

ADHERENCE TO TUBERCULOSIS THERAPY IN UNILORIN TEACHING HOSPITAL, ILORIN, NORTH-CENTRAL NIGERIA

¹Chukuma ANYAIKE

HIV/AIDS Division, Department of Public Health, Federal Ministry of Health,
Abuja, Nigeria

²Omotoso Ibrahim MUSA

Department of Community Health, University of Ilorin, Ilorin, Nigeria

³OluwoleAdeyemi BABATUNDE (*Corresponding Author*)

Department of Community Medicine, Federal Medical Center, PMB 201, Ido-Ekiti, Nigeria

⁴OladimejiAkeem BOLARINWA

Department of Community Health, University of Ilorin, Ilorin, Nigeria

⁵Kabir Adekunle DUROWADE

Department of Community Medicine, Federal Medical Center, Ido-Ekiti, Nigeria

⁶Oluseyi Samuel AJAYI

Department of Community Medicine, Federal Medical Center, Ido-Ekiti, Nigeria

E-mails: ¹chuxxanyike@yahoo.com, ²mtosh2002@yahoo.com, ³wolleking@yahoo.com,
⁴drdeji@yahoo.com, ⁵kadurowade@yahoo.com, ⁶dr.seyisamuel@yahoo.com

Abstract:

Introduction: Non-adherence to treatment has been one of the main obstacles to the control of tuberculosis. The objective of this study is to investigate the rate of adherence to medication among Tuberculosis (TB) patients.

Methodology: This study was a descriptive, cross-sectional survey with analysis of the observed variables in tuberculosis patients. All adults aged 18years and above who were accessing treatment for tuberculosis at the chest clinic of the University of Ilorin Teaching Hospital, Kwara State were recruited for the study until the desired sample size of 544 was obtained. The sample size was determined using Fisher's Formula. Structured, pre-tested interviewer – administered questionnaire was used for data collection and data were analyzed using SPSS version 16. Frequency tables and cross-tabulation of variables were done and p-value <0.05 was used to determine statistical significance.

Result: Respondents who had taken Anti-Tuberculosis drugs for 3-6 months [mean duration of 5.4 months, ($SD=\pm 1.8$)] were 76.5% and all the TB patients (100%) received pre-treatment adherence instruction. More than three quarters (80.5%) of the patients did not miss their drugs in the last 3 months while majority (90.1%) of the patients did not miss their drugs in the last 7 days. There was statistically significant association between age and treatment adherence among the TB patients, ($p=0.0165$) with higher adherence among younger age groups. The respondents with no formal education (19.4%) were the highest proportion that missed their drugs.

Conclusion & Recommendations: Adherence to Anti-Tuberculosis drugs is sub-optimal. Adherence monitoring plans such as home visiting and care should be sustained and home based care should be encouraged.

Keywords: Adherence, Tuberculosis, Therapy.

INTRODUCTION

Tuberculosis is a leading infectious disease world-wide and it is among the ten leading causes of death in Nigeria.¹ Also TB is a major public health problem in Nigeria, with an estimated 450,000 cases occurring annually of which more than 50% are smear positive.² The social stigma associated with this disease compounds the problem. The World Health Organization estimates that over 1.7 billion people in the world have been infected with the tubercle bacillus, and over 20 million are with active disease.³ Every year, there are about 8 million new cases and between 2 to 3 million deaths resulting from Tuberculosis³ despite Tuberculosis is a curable disease.

There are essentially six standard drugs for its treatment. Four are bactericidal, namely Isoniazid, Rifampicin, Pyrazinamide and Streptomycin while two are bacteriostatic namely, Ethambutol and Thiacetazone. The standard WHO regimen for the treatment of TB involves four drugs for the intensive phase of 2-3 months and two or three drugs for a further "Continuation phase" of 6 -8 months. Directly Observed Treatment Short Course (DOTS) is practiced. It is an internationally adopted strategy to improve adherence.

Adherence is the extent to which a person's behavior in taking medications corresponds with the agreed recommendation from a health care provider.⁴ The main difference between adherence and compliance is that adherence requires the patient's agreement to the recommended drugs. The patient has to play active part in the process. Adherence is preferred by many health care providers because "Compliance" suggests that patient is passively following the doctor's order and the treatment plan is not based on the therapeutic agreement between the patient and the health care provider.⁵ Rates of adherence for individual patients are usually reported as percentage of the prescribed doses of medication actually taken by the patient over a specific period.^{6,7} Some investigators have further refined the definition of adherence to include data on dose taking (taking the prescribed number of pills each day), the timing of doses (taking the pills within a prescribed period) and food restriction.⁸ Adherence rates are typically higher among patients with acute disease conditions compared with those with chronic conditions.⁸ However, there is no consensual standard for what constitutes adequate adherence. Some trials consider rates greater than 80 percent to be acceptable whereas others consider rates of 95 percent and above to be mandatory for adequate adherence.

In terms of TB control, adherence to treatment may be defined as the extent to which the patient's history of therapeutic drug-taking coincides with the prescribed treatment.⁹ The

adherence may be measured using either process-oriented or outcome-oriented definitions. Outcome oriented definitions use the end result of treatment. For example, the cure rate is used as an indicator of success while the process-oriented indicators make use of intermediate variables such as appointment keeping or pill counts to measure adherence⁹.

