

Knowledge Attitude and Practice regarding Diabetes Mellitus among patients with Type2 Diabetes in a tertiary care teaching hospital in Kerala, India

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ABSTRACT

Diabetes mellitus (DM) is one of the major health issues in India. Prevalence of type 2 or noninsulin dependent diabetes mellitus is high in India. Kerala, a southern state in India has varying prevalence rate of diabetes in its different geographical regions. Adequate knowledge, practice and attitude are the three vital parameters of a diabetic patient. Studies are there in literature to evaluate the knowledge, attitude and practice of diabetes patients in different settings but very few studies have investigated the situation in Kerala. Hence the aim of this study was to assess the current knowledge, attitude and practice to start an educational programme.

Methods

A descriptive study was conducted in the out patient department of a tertiary care hospital in South Kerala during the period April 2019 to September 2019. A sample of 220 patients were studied using a pretested questionnaire. Convenience sampling technique was adopted. Study participants were type-2 diabetic patients above 18 years and diagnosed for at least six months. Student t test/one way ANOVA was used to identify the socio-demographic variables associated with knowledge, attitude and practice.

Result

The mean(SD) knowledge, attitude and practice scores are 58.16(18.96), 77.83(8.77) and 59.75(14.58) respectively. Knowledge and attitude are found to be associated with educational and occupational status ($p < 0.05$). Family history is associated with attitude ($p = 0.001$). There is statistically significant difference between the practice scores of males and females ($p = 0.023$). Mode of treatment is associated with knowledge ($p = 0.02$)

Keywords: Type 2 diabetic patients, knowledge, attitude, practice.

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BACKGROUND:

Diabetes mellitus (DM) is one of the major health issues in India. Prevalence of type 2 or noninsulin dependent diabetes mellitus is high among Indians living in India as well as abroad(1). According to the estimates of International Diabetes Federation, the total number of diabetic subjects in India in 2025 will be 69.9 million(2). Kerala, a southern state in India has varying prevalence rate of diabetes in its different geographical regions. Comparatively high prevalence of 16.3 per cent was reported in Thiruvananthapuram district in 1999, the capital of Kerala(3). Another study conducted in Thiruvananthapuram district in 2010 reported prevalence of diabetes mellitus as 11.3% in urban areas, 16.6% in rural areas and 16.7% in slum regions(4).

One can control diabetes to an extent by changing the personal life, that is by self-care(5). The outcome of diabetes depends on patients' knowledge and medical management(6). Knowledge has an important role in early detection and disease prevention. Correct knowledge, practice and positive attitude are the three vital parameters of a diabetic patient. These three parameters are related, if the level of knowledge is higher the other two factors must be influenced positively. Patient education with improvement in knowledge, attitudes and practice leads to better control of the disease, and is widely accepted to be an integral part of comprehensive diabetes care(7). Although the prevalence of diabetes mellitus is high in Kerala, patients often lack the knowledge and practise to manage their condition. The knowledge of self-care behaviour of diabetes patients is poor in studies conducted in Kerala(8). Studies are there in literature to evaluate the knowledge, attitude and practice of diabetes patients in different settings but very few studies have investigated the situation in Kerala(9). Hence we designed a study to

evaluate the levels of knowledge, attitude, and practice of type 2 diabetic patients with a view to start an educational program. Before the beginning of the educational programme, their current knowledge attitude, and practice should be evaluated(10). Hence the aim of the study was to assess the current level of knowledge attitude, and practice prior to the start of the programme.

Research question

What is the knowledge attitude and practice regarding diabetes mellitus among type 2 diabetic patients attending the out patient department of a tertiary care teaching hospital in South Kerala.

Objectives

1. To estimate the knowledge, attitude and practice regarding diabetes mellitus among type 2 diabetes mellitus patients.
2. To identify the socio-demographic factors associated with knowledge, attitude and practice.

Study setting and study population: Type 2 diabetic patients attending the out patient department of a tertiary care hospital in South Kerala.

Duration of study: Six months from April 2019 to September 2019.

