

Original Research Article

Evaluation of clinicians' perspectives and approaches to the challenges in the management of diabetes mellitus in tribal population: a cross-sectional, observational pilot study

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ABSTRACT

Background: Management of diabetes mellitus in tribal population poses unique challenges due to their distinct socio-cultural fabric. Understanding clinicians' perspectives and their approach is crucial for effective management strategies. Objective was to study clinicians' perspective and approach to managing the challenges in treatment of diabetes mellitus (DM) in tribal population.

Methods: A cross-sectional observational pilot study was conducted with 50 clinicians treating minimum of 5% tribal patients. Data collected using a validated semi-structured questionnaire via Google forms, focusing on challenges related to comprehension, communication and compliance, alongside open-ended questions for potential solutions.

Results: 50 clinicians participated, with median clinical experience of 4 years. The median estimated prevalence of diabetes was 20% with 15.2% patients attending regular follow-ups. Tribals preferred non-allopathic treatments, with Ayurveda being the most favoured (76%). Healthcare-workers (70%) were primary source of health-related information. Major challenges included lack of follow-ups (78.3%) and low awareness (66%). Language barrier (28%) leading to extended counselling time (26%) were predominant communication issues. Metformin and glimepiride were the most prescribed medications due to their free availability from government programs. Moderately positive correlation (0.515) was observed between follow-up and awareness. Clinicians suggested increased community health programs (32%), ensuring adequate drugs and glucometers (26%) as some solutions.

Conclusions: The study highlighted various challenges faced in the management of diabetes in tribal population. Language barriers, low medication adherence, disease awareness and negligent approach are critical barriers. Community educational initiatives, improved diagnostic availability, and improving awareness may help in mitigating these challenges.

Keywords: Awareness, Healthcare barriers, Patient compliance, Traditional medicines

INTRODUCTION

The global prevalence of diabetes mellitus (DM) was estimated to be 9.3% (463 million people) in 2019, with projections indicating an increase to 10.2% (578 million) by 2030 and 10.9% (700 million) by 2045.¹ Diabetes mellitus affects people from all walks of life from urban to rural including tribal population. Tribal populations

face the threat of diabetes mellitus (DM) and other non-communicable diseases (NCDs) as well due to rapid urbanization, nutritional changes, and limited healthcare infrastructure.^{2,3} Recent studies demonstrate that the prevalence of diabetes in tribal population of India range from 3.8% to 19.8%, with significant regional variations.^{4,5} There are over 104 million tribal people live in India: accounting for 8.6% of the population but

despite this; tribals are still represented as a reclusive segment of the population. Their socio-cultural and educational fabric is markedly different from that of the non-tribal population.⁶ A 2016 Lancet study on tribal and indigenous health revealed that tribal populations often have poorer health and social outcomes and highlighted a lack of reliable data on tribal health, especially in low- and middle-income countries.⁷

A PubMed based research revealed 1835 studies only on tribal population in India, indicating a dearth of research in this area. Conducting studies in tribal populations poses a significant challenge due to absence of a unified data source to create or maintain a comprehensive nationwide disease profile.⁸ However, clinicians who have been working with tribals act as a point of contact with these tribal population and can provide valuable insights into their health issues and the challenges they face. This study was aimed to highlight the challenges faced by the clinicians catering to tribal populations in the management of diabetes mellitus, as well as various methods clinicians may use to address these challenges. These findings will be vital help develop specific strategies to address the health challenges of the tribal populations.

METHODS

This study was an observational, cross-sectional pilot study which employed a questionnaire-based approach to gather data from clinicians serving tribal populations. The study was conducted over a period of six months, from December 2024 to May 2025. Data were collected through an online questionnaire designed in Google forms and circulated among clinicians working with tribal populations in central India. Recruitment specifically targeted clinicians serving in tribal areas in and around Nagpur, with emphasis on districts such as Gadchiroli, Gondia, Chandrapur and Bhandara. It included allopathic practitioners (with minimum MBBS) whose patient base comprised at least more than 5% of the tribal population and were willing to participate in the study. Non allopathic practitioners were excluded from the study.

The study was conducted after approval from the institutional ethics committee and in accordance with Declaration of Helsinki and good clinical practice the ethical principle as mentioned in the Declaration of Helsinki and ICMR guidelines.