Nigeria has the highest estimated number of new TB cases annually among the African countries.¹⁰ Also Nigeria ranks the 5th among the 22 high burden countries in the world and total of 86,241 of all forms of TB cases were notified from the 36 states of Nigeria in 2007.⁶ TB also accounts for about 6.7% of all deaths in the developing countries; including 18.5% of all deaths of persons between 15 and 45 years of age.¹¹ This makes TB the greatest cause of death from a treatable disease within the economically productive age group in the world.¹² The treatment for Tuberculosis in Nigeria is free based on the National Tuberculosis and Leprosy Treatment guidelines. In spite of the free access to anti-Tuberculosis drugs, non-adherence to treatment has been one of the main obstacles to the control of this disease.¹³

A nine year review of TB cases in Ilorin, showed a cure rate of 43.7% and a default rate of 44.2%.¹⁴ Similar studies in Ife¹⁵ and Ibadan¹⁶ both in the southwestern part of Nigeria showed cure rates of 73% and 76.6% respectively. Although there is paucity of data on the level of Multidrug Resistant Tuberculosis (MDR-TB) in Nigeria, category 2 treatment failure cases have been reported suggestive of the existence of MDR-TB in the country.²

In patients on anti-tuberculosis drug therapy, poor adherence is recognized as a major cause of treatment failure, relapse and drug resistance.^{17, 18} Also WHO estimates that 1.9% of all new TB cases may be resistant to the first line anti-tuberculosis drugs while among the previously treated TB cases resistance was about 9.4%.¹⁹ The success of TB treatment is the sum of the patients who are cured and those who have completed treatment under the Directly Observed Therapy Short Course (DOTS) strategy.

Studies have shown that stigmatization creates a lot of self-denial among TB patients, hence most of them fail to comply with the treatment regimen.²⁰ In communities with low literacy level they believe that merely associating with TB patients may cause them to have the disease, and may create resentment by those in the household to providing support to the patients and encourage non-adherence.²¹ Discrimination on the basis of the disease at the health facilities sometimes exacerbates problem with adherence to drug taking behavior.²² Some studies in Africa and other parts of the world found that health care providers discriminate against TB more especially with the close association of TB with AIDS.^{21,23}

This may make the patients to withdraw from the rest of the community. More often than not when patients are diagnosed with TB, communities immediately label them social misfits which are often followed by exclusion from social interaction and relationships.²⁴ Tuberculosis usually affects people who are hard to reach such as the homeless, the unemployed and the poor and these have been linked as barriers to treatment adherence.²⁵⁻²⁹ Likewise lack of money for transportation which is a consequence of poverty and unemployment has also been identified as a barrier to treatment adherence especially when the clinic is situated at a distance from the community.²⁹⁻³¹

However the proximity to the health facility on the contrary has also been found to affect the follow up attendance and treatment adherence due to stigmatization.³² It has also been documented that females have a higher rate of treatment adherence than males.^{31,32,33} Knowledge about tuberculosis and the belief in the efficacy of the medication influence whether or not a patient chooses to complete the treatment.^{27,31,34,35}

Studies have shown that failure in the continuation of therapy occurs mostly after the intensive phase when the patients feel they have gotten well.^{27,31,33} Inadequate knowledge about treatment duration, deficient health education and poor knowledge of the patient regarding the disease have been found as barriers to treatment adherence to DOTS.³⁴⁻³⁷

Better communication between health professionals, particularly dispensers and patients is essential for improving treatment adherence.³⁸ Conversely, negative attitudes from the health care providers, cost of medication and stock out of drugs discourage the patients from treatment adherence.^{23,31,39} The interrelationship between these factors greatly reflects the level of treatment adherence, hence poor patient adherence is responsible for the current TB epidemic because the TB patients remain contagious and will continue to infect others.²⁰ The objective of this study is to investigate the rate of adherence to medication among Tuberculosis patient.

METHODOLOGY

This study was conducted at the chest clinic of University of Ilorin Teaching Hospital (UITH), Kwara State, a tertiary health care center in middle-belt, Nigeria. It was a descriptive, cross-sectional survey with analysis of the observed variables in tuberculosis patients who are accessing treatment at the University of Ilorin Teaching Hospital, Kwara State. Self-reported treatment adherence rate was assessed among the respondents over the previous 7 days to minimize recall bias.

Respondents were asked to indicate how many pills they missed during each of the previous 7 days. The mean percent adherence was calculated based on the total number of pills taken divided by the total number of pills respondents reported being expected to take or prescribed by the doctor. In this study treatment adherence was referred to as patients who make scores of 95% and above. Non-adherence to treatment was those patients who score below 95%.

The study population was adults aged 18 years and above who were accessing treatment for Pulmonary Tuberculosis in the clinic. Consenting patients with Pulmonary Tuberculosis who have been on treatment for at least 3 months and not on admission were included in the study. Pulmonary TB patients with co-morbidities such as HIV, Hypertension, and Liver disease and also those on re-treatment regimens were excluded from the study.

The minimum sample size of 544 was determined using the Fishers' formula z^2pq/d^2 . The tuberculosis clinic of the UIITH is run every Tuesdays and Thursdays of the week. About 800 patients are on the treatment record. The clinic records about 8 – 10 new cases weekly and about 90-100 follow-up cases weekly. Clinic appointments are given monthly for follow-up management and drug refill. All the 800 patients constituted the sample frame out of which 544 were selected using simple random sampling technique. This was done for a period of 9 weeks.

