



IJCRR  
Section: Healthcare



Copyright@IJCRR

# Challenges of Diabetes Management among TB-Diabetes co-morbid Patients in Udupi District

Ansuman Swain<sup>1</sup>, Arathi P Rao<sup>2</sup>, Prabhath M Kalkura<sup>3</sup>, Manisha Gore<sup>4</sup>,  
Kirtimayee Soumyadarshinee<sup>5</sup>

<sup>1</sup>BDS, MPH, Prasanna School of Public Health, Manipal, Karnataka, India; <sup>2</sup>Programme Coordinator, Prasanna School of Public Health, Manipal, Karnataka, India; <sup>3</sup>Department of Community Medicine, Manipal Academy of Higher Education, Manipal, Karnataka, India; <sup>4</sup>Symbiosis Institute of Health Sciences, Pune, Maharashtra, India; <sup>5</sup>India Health Action Trust, Karnataka, India.

## ABSTRACT

**Introduction:** India has witnessed a rise in TB-Diabetes co-morbid cases in the past few years. Both TB and diabetes create complications for each other not only in terms of the prognosis but also management. Glycaemic control is pivotal for the successful management of diabetes and the co-morbidity.

**Aim:** To understand the barriers and challenges of successful management of diabetes among TB-Diabetes co-morbid patients in the Udupi district.

**Methods:** This cross-sectional study was conducted in the Udupi district of Karnataka from January 2020 to June 2020. Purposely selected Healthcare providers under RNTCP, were interviewed using a semi-structured interview guide. Each interview was fully transcribed. Data collection was terminated on reaching data saturation. A manual thematic analysis of the interview data was done using an inductive approach. Codes and themes were generated by a critical review of the transcripts.

**Results:** Healthcare providers stated that certain patients such as, elderly, the homeless, and those with habits like alcoholism, were particularly difficult to manage. Besides, poor socioeconomic status, misconceptions, and lack of treatment adherence often create difficulties. Finally, participants also stressed the shortage of staff which impedes efficient management of the co-morbidity.

**Conclusion:** This study identified several barriers and challenges of diabetes management among TB-Diabetes co-morbid patients. These impediments, such as alcoholism, misconceptions, staff shortage, if addressed could aid in the better management of diabetes and eventually the co-morbidity.

**Key Words:** TB-Diabetes, Diabetes management, RNTCP, co-morbidity, Udupi district, TB challenges

## INTRODUCTION

Tuberculosis (TB) is responsible for the greatest number of deaths by a communicable disease in the world.<sup>1</sup> India is home to 27% of global TB cases and is one of the 30 high TB burden countries which contribute to 87% of the total number of TB cases in the world.<sup>2</sup> Often termed as a disease of poverty, some of the contributing factors of TB are; overcrowding, smoking, drinking and immunocompromising diseases like diabetes.<sup>3</sup> India, known as the Diabetes capital of the world is home to about 75 million diabetics with a prevalence of nearly 8.7%.<sup>4</sup> Diabetes has been known to increase the risk of contracting TB infection by impairing the immune responses of the body and thereby increasing the risk.<sup>3,5,6</sup>

Both TB and Diabetes increase the likelihood of contracting each other. TB-Diabetes co-morbid cases have been rising in the past few years in India.<sup>7,8,9</sup> Diabetes is responsible for impaired immunity which often increases the likelihood of getting TB infection. TB on the other hand, adversely affects glucose tolerance, thus elevating the risk of diabetes.<sup>10</sup> Studies have shown that TB infection proceeds at a faster rate with Diabetes as comorbidity.<sup>10</sup> Further, people with the comorbidity are at a four times higher risk of dying as compared to people with individual diseases.<sup>11</sup> A large fraction of people with both diseases remain undiagnosed and often end up developing complications. Besides, diabetes lengthens the TB management and is conducive to treatment failure and relapse.<sup>12,13,14</sup> TB-Diabetes comorbidity poses several

### Corresponding Author:

Dr. Arathi P Rao, Programme Coordinator, Prasanna School of Public Health, Manipal, Karnataka, India.