METHODS:

Design: Descriptive study

Sampling: Convenience sampling

Sample size computation

$$n = Z_{1-\alpha/2}^2 s^2 / d^2$$

From the previous study, $\bar{x} = 2.86$, $s = 1.39$ (11)

$$\alpha = 5\%, d = 10\% \text{ of } \bar{x}$$

Sample size (n) = 91

Assuming a 20% non response rate, the total sample size is $91+18=109$

Operational definition

Knowledge: Knowledge in this study is defined as the understanding of information regarding diabetes on 12 items.

Attitude: Attitude in this study was defined as the approach of the populations towards the 10 items related to diabetes.

Practice: Practice in this study was defined as the pattern and regularity of practices of the 11 items related to diabetes.

Study procedure

Inclusion criteria: Type-2 diabetic patients above 18 years and diagnosed for at least six months and willing to participate in the study.

Data collection procedure:

A pretested questionnaire was used to collect data. The questionnaire consists of four sections - socio demographic profile, knowledge, attitude and practice. A pilot study was conducted to test the reliability and validity of the questionnaire. The reliability coefficient Cronbach's alpha was obtained as 0.789. The knowledge section consists of 12 questions with multiple choice answers. The maximum attainable score is 26 and minimum score is 0. In the attitude section, a total of 10 items were included which consists of respondents attitude towards diabetes. A five point Likert scale was used to measure attitude which consists of five categories of response: 'strongly agree, agree, neither agree nor disagree, disagree and strongly disagree. Similarly in the practice section 11 questions were included. Responses were Yes/No with maximum attainable score of 11 and the minimum score of 0. The questionnaire were distributed to the participants and collected after completion after obtaining written informed consent.

Background variables: Age, gender, residence, education, occupation, income, duration of diabetes, family history, medication etc.

Outcome variables: knowledge, attitude and practice.

Statistical Analysis

Data analysis was carried out using SPSS software version 16.0. Qualitative variables were expressed in frequency and percentage. For each patient total scores were converted to percentages by dividing the total score of by the maximum attainable score of the corresponding domain. The percentage score above 70 was considered as good. Quantitative variables were expressed in mean and standard deviation(SD), qualitative variables were expressed in frequency(%). Student t test/one way ANOVA was used to identify the socio-demographic variables associated with knowledge, attitude and practice.

RESULTS:

Two hundred and fifty questionnaires were distributed, incomplete questionnaire were excluded and the remaining 220 questionnaire were included in the analysis. Age ranges from 22 to 85 with mean(SD) 60(12.0). Age of onset of diabetes varies from 21 years to 75 years with mean(SD) age of 51.13(10.77). Duration of diabetes ranges from 1 to 40 years with median duration of 6 years and inter quartile range of 10 years. Among the 103 males, 19 have the habit of smoking and 23 stopped smoking. Mode of treatment is insulin for 62(28.2%), 126(57.3%) were taking tablets and 22(10.0) were taking both insulin and tablets. Ten (4.5%) reported that they were not taking any medicines. Table 1 shows the socio demographic characteristics of the sample studied.