Data was collected by structured interviewer administered questionnaire with both open and close ended questions. The questionnaire was structured into socio-demographic variables, knowledge of TB treatment adherence and factors affecting treatment adherence. The instrument was pre-tested at the LadokeAkintola Teaching Hospital Osogbo, Osun State. This was used to identify problems with validity of the test instrument, interpretations and analysis of the data obtained from it. Findings from the pre-test were used to make amendments on the tools before it was finally used for the study.

Respondents were asked to indicate how many pills they missed during each of the previous 7 days. The mean percentage adherence was calculated based on the number of pills taken by the respondents divided by the total number of pill expected to have been taken as prescribed by the doctor. Data was analysed using the Statistical Package for Social Sciences (SPSS) version 16. The observed similarities and differences were tested using the Chi-Square Test while cross tabulation of necessary factors with observed variables were done. p-value of less than 0.05 was considered significant at 95% confidence level.

Informed consent was sought from selected respondents after careful explanation of the purpose of the study and intended respect for confidentiality had been stated. Ethical approval

was obtained from the Research and Ethical Committee of the University of Ilorin Teaching Hospital Ilorin, Nigeria.

Limitations of the study include the problem of probable under or overestimation by the patients in order to satisfy the researcher as adherence was measured using a self-reported method. Most of the patients who accepted that they had missed drugs in the previous 3 months suddenly denied when they were asked for the immediate past 7 days. There could also be the problem of recall bias on the number and periods of missed doses.

RESULTS

A total number of 544 eligible TB patients who met the criteria for the study were surveyed. The patients who could neither read nor write were assisted by the research assistants who speak the local language fluently. Table 1 showed that the age distribution of the respondents ranged from 18 to 65 years with the mean age of 36.3 years \pm 10.0. More than two-thirds (67.6%) of the respondents were in the age group 25-44 years while patients aged 65 years and above accounted for 4.8%. Above half (55.7%) of the respondents were males while 44.3% were females.

The Yoruba ethnic group accounted for the highest proportion of patients (91.7%). Hausas were 5.9% and Igbos, 0.9%. Also 65.6% of respondents were married, 3.7% divorced or separated while 29.8% were single. The highest proportion (75.4%) of respondents has formal education, Muslims (59.9%), self-employed (39.3%), earned less than Twenty Thousand naira monthly (76.5%), and had tertiary education (34.0%).

More than three-quarters (76.5%) of the respondents had taken the drugs between 3-6 months with mean duration of 5.4 months, ($SD=\pm 1.8$) and all the TB patients (100%) received pretreatment adherence instruction. Figure 1 showed that more than three quarters (80.5%) of the patients did not miss their drugs in the last 3 months while majority (90.1%) of the patients did not miss their drugs in the last 7 days. However, there was a drop on the acceptance of missing their drugs (10.4%) when compared with the responses 3 months ago.

In table 3, close to half (42.5%) of the respondents missed their drugs because they travelled outside their station; 21.7% because they felt sick and depressed. About one-third (34%) missed their drugs because they ran out of drugs at home while 5.6% missed their drugs because they felt better and discontinued treatment. Other reasons that respondents gave for missing their drugs are: lack of money for transportation, avoidance of side effects of the drugs, forgetfulness, not wanting to be seen in the clinic while collecting drugs, and because

they could not refill their drugs in the clinic because of unscheduled public holidays by the government.

The highest proportion (19.2%) of respondents that missed drugs was from those below 25 years of age (Table 4). This was followed by patients in the age range 35-44 years (11.9%). There was a descending trend in the missing of drug as the age of respondents increased with the patients above 65 years having the lowest proportion of drugs missed (5.4%). There was statistically significant association between age and treatment adherence among the TB patients, ($p=0.0165$). A higher proportion (13.9%) of the patients that missed their drugs was males while majority (95%) of the females took their drugs (Table 4). There was statistically significant association between sex and treatment ($p=0.001$).

In table 4 also, more of those that missed their drugs were divorced/separated (20%), 5% were Widows/Widowers. The respondents with no formal education (19.4%) were the highest proportion that missed their drugs. Those with tertiary education were the least proportion (4.3%) that missed their drugs. There was statistically significant association between the level of education and missing of drugs ($p=0.002$). Higher proportion (10.9%) of patients that missed their drugs earned an average of more than Twenty Thousand Naira. There was no statistically significant association between monthly income and treatment adherence among the TB patients ($p=0.7616$).

An appreciable proportion (20%) of the patients that did not get support from friends and family missed their drugs. There was statistically significant association between support from friends and family and treatment adherence among patients ($p=0.042$). In Table 5, about half (46.7%) of the patients missed their drugs because they travelled outside town and there was statistically significant association between travelling outside home and treatment adherence among patients ($p=0.0001$). Among the patients that lack money for transportation, 80% of them missed their drugs. Lack of money for transportation was statistically associated with treatment adherence among the patients, ($p=0.0001$).

More than half (56.5%) of the patients that wanted to avoid side effects of drugs missed their drugs. There was statistically significant association between avoiding side effects of drugs and treatment adherence ($p=0.0001$). A higher proportion (50%) of the patients that was forgetful missed their drug. Below average 45% of the patients who felt better and needed not to continue with their treatment missed their drugs. There was a statistically significant association between feeling better and wanting to discontinue treatment and treatment adherence among TB patients ($p=0.0001$).

