



Factors Influencing Adherence to Tuberculosis Treatment among Dots Clinics Patients in Health Facilities in IJEBU Ode LGA, Ogun State, Nigeria

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ABSTRACT

The rate of prediabetes in people living with HIV (PLWH) is 2-3 times higher than Tuberculosis remains one of the top causes of death globally and it could be resistant to treatment if adherence to the treatment plan is not ensured. This work was done to assess factors influencing adherence to tuberculosis treatment among DOTS clinics patients in health facilities in Ijebu Ode LGA, Ogun State, Nigeria. The study utilized a descriptive cross-sectional survey design. The study population was 120 patients attending DOTS clinics in health facilities in Ijebu Ode Local Government Area in the year 2020, which were included using total enumeration method. Data were collected with a questionnaire which was validated and checked for reliability using Cronbach's Alpha Coefficient. Data were analyzed using SPSS version 23.

Findings revealed that age group 20-29 years had the highest proportion of respondents 39 (32.5%). The level of knowledge of the patients on TB DOTS was good with 106 (88.3%) and the level of adherence to medication was good with 75.8%. Seventy-five percent (75%) of the patients had positive attitude towards TB DOTS treatment. Age ($p=0.001$), marital status ($p=0.010$), occupation ($p=0.026$) and patients attitude ($p=0.001$) had statistical relationship with the adherence to treatment while Knowledge of patients on tuberculosis had no significant relationship ($p=0.145$). In conclusion, majority of the patients had adequate level of knowledge about tuberculosis but there is a need for an intensified effort in improving the levels of adherence of TB patients.

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Introduction

Adherence to a treatment strategy known as Directly Observed Treatment Short-course (DOTS) by patients diagnosed of tuberculosis is essential in the effective treatment of the disease. Tuberculosis is a leading cause of death worldwide. In order to avoid recurrence, resistance and complications, adherence to treatment is important. Identifying factors influencing adherence is a stepping stone in winning the fight against tuberculosis [1]. It is a serious global health challenges despite its management discovery. However, it has also been an issue because of its negative affects on the physiological wellbeing of the individual as well as the financial burden on the family, significant others and the society at large. TB remains a leading cause of morbidity and mortality in several countries [2].

World Health Organization reported that the three countries with the largest share of the global burden were India (27%), China (14%), and the Russian Federation (9%). Nigeria is ranked 4th among the countries highly burdened with tuberculosis globally and highest in Africa [3]. Nigeria has experienced serious negative burden of tuberculosis and there was a national emergency declaration on tuberculosis in 2006 after which an emergency plan was initiated for tuberculosis control. In developing countries, about 7% of all deaths are attributed to poor adherence to TB treatment which is the most common cause of death from a single source of infection among adults [4]. Furthermore, tuberculosis morbidity rate is 10.4 million while the mortality rate attributed to tuberculosis is 1.8 million. A great percentage of patients were said

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to be non-adherent to the treatment regimen especially in the developing or underdeveloped countries, where the infection is severe. Such places include Uganda, Nigeria, Russia, South Africa and Brazil with percentage non-adherence of 13%, 10%, 9.6%, 9.1% and 8.3% respectively.

A study in Osun state, Nigeria showed that there has been a rise in the prevalence of tuberculosis complications such as pneumothorax, pleurisy, laryngitis, haemoptysis, anaemia and miliary tuberculosis which has led to increase in the rate of hospitalization among tuberculosis patients [5]. Factors such as age, gender, marital status, occupation, knowledge about tuberculosis treatment regimen and educational level significantly influence adherence with treatment regimen among tuberculosis patient [6]. Globally, women accounted for 34% TB burden. Children (aged <15 years) accounted for 8% while men accounted for 58% of the burden. The mortality rate associated with tuberculosis diseases has been estimated at 2 million people while the incidence of tuberculosis is estimated at 10.4 million [3]. Seven countries account for 64% of the burden of tuberculosis comprising of India, Indonesia, China, Philippines, Pakistan, Nigeria and South Africa [4].

A retrospective study on the prevalence of tuberculosis in Calabar showed that out of 20185 patients tested for tuberculosis, a total of 5004 cases of tuberculosis were recorded within the period of 3 months with a prevalence rate of 24.8% [7]. It has been identified that there has been increasing cases of hospitalization among tuberculosis patients due to complications of tuberculosis infection which include pneumothorax, pleurisy, laryngitis, haemoptysis, anaemia and military tuberculosis. This has been attributed to non-adherence with treatment regimen among tuberculosis patients [8]. Non-adherence can lead to drug resistance and death [9]. Researchers have observed high relapse of tuberculosis among DOTS clinics patients in health facilities in Ijebu Ode LGA, Ogun state, Nigeria due to poor adherence. It is for these reasons that this study assessed factors influencing adherence to tuberculosis treatment among DOTS clinics patients in health facilities in Ijebu Ode LGA, Ogun state, Nigeria.

