

# Prediabetes Awareness and Practice Among Indian Doctors—A Cross-sectional Study

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## ABSTRACT

**Introduction:** Prediabetes is an intermediate state between diabetes and normoglycaemia, where the glucose levels are higher than normal but not significant to be diagnosed as diabetes mellitus. Guidelines from various associations suggest different types of management in this situation.

**Objective:** To assess knowledge and attitude of the doctors regarding prediabetes using questionnaire.

**Materials and Methods:** A cross-sectional questionnaire based study was conducted to assess the knowledge, attitude and practice among doctors regarding prediabetes treatment. One hundred twenty two (of 150) filled questionnaires were received from general practitioners, post graduates (PGs), physicians and super specialists in and around Kolar and Bangalore. Data was analysed using descriptive statistics and expressed as percentage.

**Results:** A total of 81.3% responded to the questionnaire,

of which 14 were general practitioners (MBBS), 48 PGs in General Medicine, 46 physicians (MD General Medicine), and 14 super specialists (DM). Knowledge response was 85.7% (definition – 100%, prevalence – 50.8%, approved drug- 45.2%, progression- 86.2%). Screening for prediabetes was done by 71% of the general practitioners and physicians, but specialists would screen all. 100% general practitioners, 97.9% post graduates, 91.3% of physicians and 64.2 % specialist preferred diet and exercise and rest of them opted for oral antidiabetic drug (OAD) along with diet and exercise, but none of the doctors considered OAD alone for prediabetes. Among OADs metformin (77.45%) was the most preferred followed by voglibose (20.6%) and sitagliptin (1.9%).

**Conclusion:** All doctors had awareness of prediabetes and most of them would regularly screen and treat prediabetes. Majority considered diet and exercise as first modality of treatment. The OAD opted commonly was metformin.

**Keywords:** Metformin, Normoglycaemia, Voglibose

## INTRODUCTION

There is constant increase in physician interest in treating type 2 diabetes mellitus (DM). Doctors are aware of growing health care demand due to increase in the occurrence of DM. It is estimated that nearly 438 million adults worldwide will manifest with diabetes by 2030 [1]. The large number of people with prediabetes portend the future increase in prevalence of DM. Prediabetes is an intermediate state between normoglycaemia and diabetes, where the glucose levels are higher than normal but not significant enough to be diagnosed with diabetes mellitus. Prediabetes includes either impaired glucose tolerance (IGT) i.e. post prandial blood sugar (PPBS) 140-199mg/dl or impaired fasting glucose (IFG) i.e. fasting blood sugar (FBS) 100-125mg/dl alone or combination of both IGT and IFG [2]. The time taken for the transition from prediabetes to diabetes may take many years but in some subjects it could be rapid. Nearly 70% of prediabetic subjects can eventually develop diabetes if not managed in early stages [3].

Early detection of this status and treatment can prevent development of DM and also reduce cardiovascular macroangiopathy changes especially in prediabetic subjects having combined IGT and IFG [4].

The treatment modalities to manage prediabetes differ in various guidelines. The American Diabetes Association (ADA) and American Association of Clinical Endocrinologists (AACE) guidelines recommend lifestyle modification and metformin [5]. The Indian Health Services (IHS), Canadian Diabetes Association (CDA) and Australian Diabetes Society (ADS) consider thiazolidinedione and alpha glucosidase inhibitors along with lifestyle modification [6]. Based on numerous randomized clinical trials, it is known that the onset of DM can be delayed by using life style modification (LSM) alone or in combination with metformin, acarbose, voglibose and troglitazone [7-9].

Literature search revealed that data regarding knowledge, attitude and practice towards management of prediabetes among Indian doctors was lacking. Diabetes Mellitus is a commonly encountered disease for which patients consult various general practitioners, physicians and specialists, hence we have included practicing doctors in rural areas, physicians from teaching institutions, private hospitals and endocrinologist from corporate hospitals. This study was carried out to determine the awareness and management of prediabetes among the doctors using a questionnaire.

## MATERIALS AND METHODS

**Study design:** It was a cross-sectional, questionnaire based study conducted by Department of Pharmacology of Sri Devaraj Urs Medical College and R.L. Jalappa Hospital and Research Center, Kolar, Karnataka, from April to August 2014. The Institutional Ethics Committee permission was obtained prior to initiation of the study. Written informed consent was obtained from all the doctors who were willing to participate in the study. The pre validated questionnaires were distributed in person to the doctors working in our college and general practitioners in and around Kolar and were given 15 minutes to complete it. Some of them who were busy asked us to visit them the subsequent day and a particular time. The physicians and endocrinologists from other places were sent questionnaire and consent form through email and were requested to mail the filled questionnaire, reminders were sent for some of them. The doctors involved in the study were identified with a code number and privacy and confidentiality was maintained regarding the data throughout the study.