Mob: +919008418848; Email: [arathi.anil@manipal.edu](mailto:arathi.anil@manipal.edu)

ISSN: 2231-2196 (Print)

ISSN: 0975-5241 (Online)

Received: 04.06.2022

Revised: 27.06.2022

Accepted: 03.07.2022

Published: 20.07.2022

challenges to the management of both diseases. Glycaemic control is the key to achieve treatment success in TB and consequently diabetes.<sup>11</sup>

In other words, the successful management of TB is dependent on the successful management of diabetes. The dilemma in the management of comorbidity is multifactorial.<sup>15</sup> For instance, while rich nourishment is recommended in case of TB, it is contraindicated for Diabetics.<sup>16</sup> According to a study by Thomas et al., in Chennai, India, the health centres face difficulties in the management of TB patients due to reasons such as illegible or missing addresses given by patients, and loss of follow-up.<sup>17</sup> Such issues when complimented by persisting blood glucose levels, pose a serious hindrance to TB management. Considering the importance of diabetes management for subsequent TB-diabetes comorbidity management, it is pivotal to understand the difficulties faced by healthcare personnel in diabetes management. Therefore, the purpose of this study was to understand the barriers and challenges of successful diabetes management among TB-diabetes co-morbid patients.

## METHODS

### Study design and setting

This cross-sectional study followed a quantitative study that aimed to understand the factors affecting diabetes management among TB-diabetes co-morbid patients in the Udupi district. It was conducted in the Udupi district of Karnataka from January 2020 to June 2020. The proposal was approved by the Institutional Ethical Committee (IEC 888/2019) of Kasturba Medical College (KMC), Manipal Academy of Higher Education. TB and co-morbidities are within the purview of the District TB control centre, Udupi. The regional community health workers such as Accredited Social Health Activists (ASHAs), auxiliary nurse midwives (ANMs), along senior treatment supervisors (STOs) under the revised national TB control program (RNTCP) collectively function to notify and follow up TB patients in the district. The healthcare providers under the RNTCP conduct the directly observed treatment short-course (DOTS).

### TB-DIABETES collaborative strategies

The WHO has come up with a collaborative framework for the management of both diseases in 2011.<sup>10</sup> The framework has established guidelines for the detection and management of TB in diabetics and vice-versa. Likewise, the RNTCP, and the NPCDCS, have their own National framework for joint TB-Diabetes collaborative activities in India.<sup>11</sup> The framework explains the screening procedure, sensitization of

health personnel, reporting, as well as joint management of the co-morbidity.

### Data Collection

Purposively selected Healthcare providers under RNTCP, were interviewed using a semi-structured interview guide which contained questions that covered the following domains: introduction and orientation, diagnosis of diabetes in TB-diabetes co-morbid patients, the process of management of Diabetes in TB-diabetes co-morbid patients, follow-up of diabetes in TB-diabetes co-morbid patients. The identity of the participants was kept anonymous. The entire in-depth interviews were recorded using a voice recorder application, after obtaining the consent of the participants. Each interview was fully transcribed. Data collection was terminated on reaching data saturation.

### Data Analysis

We resorted to the 'Grounded theory' approach of analysis of the data.<sup>18</sup> A manual thematic analysis of the interview data was done using an inductive approach. Each interview transcript was critically reviewed by the researchers. Suitable codes were generated and assigned to sections. The interview transcripts were carefully analyzed to look for similarities and differences. The generated codes were aligned under categories and the categories were reviewed to generate meaningful themes systematically.

## RESULTS

The thematic analysis of the 10 participants revealed the following barriers and challenges for the management of diabetes among TB-diabetes co-morbid patients.

### Habit of alcoholism is a challenge in the follow up

The management of patients with habits such as alcoholism was found to impede efficient follow-up. Participants stressed the difficulties of the management of alcoholic patients, elderly patients, patients without a family, and those belonging to the lower socioeconomic strata.