Materials and Methods

Research design

The study was a quantitative descriptive cross-sectional survey which assessed the factors influencing adherence of TB patients to DOTS in Ijebu-ode LGA, Ogun State.

Population

The study population for this study was 135 DOTS clinics patients in health facilities in Ijebu Ode LGA Ogun State, Nigeria. Total enumeration method was utilized to include respondents in the student. Record of respondents was obtained from clinical records of attendance with the tuberculosis resource staff for the entire Ijebu Ode LGA, Ogun State. DOTS clinics patients at State hospital were 67, Oke-Oyinbo were 25, Ita-Alapo were 35; Ita-Osu were 4 and Custodian centre were 4. Tuberculosis patients who have been on the DOTS treatment for at least two to six months (2-6 months) uninterrupted under the supervision of a Nurse, healthcare provider, treatment supporter/partner were included in the study. All DOTS clinics patients that collect anti-tuberculosis therapy at the designated DOTS clinic were included in the study. Tuberculosis (TB) patients that are Multi-Drug Resistant (MDR) and TB patients on retreatment therapy were excluded from the study. Tuberculosis patients that have co-morbidities such as HIV, Diabetes mellitus were excluded from the study.

Sample size and sampling technique

Total enumeration method was utilized to include the research respondents in the year 2020 for this study. Record of respondents was obtained from clinical records of attendance with the tuberculosis resource staff for the entire Ijebu Ode LGA, Ogun State. DOTS clinics patients at State hospital were 67, Oke-Oyinbo were 25, Ita-Alapo were 35; Ita-Osu were 4 and Custodian centre (Nigerian Prison) were 4.

Instrumentation

Researchers designed questionnaire was used to collect data from TB DOTS patients. This questionnaire consisted six sections which are section A that covered socio-demographic data with 10 questions. Section B was on general knowledge about tuberculosis and had 14 questions which was scored and graded in percentage. Adequate knowledge was $\geq 50\%$ while inadequate knowledge was $\leq 50\%$. Section C covered knowledge of TB DOTS treatment and had 5 questions. It was scored and graded in percentage. Adequate knowledge was $\geq 50\%$ while inadequate knowledge was $\leq 50\%$. Section D was on adherence to DOTS treatment and had 21 questions scored and graded in percentage. Poor adherence was $\leq 49.9\%$, fair, 50.0-69.9% while $\geq 70\%$ was good adherence. Section E was on accessibility to DOTS treatment and had 5 questions. Section F was on satisfaction with health facilities and attitudes to DOTS treatment by patients and had 17 questions.

Procedure for Data Collection

A letter of introduction was obtained from the School of Nursing Babcock University, the State Hospital, Ogun State Health Management Board, Oke Mosan, Abeokuta, Ogun State Ministry of Health, Abeokuta, Research, Planning, Statistics and Ethical Committee, Abeokuta, Ogun State, Nigeria. Ethical clearance was sought from Babcock University Health Research Ethical Committee (BUHREC) and the Ministry of health.

Respondents were recruited from the five DOTS health facilities in Ijebu Ode LGA of Ogun State, Nigeria. Prior to collection of data, the tuberculosis coordinator with her team was met and the study was discussed with them. The TB coordinator informed the various health centres about the study. With Short Message Service (SMSs) and phone calls sent to all the TB patients by the Ijebu Ode LGA supervisor for TB, all the patients on DOTS showed up and came at different times allocated for their meetings in all the centres except for those at the custodian centre (former Nigeria Prisons) that are resident within the confinement custodian centre, Ijebu Ode

The researchers employed the help of one assistant in each of the DOTS health facilities for the collection of data. The assistants were healthworkers of the various DOTS health facilities who were educated on the modalities for supervising the respondents in their filling of the questionnaire. The questionnaires were filled in English language or Yoruba (a translation of the English version) depending on the preference of the respondent. The researchers and assistants stayed with the respondents during the process of data collection to avoid external influence or assistance in filling the questionnaire. The researchers and assistants ensured that the questionnaires were properly filled before retrieval from the respondents. The researchers ensured that respondents were not selected twice during data collection using the details of respondents that were gotten from clinics record. Clinical records were also consulted to ensure information supplied by respondents on adherence was true. Data was collected over a period of two (2) weeks. The health facilities were visited once in a week.