Table 1. Socio-demographic pattern of study participants

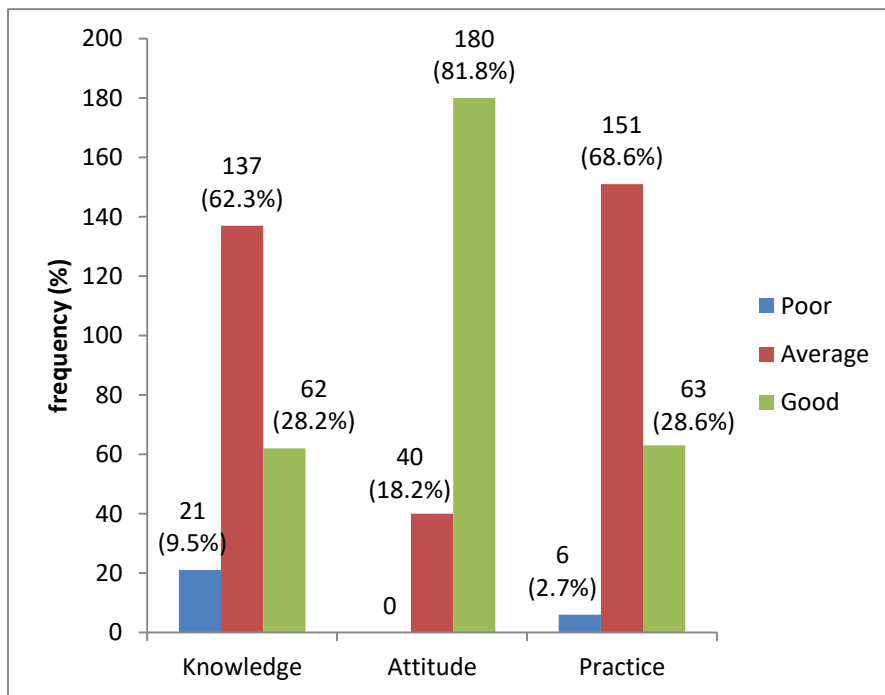
| Variables | Frequency(%) |
|-----------------------------------|---------------------|
| Age | |
| <40 | 13(5.9) |
| 40-60 | 100(45.5) |
| >60 | 107(48.6) |
| Gender | |
| Male | 103(46.8) |
| Female | 117(53.2) |
| Residence | |
| Rural | 188(85.5) |
| Urban | 32(14.5) |
| Qualification | |
| Primary | 28(12.7) |
| Middle | 36(16.4) |
| High school/higher secondary | 125(56.8) |
| Degree | 22(10.0) |
| Post graduate/Professional | 9(4.1) |
| Occupation | |
| Never gone for job | 47(21.4) |
| Full time | 21(9.5) |
| Part time | 80(36.4) |
| Retired | 72(32.7) |
| Income status(n=202) | |
| <5000 | 92(41.8) |
| 5000-10000 | 90(40.9) |
| 10000-25000 | 24(10.9) |
| >=25000 | 11(5.0) |
| Marital status | |
| Married | 206(93.6) |
| Unmarried | 11(5.0) |
| Divorced | 3(1.4) |
| Family history of diabetes | |
| Yes | 112(50.1) |
| No | 102(46.2) |
| Don't know | 6(2.7) |

Factors affecting knowledge, attitude and practice

The mean(SD) knowledge score is 58.16(18.96), mean (SD) attitude score is 77.83(8.77) and mean practice score is 59.75(14.58). The percentage scores are categorized as poor (<30%), average (30%-70%) and good (>70%) and the distribution is given by Figure 1. From the figure it is evident that majority had average knowledge and practice but good attitude. From table 2 we can see that the mean knowledge and attitude scores of patients with high educational and occupational status have higher scores than

others which is found to be statistically significant ($p < 0.05$). Those without positive family history have higher attitude score than others ($p = 0.001$). There is statistically significant difference between the practice scores of males and females ($p = 0.023$). Males have better practice compared to females. Mode of treatment is also associated with knowledge score ($p = 0.02$). Duration of diabetes has weak negative correlation with knowledge score (Spearman's rank correlation coefficient = -0.166, p -value = 0.014), but no significant correlation found with attitude and practice scores.

Figure 1. Knowledge, attitude and practice levels of study participants



Knowledge has weak significant positive correlation with attitude and practice scores.

