Short Communication

Factors Affecting Diabetes Management among Tuberculosis-Diabetes Comorbid Patients in Udupi District

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Abstract

Background: Tuberculosis (TB)-diabetes comorbid cases have increased in India with Karnataka among the states with the highest numbers. The comorbidity adversely affects the prognosis of individual diseases. Diabetes management is crucial to the management of TB. **Aim:** This study aims to understand the factors influencing diabetes management, and the barriers and challenges affecting the management of diabetes in TB-Diabetes comorbid patients in Udupi district. **Materials and Methods:** For this mixed-method, cross-sectional study, TB-Diabetes comorbid patients, registered under the NIKSHAY in 2018 and 2019, and government Medical Officers were included in the study. Data were analyzed using SPSS. For the qualitative study, thematic analysis was done. **Results:** A total of 154 participants were included in the study. The disease the participant developed first, the place of diabetes diagnosis, person initiating diabetes treatment, and counseling ($P < 0.05$), were some of the factors affecting diabetes management. In addition, alcoholism, migrant status, and old age were some of the barriers in the management of diabetes among comorbid patients. **Conclusion:** Diabetes management of alcoholics, migrants, elderly patients, and patients without a family needs special consideration for the successful management of TB-Diabetes comorbidity.

Keywords: Diabetes management, NIKSHAY, Revised National Tuberculosis Control Programme, tuberculosis-diabetes comorbidity

Introduction

Tuberculosis (TB) is the leading cause of mortality from an infectious disease and is among the top 10 causes of death.[1] Harboring 27% of global TB cases, India leads the list of the eight countries that are accountable for almost two-thirds of the total global cases of TB.[2] One of the contributing factors of TB is the presence of underlying immunocompromised conditions such as Diabetes.[3] Both the number of cases and the number of deaths due to diabetes have increased since 1990 in India making it the diabetes capital of the world.[4]

Patients with diabetes have thrice the risk of getting TB than those without.[5] Over the years, the number of diabetes as well as TB-diabetes comorbid cases in India has increased.[5] With a 25.3% prevalence of TB-diabetes comorbidity in 2016, Karnataka is one of the states with higher TB-Diabetes comorbidity.[1,6] The comorbidity poses several challenges to the management of individual diseases. As diabetes impairs immunity, thereby increasing the susceptibility of TB infection, TB can create temporary impaired glucose tolerance, which is a risk factor for diabetes.[7] Diabetes prolongs the TB treatment and increases the chances of treatment failure and relapse.[8] Therefore, it is pivotal that the comorbidity is managed with the utmost priority. The WHO, the Revised National Tuberculosis Control Programme (RNTCP), and the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke (NPCDCS) have come up with the collaborative frameworks joint TB-diabetes activities.[9,10] Glycemic control is the key to achieve treatment success in TB and consequently DM.[10] In other words, the effective management of the comorbidity is invariably dependent on the control of diabetes. This study aims to understand the factors influencing the management of diabetes, and the barriers and challenges affecting diabetes management in TB-diabetes comorbid patients for successfully managing the comorbidity.

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Materials and Methods

This mixed-methods cross-sectional study was conducted in the Udupi district of Karnataka between January 2020 and June 2020. A convergent parallel design was adhered to whereby both quantitative and qualitative data collection and analysis were conducted simultaneously.[11] While the quantitative study primarily focused on the factors affecting diabetes management among TB-DM co-morbid patients, the qualitative study delved deeper to understand the barriers of diabetes management from the perspective of healthcare providers, which would also be counted as factors of diabetes management. The quantitative study included TB-Diabetes comorbid patients diagnosed and registered under NISHAY in the years 2018 and 2019. Data were collected by complete enumeration. Likewise, the qualitative study included a purposive selection of Medical Officers functioning under the RNTCP as study participants.

Data collection

A total of 226 TB-diabetes comorbid patients diagnosed and registered in the NIKSHAY in the years, 2018 and 2019 met the study criteria. Leaving out the 72 patients (6 deaths, 27 refusals, and 39 nonresponses), the final sample size achieved was 154. Participants were interviewed face-to-face with the help of a structured questionnaire after obtaining informed consent. The questionnaire covered the topics of; socio-demographic characteristics, TB diagnosis, and management, diabetes diagnosis and management, referral, and follow-up.