Method of Data Analysis

Analysis of data gathered from respondents was done in May 2020 using Statistical Package for Social Sciences (SPSS) version 23.0. Frequency tables were made and data were presented on it. Chi-square was used to test for relationships between variables at 0.05 level of

significance.

Ethical Consideration

Ethical clearance was obtained from Babcock University Health Research Ethics Committee, Ogun State Health Management Board, Permanent Secretary State Ministry of Health Abeokuta and permission was taken also from the Director of Planning Research and Statistics, Ministry of Health Oke Mosan, Abeokuta. Respondents were told about the research and permission was obtained before the research was conducted. A letter of introduction was obtained from the Dean, School of Nursing, Babcock University, Ilishan-Remo which was taken to the hospital management board of Ijebu Ode LGA to obtain permission to carry out the study. The head of units of the DOTS clinics of the health facilities were approached and record of clinic attendance was obtained from which the respondents were recruited. Individual right to choose whether or not to participate and to know about the personal risks and consequences of joining the study was respected. Written informed consent (Table 1) was obtained from the study respondents. Information obtained from respondents was kept confidential and for research purpose only.

Table 1. Distribution of the Sociodemographic Characteristics of the Patients

Sociodemo-graphic Characteristics	Frequency (n=120)	Percentage%
Age		
Oct-19	8	6.7
20-29	39	32.5
30-39	29	24.2
40-49	29	24.2
>50	15	12.5
Gender		
Male	56	46.7
Female	64	53.3
Marital Status		
Single	43	35.8
Married	67	55.8
Separated	7	5.8
Divorced	2	1.7
Widow/Wid-owed	1	0.8
Ethnicity		

Yoruba	91	75.8
Igbo	13	10.8
Hausa	16	13.3
Educational Qualification		
None	11	9.2
SSCE/WAEC	52	43.3
Tertiary	57	47.5
Religion		
Christian	68	56.7
Muslim	50	41.7
Traditional	2	1.7
Residence		
Rural	51	42.5
Urban	69	57.5
Monthly Income		
>N20,000	42	35
N21,000-N40,000	37	30.8
N41,000-N60,000	20	16.7
N61,000-N80,000	10	8.3
N81,000 and above	11	9.2

The sociodemographic distribution showed that the age group 20-29 years had more respondents (39; 32.5%). Over half (64; 53.3%) of the patients were females while 56 (46.7%) were males. The distribution of respondents' marital status showed that 43 (35.8%) were single, 67 (55.8%) married and 2 (17%) were separated. Ninety-one patients (75.8%) were from the Yoruba ethnic group; 13 (10.8%) were Igbos and 16 (13.3%) were Hausas. Only 9.2% (11) patients reported that they had no educational qualification while 52 (53.3%) had secondary level educational qualification and 57 (47.5%) had a tertiary level qualification. Over half of the patients (68; 56.7%) affiliated with the Christianity religion; 50 (41.7%) were Muslims and only 2 (1.7%) were traditionalists. Fifty-one patients (42.5%) lived in rural residential areas while 69 (57.5%) lived in urban areas. About a third of the population reported (Table 2) to earn N20,000 or less monthly while 37 (30.8%) earned between N21,000-N40,000 and 10 (8.3%) earned between N61,000-N80,000.

Table 2. Distribution of Patients' General Knowledge of Tuberculosis

Variables	Frequency (n=120)	Percentage%
The organ mainly affected by TB		
The Heart	7	5.8
The Blood	6	5
The Lungs	99	82.5
The Saliva	8	6.7
Cause of TB is		
Virus	21	17.5
Fungal Infection	10	8.3
Bacterial Infection	86	71.7
Myths/Spiritual attack	3	2.5
TB patient should cover nose and mouth to cough and sneeze		
Yes	115	95.8
No	5	4.2
TB can result in death if not well treated		
Yes	109	90.8
No	11	9.2
Touching, talking or eating with an infected person transmits TB		
Yes	33	27.5
No	87	72.5
Discriminating against TB patients in our community is good		
Yes	23	19.2
No	97	80.8
TB is preventable		
Yes	114	95
No	6	5
Have you ever been screened for TB		
Yes	81	67.5
No	39	32.5