Figure 2. Correlation between knowledge, attitude and practice

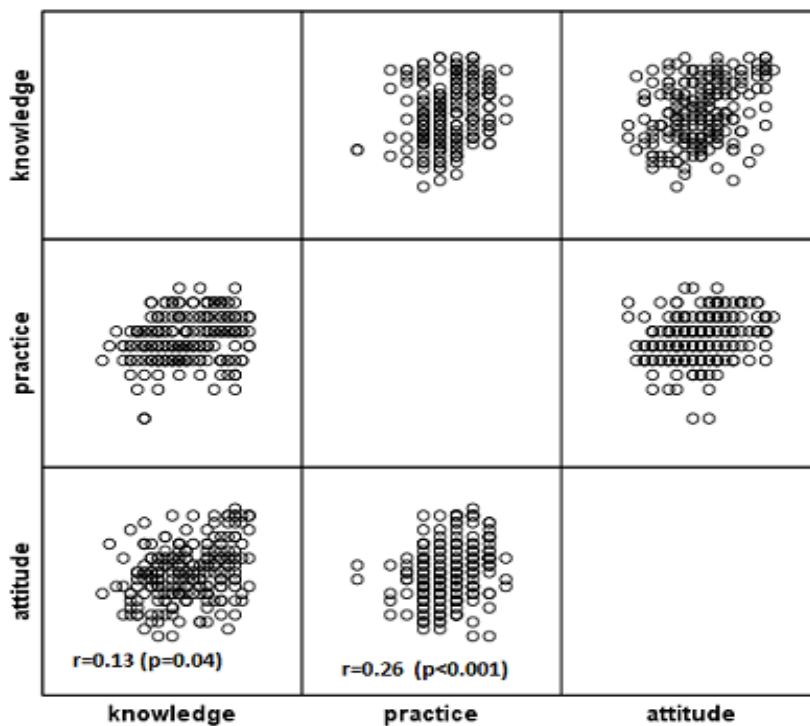


Table 2. Factors affecting knowledge, attitude and practice score

| | Knowledge Mean(SD) | p-value | Attitude Mean(SD) | p-value | Practice Mean(SD) | p-value |
|------------------------------|--------------------|---------|-------------------|---------|-------------------|---------|
| Age | | | | | | |
| <40 | 58.87(20.49) | | 75.05(9.52) | | 65.03(12.77) | |
| 40-60 | 56.65(19.10) | 0.55 | 77.15(7.54) | 0.19 | 58.27(15.18) | 0.22 |
| >=60 | 59.48(18.72) | | 78.81(9.65) | | 60.49(14.13) | |
| Gender | | | | | | |
| Male | 59.07(17.63) | 0.50 | 78.27(8.47) | 0.49 | 62.13(14.12) | 0.02 |
| Female | 57.36(20.10) | | 77.45(9.04) | | 57.65(14.72) | |
| Residence | | | | | | |
| Rural | 58.18(19.43) | 0.96 | 78.03(8.95) | 0.41 | 59.76(14.80) | 0.97 |
| Urban | 58.05(16.21) | | 76.66(7.61) | | 59.65(13.45) | |
| Qualification | | | | | | |
| Primary | 47.94(14.22) | | 73.51(8.82) | | 54.22(15.34) | |
| Middle | 51.23(19.38) | <0.001 | 75.80(9.19) | 0.002 | 58.08(12.90) | 0.11 |
| High School/Higher secondary | 59.07(18.85) | | 78.50(8.82) | | 61.31(14.73) | |
| Degree and above | 72.58(13.92) | | 81.36(8.48) | | 60.41(14.38) | |
| Occupation | | | | | | |
| Never | 52.04(19.52) | | 74.95(7.69) | | 60.15(14.12) | |
| Fulltime | 65.75(18.15) | 0.02 | 81.16(8.87) | 0.004 | 57.57(18.03) | 0.82 |
| Part time | 57.25(18.39) | | 76.83(7.90) | | 59.20(15.51) | |
| Retired | 60.95(18.49) | | 79.87(9.65) | | 60.73(12.84) | |
| Income status | | | | | | |
| <5000 | 56.68(21.86) | | 78.14(9.47) | | 57.91(12.62) | |
| 5000-10000 | 56.71(16.81) | 0.04 | 77.23(8.27) | 0.56 | 60.40(15.73) | 0.28 |
| >10000 | 65.49(14.93) | | 78.98(7.47) | | 62.07(15.67) | |
| Marital Status | | | | | | |
| Married | 58.25(18.97) | 0.79 | 78.03(8.72) | 0.19 | 59.97(14.30) | 0.39 |
| Unmarried | 56.86(19.38) | | 74.92(9.32) | | 56.49(18.58) | |
| Family history | | | | | | |
| Yes | 56.41(18.25) | 0.06 | 76.46(8.47) | 0.001 | 60.20(15.34) | 0.52 |
| No | 61.44(19.76) | | 80.51(8.56) | | 58.86(13.49) | |
| Mode of treatment | | | | | | |
| Insulin | 58.56(18.92) | | 77.99(8.22) | | 57.92(13.30) | |
| Oral pills | 59.86(18.41) | 0.02 | 78.52(9.24) | 0.40 | 61.33(15.51) | 0.09 |
| Both | 47.55(21.35) | | 75.76(8.02) | | 54.96(11.73) | |