The proportion of TB patients who missed drug because they felt better and needed to discontinue treatment was 45% while 34.8% of those that feel sick and depressed missed their drugs. There was statistically significant association between feeling sick and depressed and missing of drugs ($p=0.0001$). 80.6% of TB patients that ran out of drug at home missed their drugs. There was statistically significant association between running out of drugs at home and missing drugs ($p=0.0001$). About half (52.6%) of the patients that wanted to avoid being seen in the clinic missed their drugs. There was statistically significant association between avoiding being seen in the clinic and treatment adherence ($p=0.0001$).

DISCUSSION

This study found out that 90.1% of the patients did not miss their drugs. Of those who missed their drugs only 35.2% of the prescribed anti-TB drugs were taken by them. The mean adherence rate of all the respondents was 93.1%. Although this was below the optimal level of greater than 95%, there was an improvement in the treatment adherence level of 47.3% reported by Salami et al³⁰ in the same hospital where they evaluated the management outcome of TB patients about fifteen years ago.

This improvement could be due to improved access to anti-tuberculosis drugs, shift from multiple pills therapy and awareness programs on treatment adherence by the government and development partners. However there was an observed variation in favour of improved adherence levels in respondents when compared with their responses if they missed taking any drugs three months ago. This variation could be explained as recall bias on the part of the respondents. It could also be that the respondents wanted to impress the doctor by their responses. This has been demonstrated in many studies concerning therapy for other diseases where patients often say what they think the doctor would want to hear.^{40,41}

The highest proportion (19.2%) of the TB patients that missed their drugs was from ages below 25 years while the least proportion (5.4%) that missed their drugs was from ages 65 years and above. This supports the finding by Christensen and Smith⁴² in which they found that treatment adherence increased with increasing age. The reason could be that the younger age groups were less experienced, under the influence of youthful exuberances and peer group influences whereas the older groups could be more experienced, focused and with more responsibilities.

Among the patients treatment adherence was found to be significantly higher in females (95%) compared to 86.1% of the males, ($p=0.001$). The reason could be that in our

environment women are the responsibilities of men, they are less likely to take risk therefore are likely to comply with treatment instructions.

This study also found that level of education was significantly associated with treatment adherence among the patients, ($p=0.002$). Those with no formal education were the highest proportion (19.4%) that missed their drugs compared to 4.3% of those with tertiary education. This was consistent with the finding by Okuno et al⁴³ in which they found that patients with higher educational level have higher treatment adherence because they could have better knowledge of the disease and therapy.

Employment status was not found to be significantly associated with treatment adherence among the patients, ($p=0.6628$). However, the unemployed respondents were found to have higher treatment adherence than the employed. Among the patients, the unemployed were the least proportion (6.1%) that missed their drugs compared to 11.6% and 10.9% of the government employed and self-employed respectively.

There was no statistically significant association between level of income and treatment adherence among the patients ($p=0.7616$). However, higher proportion (10.9%) of those that missed their drugs, earned more than twenty thousand naira monthly. Higher proportion (10.2%) of patients that missed their drugs, live above one Dollar per day. This finding was at variance with the result of the study by Golinet et al⁴⁴ where they found that high level of income was significantly associated with treatment adherence. This difference could be because in the developed countries drugs for TB are not subsidized and so treatment adherence could be income driven whereas in our environment the drugs are free and the level of income may not be a recognized driving force to treatment adherence.

This study found out that treatment adherence was higher with shorter duration of therapy. Among the TB patients, higher proportion (15%) the patients that missed their drugs have been on treatment for more than seven months compared to 8.2% who have been on treatment between 3 to 6 months. Longer duration of therapy was significantly associated with treatment adherence among TB patients, ($p=0.1060$). Disclosure of illness to friends and family was found to be significantly associated with treatment adherence ($p=0.0135$).

Higher proportion (23.5%) of those that missed their drugs did not disclose their illness to their friends and families compared to 10.4% that did. This finding was consistent with the findings by Mills et al⁴⁵ and Chesney et al¹ in which they identified that not disclosing of illness to friends and families could affect treatment adherence. Disclosure of illness to friends and families will help reduce stigmatization and improve support from friends and

families. This study found out that support from friends and family could improve treatment adherence ($p=0.042$).

Higher proportion (20%) of patients that missed their drugs did not have support from friends and family. Support from friends and families could reduce psychological stress and financial burden especially in our environment where extended family system is practiced. Lack of money for transportation was also identified as a significant factor affecting treatment adherence ($p=0.0001$). Eighty percent of the TB patients who lacked money for transportation missed their drugs. This finding also was consistent with the result of similar studies by Salami et al¹⁴ in the same hospital fifteen years ago and Erhabor et al³¹ among TB patients in Ile Ife, Nigeria. Possible reasons could be because above half of the patients live below one Dollar per day. Also it could be that some of the patients travel a long distance outside where they live to access their drugs to avoid being seen by those who may know them.