Knowledge of Patients on Tuberculosis

Majority of the patients (82.5%; 99) reported to have known that the lungs are the organs which are mainly affected by tuberculosis. Seven (5.8) patients identified the heart; 6 (5.0%) identified the blood and 8 (6.7%), the saliva. Regarding the causative agent of tuberculosis, 86

(71.7%) of the patients rightly selected bacteria while 8.3% of the patients thought it was caused by a fungus. Majority of the patients (115; 95.8%) knew about the precaution method of covering the mouth and nose while coughing or sneezing to prevent transmission to people around. One hundred and nine patients knew that the disease could be deadly if not well treated. Thirty-three patients reported that the touching, talking to or eating with an infected person may transmit the bacteria to other people. Almost a fifth of the population reported (Table 3) that discriminating against TB patients was good while 95% (114) reported that the disease is preventable. However, only two-thirds (67.5%) of the patients knew that they had been screened for TB.

Table 3. Distribution of Patients' General Knowledge of Tuberculosis

Variables	Frequency (n=120)	Percentage (%)
Have you ever received health education on tuberculosis?		
Yes	83	69.2
No	37	30.8
Sleeping in the same room or bed can cause TB		
Yes	61	50.8
No	59	49.2
Is there length of treatment for tuberculosis?		
Yes	108	90
No	12	10
Proper disposal of sputum is		
Collecting in a cup	43	35.8
Spitting on a handkerchief or tissue and discard after use	70	58.3
Spitting it out anywhere around	2	1.7
Swallowing the phlegm/sputum	5	4.2
TB can be prevented by		
Staying in an overcrowded area	4	3.3
Treatment of the infected	27	22.5

Good ventilation	27	22.5
One should cover mouth when coughing or sneezing	62	51.7

Eighty-three patients (69.2%) reported that they once received a health education on tuberculosis prior to the survey. Sixty-one patients reported that sleeping in the same room or bed with an infected person could cause TB. Ninety percent of the patients reported that there is duration for the length of TB treatment while 12 patients (10%) did not know about this. Regarding the proper disposal of sputum, patients indicated collecting in a cup (43; 35.8%), spitting in a handkerchief or tissue (70; 58.3%), spitting anywhere (2 (1.7%) and swallowing (5; 4.2%). The patients reported staying in an uncrowded area (4 3.3%), treatment of the infected (27; 22.5%), good ventilation (27; 22.5%) and covering of mouth while coughing/sneezing (62; 51.7%) (Figure 1).

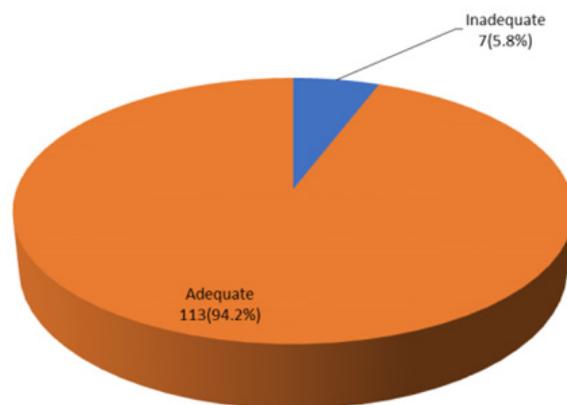


Figure 1. Level of Knowledge of Patients on Tuberculosis

Overall, 5.8% (7) of the patients attending the DOTS clinic had a poor level of knowledge of tuberculosis while 113 (94.2%) had a good level of knowledge on tuberculosis (Table 4).

Table 4. Distribution of Patients on Knowledge of TB DOTS Treatment

Variables	Frequency (n=120)	Percentage (%)
Have you received health information about TB DOT treatment before or after starting the treatment?		
Yes	106	88.3
No	14	11.7

Daily medication for the correct duration can cure TB		
Yes	116	96.7
No	4	3.3
DOTs treatment could be stopped when someone		
Feels better	29	24.2
Stopped coughing	19	15.8
Feels like stopping treatment	7	5.8
When health workers discontinue treatment		
Yes	65	54.2
TB can reoccur if treatment is not properly completed		
Yes	111	92.5
No	9	7.5
TB is preventable		
Yes	110	91.7
No	10	8.3

Knowledge of Patients on Tuberculosis DOTS Treatment

The distribution of respondents' knowledge about TB DOTS showed that only 14 (11.7%) of the patients had not had health information about the treatment protocol before they commenced their treatment. Majority knew that correct duration of the treatment could cure TB while 4 (3.3%) did not have knowledge about that. About a quarter of the patients reported that they could stop their DOTs treatment if they feel better while 19 (15.8%) reported that they could stop when they stop coughing and 65 (54.2%) indicated that the health workers would discontinue the treatment. Majority of the patients knew that TB is preventable (110; 91.7%) and may reoccur if not properly treated (111; 92.5%) (Figure 2).

