

# Knowledge of diabetes mellitus in tuberculosis amongst healthcare workers in Nigeria

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## ABSTRACT

**Background:** There is a World Diabetes Foundation funded research on detection of diabetes mellitus (DM) in tuberculosis (TB) which is currently being carried out in 56 TB centers in Lagos State Nigeria and against this background, we decided to evaluate the knowledge of DM and (TB) amongst the health workers from these facilities. **Materials and Methods:** We employed the use of self-administered questionnaires comprising questions to determine participant's knowledge on risk factors, clinical presentation and complications of DM, diagnosis, management of DM, and presentation and management of TB. We documented and also compared responses that differed in a statistically significant manner amongst the various cadres of health worker and the three tiers of healthcare facilities. **Results:** A total of 263 health care workers responded, out of which medical doctors constituted 72 (27.4%) while nurses and other categories of health care workers constituted 191 (72.6%). All the respondents knew that TB is a communicable disease and a large majority– 86% knew that DM is a chronic disorder that as of now has no cure. One hundred and eighty one (71%) respondents gave a correct response of a fasting plasma glucose level of 9mmol/L, which is in the range for diagnosis of DM. About a third-90-of the health workers, however, stated that DM may be diagnosed solely on clinical symptoms of DM. However, 104 (46%) of the Study participants stated that urine may be employed for objectively diagnosing DM. All respondents had hitherto not had patients with TB who had been routinely screened for DM. There was insufficient knowledge on the non-pharmacological management with over half of the respondents, irrespective of status, maintained that all persons diagnosed with DM should be made to lose weight and carbohydrate should make up less than 30% of the component of their meals. **Conclusion:** There remains largely inadequate knowledge on diagnosing and non-pharmacological management of DM among the health workers in our TB facilities.

**Key words:** Diabetes mellitus, knowledge, Nigeria, tuberculosis

## BACKGROUND

Human tuberculosis, (TB) an infection caused by *Mycobacterium tuberculosis* remains an important cause of death, second only to the human immunodeficiency virus (HIV).<sup>[1]</sup> TB infection is associated with an enormous burden of disease especially in developing countries like Nigeria which has an estimated TB prevalence rate of

12.8% and is ranked as one of the 22 high burdened countries in the world with TB.<sup>[1-2]</sup> Lagos State, located in the South Western region of Nigeria and one of the most cosmopolitan states in Nigeria carries 8.4% of Nigeria's TB burden and consistently has been responsible for about 11% of the cases of TB registered in Nigeria.

Lagos State is currently implementing the internationally recommended strategy for TB control called the new stop TB strategy.

Diabetes mellitus (DM) is a non-communicable disease that has been shown to have a concrete association with TB.<sup>[3-5]</sup> The present status of DM in Nigeria although not known but prevalence estimates may be in the range of a four-fold increase from the earlier 2.2% prevalence rate that was documented in the only national survey

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done on DM in 1997.<sup>[6]</sup> DM has been noted not only to confer an increased risk for the development of TB but also puts co-affected patients at increased risks for poor outcomes.<sup>[7]</sup>

Early detection and good management can prevent or delay complications of both diseases. In our practice health care practitioners are often aware that persons living with DM are prone to developing TB if glycaemia is poorly controlled but the possible presence of DM in TB is an aspect that has not been looked into. In a resource poor setting like Nigeria, integrating diabetes screening into the already established TB program may prove to be cost effective.

Nigeria is facing a double burden of communicable and non-communicable disease and we are in the early stages of putting in place collaborative efforts to reduce the dual burden of these two diseases.

The premise for this Report is based on a current research work sponsored by the World Diabetes Foundation that is ongoing, to detect DM in TB in 56 Directly Observed Therapy (DOT) centers in Lagos Nigeria. The DOT centers are usually manned by healthcare personnel, which included medical doctors, nurses, and community workers that incidentally makes up the bulk of the healthcare workers for these facilities. The Community health workers (CHWs) who are lay personnel with some medical training but also serve as a link between professional health care staff and the community. They visit homes and can be a powerful and effective tool for diabetes detection and adherence to TB treatment regimens if given appropriate knowledge.

This Report aim to assess health care workers' knowledge on various aspects of diabetes and TB detection and management based on recommended guidelines. We hope to glean from the results of the Report the unmet needs of these health workers who can be ultimately involved in the screening, detection and management of DM in persons with TB in the DOT centers in Lagos State.