A semi-structured questionnaire with 28 questions was used and validated by five external subject experts, including the Head of the medicine department and several senior physicians who have conducted research in tribal populations over several years. The construct validity was assessed using Cronbach's alpha for the Likert scale questions. The questionnaire addressed challenges doctors faced in managing diabetes among tribal patients, focused on comprehension, communication, and compliance related issues/

challenges. It also included open-ended questions focused on suggested solutions for these challenges. Clinicians were invited to participate through a Google form and their electronic consent was obtained. The open-ended questions were analysed by identifying the key words first followed by making a theme and content followed by a thematic analysis which was conducted afterwards.

Sample size

Sample size of 50 was selected for this pilot study based on the rule-of-thumb approach for feasibility studies, where 12-50 participants are generally considered adequate.^{9,10} For questionnaire development, it is recommended that at least 10 respondents be included per key parameter; as the present study assessed five key parameters, a total of 50 participants were included.

Statistical analysis

Demographic data, including age and years of practice, were summarized using descriptive statistics. Qualitative data were analysed with descriptive statistical methods.

RESULTS

The study team reached out to 62 physicians working in tribal areas. Of these, 7 were ineligible and 5 did not consent to participate. Therefore, a total of 50 clinicians were enrolled in this study. Among these participants, 52% were males and 48% were females. The median age was 30 years (IQR:28, 38) and median years of experiences was 4 years (IQR:3, 10). According to the participants the estimated prevalence of diabetes among tribals was around 15% (10, 30) (Table 1).

Table 1: Demographic profile of clinicians who were treating tribal populations.

Parameters	Observation
Median age (IQR)	30 years (28, 38)
Median years. of experience (IQR)	4 years (3, 10)
Median prevalence of DM among tribal as per treating doctors (IQR)	15% (10, 30)

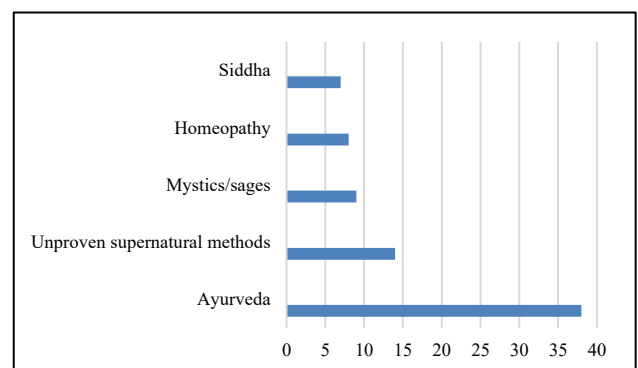


Figure 1: Common non-allopathic modes of treatment employed by tribal patients with diabetes mellitus.

According to the participants, 70% of diabetic patients from tribal population seek non-allopathic mode of treatment first which predominantly includes ayurveda (76%) (Figure 1).

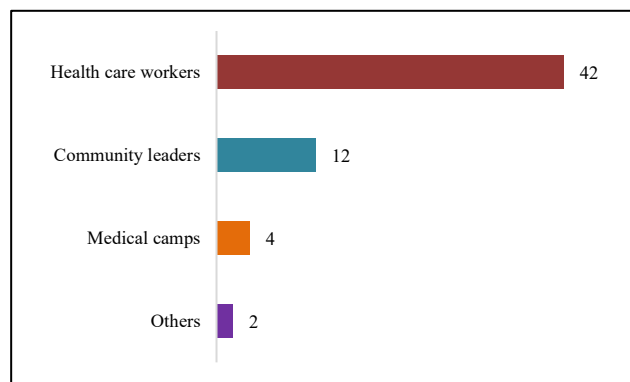


Figure 2: Source of information.

Participants mentioned that taboos and stigmas prevent patients from seeking timely allopathic care. It included nearly 50% of patients who feared taking lifelong medication and 19% denied the existence of diabetes altogether. Additionally, 19% had misconceptions about medication-induced complications. Among the tribal population, health care workers were mentioned by 42 out of 50 clinicians (84%) as the common source of information about health conditions like diabetes mellitus. Community leaders were cited by 12 clinicians (24%), while medical camps were indicated by 4 clinicians (8%) as sources of information for the tribals (Figure 2).