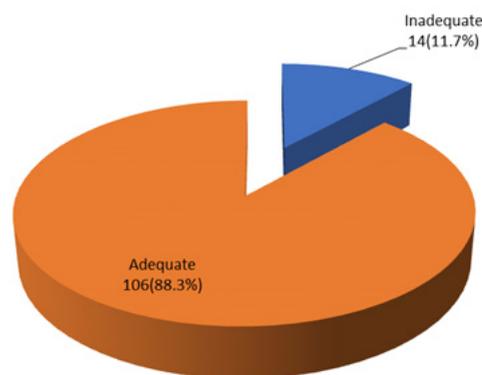


Figure 2. Patients' Level of Knowledge on TB DOTS Treatment

Overall, the level of knowledge of the patients on TB DOTS was good. With 106 (88.3) having adequate knowledge and 14 (11.7%) with inadequate level of knowledge.

Knowledge of Patients on the Adherence to TB DOTS Treatment

Majority of the patients reported that they cannot stop the treatment by themselves and they were committed to taking the drugs. The patients knew that stopping the treatment without finishing the course would not cure the disease and they had to continue their treatment even when the symptoms have stopped. Ninety-eight patients indicated that they had the correct does of the treatment and 36.7% reported that they defaulted on their treatment (Table 5).

Table 5. Knowledge of Adherence to DOTS Treatment

Variables	Frequency (n=120)	Percentage(%)
I can't stop DOTS treatment by myself		
Yes	17	14.2
No	103	85.8
TB could be cured if treatment is adhered to correctly for period of 6-8 months		
Yes	114	95
No	6	5
Committed to taking drugs		
Yes	85	70.8
No	35	29.2
TB treatment can be cured without finishing course of treatment		
Yes	29	24.2

No	91	75.8
Should treatment continue even when symptoms are no more		
Yes	84	70
No	36	30
TB patients are allowed to miss some of their DOTS medication		
Yes	15	12.5
No	105	87.5
Do you take the correct dose of your TB medications?		
Yes	98	81.7
No	22	18.3
Do you at any time default treatment for any reasons?		
Yes	44	36.7
No	76	63.3

Adherence to DOTS Treatment

One hundred and nine patients reported that they always took their DOTS medication as prescribed. Nine (7.5%) took their often and only 1 (0.8%) never did. Seventy-six (63.3%) reported that they never stayed away from home without their TB medications and 14 (11.7%) always did that. One hundred and one of the patients indicated that they always get refills of their medications whenever they exhaust them while 3 (2.5%) never did that. Nine (7.5%) often experienced side effects, 43 (35.8%) experienced them sometimes and 26.7% (32) never experience side effects. A few of the patients reported that felt embarrassed to go to the clinics for refills. Majority (91.7%; 110) took their medications at

Table 6. Patients’ Adherence to DOTS Treatment

Variables	A (%)	O (%)	S (%)	R (%)	N (%)
Take TB DOTS medication as prescribed	109(90.8)	9(7.5)	0(0.0)	1(0.8)	1(0.8)
Anytime away from home without TB medications	14(11.7)	4(3.3)	5(4.2)	21(17.5)	76(63.3)
Keep scheduled appointments to collect TB medications?	105(87.5)	8(6.7)	4(3.3)	0(0.0)	3(2.5)
Frequently go to health facility on date of appointments	106(88.3)	2(1.7)	9(7.5)	2(1.7)	2(0.8)
Get refill of TB medications after drugs have been exhausted	101(84.2)	9(7.5)	1(0.8)	6(5.0)	3(2.5)
Frequently experience side effects of the TB medications	9(7.5)	9(7.5)	43(35.8)	27(22.5)	32(26.7)
Feel embarrassed about going to tuberculosis clinic to take medications	6(5.0)	0(0.0)	11(9.2)	32(26.7)	71(59.2)

the correct time each day as prescribed while 4 (3.3%) never followed the prescription (Figure 3) (Table 6).