"The only problem is that we come across cases when patients are alcoholics. They are not regular. Just one problem with them is they don't take medications properly if they also are Diabetic then it's probably the worst combination. Alcohol is a big Factor. Because of the alcohol, they miss medication and appointments." (Respondent 3)

Most participants agreed to the added challenges of keeping a track of patients with family problems, or without a family. Besides, such patients are irregular with their medications, thus increasing the difficulties.

### **Multiple medications and a lengthy treatment lead to non-compliance**

TB patients invariably follow a list of medications for the management of the disease and in case of comorbidity, diabetic medication additions often increase the difficulties of the patient. As a result, they end up skipping the medications or stopping them completely.

“See already they are, you know taking a lot of medication for TB, right? And then we are telling them to add on to that list, medications for diabetes. So that’s a bit of a worry to them, you know maintaining so many medications, the timings and you are treating the body with a lot of chemicals. So that is never a good thing to have.” (Participant 3)

### **Misconceptions and stress related to the co-morbidity**

Many patients have several misconceptions regarding the treatment. Likewise, there is stigma associated with comorbidity as well which affect diabetes management.

“And one wrong notion that many of the patients have is that when they see the fasting and you know, Postprandial blood sugars are normal, they think that they’re completely cured of Diabetes and they revert back to the, you know, original lifestyle and this is something that is a big misconception. They do stop medication and like I said, it adds on to the problem and sometimes they even reduce the dosage.” (Respondent 7)

Also, having both diseases make some patients stressed. Elderly patients and those of the lower socioeconomic class are often reported to be under a lot of stress due to the management of the comorbidity.

“Patients, especially of the socially backward class are under a lot of stress because of this because of the dual management. Yeah, some of them are under stress. The stress levels are according to his age. More the age more the stress like older patients are at a more stress.” (Respondent 10)

### **Contradictory diet advice for the co-morbidity**

Some participants also mentioned the paradox of dietary management in case of comorbidity, meaning; the patients need to gain weight as they have TB and therefore require to eat well. However, as they also have diabetes, they might need to cut down on a few things which make dietary management tricky.

“They have to take care of the diet as well, which is also contradictory because you know in Tuberculosis, we usually prescribe them to have protein rich and good food to gain weight and you know to gain mass but it’s a contradictory statement when it comes to Diabetes. So like it’s a paradox when you have both diseases in one you need to eat, well in the other you don’t.” (Participant 3)

“ See if it was a normal person with Tuberculosis you can ask them to have Banana, Milk and you know anything that is high energy yielding. But this is absolute contraindication when it comes to Diabetes, so they can’t afford to have skimmed milk and all those sort of things. So that becomes a big issue with people those who have Diabetes as well” (Respondent 4)

### **Poor socio-economic status acts as a hindrance for the dietary management**

Patients belonging to the lower socio-economic strata face many issues due to comorbidity, especially due to the necessity of a change of diet and lifestyle. Such patients are often unable to afford the often expensive, high calorific foodstuff such as meat and milk powder advised by the healthcare personnel, eventually letting the co-morbidity persist.

“The major problem is that they are dependent on Rice, which they can’t have in case of Diabetes. So if they had anything other than rice, they don’t feel complete. So it’s very difficult to alter that kind of a diet because you know, even if I tell them anything, they might not be able to afford it. Green. Most of them here are fishing community people. Rice and fish is the staple. That is my biggest problem.” (Respondent 4).

### **Non-adherence gives rise to complications**

Whether or not a co-morbid patient is compliant with the management, is dependent on several factors ranging from the socio-economic status of the patient to periodic follow-up. Although a majority of patients follow instructions, few of them don’t and their follow-up is difficult.

“ Patient non-compliance is a very big problem for us. That’s whenever we call them for follow-up, they won’t come. Yeah, they’ll say they have work. Even when the ASHA workers go, their doors will be locked then they’ll not pick up the phone.” (Respondent 5)

Some patients may discontinue the treatment on their own, either because of financial constraints or sometimes due to negligence.

“ There are specific cases where they could discontinue either TB or Diabetes medication on their own because of several reasons. Economic regions, and also non seriousness. I mean not being aware about it or, aware, but kind of casual attitude.” (Respondent 10).