DISCUSSION:

Knowledge, attitude and practice depend on the educational and cultural background of the people. Knowledge plays a vital role in control of disease. This study results reveal that patients had average knowledge about diabetes (mean(SD) =58.16(18.96)). A community based study conducted in a rural setting in Kerala reported a mean score of 15.06 with maximum possible score of 23(9). This result agrees with

the finding of the present study. Studies conducted in Bhopal, Bangladesh and Vijayapura too reported the same(12–16). A study conducted in four geographical regions in India, particularly in rural areas reported poor knowledge and awareness about diabetes(17). Several studies done in middle east and other countries reported that knowledge about diabetes is poor among diabetic patients(18–26). Since

Kerala is a state with high literacy the proportion of patients with poor knowledge is less even though this study is conducted in a rural setting. Studies conducted in Kulasekharam district of Tamil Nadu, Delhi and Gujarat reported good knowledge (27–29). Similar results were found with studies done in Saudi Arabia(30,31). Knowledge score has positive correlation with attitude and practice scores. Similar results were reported by Bruce (27). Knowledge has got statistically significant association with qualification, occupation, income status and mode of treatment. The association with qualification was reported by previous studies also(12,13,32,33). Higher knowledge and attitude score were found among old age people, but not statistically significant. Significant results were reported by Niramoodu et al and Nagar et al(10,16). Significant weak positive correlation with knowledge score was observed for both attitude and practice scores. This is in agreement with the study by Fatema et al(12,34). Positive correlation with knowledge and attitude was reported by Al-Masakari et al and El-Khawaga (33,35). But negative correlation between knowledge and practice was reported by El-Khawaga(35).

In this present study 81.8% have good attitude and none with poor attitude. This is similar to the result got by Bruce, Fatema et.al and Tejaswi(12,27,28). A study done in Northern rural part of India by Gupta et al reported positive attitude among 65.21% of participants(11). Study by Nagar et al reported negative attitude and practice towards diabetes(16). Satyanarayana and Mahendrapa concluded that the attitude and practices towards prevention and control of diabetes was not satisfactory(36). Negative attitude and poor practices were observed in a study conducted in South Africa by Roux et al(18). Attitude is associated with qualification, occupation and

family history, which agrees with the studies of Fatema et al(12).

In the current study most of the patients (68.6%) had average practice. This agrees with the study done in UAE by Masakari et al and Tanuja P(16,36). Fatema et al reported good practice(12) and study by Ratode et al reported poor attitude(29). Male patients has better practice which is found to be statistically significant. This is consistent with the previous study by Niroomand et al(10). But Fatema et al reported better practice for females(12). This study reveals that even though majority people have good attitude their practice is not upto that level. It is therefore important to conduct awareness programmes to improve the knowledge and change the practice of people.

CONCLUSION:

This study reflected average knowledge, good attitude and average practice among diabetic patients. Continuing health interventions and education programmes must be implemented to increase the knowledge attitude and practice of diabetic patients. Media and nongovernment organizations can take steps to improve the awareness and there by increase the attitude and practice of patients.

Limitation of the study

The study participants were from a single tertiary care hospital from Kerala, the results may not be truly representative of all diabetic patients in Kerala. This study suffered the limitations due to convenience sampling.

Research and Ethical Committee Approval

This study was approved by the institutional Research and Ethics Committee

Conflicts of interest

There is no conflicts of interest.

Funding

Nil

REFERENCES:

1. Raman Kutty V, Joseph A, R Soman C. High prevalence of type 2 diabetes in an urban settlement in Kerala, India. *Ethn Health*. 1999;4(4):231–239.
2. Mohan V, Sandeep S, Deepa R, Shah B, Varghese C. Epidemiology of type 2 diabetes: Indian scenario. *Indian J Med Res*. 2007;125(3):217–30.
3. Vijayakumar G, Arun R, Kutty VR. High prevalence of type 2 diabetes mellitus and other metabolic disorders in rural Central Kerala. *J Assoc Physicians India*. 2009 Aug;57:563–7.
4. Thankappan KR, Shah B, Mathur P, Sarma PS, Srinivas G, Mini GK, et al. Risk factor profile for chronic non-communicable diseases: results of a community-based study in Kerala, India. *Indian J Med Res*. 2010;131(1):53.
5. Shayeghian Z, Aguilar-Vafaie M, Besharat MA, Parvin M, Roohi Gilani K. The association between self-care and control of blood sugar and health-related quality of life in type II diabetes patients. *Iran J Endocrinol Metab*. 2014;15(6):545–551.
6. Knight K, Badamgarav E, Henning JM, Hasselblad V, Gano Jr AD, Ofman JJ, et al. A systematic review of diabetes disease management programs. *Am J Manag Care*. 2005;11(4):242–50.
7. Mohan D, Raj D, Shanthirani CS, Datta M, Unwin NC, Kapur A, et al. Awareness and knowledge of diabetes in Chennai-The Chennai urban rural epidemiology study [CURES-9]. *Japi*. 2005;53:283–287.
8. Nelson et al. Diabetes self-care: A community based cross sectional study from Kollam district, Kerala. *Indian J Basic Appl Med Res*. 2016;5(2):581–8.
9. Kurian B, Qurieshi MA, Ganesh R, Leelamoni K. A community-based study on knowledge of diabetes mellitus among adults in a rural population of Kerala. *Int J Noncommunicable Dis*. 2016;1(2):59.
10. Niroomand M, Ghasemi SN, Karimi-Sari H, Kazempour-Ardebili S, Amiri P, Khosravi MH. Diabetes knowledge, attitude and practice (KAP) study among Iranian in-patients with type-2 diabetes: A cross-sectional study. *Diabetes Metab Syndr Clin Res Rev*. 2016;10(1):S114–S119.
11. Gupta RK, Shora TN, Jan R, Raina SK, Mengi V, Khajuria V. Knowledge, attitude and practices in type 2 diabetes mellitus patients in rural Northern India. *Indian J Community Health*. 2015;27(3):327–333.
12. Fatema K, Hossain S, Natasha K, Chowdhury HA, Akter J, Khan T, et al. Knowledge attitude and practice regarding diabetes mellitus among Nondiabetic and diabetic study participants in Bangladesh. *BMC Public Health*. 2017;17(1):364.
13. Islam FMA, Chakrabarti R, Dirani M, Islam MT, Ormsby G, Wahab M, et al. Knowledge, attitudes and practice of diabetes in rural Bangladesh: the Bangladesh Population based Diabetes and Eye Study (BPDES). *PLoS One*. 2014;9(10):e110368.
14. Salem, et al. Knowledge, Attitude, and Practice Regarding Diabetes Mellitus among General Public and Diabetic