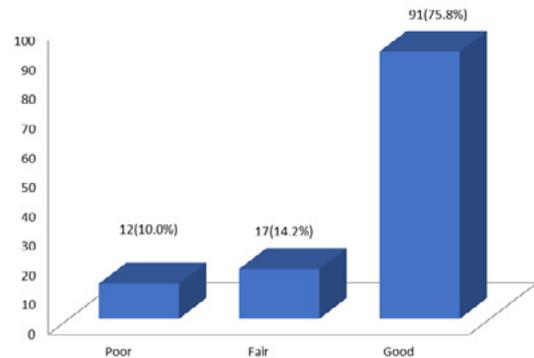


Figure 3. Adherence of Patients to DOTS treatment

Overall, the adherence to DOTS distribution showed that the 75.8% (91) had a good level of adherence to their medications, 17 (14.2%) had a fair level while 12 (10%) had a poor level of adherence.

Accessibility to DOTS Treatment

Majority indicated that they always had the drugs readily available in the clinic while 8 (6.7%) never had drugs in the clinics. Fifty-four (45%) always perceived the treatment regimen to be complex, 22 (18.3%) sometimes had the perception and 29 (24.2%) never did. A fifth of the population (24) indicated that the cost of transportation to the clinics prevented them from attending the clinics and they found it difficult to get to the clinics while 65 (54.2%) never had the same perception (Figure 4) (Table 7).

Times defaulted on TB DOTS medications	7(5.8)	4(3.3)	7(5.8)	12(10.0)	90(75.0)
Take medications at the correct time each day	110(91.7)	4(3.3)	0(0.0)	2(1.7)	4(3.3)

Table 7. Accessibility to DOTS Treatment

Variables	A (%)	O (%)	S (%)	R (%)	N (%)
Drug readily available in the clinic	102(85.0)	6(5.0)	3(2.5)	1(0.8)	8(6.7)
Perceived the treatment regimen to be complex	54(45.0)	2(1.7)	22(18.3)	13(10.8)	29(24.2)
Cost of transportation prevent from clinic attendance	24(20.0)	8(6.7)	4(3.3)	19(15.8)	65(54.2)
Found it difficult getting to the clinic for treatment	24(20.0)	4(3.3)	3(2.5)	12(10.0)	77(64.2)

**Figure 4.** Accessibility to DOTS Treatment

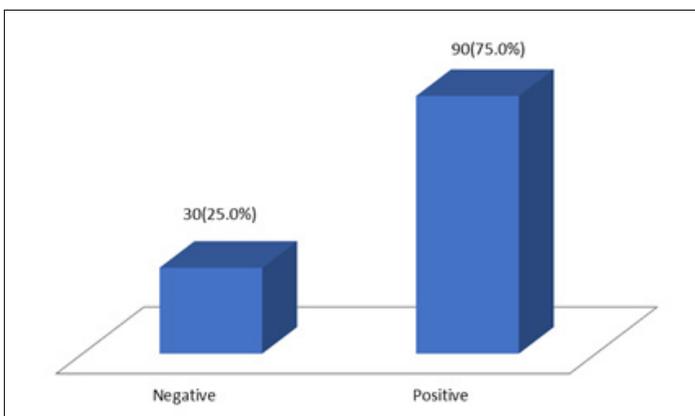
Overall, 65(54.2%) had good accessibility to DOT treatment while 55(45.8%) had poor accessibility to DOT treatment.

Attitude to DOTS Treatment

The distribution of the attitudinal disposition of the patients towards adherence showed that majority felt the health workers were friendly and they had required skills needed to do their jobs. The patients also felt that they were treated with respect and felt comfortable to treatment rendered (Figure 5) (Table 8).

Table 8. Attitudes to DOTS Treatment

Variables	Agree (%)	Disagree (%)
Workers attitude is friendly, I am treated with respect	111(92.5)	9(7.5)
Perceived healthcare providers to have required skills	97(80.8)	23(19.2)
Treated with respect in the hospital	106(88.3)	14(11.7)
TB clinic located near your house	80(66.7)	40(33.3)
Feel comfortable to treatment rendered	108(90.0)	12(10.0)

**Figure 5.** Attitude to DOTS Treatment

Overall, 90(75.0%) had positive attitude towards DOT treatment while 30(25.0%) had negative attitude towards DOT treatment (Table 9).

There is no significant relationship between selected socio-demographic variables (gender, gender, education, residence, centre location) and adherence to DOTS treatment among tuberculosis clinics patients in health facilities in Ijebu-Ode LGA of Ogun State, Nigeria.

The findings revealed that there was a statistical relationship between adherence to treatment and age

(p=0.001), marital status (p=0.010) and occupation (p=0.026). However, gender, educational qualification, religion and residence did not influence the adherence of the patients to medication (Table 10).