For the qualitative data collection, medical officers functioning under RNTCP in the district were listed as potential participants. Based on the recommendations of the participants of the quantitative study, and the Senior Treatment Supervisors of each taluk, Medical officers were purposively selected for the study. In-depth face-to-face interviews were conducted and recorded using the "Voice Recorder" android application, after obtaining the consent of the participant. The interview guide contained questions of the following domains; diagnosis of diabetes, the process of management of diabetes, and the follow-up of diabetes in TB-diabetes comorbid patients. Data collection was stopped on obtaining data saturation.

Data analysis

Data were entered into MS Excel and analyzed using SPSS version 20 (Statistical Package for the Social Sciences (SPSS for Windows version 20.0, SPSS Inc., Chicago, Illinois, USA) software). Categorical variables were expressed in frequencies and percentages. The Chi-square test was used to find out the association between variables. A $P < 0.05$ was considered statistically significant.

The interviews of the qualitative study were transcribed and the data were analyzed manually. Thematic analysis was done using an inductive approach to understand the barriers and challenges of diabetes management. Codes, categories, and themes emerged from the critical review of the transcripts.

Ethics approval (IEC: 888/2019) was obtained from the Institutional Ethics Committee and the identities of the participants were kept confidential.

Results

About 66% of participants belonged to the age group of 40–60 years. A majority (77.9%) of the participants were males. The Modified Kuppuswamy Scale was used to assess the socioeconomic class of the study participants.[12] 86.4% of the participants got diabetes before TB. The diabetes management of almost half of the participants started at the TB unit under RNTCP. Furthermore, 91.20% of participants were screened again for diabetes at the end of TB treatment [Figure 1].

Although most (81.4%) of the participants reported that they were counseled at the end of TB treatment for the further management of diabetes, referral for diabetes management after TB treatment completion was low. It was found that the disease the participant got first, place of diabetes diagnosis, and counseling at the end of TB treatment regarding the further management of diabetes were significantly associated with the status of diabetes management [Table 1]. The status of diabetes management explicitly indicates whether or not the participant was under any form of treatment for diabetes. In other words, an "Yes" response to the question meant that the participant is under some form (pharmacological/lifestyle/other) treatment for diabetes, and a "No" response meant that he/she was not under any form of treatment for diabetes. A significant association was found between periodic reporting back at the healthcare facility after the completion of TB treatment, and the place of diabetes diagnosis [Table 2].

In the qualitative study, out of a total of 10 participants, 7 were females. Some of the major themes revealed by the analysis were as follows: (1) Adequate counseling, education, number of staff, and habits of patients are important factors of diabetes management and (2) Although periodic follow-up is done, healthcare providers are unaware of the exact follow-up protocol after the end of TB treatment.

Adequate counselling, education, number of staff, and habits of patients are important factors of Diabetes management:

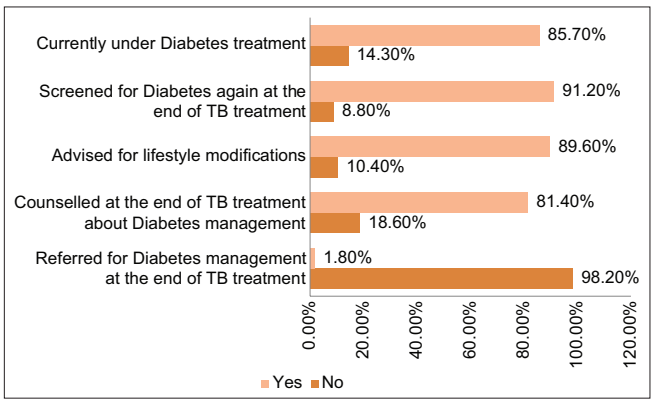

Figure 1: Parameters of diabetes management

Table 1: Factors associated with the status of diabetes management

Variables	Categories	Diabetes management status		*P* (<0.05)
		Yes, *n* (%)*	No, *n* (%)*	
Disease the participant got first	Diabetes	120 (90.2)	9 (9.8)	<0.001
	TB	12 (57.1)	13 (42.2)	
Place of diabetes diagnosis	At same place as TB diagnosis (government)	117 (88.0)	16 (12.0)	0.044
	In private setup	15 (71.4)	6 (28.6)	
Counselling at the end of TB treatment	Yes	80 (87.0)	12 (13.0)	0.025
	No	14 (66.7)	7 (33.3)	