Patients wanting to avoid side effects of drugs was significantly associated with treatment adherence among the patients ($p=0.0001$). Above half (56.5%) of patients who wanted to avoid side effects of the drugs missed their drugs. This finding is consistent with result of similar studies by Awofeso et al⁴⁶ and Teckle et al³⁹ in Ethiopia. Forgetfulness was found to be significantly associated with treatment adherence among TB patients ($p=0.0001$). Half (50%) of the patients that were always forgetful missed their drugs. The reason for forgetfulness could be that they were getting better or that they have busy schedules.

Running out of drugs at home was significantly associated with treatment adherence among the TB patients ($p=0.0001$). Probable reason for running out of drugs at home could be not keeping clinic appointment for follow-up care and drug refill. Patients avoiding being seen at the clinic was also found to be a significant barrier to treatment adherence among the patients ($p=0.0001$).

CONCLUSION AND RECOMMENDATION

The treatment adherence rate of the patients was 93.1% and there was an improvement in the treatment levels when compared with previous studies. Although this commends the efforts of the government and the development partners, adherence among TB patients needs to be improved so as to achieve success cure rate of 85%, one of the health indicators of the Millennium Development Goals.⁴⁷ This study has been able to identify some factors affecting adherence such as lack of money for transportation, forgetfulness, frequent travelling outside

home, feeling sick and depressed, running out of drugs at home, wanting to avoid side effects of drugs, and no access to drugs due to unscheduled public holidays.

The establishment of initiatives by the government, non-governmental organizations or the communities to address these problems would help patients to keep clinic appointments. A system of financial enhancement to defray transportation cost for every clinic visit could be considered and patients should be given a week appointment before the exhaustion of the prescribed drugs. This could address the problem of running out of drugs during unscheduled public holidays. Adherence monitoring plans such as home visiting and care should be sustained and home based care should be encouraged. This will help reduce discrimination and stigmatization against TB patients.

REFERENCES

- [1] Stark JR. Tuberculosis: An old disease but a new threat to the mother, fetus and neonate. *Clinics in perinatology*. 1997; 24: 107-127
- [2] Federal Ministry of Health. National Guidelines for HIV and AIDS Treatment and Care in Adolescents and Adults (2007). Federal Ministry of Health Abuja, Nigeria. Pp. 1-4.
- [3] Kochi A. The global tuberculosis situation and the new control strategy of the World Health Organization. *Tubercle*.1991; 72:1-6
- [4] World Health Organization. Adherence to long-term therapies: evidence for action. WHO, 2003. P3.
- [5] Claxton AJ, Cramer J, Pierce C. A systematic review of the associations between dose regimens and medication compliance, *Clinical Therapy* 2001; 23:1296-310.
- [6] Federal Ministry of Health. National Tuberculosis and Leprosy Control Programme. Department of Public Health. Worker`s Manual 2008, 5th Edition. P.42
- [7] Rudd P, Byyny RI, Zachary V. Pill count measures of compliance in a drug trial: variability and suitability. *Am J. Hypertens* 1998; 309-12
- [8] Lars Osterberg, MD and Terrence Blaschke, MD. Adherence to medication. *N Engl J Med* 2005; 353:487-97
- [9] Sum artojo E. When tuberculosis treatment fails. A social behavioural account of patient adherence. *American Review of Respiratory Disease* 1993, 147: 1311-1320
- [10] STOP TB Partnership. Available from www.stoptb.org/stop_initiative/amsterdam_conference/Nigeria_speech.asp (accessed 2007 Nov.24)

- [11] Enarson DA. Why not the elimination of tuberculosis? *Mayo Clin Proc.* 1994;69:85-6986.
- [12] World Bank Staff. *World Development Reports. Investing in health.* Oxford (England): Oxford University Press 1993. P.126-128
- [13] Jaiswal A, Singh V, Ogden JA. Adherence to tuberculosis treatment: Lessons from the urban settings of Delhi, India. *Trop Med Int Health*, 2003;8: 625-633.
- [14] Salami AK, Oluboyo PO. Management outcome of pulmonary tuberculosis: A nine year review in Ilorin. *West Afr J. Med* 2003; 22:114-9.
- [15] Erhabor GE, Adebayo RA, Omodara JA, Famurewa OC. Ten year review of pattern of presentation and outcome of pulmonary tuberculosis in OAUTHC, Ile-Ife, Nigeria. *J Health Sci* 2003; 3: 34-9
- [16] Akinola A, Fatiregun, Abimbola S. Ojo, Afolabi E. Bamgboye. Treatment outcome among pulmonary tuberculosis patients at treatment centres in Ibadan, Nigeria. *Annals of African Medicine* Vol.8, No.2; 2009: 100-104
- [17] Yach D. Tuberculosis in the Western Cape health region of South Africa. *Social Science and Medicine*, 1988; 27: 683-9.
- [18] Bell J, Yach D. Tuberculosis patients compliance in the Western Cape, 1984. *S. Afr Med J* 1988; 73: 31-3.
- [19] World Health Organization(WHO).Global Tuberculosis Control. World Health Organization Report 2009, p.129
- [20] Volmink J, Gamer P. Interventions for promoting adherence to tuberculosis management. *Cochrane Database of Systemic Review* 2000; 4:CD000010
- [21] Odusanya OO, Babafemi O, Joseph. Patterns of delays among pulmonary tuberculosis patients in Lagos. *BMC Public Health* 2004; 4: 17
- [22] Somerville MA, Orkin AJ. Human rights discrimination and AIDS: Concepts and Issues. *AIDS* 1989; 3 (suppl):S283
- [23] Maher D, Hausler HP, Raviglione MC. Fourie- Tuberculosis care in community care organizations in Sub-Saharan Africa: practice and potential. *Global Tuberculosis Programme. World Health Organization, Geneva Switzerland. Int J Tuberc Lung Dis* 1997; 1 (3): 276-83
- [24] Ingengo A, Mattosovich D, Kiasekoka MJ. AIDS patients in Abjan: Social dynamics and care process 1993. Abstract number (PO-D 20-4014) Berlin