Findings showed that the knowledge of the patients on tuberculosis had no significant relationship (p=0.145) with the adherence to treatment while knowledge on TB DOTS is significantly related to patients' adherence to

treatment (p=0.001).

There is significant relationship between attitudes to tuberculosis treatment and adherence to DOTS treatment among DOTS clinics patients in health facilities in Ijebu-Ode LGA of Ogun State, Nigeria (p=0.001) while accessibility to DOT center is not significantly related to patients' adherence to treatment (p=0.457).

Table 9. Relationship between sociodemographics and level of adherence to TB DOTS treatment

Socio demographic	Level of Adherence (%)			Chi square	p value
	Poor	Fair	Good		
Age					
10-19	0(0.0)	0(0.0)	8(8.8)	25.188	0
20-29	8(66.7)	1(5.9)	30(33.0)	-	-
30-39	0(0.0)	8(47.1)	21(23.1)	-	-
40-49	2(16.7)	7(41.2)	20(22.0)	-	-
≥50	2(16.7)	1(5.9)	12(13.2)	-	-
Gender					
Male	5(41.7)	10(58.8)	41(45.1)	1.225	0.5
Female	7(58.3)	7(41.2)	50(54.9)	-	-
Marital Status					
Single	6(50.0)	3(17.6)	34(37.4)	20.059	0
Married	2(16.7)	13(76.5)	52(57.1)	-	-
Separated	2(16.7)	1(5.9)	4(4.4)	-	-
Divorced	2(16.7)	0(0.0)	0(0.0)	-	-
Widow/ Widowed	0(0.0)	0(0.0)	1(1.1)	-	-
Educational Qualification					
None	4(33.3)	1(5.9)	6(6.6)	9.423	0.1
SSCE/WAEC	4(33.3)	8(47.1)	40(44.0)	-	-
Tertiary	4(33.3)	8(47.1)	45(49.5)	-	-
Occupation					
Public servant	2(16.7)	7(41.2)	25(27.5)	17.383	0
Private Organization	0(0.0)	5(29.4)	8(8.8)	-	-
Owned Business	5(41.7)	4(23.5)	27(29.7)	-	-
Unemployed	2(16.7)	1(5.9)	9(9.9)	-	-
Student	3(25.0)	0(0.0)	22(24.2)	-	-

Religion						
Christian	4(33.3)	11(64.7)	53(58.2)	4.48		0.3
Muslim	8(66.7)	6(35.3)	36(39.6)	-		-
Traditional	0(0.0)	0(0.0)	2(2.2)	-		-
Residence						
Rural	4(33.3)	7(41.2)	40(44.0)	0.514		0.8
Urban	8(66.7)	10(58.8)	51(56.0)	-		-
Center						
Custodian	0(0.0)	4(23.5)	14(15.4)	13.652		0.1
Ita Osu	2(16.7)	1(5.9)	9(9.9)	-		-
Ita Alapo	2(16.7)	7(41.2)	15(16.5)	-		-
Oke Oyinbo	2(16.7)	3(17.6)	15(16.5)	-		-
State Hospital	6(50.0)	2(11.8)	38(41.8)	-		-

Table 10. Factors influencing the Adherence to DOTS treatment

Variables	Level of Adherence (%)			Chi square	p value
	Poor	Fair	Good		
Knowledge about tuberculosis					
Inadequate	2(16.7)	2(11.8)	3(3.3)	3.864	0.1
Adequate	10(83.3)	15(88.2)	88(96.7)		
Knowledge of TB DOTS					
Inadequate	8(66.7)	4(23.5)	2(2.2)	33.402	0
Adequate	4(33.3)	13(76.5)	89(97.8)		
Attitude to DOTS treatment					
Negative	9(75.0)	7(41.2)	14(15.4)	22.86	0
Positive	3(25.0)	10(58.8)	77(84.6)		
Accessibility					
Poor	6(50.0)	10(58.8)	39(42.9)	1.564	0.5
Good	6(50.0)	7(41.2)	52(57.1)		

Discussion of Findings

The age group distribution of the respondents in this group is similar to the distribution reported by [10]. The findings of this study revealed an association between age and adherence to TB treatment. Similar to this finding, some studies conducted also reported the association between age and adherence to treatment [8,11]. Other studies however showed that there was no difference in the level of adherence across age groups [12,13]. Also, there was a relationship between the marital status of the patients and their adherence to medication. This

indicates that the partners could have an influence on the treatment compliance of patients. In contrast to the findings on the association of treatment adherence to marital status, [14] reported that marital status had no association with adherence to treatment among their respondents. Occupation of the patients also had a statistical relationship with adherence to medications. The study also revealed that educational status and residence and religious affinity had no associations with the adherence to TB treatment. [15] however reported associations between the educational level and poor

adherence to treatment.

