Diabetes & Metabolic Syndrome: Clinical Research & Reviews xxx (2017) xxx–xxx

Contents lists available at ScienceDirect

Diabetes & Metabolic Syndrome: Clinical Research & Reviews

journal homepage: www.elsevier.com/locate/dsx

Original Article

Treatment-seeking behavior and obstacles to treatment compliance in diabetic patients in Mangaluru, India

Shannon M. Mentock[a], Vanessa Y. Ng[a], Rashmi Narayana[b], Harshini Ullal[c], Suchetha Kumari[c], Sanjeev Badiger[c], Avinash K. Shetty[a,*]

[a] Wake Forest School of Medicine, Medical Center Blvd, Winston-Salem, NC 27103, USA
[b] T.A. Pai Management Institute, P.O. Box 9, Manipal 576 10, India
[c] K.S. Hegde Medical Academy and Nitte University, P.O. Nityanandanagar, Deralakatte, Mangaluru, Karnataka, India

ARTICLE INFO

Article history:
Available online xxx

Keywords:
Diabetes
Management
India
Mangalore
Glucose
Control
Barriers

ABSTRACT

Aim: To evaluate the local treatment-seeking behaviors of diabetics with a focus on the root causes of culture-specific barriers to treatment compliance and define targets for intervention.
Methods: A cross-sectional survey was administered in the local language to 204 diabetic adults in rural and urban clinical settings. Fasting blood glucose level was measured in all participants prior to the survey. Questions included sociodemographic characteristics, treatment-seeking behavior, and perceptions of obstacles.
Results: Out of 204 participants, predictors of at target status included age (OR 1.06, 95% CI 1.02–1.11) and rural living area (OR 1.92, 92% CI 1.02–3.60). Participants were commonly diagnosed with symptoms of diabetes (44.6%). Participants demonstrated frequent healthcare provider contact (51% in last one month, 74.5% in last three months). Accidental or purposeful deviation from the recommended medications or treatment plan was reported by 18.7% and 12.8%, respectively. From the sample, 111 participants (54.4%) were capable of receiving SMS messages and 79 (71.1%) were willing to receive messages about diabetes. The most frequently self-reported obstacles to diabetes management were: medication costs (49.3%), treatment costs (46.6%), diabetic diet (33.8%), lack of relief on current treatment (17.4%), and transportation (16.7%).
Conclusion: Though most diabetics have frequent encounters with healthcare providers and report compliant behaviors, the majority do not meet recommended diabetes management guidelines. Screening of at-risk populations, targeted SMS campaigns, or diabetes-specific training for healthcare providers may improve clinical outcomes.

1. Introduction

Diabetes mellitus type II is a global epidemic requiring long-term surveillance and management of treatment plans. The total number of adults with diabetes are expected to increase worldwide by 54.1% between 2010 and 2030 [1]. Delay in diagnosis, barriers to access of care, lifestyle changes, and adherence to adequate long-term treatment increase the risk of the systemic complications for uncontrolled diabetes morbidity and mortality [2,3]. Proper management of diabetes requires significant participation and compliance on the part of the patient.

This study focuses on diabetes within southern India. India has the highest number of diabetic people 20–79 years old in the world with over 50 million diabetics [1,4]. Current estimates of the prevalence of diabetes in adults in India range between 3.1% and 7.3%, with areas of southern India having a self-reported prevalence of 6.4% [5,6]. The number of adult diabetics in India is expected to increase about 1,813,000 per year (36,268,000 between 2010 and 2030) [1]. Caring for this already massive diabetic population will require anticipatory improvements in access to diagnosis and in quality of care services. Improvements could lessen the burden of long-term complications in this population and lessen the effects complications will have on India's healthcare system and society.

Limited data exists regarding treatment seeking behaviors of patients with type II diabetes mellitus in India [7–10]. This study sought to characterize the treatment seeking behaviors and obstacles to care reported by Indian diabetics. Given that the growing burden of diabetes is in the developing world, and India in particular, global healthcare goals rely on accurate determination

* Corresponding author.
E-mail address: ashetty@wakehealth.edu (A.K. Shetty).

http://dx.doi.org/10.1016/j.dsx.2017.04.014
1871-4021/

of areas for intervention in diabetes control. These results lay the foundation for promising culturally specific and patient centered interventions to address the complicated global diabetic management dilemma.

2. Methods

2.1. Study design, setting and participants

This study explored patterns of treatment-seeking behavior and barriers that prevent access to adequate treatment and compliance for adult diabetic patients in southern India. Our hypothesis was that diabetes patient treatment-seeking behavior and compliance to treatment is influenced by barriers to care at all levels of influence in the socio-ecological model. Previous studies on treatment-seeking behavior and compliance in developing countries have described both diabetic populations as well as other chronic diseases [9,11]. Our quantitative questionnaire incorporated questions from previously published qualitative studies in India in order to more accurately describe issues regarding diabetic self-care [9,11]. In particular, we sought to expand the depth of questioning of broadly recognized barriers to compliance and positive diabetic health maintenance goals.