- [25] Glynn JR, Carael M, Auvert B, Kalimdo M. For the study group on heterogeneity of HIV epidemic in African Cities; “why do young women have a much higher prevalence of HIV than young men”. A study in Kisumu, Kenya and Ndola, Zambia. *AIDS* 2001 ; 15(Suppl 4): S51-60
- [26] Liefoghe R. Perception and social consequences of tuberculosis. A focus group of tuberculosis patients in Siaikot, Pakistan. *Social Sciences and Medicine* 1995, 41:1685-1692
- [27] Needham DM, Faussett GP, Foster. Barriers to tuberculosis control in urban Zambia: the economic impact and burden on patients prior to diagnosis. *Int J Tuberc Lung Dis* 1998; 2: 811-817
- [28] Hasker E, Khodjikhhanov M, UsarovaS . Default from tuberculosis treatment in Tashkent, Uzbekistan; who are these defaulters and why do they default? *BMC infect Dis* 2008, 8:87
- [29] Michael KW, Belachew T, Jira C. Tuberculosis defaulters from the”DOTS” regimen in Jimma Zone, Southwest Ethiopia. *Ethiop Med J* Oct 2004;42(40): 247-53
- [30] Salami AK, Oluboyo PO. Management outcome of pulmonary tuberculosis; a nine year review in Ilorin, Nigeria. *West Afri J Med* June 2003; 22(2):114-9
- [31] Erhabor GE, Aghanwa HS, Yusuph M, Adebayo RA, Arogundade FA, Omidaiora A. Factors influencing compliance in patients with tuberculosis on directly observed therapy at Ile-Ife, Nigeria. *East Afr Med J* May 2000 ; 77(5):233-4
- [32] Demissie M, Kebede D. Defaulting from tuberculosis treatment at Addis Abeba tuberculosis centre and factors associated with it. *Ethiop Med J* 1994;32(2): 97-106
- [33] Daniel OJ, Oladapo OT, Alausa OK. Default from tuberculosis treatment programme in Sagamu, Nigeria. *Niger J Med* 2006; 15(1): 63-7
- [34] Chan-Yeung M, Noertjojo K, Leung CC. Prevalence and predictors of default from tuberculosis treatment in Hong Kong. *Hong Kong Med J* 2003; 9(4): 263-8
- [35] MorsyAM, Zaher HH, Hassan MH, Shouman A. Predictors of treatment failure among tuberculosis patients under DOTS strategies in Egypt. *East mediterr Health J* 2003;9(4): 689-701
- [36] Jing J, Grant ES, Vernon MSO, ShuChuen L. Factors affecting therapeutic compliance: A review from the patient`s perspective. *Therapeutic and clinical Risk management* 2008; 4(1):269-286

- [37] Bam TS, Gunneberg C, Chamroonsawasdi K et al . Factors affecting patient adherence to DOTS in urban Kathmandu, Nepal. *Int J Tuberc Lung Dis* Apr 2003; 7(4): 327-35
- [38] Mishra P, Hansen EH, Sabroe S, Kafle KK. Adherence is associated with the quality of professional- patient interaction in Directly Observed Treatment Short-course, DOTS. *Patient Educ Couns* Oct 2006;63(1-2):29-37
- [39] Teckle B, Marriam DH, Ali A. Defaulting from DOTS and its determinants in three districts of Arsi zone in Ethiopia. *Int J Tuberc Lung Dis* 2002;6(7):573-9
- [40] Arnsten J, Demas P, Farzadegaan H. Antiretroviral therapy drug users: Comparison of self-report and electronic monitoring. *Clin Inf Dis*, 2001; 33: 1417-1432
- [41] Besch CL. Compliance in clinical trials. *AIDS* 1995; 9: 1-9
- [42] Christensen AJ, Smith TW. Personality and patience adherence correlates of the five factor model in renal dialysis. *J Behav Med*, 18:305-13.
- [43] Okuno J, Yanagi H, Tomura S. Is cognitive impairment a risk factor for [oor compliance among elderly Japanese home care recipients. *Eur J Clin Pharmacol*, 55:145.
- [44] Golin C, Liu H, Hays RD. A perspective study of predictors of adherence to combination of antiretroviral medication. *J Gen Intern Med* 2002, 17:756-65
- [45] Arnsten J, Demas P, Farzadegan H, Grant R, Gourevitch M, Chang C. Antiretroviral therapy adherence and viral suppression in HIV infected drug users. Comparison of self report and electronic monitoring. *Clinical infectious disease*, 2001; 33:1417-1423.
- [46] Awofeso N. Anti-tuberculosis medication side-effects constitute major factor for poor adherence to tuberculosis treatment. *Bull World Health Organ*. March 2008;86(3)
- [47] World Health Organization. *Global Tuberculosis Control: Surveillance, Planning, Financing*. WHO Report, 2005 publication. WHO/HTM/TB 2005. 349, Geneva: p.258.