**Data collection tool:** To assess the knowledge, attitude and practice of doctors regarding prediabetes management, a questionnaire consisting of 24 questions (17 closed ended and 7 open ended questions) was designed. The questionnaire was subjected to peer

review by 2 senior faculty and was validated by doing pilot study among the post graduates, who were not part of this study. The questionnaire was divided into three parts. The first part included details of educational qualification and designation of respondents. The second part questions were designed for self-assessment of knowledge and attitude about prediabetes, current guidelines for its management. The third part of the questionnaire was addressed to their clinical practice related to screening and management of prediabetes.

## RESULTS

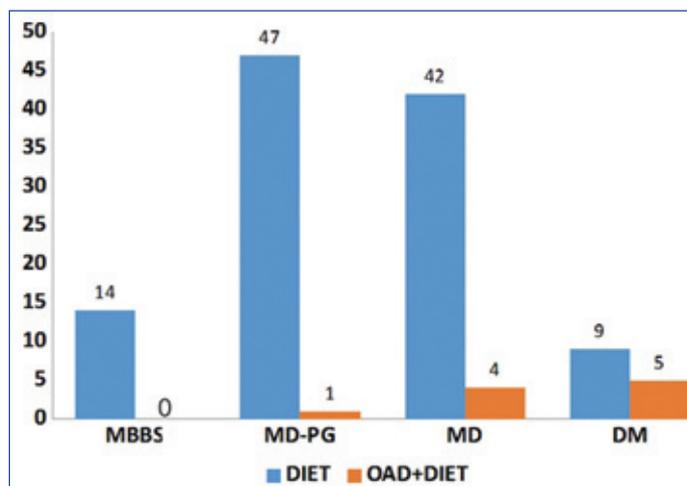
The data was analysed using descriptive statistics. A total of 150 questionnaires were distributed to the doctors in and around Kolar and Bangalore. One hundred and twenty two filled questionnaires were received therefore the response rate 81.3 %, of which 14 were general practitioners (MBBS), 46 physicians (MD General Medicine), 48 post graduates (PG) in General Medicine and 14 specialists (DM). The knowledge responses among various practitioners are depicted in [Table/Fig-1]. The various practices followed by doctors in treating prediabetics is shown in [Table/Fig-2]. The preferred approach by practitioners to treat prediabetics is represented in [Table/Fig-3].

Knowledge response	MBBS (n=14) (%)	PG-MD (n=48) (%)	MD n=46(%)	DM n=14(%)
1. Prediabetes definition				
Correct response	14 (100)	48 (100)	46 (100)	14 (100)
Incorrect response	-----	-----	-----	-----
2. Prediabetes reversal				
Correct response- Yes	11 (78.5)	44 (91.6)	41(89.1)	12(85.7)
Incorrect response- No	3 (21.4)	4(8.3)	5(10.8)	2(14.3)
3. Availability of approved drugs for prediabetes				
Correct response –Yes	4 (28.6)	10 (20.8)	21(45.6)	12(85.7)
Incorrect response- No	10 (71.4)	38(79.1)	25(54.3)	2(14.3)
4. Prevalence of prediabetes				
Correct response		15(31.2)	20(43.4)	
Incorrect response	9(64.2)	20(41.7)	21(45.6)	9(64.3)
No response	5 (35.7)	13(27.1)	5 (10.8)	5(35.7)

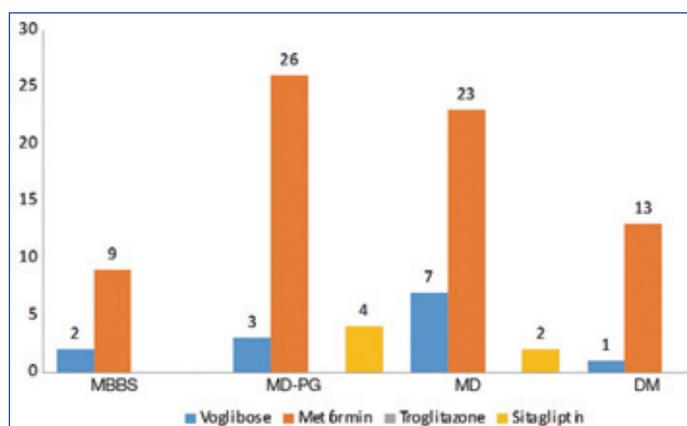
[Table/Fig-1]: Knowledge response of practitioners regarding prediabetes