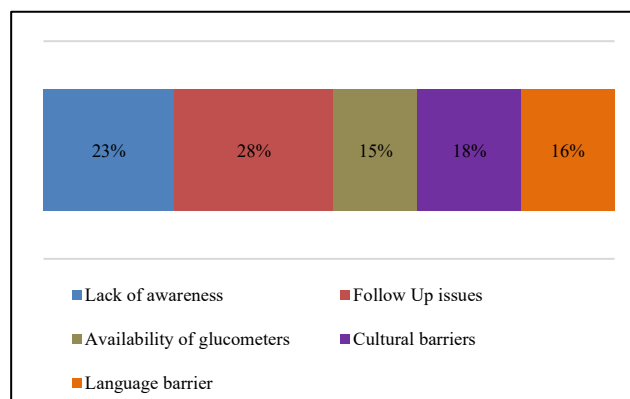


Figure 3: Challenges faced by clinicians in diabetes management.

The major challenges faced by clinicians in management of diabetes in tribal patients were Lack of follow up (28%) and lack of awareness (23%) followed by cultural beliefs (18%), language barriers (16%) and lack of glucometers (15%) (Figure 3). Communication is a significant challenge for physicians treating tribal populations. Participants identified language barriers (14, 28%) and requirement of extended patient counselling time (13, 26%) as major issues.

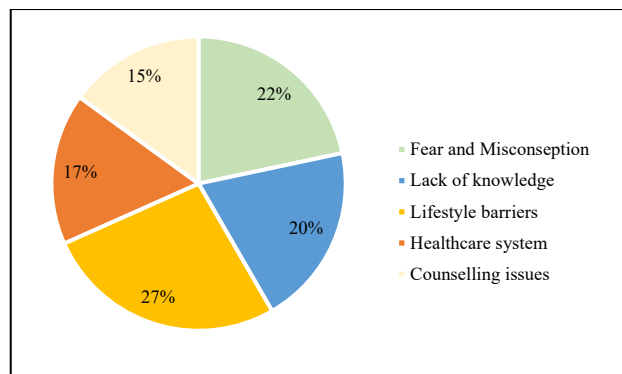


Figure 4: Thematic analysis of barriers in insulin prescription.

In conjunction with the above results, 86% of clinicians indicated a necessity to adopt a different approach for managing diabetes in tribal patients. Additionally, 48% of clinicians emphasized the need to modify their approach when prescribing insulin in tribal patients compared to the general population. The change in approach to insulin prescription was reflected when a thematic analysis of barriers to insulin prescription' was done which indicated fear of injections (27%), misconceptions regarding is insulin (22%) and struggling with self-administration due to lack of knowledge (20%) were major barriers in prescribing insulin therapy (Figure 4).

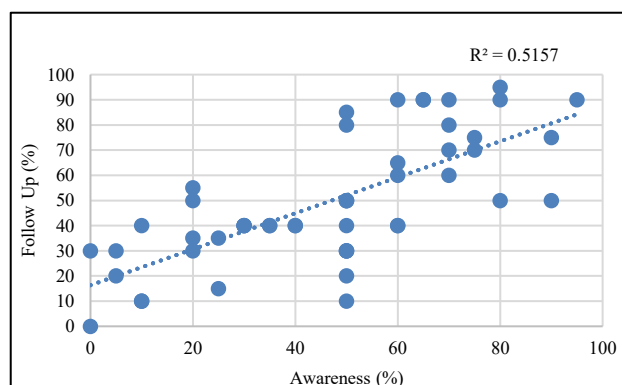


Figure 5: Correlation of awareness of diabetes and follow up visits.

We observed a moderate positive correlation ($R^2=0.5157$) between follow up (%) and awareness (%) according to the participants response to both the questions (Figure 5).

According to the participants, some of the possible solutions/remedies to enhance diabetes management in tribal patients; included increased community health programs (22, 32%), improvement of infrastructure and ensuring adequate availability of medicines and glucometers (18, 26%). Some other recommendations included training of doctors on tribal culture and language (15, 22%), regular screening camps (8, 12%) and training of ASHA workers (5, 7%) (Figure 6).

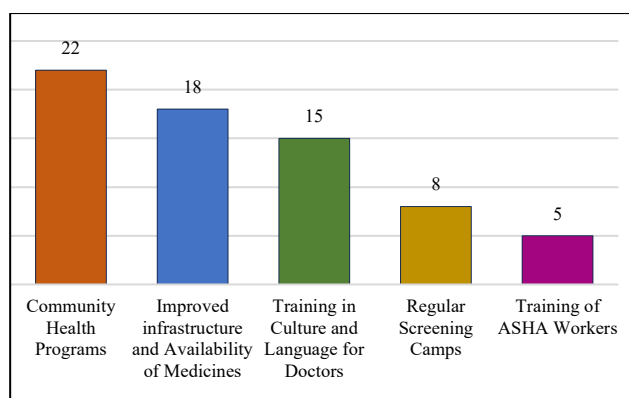


Figure 6: Clinicians' recommendations for enhancing diabetes management: improving compliance, comprehension and communication.