- Patients in Riyadh, Saudi Arabia. *Asian J Pharm.* 2018;12(1).
15. Tanuja. P.Pattankar and Shailaja. S. Patil. Knowledge, attitude and practice regarding type 2 diabetes mellitus among Diabetic patients residing in an urban field practice area of Patil medical college, Vijayapura. *Int J Curr Adv Res.* 2017;6(6):4190–3.
 16. Nagar V, Prasad P, Mitra A, Kale S, Yadav K, Shukla M. Assessment of knowledge, attitude and practice about diabetes among diabetic patients of tertiary care centre in central India. *Int J Community Med Public Health.* 2018;5(9):4065–4071.
 17. Deepa M, Bhansali A, Anjana RM, Pradeepa R, Joshi SR, Joshi PP, et al. Knowledge and awareness of diabetes in urban and rural India: the Indian Council of Medical Research India diabetes study (phase I): Indian Council of Medical Research India diabetes 4. *Indian J Endocrinol Metab.* 2014;18(3):379.
 18. Roux M le, Walsh C, Reid M, Raubenheimer J. Diabetes-related knowledge, attitude and practices (KAP) of adult patients with type 2 diabetes mellitus in the Free State province, South Africa. *South Afr J Clin Nutr.* 2018;1–8.
 19. Mangaiarkkarsi A, Nitya S, Ali MR, Ramaswamy S. A study to assess the knowledge, attitude and practice about diabetes among diabetic patients in Pondicherry. *Res J Pharm Biol Chem Sci.* 2012;3(4):1185–96.
 20. Babikr WG, Aedh AI, Ahmed AM, Abdelraheem AM, Elhussein AB. Assessment of knowledge, attitude and practice of diabetic people in Najran, Kingdom of Saudi Arabia. *Int J Res Med Sci.* 2017;5:2150–5.
 21. Baradaran H, Knill-Jones R. Assessing the knowledge, attitudes and understanding of type 2 diabetes amongst ethnic groups in Glasgow, Scotland. *Pract Diabetes Int.* 2004;21(4):143–8.
 22. Hawal NP, Shivaswamy MS, Kambar S, Patil S, Hiremath MB. Knowledge, attitude and behaviour regarding self-care practices among type 2 diabetes mellitus patients residing in an urban area of South India. *Int Multidiscip Res J.* 2012;2(12).
 23. Kamel NM, Badawy YA, El Zeiny NA, Merdan IA. Sociodemographic determinants of management behaviour of diabetic patients. Part II. Diabetics' knowledge of the disease and their management behaviour. 1999;
 24. Al-Adsani AMS, Moussa MAA, Al-Jasem LI, Abdella NA, Al-Hamad NM. The level and determinants of diabetes knowledge in Kuwaiti adults with type 2 diabetes. *Diabetes Metab.* 2009;35(2):121–8.
 25. He X, Wharrad HJ. Diabetes knowledge and glycemic control among Chinese people with type 2 diabetes. *Int Nurs Rev.* 2007;54(3):280–287.
 26. Shah VN, Kamdar PK, Shah N. Assessing the knowledge, attitudes and practice of type 2 diabetes among patients of Saurashtra region, Gujarat. *Int J Diabetes Dev Ctries.* 2009;29(3):118.
 27. Bruce P. Knowledge attitude and practice about diabetes among patients with diabetes attending medicine OPD of tertiary care hospital at Kulasekharam. *Int J Community Med Public Health.* 2018;5(10):4254–4257.

28. Tejaswi P, Dhakre S, Reddy P, Goyal C. Evaluation of the knowledge, attitudes and practices of diabetic patients in a tertiary care hospital in Central India. *Int J Med Res Rev.* 2018;6(1):24–32.
29. Rathod S, Kumar S, Rathod GB, Parmar P. Knowledge, attitude and practice (KAP) of general population of Vadodara towards diabetes mellitus. *IAIM.* 2018;5(4):1–6.
30. Aldossari K, Abdelrazik M, Kamal S, Al-Zahrani J, Al-Ghamdi S, Altamimi I, et al. Assessment of Levels of knowledge, attitude and practice about diabetes mellitus (DM), its complications and self-management of diabetic patients in AlKharj city, Saudi Arabia. *Int J.* 2015;3(5):23–32.
31. Alanazi FK, Alotaibi JS, Paliadelis P, Alqarawi N, Alsharari A, Albagawi B. Knowledge and awareness of diabetes mellitus and its risk factors in Saudi Arabia. *Saudi Med J.* 2018;39(10):981.
32. Basu S, Khobragade M, Raut DK, Garg S. Knowledge of diabetes among diabetic patients in government hospitals of Delhi. *Int J Noncommunicable Dis.* 2017;2(1):8.
33. Al-Maskari F, El-Sadig M, Al-Kaabi JM, Afandi B, Nagelkerke N, Yeatts KB. Knowledge, attitude and practices of diabetic patients in the United Arab Emirates. *PloS One.* 2013;8(1):e52857.
34. Al-Naggar RA, Osman MT, Ismail N, Ismail Z, Noor NAM, Ibrahim NS, et al. Diabetes mellitus among selected Malaysian population: A cross-sectional study. *Int J Med Res Health Sci.* 2017;6(4):1–11.
35. El-Khawaga G, Abdel-Wahab F. Knowledge, attitudes, practice and compliance of diabetic patients in Dakahlia, Egypt. *Euro J Res Med Sci.* 2015;3(1).
36. Satyanarayana TB, Mahendrappa SK. A cross sectional study of knowledge, attitude and practice among patients with type 2 diabetes mellitus at a tertiary care hospital. *J Evol Med Dent Sci.* 2014;3:5317–21.