## MATERIALS AND METHODS

This is a cross-sectional Study that sought to determine the knowledge of healthcare workers on DM and TB. This Report employed the use of self-administered questionnaires which were given to the health care workers drawn from DOT centers at the beginning of a workshop on DM and TB. They were, however, allowed to respond to the questions at the end of the training program and the responses were analyzed. Lagos State has a total of 56 DOT centers which are located in primary, secondary and tertiary

healthcare facilities). The categories of healthcare workers in these DOT centers are varied and include the following:

Medical doctors – These are medical professionals that have at least the basic medical degree-MBBS; Nurses – These are healthworkers with a nursing certificate usually issued by the Nursing council of Nigeria; Pharmacists – Healthworkers with a degree in Pharmacy; CHWs – These are health workers who undergo some form of medical training by the Ministry of Health in Lagos State; Dieticians – These usually have a degree in food and nutrition. The DOT centers are usually supervised by the medical doctors.

The first part of the questionnaire covered the respondent's demographic information which included: Age, sex, level of education, and cadre of healthcare occupation. Besides these, the components of the questionnaires included questions on DM to determine participants' knowledge on risk factors, clinical presentation and complications of DM, diagnosis, and management of DM. Information on TB included clinical presentation, diagnosis and management of TB. We documented the percentage of correct responses. We also compared and documented responses that differed in a statistically significant manner amongst the various cadres of health workers. Responses that differed significantly between tertiary, secondary and primary healthcare facilities were also noted.

The test statistics used includes Student's *t*-test for quantitative data and Chi square for categorical data. A *P* value of 0.05 was considered to be significant.

## RESULTS

A total of 263 health care workers participated. A total of 191 (72.6%) were females and 72 (27.4%) were males. Medical doctors constituted 72 (27.4%) while nurses and other categories of health care workers constituted 191 (72.6%). The different categories are shown in Figure 1.

For the doctors the duration since attainment of MBBS the basic medical degree ranged from 1 to 30 years. The mean (SD) duration of attainment of MBBS was 6.8 (5.1) years. A total of 14 (19.4%) of the doctors had some postgraduate medical training. The distribution of the different cadre of healthcare workers and their place of work is shown in Table 1. An evaluation of the responses made by the Respondents revealed that nurses gave the least correct responses. These results are shown in Table 2. We have also shown in this report – as displayed in Table 3 – that not surprisingly, correct responses were

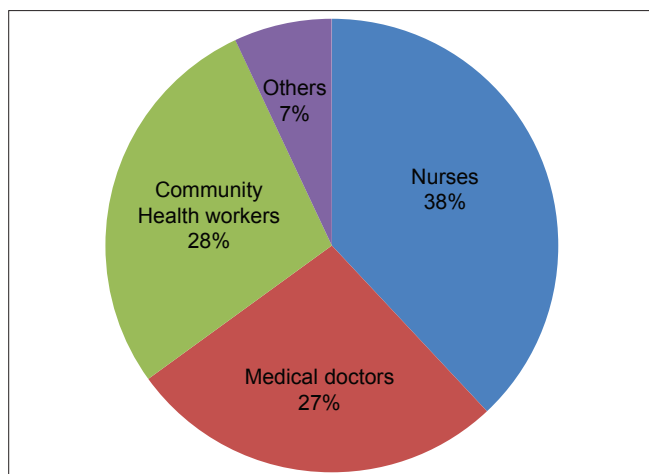


Figure 1: Distribution of the categories of healthcare workers

Table 1: Distribution of healthworkers according to their place of work

Cadre of health worker	1° health facility	2° health facility	3° health facility
All	75	90	98
Medical doctors	0	18	54
CHW	52	22	0
Nurses	22	44	34
Others	1	6	10

1°: Primary health care facility, 2°: Secondary health care facility, 3°: Tertiary healthcare facility, CHW: Community health workers

Table 2: Comparison of proportion of correct responses according to cadre of health care professional

Parameter	MD (%)	CH (%)	N (%)	O (%)	P
Everybody who contracts TB fall ill	(82)	(48)	(48)	(64)	0.0001
TB not diagnosed solely by chest X-ray	(72)	(55)	(41)	(41)	0.001
DM is sometimes contagious	(100)	(88)	(95)	(98)	0.02
Obesity is a non modifiable DM risk factor	(89)	(65)	(58)	(41)	0.0001
GDM is a risk factor for DM	(96)	(95)	(81)	(64)	0.001
FHx of DM	(94)	(61)	(58)	(64)	0.001
HbA 1c may be used in the diagnosis of DM	(50)	(47)	(11)	(24)	0.001
Sole CS may be used in the diagnosis of DM	(85)	(55)	(57)	(82)	0.001
FPG of 9mmol/L is diagnostic of DM	(47)	(35)	(27)	(41)	0.05
Dyslipidaemia may occur in DM	(94)	(87)	(90)	(59)	0.001
Persons with type 1DM may respond to OHA	(65)	(39)	(51)	(64)	0.01
Insulin may be injected in the abdomen	(88)	(78)	(77)	(80)	0.007
HbA 1c may be used to assess glycaemic control	(97)	(89)	(94)	(82)	0.05

