them feel hungry. Although breakfast (bread, egg and mayonnaise) was offered to patients some refused it because it was not being properly preserved.

There was serious misdiagnosis by doctors leading to unnecessary delay before diagnosis. This was costly for patients because they had to buy some prescribed drugs from pharmacies and had to receive aggressive treatment for a totally different condition. Although it is clear in the tuberculosis programme manual that a cough of three weeks after a dose of antibiotic without improvement

patients should be referred for sputum test. This shows that medical staff can contribute immensely by referring patients for sputum tests at appropriate time.

The patients knew they were receiving treatment for TB and clearly proved that they knew what treatment they were receiving and acknowledged its effectiveness at the appropriate time. But they did not know what causes the disease. This could imply that despite receiving health talk at registration some vital issues might not had been explained to them or they were not being responsive. This undermines the effectiveness of the training received by the tuberculosis inspectors. A proper health education at registration before even patients starting any treatment is required.

The core idea of DOTS is for treatment supervisors to watch patients while swallowing the medicines. Unfortunately this vital element of DOTS strategy is not practiced at the clinic. This was reported as a serious issue in Harper et al[5] when a large number of patients were not taking their medication under direct observation. Four years on the problems persists at this clinic.

Patients' records were not fully completed. Patients were registered without their addresses being recorded to enable systematic defaulter tracing. There were so many cancellations in the register that some information was not easily identifiable. The importance of neat and proper record keeping for such disease cannot be over emphasized and only with complete register TB programme be properly evaluated.

An ideal system to improve systematic defaulter tracing may be, every patient be issued a treatment identification card rather than patients' attendance cards. This treatment ID card can bear the patient's details; treatment registration number, demographic profile and the reverse of it can bear his/her address. The attendance cards can be kept at the clinic monitoring patients' attendance. This can enable staff easily and quickly find medication attendance cards that they have not marked, that particular patient's registration number can be used and his/her address extracted from their treatment record cards for immediate tracing.

The study had some limitations as follows; it covered only smear-positive pulmonary TB patients registered at the Brikama chest clinic and aged 18 and over. In addition, case selection for daily DOTS medication defaulters was based on only patients

based only on patients registered at the Brikama chest clinic and might not reflect the views of the study population. This limits the generalisibility of the results. However it can serve to illuminate insight into the potential factors reportedly "associated" with defaulting on the daily-clinic medication.

Conclusion

There was no difference in treatment outcomes between the two medication policies. However patients are less likely to be reviewed with the daily medication and male gender TB-population is over 3-times more than female TB-population in the daily medication policy.

It also concluded according to the participants that DOTS daily medication with fixed-dose medication is convenient to take and effective with minimal side effects. However for full compliance with the medication, patients had to sacrifice important family responsibilities and income. The responsibilities that come with daily medication undermine effective implementation of fundamental DOTS elements of direct supervision, periodic sputum reviews and systematic defaulter tracing.

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