TABLE 1: SOCIO-DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

VARIABLE		FREQUENCY (%)
Age group	<25	74(13.6)
	25-34	197(36.2)
	35-44	151(27.8)
	45-54	72(13.2)
	55-64	24(4.4)
	65+	26(4.8)
	Mean age= 39±12.4	
Sex distribution	Male	303(55.7)
	Female	241(44.3)
Ethnicity	Hausa	33(6.1)
	Yoruba	498(91.5)
	Igbo	5(0.9)
	Others	8(1.5)
Religion	Christian	216(39.7)
	Islam	326(59.9)
	Traditional	2(0.4)
Marital status	Married	357(65.6)
	Single	162(29.8)
	Divorced/Separated	5(0.9)
	Widow/Widower	20(3.7)
Level of education	No formal education	134(24.6)
	Primary education	86(15.8)
	Secondary education	139(25.6)
	Tertiary education	185(34.0)
Monthly income	<N20,000	416(76.5)
	>N20,000	128(23.5)
Average daily income	<1 Dollar	319(58.6)
	>1 Dollar	225(41.4)

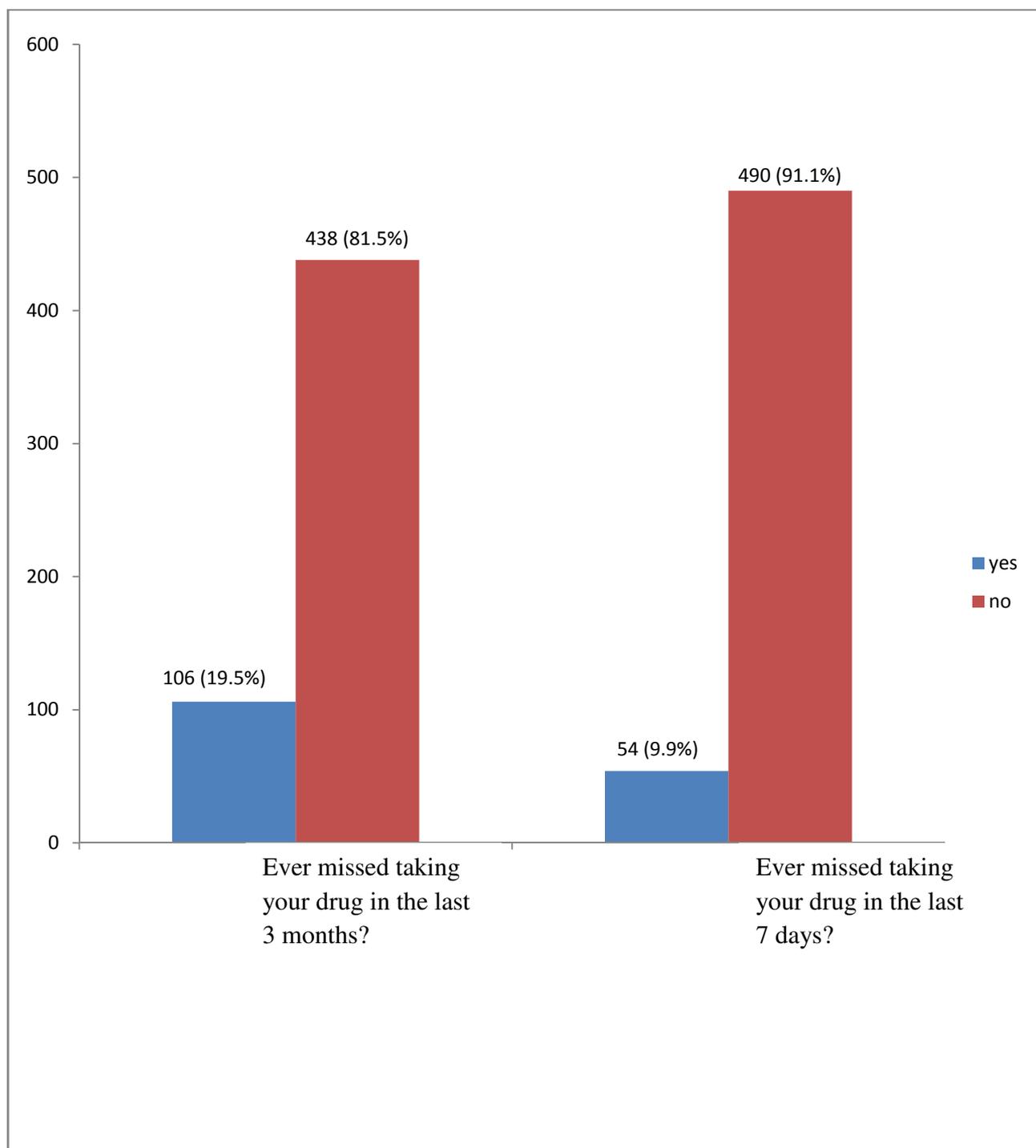


Figure 1: Treatment adherence among the respondents.