Overall, the findings of the study revealed that majority of the patients had adequate level of knowledge about tuberculosis. In addition, only 11.7% of the patients had inadequate knowledge of DOTs treatment. These results indicate that there may be a well-established communication between the health workers in the clinics and the patients. Majority of the respondents were aware that the health condition mainly affects the lungs and is deadly if not treated. Though there is a good level of knowledge on TB, the patients' knowledge on the cause, transmission routes could be increased. In addition, the knowledge on the treatment using the DOTs method is inadequate in some areas. Some of the patients indicated that they could stop the treatment whenever they felt better.

In this study, there was no statistical relationship between the level of knowledge of the patients about tuberculosis and adherence to medications. These findings are similar to the findings from a study by [16] at Morocco in which TB knowledge was not associated with the compliance of patients to treatment. In contrast, [8,17] reported that knowledge of their respondents on TB was associated with poor adherence to the treatment.

The knowledge of the patients about the tuberculosis DOTs treatment had a significant relationship with the level of adherence of the patients. This indicates that the patients' knowledge about the schedule, risks involved with non-compliance and the effectiveness of the treatment will make the patients adhere better to the treatment. The higher the knowledge of the patients, the higher their adherence to the treatment procedures and vice versa. Patients who have received adequate comprehensive education on the procedure of the treatment will understand how essential the compliance and non-compliance could influence their health and well-being.

The level of adherence of the patients to the treatment was fair with about 75% of the sample population recording a good level of adherence to medications. This is similar to findings from previous studies which reported 21.2% in Ethiopia [18] and 25% in Uganda [19]. Some of the patients indicated that they did not keep to their scheduled appointments at the clinics. Though majority of the patients stated that the drugs were readily available at the clinic, a high proportion of patients perceived the treatment regimen to be complex. In addition, some of the patients considered transportation to be a major hindrance to their clinic attendance while some indicated that they found it

difficult getting to the clinic for treatment. Challenges with accessing healthcare due to distance or cost for transportation have been reported by several studies as a risk factor for non-adherence during TB treatment.

It is worth mentioning that 100% adherence was observed among custodian centre (Nigerian Prison) DOTs patients. This can be attributed to the fact that the DOTs treatment centre is located in their compound and hence highly accessible to the healthcare providers for effective medication adherence. Additionally, they were eager to receive treatment, due to the fact that they live in a densely populated environment in which they are confined and hence can easily transmit the disease and even get re-infected which they were aware of. This was noted by the researcher in her study as well.

Seventy-five percent of the patients had a positive attitude towards the DOTs treatment. The patients reported that the health workers were friendly and respectful towards them. Likewise, about 80% reported that they perceived the health care workers had the required skills for their jobs. This shows that the patients had confidence in the healthcare system and are more likely to comply with their medication regimen. Only two-thirds of the patients reported that the clinics were close to their houses and this may indicate that they would have no issues with clinic attendance. It was noted by the researcher that some patients preferred attending DOTs treatment centres which were far from them as long as the centres were located in obscure areas. This is because it prevents people from identifying their disease condition and thus avoids stigmatisation. This was particularly observed in Ita-Alapo Primary Health centre where patients travelled over long distances to seek treatment there due to its location in an obscure place. A study conducted by [20] in Indonesia reported that the patients who did not adhere to treatment were not satisfied with the behaviours of the health care staff. As reported by [21], patients' perceptions of health care provider interaction had a significant influence on patient satisfaction and adherence to TB treatment. Furthermore, low level of dissatisfaction or comfort with the clinic and/or health workers has been known as one of the risk factors for defaulting treatment among adult tuberculosis patients [22].

Conclusion

The study identified factors which could influence the adherence of tuberculosis patients to treatments. The variables examined included knowledge, attitude and accessibility to the DOTs treatment. The level

of knowledge of the patients on tuberculosis and adherence to treatment was high. Among all factors within the scope of the study, knowledge of patients on adherence to treatment and attitude towards the TB DOTS treatment had significant relationship with the adherence to treatment. Marital status and age of patients positively predicted the adherence to treatment. Other sociodemographic factors such as occupation, educational background and religion had no influence on the adherence to treatment. The findings of this study show that though the patients were knowledgeable about the disease, they lacked information about issues such as the duration of treatment.

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