DISCUSSION

The findings highlight the complex barriers to diabetes management in tribal populations, many of which stem from a combination of economic, social, and cultural factors.

The reliance on the non-allopathic mode as the first choice was clearly highlighted in the study. Socio-cultural beliefs including taboos and misconceptions complicate diabetes care in tribal communities. Common misconceptions like denial of diabetes or the stigma of taking lifelong medication can compound the problem which in the end results in delayed treatment and poor disease control amongst tribal populations.

A systematic review done by Kumar et al indicated language barriers as a significant factor in effective communication which was highlighted in our study as well. As inferred from the findings in our study; factors like illiteracy, limited access to healthcare facilities as well as financial constraints may act as major barriers to treatment. Other factors, such as travel costs and treatment expenses, often deter individuals from seeking timely care. Additionally, geographical isolation, due to inadequate transportation and poor infrastructure, presents further obstacles that hinder patients from accessing prompt health care services. In totum, all these factors further exacerbate the enormity of challenges faced in the management of diabetes in tribal populations.¹¹

A study conducted by Jamadar et. al. highlighted major hinderances to health care in tribal populations as lack of self-care, including lack of supportive care, addictions, and family circumstances that hinder patient compliance and regular health service utilization.¹² One of the major patient-related hindrances to management of diabetes in tribal populations similar to the findings of Jamadar et al is lack of awareness, poor patient compliance and medication adherence.

Another key finding in the study revealed the widespread use of metformin and glimepiride reflecting the practical constraints of government-run healthcare facilities, where affordability and availability influence prescribing patterns. However, the resistance to insulin therapy remains a significant challenge, largely due to fear, misconceptions, and a lack of patient education. These findings align with previous research by Kiconco et al, which highlighted similar barriers to insulin use in rural and vulnerable populations.¹³

Each participants had their own recommendations for improving the patient communication, comprehension and compliance like increased community health programs, training of doctors on culture and language as well as regular screening camps, etc.

To address the challenge of communication there is a need for innovative solutions such as multilingual health workers, visual aids, and culturally adapted counselling materials. A study done by Qu et al, has shown that the use of pictorial health communication tools can significantly improve comprehension in populations with low literacy levels.¹⁴ Implementing such strategies could help bridge the communication gap and enhance treatment adherence.

Integrating traditional healers into diabetes awareness programs may improve patient trust and encourage early medical care. A study by Corso et al has shown that acknowledging and incorporating indigenous healthcare practices into modern medical outreach efforts significantly improves patient engagement.¹⁵

Something which could be seen as low hanging-fruit yet an innovative strategy nonetheless may be improvement in training of ASHA workers with better incentives and strict monitoring which could enhance their overall effectiveness. This would ensure tribal communities receive essential and correct information that could result in improvement in patient follow up and compliance thereby improving overall patient health outcomes.

Despite these obstacles, one encouraging outcome of this study was the positive impact of clinician-led awareness programs. Patients who received structured education about diabetes care, lifestyle modifications, and medication adherence demonstrated better treatment compliance and attended follow-up visits more regularly. This reinforces the importance of culturally sensitive educational initiatives in improving diabetes management. Future research should explore the long-term effects of these interventions and evaluate community-based models that focus on sustainable healthcare improvements for tribal populations.

With only 50 clinicians participating, the study may not fully capture the experiences of all healthcare providers treating tribal populations. Since the data is based on self-reported perceptions, the findings could be subjective.

The lack of direct input from tribal patients makes it harder to understand their challenges firsthand. Additionally, differences in healthcare access and cultural beliefs across regions may limit how widely the results can be applied.

CONCLUSION

The study highlighted the multifaceted challenges faced by clinicians in managing diabetes among tribal populations. Key barriers include language difficulties and cultural beliefs favouring traditional medicine. Lack of follow up and lack of awareness were the major challenge faced by the clinicians. Reluctance for insulin therapy complicates management of uncontrolled diabetes mellitus. The study emphasizes the importance of community-based interventions and importance of awareness which will improve follow up. Innovational educational programs tailored to tribal populations and standardized training and strengthening ASHA workers may solve the challenge.

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