TABLE 2: TREATMENT ADHERENCE RATE AMONG TB PATIENTS BASED ON 7 DAYS RECALL

Total No. of pills expected to be taken in 7 days	No. of pills missed in 7 days	No. of pills taken in 7 days	Adherence	Summed adherence
(a)	(b)	(c = a-b)	$d = \frac{c}{A} \times 100$	d x n
14	14	0	0	0
14	8	6	42.9	171.4
14	6	8	57.1	285.7
14	4	10	71.4	928.6
14	2	12	85.7	514.3
14	0	14	100.0	48800.0
	Total			50646.4

$$\text{Adherence rate} = \frac{d \times n}{n}$$

$$\text{Adherence rate} = \frac{50646.4}{544}$$

Adherence rate for TB patients = 93.1%

TABLE 3: MAIN REASONS FOR NON ADHERENCE

Reasons for non adherence	N=106	
	Yes (%)	No (%)
Travelled outside town	45 (42.5)	61 (57.5)
Feel sick and depressed	23 (21.7)	83 (78.3)
Ran out of drugs at home	36 (34.0)	70 (66.0)
Felt better and need not continue medication	21 (19.8)	85 (80.2)
Lack of money for transportation	15 (14.2)	91 (85.8)
Want to avoid side effects	12 (11.3)	94 (88.7)
Simply forgot	14 (13.2)	92 (86.8)
Does not want to be seen in the clinic	19 (17.9)	87 (82.1)

Variable	Yes Frequency (%)	No Frequency (%)	Total
Age Group (years)			
<25	4 (5.4)	70 (94.6)	74
25 – 34	22 (11.2)	175 (88.8)	197
35 – 44	18 (11.9)	133 (88.1)	151
45 – 54	4 (5.6)	68 (94.4)	72
55 – 64	2 (8.3)	22 (81.7)	24
65 +	4 (15.4)	22 (84.6)	26
	X² = 13.861, df = 5, p = 0.0165		
Sex			

Male	42 (13.9)	261 (86.1)	303
Female	12 (5.0)	229 (95.0)	241
X² = 11.844, df = 1, p = 0.001			
Level of Education			
No Formal Education	26 (19.4)	108 (80.6)	134
Primary Education	10 (11.6)	76 (88.4)	86
Secondary Education	10 (7.2)	129 (92.8)	139
Tertiary	8 (4.3)	177 (95.7)	185
X² = 13.657, df = 3, p = 0.0034			
Average Monthly Income (Naira)			
<20,000	40 (9.6)	376 (90.4)	416
>20,000	14 (50.0)	14 (50.0)	28
Marital status			
Married	27 (7.5)	330 (82.5)	357
Single	25(7.5)	137(84.6)	162
Divorced/separated	1(20.0)	4(80.0)	5
Widow/widower	1(5.0)	19)95.0)	20
X²=8.83,df = 3, p = 0.0315			

TABLE 4: SOCIO – DEMOGRAPHIC CHARACTERISTICS AND TREATMENT**TABLE 5: FACTORS AFFECTING TREATMENT ADHERENCE AMONG THE RESPONDENTS**

Variable	Treatment Adherence		Total
	Yes (%)	No (%)	
Travelling outside town	Yes	21 (46.7)	15
	No	33 (6.6)	499

	$X^2 = 74.063, df = 1, p = 0.0001$		
Lack of Money			
Yes	12 (80.0)	3 (20.0)	15
No	42 (7.9)	487 (92.1)	529
	$X^2 = 84.713, df = 1, p = 0.0001$		
Want to avoid side effects			
Yes	13 (56.5)	10 (43.5)	23
No	41 (7.9)	480 (92.1)	521
	$X^2 = 53.315, df = 1, p = 0.0001$		
Simply forgot			
Yes	6 (50.0)	6 (50.0)	12
No	48 (9.0)	484 (91.0)	532
	$X^2 = 22.439, df = 1, p = 0.0001$		
Felt better and need not to continue drug			21
Yes	9 (45.0)	12 (55.0)	
No	45 (8.6)	478 (91.4)	523
	$X^2 = 28.439, df = 1, p = 0.0001$		
Feeling sick and depressed			
Yes	8 (34.8)	15 (65.2)	23
No	46 (8.8)	475 (91.2)	521
	$X^2 = 19.827, df = 1, p = 0.0001$		
Ran out of drugs at home			
Yes	29 (80.6)	7 (19.4)	36
No	25 (4.9)	483 (95.1)	508
	$X^2 = 215.1, df = 1, p = 0.0001$		
Does not want to be seen at the clinic			
Yes	10 (52.6)	9 (47.4)	19
Yes	44 (8.4)	481 (91.6)	525
	$X^2 = 46.082, df = 1, p = 0.0001$		
Support from friends and family			
Yes	53 (9.8)	486 (90.2)	539

	No	1 (20.0)	4 (80.0)	5
		X² = 4.103, df = 1, p = 0.042		
Duration of therapy				
	3-6 months	34(8.2)	382(91.8)	416
	≥7 months	20(15.6)	108(84.4)	128
		X² =5.27, df = 1, p=0.0216		
Disclosure of illness to friends and family				
	Yes	50(10.4)	477(89.6)	527
	No	4(23.5)	13(76.5)	17
		X² =2.23, df = 1, p=0.1353		
Support from friends and family				
	Yes	50(10.4)	486(90.2)	539
	No	1(20.0)	4(80.0)	17
		X² =2.23, df = 1, p =0.1353		