Several participants reported such casual attitudes of certain patients, which often results in poor outcomes. Consequently, the lack of adherence leads to complications and the development of drug resistance in some cases.

“ What happens is one patient if not compliant, the chances of complication are very high. So when I tell them that you are in initial stage of Diabetes, you need to start medication,

they usually don't. But after six months they come to me with complaints like I'm having numbness, I feel fatigued, there is chest pain, difficulty in breathing and so on. So, you know once these complications have started it becomes difficult to manage. So, the early stages of treatment is very easy as compared to, when you have developed complications." (Respondent 4)

### **Differences in the 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 healthcare facilities. However, a notable amount of differences was observed in the responses of the participants within the duration and period of follow-up.

"We certainly follow up on a monthly basis. The appointment date is mentioned in the prescription forms." (Respondent 1)

"As soon as the patient is completely of TB, we need to do timely follow-up for two years. As per the latest guidelines, we should be following-up within every six months." (Respondent 2)

"Usually, we prescribe medications for one month after the treatment in between is over and we ask them to regularly come to the centre every 15 days." (Respondent 7)

### **Shortage of staff**

All the participants mentioned the availability of adequate resources and facilities. However, participants also expressed the issues of the shortage of staff and consequently not being able to manage the comorbidity efficiently.

"In the PHC, I am the only health care provider here so you don't have a counsellor. So, you need to have a specialized counsellor. So, you have to counsel them regarding the change of lifestyle, you know they forget about diet and a lot of other things, that needs time. In the community health centre or they have specialized doctor and they have more manpower than a PHC. But here we have difficulty to manage all these things with the existing number of staff." (Respondent 9)

Another participant stressed the importance of male health workers in managing alcoholic patients, as understandably, ASHAs (female health workers) would have difficulties dealing with them.

"There's a shortage of male workers. I have nine sub centres under me. All have ANMs. Four female workers are there where there is only one male health worker and 28 ASHAs or ladies. So there should be option for ASHAs to be men also. I believe men would be in a better position to deal with alcoholic patients." (Respondent 2)

Data is sketchy, please read all the transcripts again and add

the data to the respective sections You need to rearrange the findings. Bring the common codes under one theme. Suppose theme is about follow up bring all the points related to follow up under it.

## **DISCUSSION**

This study aimed to understand the barriers and challenges in the effective management of diabetes among TB-diabetes co-morbid patients in the Udupi district of India. Many participants believed that patients who were alcoholics often showed poor adherence to treatment and their follow-up was difficult. This is also the case with elderly patients and patients who do not have a family. The study conducted by Gelmanova et al. in the Russian Federation highlighted the significant negative impact of alcohol and substance abuse on the treatment adherence of TB patients.<sup>19</sup> Most participants agreed that the increase in the number of tablets patients has to take periodically, often led to discontinuation of the treatment. Also, the prevailing misconceptions about the treatment, especially among the people from lower socio-economic strata cause the management to extend. Furthermore, healthcare personnel faced difficulties in advising high calorific diets to patients of the lower socio-economic strata due to their financial constraints. A study by Nonogaki et al. revealed that people with a family from the higher socioeconomic strata showed better adherence to Diabetic medication as compared to those from the lower socioeconomic strata.<sup>20</sup> Besides, some patients do not take medication as directed, thereby increasing the likelihood of developing drug resistance and complications. The follow-up of some patients, particularly those of the lower socioeconomic class was difficult. There have been cases of drug resistance due to the lack of adherence by some patients. This in turn may also adversely affect the prognosis of TB treatment. A change in the diet of such people is difficult and adds to the list of barriers and challenges of diabetes management in TB-diabetes co-morbid patients. Apart from that, notable differences could be observed in the opinions of participants about the periodicity of the follow-up procedure. Multiple responses ranging from 15 days to 6 months were received. Finally, many stressed the shortage of manpower in the healthcare centres, which meant ineffective treatment provision. In response to the challenges of diabetes management in co-morbid patients, participants also came up with a few suggestions for improving the same.