MD: Medical doctors, CH: Community health workers, N: Nurses, O: Others (Pharmacists, dieticians) FHx of DM: Family history of DM is a certainty that DM would certainly develop in a family member, Sole CS may be used in the diagnosis of DM: Sole clinical symptoms may be used in the diagnosis of DM, FPG: Fasting plasma glucose, TB: Tuberculosis, DM: Diabetes mellitus, OHA: Oral hypoglycaemic agent, CS: Clinical symptoms, GDM: Gestational diabetes mellitus, HbA1c: Glycosylated haemoglobin

Table 3: Comparison of proportion of correct responses according to the place of work

Parameter	1° (%)	2° (%)	3° (%)	P
Everybody who contracts TB fall	(55)	(45)	(71)	0.002
GDM is a risk factor for DM	(79)	(91)	(92)	0.017
FHx of DM	(55)	(73)	(76)	0.005
HbA 1c may be used in the diagnosis of DM	(86)	(70)	(96)	0.001
Persons with type 1DM may respond to OHA	(42)	(48)	(65)	0.01
Urine glucose may be used to diagnose DM	(62)	(56)	(76)	0.01
HbA 1c may be used to assess glycaemic control	(97)	(89)	(94)	0.05

FHx of DM: Family history of DM is a certainty that DM would certainly develop in a family member, 1°: Primary health care facility, 2°: Secondary healthcare facility, 3°: Tertiary healthcare facility, TB: Tuberculosis, DM: Diabetes mellitus, GDM: Gestational diabetes mellitus, OHA: Oral hypoglycaemic agents, HbA1c: Glycosylated haemoglobin

documented most from Respondents who work in the tertiary facilities.

### Knowledge of tuberculosis amongst healthcare workers

All the respondents knew that TB is a communicable disease (100%). About half of the respondents– 154 (59%) knew that not everybody who contracts TB fall ill and 122 (47%) correctly stated that the diagnosis of TB is not made solely on chest X-ray findings.

Concerning the number of sputum samples to be used in the diagnosis of TB, 175 (67%) respondents noted that 3 samples of sputum are required to be collected for diagnosis and 67 (33%) of respondents were of the opinion that 2 sputum samples were required for this purpose. Regarding the treatment of TB, all the respondents agreed that DOT should be initiated when TB is diagnosed. However, 107 gave a correct response of 6 months as the recommended duration for the treatment of newly diagnosed TB.

### Knowledge of diabetes mellitus amongst healthcare workers

#### Diabetes mellitus risk factors

A total of 212 accounting for 86% of the respondents

knew that DM is a chronic disorder that as of now has no cure. A small percentage-5% – stated that DM is contagious and a total of 216 (82%) of the respondents knew that DM especially if poorly controlled increases the risk of contracting TB. Of the Study participants 93% correctly indicated that intake of calorie-dense food as well as lack of exercise are risk factors for the development of DM. Obesity as a modifiable risk factor of DM was correctly stated as such by 177 (67%) of the health workers.

A total of 182 (69%) correctly stated that having a first degree family history is not certain evidence that such persons would develop DM. Well over half - 87% of the respondents knew that gestational DM is a risk factor for the development of type 2DM.

#### *Diagnosis of diabetes mellitus*

One hundred and eighty one (71%) respondents gave a correct response of a fasting plasma glucose level of 9mmol/L, being in the range for the diagnosis of DM. That glycosylated hemoglobin may be used in the diagnosis of DM was correctly indicated by 40 (15%) of respondents. A total of 90 (34%) of the health workers, however, stated that DM may be diagnosed solely on clinical symptoms of DM. Similarly, 94 (36%) respondents gave a correct response of that random plasma glucose of 10mmol/L is not diagnostic of DM. However, 104 (46%) of the Study participants stated that urine may be employed for objectively diagnosing DM. All respondents had hitherto not had patients with TB who had been routinely screened for DM.

#### *Clinical presentation and complications of diabetes mellitus*

As regards the clinical presentation of DM, the proportion of respondents that knew that type 2 DM may be asymptomatic at diagnosis and on the other hand may present with complications at diagnosis were 81% and 86% respectively. All the Study participants except 17% and 10%, respectively knew that DM is a component of the metabolic syndrome and that type 2 DM may occur in adolescents. Peripheral neuropathy as a risk factor for DM foot lesions was indicated as true by 238 (90%) whilst dyslipidemia as a co-morbidity of DM was noted to be true by 211 (80%) of the Study participants.