This cross-sectional study was carried out in the main city and surrounding periurban villages within a 2-h drive of Mangaluru, India. The city of Mangaluru is located in the Dakshina Kannada district in the state of Karnataka in southwest India with a metropolitan region population of over 600,000 people as recorded in the 2011 Census [12]. The surrounding communities are comprised of more rural and low income areas. All research was conducted at clinical laboratories associated with KS Hegde Medical Academy/Nitte University, located in the Deralakatte suburb of Mangaluru, as well as clinical laboratories led by private physicians.

Diabetic patients were sampled with a quantitative survey to determine treatment-seeking behavior, barriers to access, and compliance to treatment plans. Interview questions regarding obstacles to care were organized as in Fig. 1 according to the bioecological model of influence on human behavior [13]. This model stratified the complexities of diabetes management into individual, interpersonal, organizational/community, physical and national policy levels of influence. By breaking down the analysis of determinants into these categories, the study investigated interventions and further research at each level.

Fasting blood glucose (FBG) levels were used as a verifiable marker of target status for diabetes control. Participants that met the American Diabetes Association 2014 FBG goal (70–130 mg/dl) were considered "at target" [14].

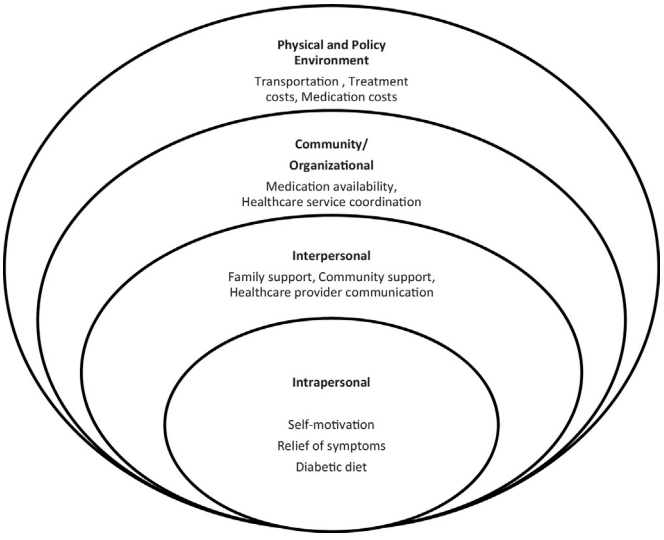

Fig. 1. Evaluated obstacles to diabetes management by level of influence in the socio-ecological model.

2.2. Procedures

Data was collected over a period of 5 weeks in July 2014. Participants were identified at clinical laboratories when they arrived for FBG testing. To be eligible to participate in the study, subjects were fasting self-identified type II diabetic adults aged 18–80, not pregnant, competent to give informed consent, and willing to also have their FBG level tested. Snowball sampling using referrals from identified diabetics was used to identify diabetic community members who may have lost contact with local healthcare facilities.

All survey data was collected during one-time encounters to minimize the risk of loss of participants to follow-up. After consenting to participate in the study, participants had their FBG level tested. Participants then completed a 30–45 min interviewer-administered questionnaire. Survey questionnaire included socio-demographic characteristics, treatment-seeking behavior (diagnosis of diabetes, healthcare provider contact, self-care behaviors, access to information), and perceptions of obstacles (cost, access to care, quality of care, diet, emotional support). Interactions with participants were conducted in Kannada by a trained bilingual research assistant. Research assistants were Indian graduate students at Nitte University with previous research experience. Trained translators ensured accurate and consistent translation of the pre-tested questionnaire.

2.3. Statistical analysis

Quantitative data was coded on Excel spreadsheets and analyzed by a statistician with the aid of SPSS version 22.0 statistical software (Armonk, NY: IBM Corp). Comparison of responses from at target versus not at target participants were conducted to determine the influence of each variable on FBG. Univariate analyses were done using Pearson chi-square test, Fisher's exact test, or Likelihood ratio test, as appropriate. Student's t test was used to analyze continuous variables. Strength of associations between categorical variables of perception of obstacles shall be presented as unadjusted and adjusted (as indicated) odds ratios using binary logistic regression.

2.4. Ethical considerations

The questionnaire was administered in a private area of the lab to ensure confidentiality. Written Informed consent was obtained from all study participants. The study protocol was approved by the Institutional Ethics Committee at Nitte University and Wake Forest School of Medicine.

3. Results

3.1. Study demographics

Of 253 patients who were approached in clinical laboratories, 19 did not agree to participate in study and 30 did not meet eligibility requirements as detailed in Fig. 2, leaving a sample of 204 patients. Only 77 study participants ($n = 204$) were considered at target for FBG (37.7%). The majority of participants were male, lived in a rural location, had a household income < 10,000 rupees/month, were Hindu, and were married. Strongest predictors of achieving at

Please cite this article in press as: S.M. Mentock, et al., Treatment-seeking behavior and obstacles to treatment compliance in diabetic patients in Mangaluru, India, Diab Met Syndr: Clin Res Rev (2017), http://dx.doi.org/10.1016/j.dsx.2017.04.014