*Row percentages. TB: Tuberculosis

Table 2: Parameters of diabetes management and periodic reporting back

Variable	Categories	Asked to report back periodically at the healthcare facility after the completion of TB treatment		*P* (<0.05)
		Yes, *n* (%)*	No, *n* (%)*	
Place of diabetes diagnosis	Same place as TB diagnosis (government)	87 (87.9)	12 (12.1)	0.003
	In private	8 (57.1)	6 (42.9)	
Person who initiated diabetes treatment	Government practitioner	72 (88.9)	9 (11.1)	0.026
	Private practitioner	23 (71.9)	9 (28.1)	

*Row percentages. TB: Tuberculosis

While the participants had no complaints about the availability of resources such as medicines, many expressed the need for more healthcare workers in the health facilities for the better management of the comorbidity.

[...] There's a shortage of male workers. I have nine sub-centres under me. All have ANMs. Only one male Health worker is there.(Respondent 6)

Furthermore, a majority of the participants mentioned the difficulties of Diabetes management of alcoholic patients, elderly patients, migrant workers, and those who do not have a family.

[...]So some patients we have to tell them that you're taking alcohol, so this might extend till one year or two years. It will be very difficult. Most of these patients have family issues also. Some are staying alone; some have family problems.So, I think. It's sad that certain aged people, certain elderly people are difficult to follow.(Respondent 4)

Another participant mentioned:

[...] Only problem is that we come across cases when patients are alcoholics. They are not regular.(Respondent 3)

Patients without a family or those who stay away from their families often show poor compliance with Diabetes treatment.

Although periodic follow-up is done, healthcare providers are unaware of the exact follow-up protocol after the end of TB treatment: There is a periodic follow-up of co-morbid patients after the completion of TB treatment in almost all the healthcare facilities. However, a notable number of differences were observed in the responses of the participants within the duration and period of follow-up.

[...] See what we do is every month we follow up. Follow up appointment is written in the prescription forms that the patient should come back after a month.(Respondent 1)

[...] Once TB is over also, we are supposed to do for a follow for two years. Every six months we are supposed to now according to the new protocol. Although the TB treatment is completed, we have to go with the follow up every six months.(Respondent 2).

Discussion and Conclusion

This study highlights the factors affecting diabetes management which is pivotal for the management of the comorbidity. It also throws light upon the barriers of diabetes management from the perspective of medical doctors dealing with the management of TB-DM comorbid patients. A majority of the participants of the quantitative study were males and were of the age group of 40–60 years. In a similar study done by Pande *et al*. in Manipal, India, a majority of TB-Diabetes patients were males and aged between 41 and 60 years.[13] Most of the participants were screened for diabetes at the government health facility, the same place as TB diagnosis, as recommended by the RNTCP and NPCDCS.[10] Likewise, this study revealed that 91.2% of participants were screened for diabetes again at the end of TB treatment, as recommended by "The Union."[14] A significant association was found between the status of diabetes management and the disease the participant got first. A majority of participants were counseled at the end of TB treatment regarding the further management of diabetes, as stated by the guidelines of the RNTCP and the Union.[10,14] However, the referral at the end of TB treatment to a diabetes practitioner was low.

In the in-depth interviews, participants mentioned the shortage of staff in the government healthcare centers. This finding was consistent with a study done by Ereso *et al*.[15] Likewise, most participants highlighted the difficulty in the diabetes management of alcoholic patients, migrants, elderly patients, and patients without a family. In a study by Gelmanova *et al*. in the Russian Federation, it was found that alcoholism and substance abuse were significant factors that affected the adherence to TB treatment among patients.[16]

Apart from the demographic factors, the place of diabetes diagnosis, disease the participant got first, the person who initiated diabetes treatment, counseling, re-screening for diabetes at the end of TB treatment, and referral for diabetes management, were identified as some of the factors influencing the diabetes management among TB-diabetes comorbid patients. Furthermore, the referral of comorbid patients for diabetes management at the end of TB treatment was low. Finally, the diabetes management of alcoholic patients, migrants, elderly patients, and patients without a family was particularly difficult. We recommend the inclusion of more male health workers for better management of such patients. Therefore, it is pivotal to understand these factors and address the hindrances for the better management of diabetes among TB-diabetes comorbid patients, as diabetes management is the key to the management of the comorbidity.

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Conflicts of interest

There are no conflicts of interest.

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