Some participants acknowledged the importance of adequate counselling of the patients for effective diabetic management and recommended explaining the patient properly as and when necessary. Another suggestion was to include more male health workers in the management process as they are more effective in managing and following up alcoholic patients. An in-depth review of the challenges and the sugges-



tions by the healthcare personnel is pivotal for the effective management of TB-diabetes comorbidity.

## CONCLUSION

This study aimed to understand the barriers and challenges of diabetes management among TB-diabetes patients. In-depth interviews with the healthcare providers under the RNTCP brought out several roadblocks. Alcoholic patients, elderly patients, and patients without a family were identified as the most difficult to manage and follow-up. Similarly, the length of the treatment and the increased number of medications often lead to discontinuation. Also, some patients do not take medications as directed which leads to the development of resistance and complications. Difficulties in diet management of certain patients, especially from the lower socio-economic strata as highlighted by the participants as well. Some of the internal challenges such as, discrepancies in the follow-up timelines, and the shortage of staff, were also noted. In this regard, some suggestions such as the inclusion of male health workers in the management and follow-up of co-morbid patients might be effective for the cause. These challenges need to be addressed for the better management of the co-morbidity.

## Declarations

**Source of funding:** No funding was received to assist with the preparation of this manuscript

## ACKNOWLEDGEMENT

Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

**Conflict of interest:** The authors have no conflicts of interest to declare that are relevant to the content of this article

**Availability of data and material:** The datasets/themes generated during and/or analyzed during the current study are available from the corresponding author on reasonable request

**Ethics approval:** Obtained from KMC, Manipal (IEC: 888/2019)

## Authors' Contribution:

Ansuman Swain: Research concept, Research design, Data collection, Data analysis, Manuscript drafting

Arathi P Rao: Research concept, Research design, Data analysis

Prabhath M Kalkura: Research design, Data analysis

Manisha Gore: Research concept, Research design, Data analysis

Kirtimayee Soumyadarshinee: Research concept, Research design, Manuscript drafting

## REFERENCES

- MacNeil A, Glaziou P, Sismanidis C, Maloney S, & Floyd K. (2019, March 21). Global Epidemiology of Tuberculosis and Progress Toward Achieving Global Targets - 2017. Retrieved April 8, 2020, from <https://www.cdc.gov/mmwr/volumes/68/wr/mm6811a3.html>
- Global Tuberculosis Report 2019. (2019). Retrieved April 8, 2020, from <https://apps.who.int/iris/bitstream/handle/10665/329368/9789241565714-eng.pdf?ua=1>
- Narasimhan P, James W, MacIntyre C, Mathai D. (2013, February 12). Risk Factors for Tuberculosis. Retrieved April 10, 2020, from <https://www.hindawi.com/journals/pm/2013/828939/>
- Tripathy JP. (2018, July 31). Burden and risk factors of diabetes and hyperglycemia in India: findings from the Global Burden of Disease Study 2016. Retrieved April 10, 2020, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6074770/>
- Siddiqui AN, Hussain S, Siddiqui N, Khayyam KU, Tabrez S, & Sharma M. (2018). Detrimental association between diabetes and tuberculosis: An unresolved double trouble. *Diabetes Metab Syndr*, 12(6), 1101–1107. <https://doi.org/10.1016/j.dsx.2018.05.009>
- Kumar P, Babu S. (2017). Influence of diabetes mellitus on immunity to human tuberculosis. *Immunology*, 152(1), 13–24. <https://doi.org/10.1111/imm.12762>
- Restrepo B. (2016, December). Diabetes and Tuberculosis. Retrieved April 11, 2020, from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5240796/>
- Sil A, Patra D, Dhillon P, & Narasimhan P. (2020). Co-existence of diabetes and TB among adults in India: a study based on National Family Health Survey data. *J. Biosoc. Sci.*, 1–15. Advance online publication. <https://doi.org/10.1017/S0021932020000516>
- Sembiah S, Nagar V, Gour D, Pal DK, Mitra A, & Burman J. (2020). Diabetes in tuberculosis patients: An emerging public health concern and the determinants and impact on treatment outcome. *JFCM*. 27(2), 91–96. [https://doi.org/10.4103/jfcm.jfcm\\_296\\_19](https://doi.org/10.4103/jfcm.jfcm_296_19)
- Collaborative framework for care and control of tuberculosis and diabetes. (2011). Retrieved April 11, 2020, from [https://apps.who.int/iris/bitstream/handle/10665/44698/9789241502252\\_eng.pdf?sequence=1](https://apps.who.int/iris/bitstream/handle/10665/44698/9789241502252_eng.pdf?sequence=1)
- National framework for joint TB-Diabetes collaborative activities. (2017). Retrieved April 11, 2020, from <https://tbcindia.gov.in/WriteReadData/National framework for joint TB diabetes 23 Aug 2017.pdf>
- Cheng J, Zhang H, Zhao YL, Wang LX, & Chen MT. (2017). Mutual Impact of Diabetes Mellitus and Tuberculosis in China. *Biomedical and environmental sciences: BES*, 30(5), 384–389. <https://doi.org/10.3967/bes2017.051>
- Kornfeld H, Sahukar SB, Procter-Gray E, KumarNP, West K, Kane K, et al. (2020). Impact of Diabetes and Low Body Mass Index on Tuberculosis Treatment Outcomes. *Clinical infectious diseases: An official publication of the Infectious Diseases Society of America*, 71(9), e392–e398. <https://doi.org/10.1093/cid/ciaa054>