Practice responses	MBBS (n=14) (%)	PG n (%) n=48 do as shown in the left box	MD n (%) n=46	DM n(%) n=14
1. Screening for prediabetes routinely				
Yes	10 (71.4)	39(81.2)	28 (60.8)	14 (100)
No	4(28.6)	9(18.7)	18(39.1)	----
2. Age group screened for prediabetes (years)				
20-30	5(35.7)	20 (41.7)	34(73.9)	1(7.1)
31-40	9 (64.3)	28(58.3)	12(26.1)	6(42.8)
>40	----	----	----	7(50)
3. Range of youngest Prediabetics in your practice				
20-30	8(57.1)	20(41.7)	16(34.8)	----
31-40	2(14.3)	11(22.9)	30(65.2)	2 (14.3)
>40	0(0)	0(0)	2(4.3)	10(71.4)
Not responded	4(28.6)	17(35.4)	----	----
4. Concerned regarding hypoglycemia in treating prediabetics?				
Yes	5(35.7)	24(50)	21(45.6)	3(21.4)
No	9 (64.3)	24(50)	25(54.3)	11(78.6)
5. Prescribed OAD for prediabetes				
Yes	3(21.4)	4(28.6)	19(41.3)	13(92.8)
No	11(78.6)	44(91.7)	27(58.7)	1(7.1)
6. Duration of administration OAD				
<6months	2(14.3)	----	2(4.3)	----
6-12 months	----	----	9(19.6)	1(7.1)
12 months	1(7.1)	1(2)	3(6.5)	9(64.3)
>12 months	----	----	----	2(14.3)
Not responded	11(78.6)	47(98)	32(69.6)	1(7.1)

[Table/Fig-2]: Practices followed by doctors in treating prediabetics



[Table/Fig-3]: Preferred modality of treatment of prediabetes among doctors



[Table/Fig-4]: Preferred OAD among doctors for the treatment of prediabetes

The preferred oral antidiabetic drug (OAD) among doctors is shown in [Table/Fig-4].

The most common dietary advices given by doctors (69) were to reduce carbohydrates, fats and increase protein and fiber rich diet. Around 29 practitioners advised small frequent meal, complex carbohydrates and increase intake of raw vegetables. Few practitioners (9) advised to avoid alcohol and junk food. Majority of the practitioners (76) mentioned that only some of their patients were willing to consume OAD for prediabetes. The most well tolerated OAD was metformin (78) followed by voglibose (20) and sitagliptin (2). The most common side effects encountered with OADs were gastrointestinal disturbances like nausea, vomiting, diarrhoea and gastritis (36) followed by hypoglycemia (24) and flatulence (19). Only 8 practitioners had encountered serious adverse drug reaction to OAD. The three most common (71) investigations advised were fasting blood sugar (FBS), post prandial blood sugar (PPBS) and glycated haemoglobin (HbA1c) followed by (34) renal function test, liver function test, fundoscopy and cardiac evaluation to rule out complications. The follow up suggested by 77, 24 and 16 practitioners was twice a year, once a month and once a year respectively. Majority of practitioners (49) opined hypertension as most common co morbid condition followed by obesity (18), neuropathy (9) and ischemic heart disease (4) among prediabetics. Ninety nine practitioners responded that prediabetes treatment would reduce economic burden. Majority (86) responded positively and opined that prediabetes reversed to normal in their clinical practice.

## DISCUSSION

All the general practitioners, physicians and specialists should be aware of prediabetes as this can bring down the incidence of type II DM which constitutes to 80% of all types of DM. Around 5-10% of prediabetics become diabetics every year [10]. The diagnosis

of diabetes is often delayed because patients present usually with complications such as renal impairment, Ischemic heart disease and neuropathy. The current treatment modalities do not prevent all the complications associated with diabetes. Diabetes Prevention Program Research Group has shown that type II DM may be prevented by diet and exercise alone [11].

All the doctors in our study were aware of prediabetes and majority of them believed that it is a reversible condition. Only 60-70% of the general practitioners and physicians screened their patients routinely for prediabetes whereas all super specialists followed it stringently. There is a necessity to change the attitude of general practitioners towards management of this condition since patients first approach is the primary physicians in majority of rural and urban population. Majority of general practitioners and physicians preferred only LSM and use of OADs was less. Patient adherence to LSM is generally poor, hence OAD should be considered in such patients. A survey reported 70.7% of doctors from different specialties preferred OAD for treating prediabetes [12]. We observed that majority of diabetologists preferred OAD along with LSM. The most preferred OAD was metformin followed by voglibose and sitagliptin. This was comparable with the results from previous study where the preferred OADs were metformin, voglibose, pioglitazone followed by sitagliptin among various cross speciality doctors [12]. The reason for preferring metformin could be its safety profile and various clinical trials which have proved its efficacy in delaying the onset of DM in prediabetics [7,13,14]. Voglibose was the second most commonly preferred drug for prediabetes as it is approved in Japan for prediabetes management and most of our practitioners opined that it is applicable to Indian population as well [4,12]. Although majority of doctors (88.32%) in our study preferred LSM, patient adherence to it should be identified and if found poor they should consider OAD.

## LIMITATIONS

There were certain limitations in our study. The data was from practitioners from a particular area only. Since this was a questionnaire based study, the results depend on the responses received. However, in this study an effort has been made to capture the existing situation in terms of the level of knowledge, attitude and practice among practitioners regarding prediabetes.

## CONCLUSION

All practitioners were aware of prediabetes, but majority of the general practitioners and physicians did not screen their patients for prediabetes but specialist screened regularly and treated them by either LSM alone or OAD in combination with LSM. Practitioners need to incorporate their knowledge into practice and screen every patient for prediabetes and treat them.

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