#### *Management and treatment targets of diabetes mellitus*

All the participants except 9 (3%) noted that persons with DM be involved in their management of their condition. About 111 (42%) respondents stated that weight loss be recommended for all persons with DM. A total of 154 (59%) were of the opinion that carbohydrate should make up 10-20% of the diet of a person with DM. Two

hundred and five (78%) of respondents answered correctly that insulin may be used in the management of DM and has to be injected subcutaneously in the abdomen. A total of 130 (49%) of the healthcare workers incorrectly noted that diet sodas should be used in the abortion of hypoglycemic episodes. The large majority of the respondents – 205 (78%) correctly noted that glycosylated hemoglobin is used for assessing long term glycemic control. Desirable LDL levels of <100 mg/dl and HDL levels of >50 mg% were noted to be correct by 174 (66%) and 71 (27) of the respondents.

## DISCUSSION

Sufficient knowledge of the detection, diagnosis, and management of DM in TB is imperative especially in resource limited settings where health care expenses are usually “out of pocket”. Empowerment of healthcare providers in DOT centers to detect DM will also ensure a considerable reduction in the undesirable morbidity and mortality often documented as a result of ignorance. Well over half of the respondents worked in primary and secondary healthcare facilities and the large majority of the Study subjects were nurses and medical doctors.

We have shown in this report that the healthcare workers from the DOT centers studied are not fully poised to handle the detection and management of DM in TB. This is rather unfortunate and is a possible result of an unexisting synergy in TB and DM in our present practice. Sadly none of the respondents had patients who had been routinely screened for Diabetes thus further emphasising the need for routine screening of diabetes among patients with TB.

The large majority of respondents displayed sufficient knowledge of the diagnosis and management of TB. Overall, medical doctors displayed higher knowledge of TB diagnosis and management compared with other cadre of healthcare professionals. This finding is comparable with that from a South African report<sup>[8]</sup> which reported that doctors having a higher knowledge of TB than other healthcare workers. It is pertinent to note that the CHW which make up the majority of the staff of these DOT centers and nurses had better knowledge compared with nurses for many questions.

In a Peru Report on knowledge displayed by the healthcare workers on TB detection, the healthcare professionals which in that context referred to medical doctors and nurses fared better than other cadre of healthcare workers.<sup>[9]</sup>

In the evaluation of responses on risk factors for DM, over half of the respondents were knowledgeable about these.

However, medical doctors obviously had better knowledge than the other cadres of healthcare professionals. For the diagnosis of DM, about 50% of the CHW and nurses incorrectly stated that the clinical symptoms of DM alone were sufficient to make a diagnosis. About half of all cadres of healthcare workers displayed insufficient knowledge of fasting plasma glucose values in the diagnostic range of DM. For random plasma glucose values, there were more correct responses obtained and the results for these were comparable between the cadres of healthcare personnel. Most of the Study participants were well informed on the clinical presentation and complications of DM. The majority of respondents irrespective of their cadre displayed ignorance in terms of non-pharmacological management of DM. Responses in terms of diet were geared towards making carbohydrate the least component of a meal and weight loss was deemed to be almost a routine for everyone with a diagnosis of DM. Correct responses were obtained more for pharmacological management of DM compared with non-pharmacological management. However, responses differed significantly on the use of insulin for people with type 1 DM as well over half of the CHW and nurses were of the opinion that oral glucose lowering medications may be used in persons with type 1 DM. In the comparison of correct responses according the tier of healthcare delivery, only a few responses differed. In this regard, however, persons from the tertiary centers gave the most correct responses.

We have shown from the foregoing that following a training program on detecting DM and TB, healthcare workers especially CHW and nurses did not display pre-requisite knowledge for detecting DM. There was gross ignorance on the knowledge of non-pharmacological management of DM. We are of the opinion that this scenario may be due not only to deep rooted erroneous beliefs on DM but also poor accessibility to continuous medical education. It is obvious that a one-time training is insufficient to get it right and regular CMEs should be made an integral part of our healthcare institutions. Our finding is similar to the South African study where it was also shown that the CHWs did not have the requisite knowledge, attitudes, and beliefs to make a positive impact on prevention and management of diabetes.<sup>[10]</sup> That study similarly concluded that there is need to empower the CHWs with skills to

work in their communities.<sup>[10]</sup> It is obvious that the dangers of an ill-equipped healthcare team would inevitably result in dismal health outcome statistics in terms of morbidity and mortality.

## CONCLUSION

There is a need to improve healthcare workers' overall knowledge of TB and DM in order to reduce the oft associated high morbidity and mortality associated with these disease entities. Training programs on DM and TB would empower healthcare professionals especially the CHWs to identify risk factors for diabetes in TB and in their communities. In a resource-limited setting as ours utilizing the already well-structured DOTs centers in addition to improve training will ultimately improve diabetes detection, prevention, and treatment in a cost-effective manner.

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