14. Alfarsi O, Mave V, Gaikwad S, Sahasrabudhe T, Ramachandran G, Kumar H, et al. (2018). Effect of Diabetes Mellitus on the Pharmacokinetics and Pharmacodynamics of Tuberculosis Treatment. *Antimicrobial agents and chemotherapy*, 62(11), e01383-18. <https://doi.org/10.1128/AAC.01383-18>
15. Harries AD, Kumar AM, Satyanarayana S, Lin Y, Zachariah R, Lönnroth K, et al. (2015). Diabetes mellitus and tuberculosis: programmatic management issues. *The international journal of tuberculosis and lung disease(IJTLD): the official journal of the International Union against Tuberculosis and Lung Disease*, 19(8), 879–886. <https://doi.org/10.5588/ijtld.15.0069>
16. Riza AL, Pearson F, Ugarte-Gil C, Alisjahbana B, van de Vijver S, Panduru NM, et al. (2014). Clinical management of concurrent diabetes and tuberculosis and the implications for patient services. *The lancet. Diabetes& endocrinology*, 2(9), 740–753. [https://doi.org/10.1016/S2213-8587\(14\)70110-X](https://doi.org/10.1016/S2213-8587(14)70110-X)
17. Thomas BE, Subbaraman R, & Sellappan S. Pretreatment loss to follow-up of tuberculosis patients in Chennai, India: a cohort study with implications for health systems strengthening. *BMC Infect Dis* 18, 142 (2018). <https://doi.org/10.1186/s12879-018-3039-3>
18. Chapman AL, Hadfield M, & Chapman CJ. (2015). Qualitative research in healthcare: an introduction to grounded theory using thematic analysis. *J. R. Coll. Physicians Edinb.*, 45(3), 201–205. <https://doi.org/10.4997/JRCPE.2015.305>
19. Gelmanova IY, Keshavjee S, Golubchikova VT, Berezina VI, Strelis AK, Yanova GV, et al. (2011, March 04). Barriers to successful tuberculosis treatment in Tomsk, Russian Federation: Non-adherence, default and the acquisition of multidrug resistance. Retrieved May 14, 2020, from <https://www.who.int/bulletin/volumes/85/9/06-038331/en/>
20. Nonogaki A, Heang H, Yi S, van Pelt M, Yamashina H, Taniguchi C, et al. (2019) Factors associated with medication adherence among people with diabetes mellitus in poor urban areas of Cambodia: A cross-sectional study. *PLoS ONE* 14(11): e0225000. <https://doi.org/10.1371/journal.pone.0225000>