Knowledge of Household Contacts of Diabetic Patients about the Disease

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Abstract

BACKGROUND: Diabetes is a complex and chronic illness requiring continuous medical care with multifactorial risk-reduction strategies beyond glycemic control. Ongoing patients and their household care givers self-management education and support are critical to preventing acute complications and reducing the risk of long-term complications.

AIM: The aim of the study was to assess the knowledge of household contacts about different aspects of diabetes and determine factors affecting it.

SUBJECTS AND METHODS: A cross-sectional analytic design was conducted in Buraibah city, North central Saudi Arabia among a sample of household contacts of diabetic patients (Type 1 or 2) attending Buraidah diabetic center throughout the period of the study. A valid self-administered questionnaire including question about sociodemographic characteristics of the participants, patient’s diabetic characteristics, and knowledge questions regarding diabetes was used for data collection.

RESULTS: The study included 422 household contacts of diabetic patients. The age of 44% of the participants was ranging between 20 and 39 years. Females represent 55.2% of them. Almost two-thirds of the participants (64.4%) expressed adequate level of knowledge about diabetes whereas 12.6% had poor level of knowledge. Their main source of information about diabetes was physicians (56.9%), followed by books/social media (23.9%). Household contacts aged between 20 and 39 years, singles, postgraduate educated, working, and being sons and parents of patients were more knowledgeable about diabetes compared to their counterparts. Participants whose patients had more duration of diabetes, family support, and no foot fungal infection were more knowledgeable about the disease. With increasing in the level of HbA1c% among diabetic patients, the knowledge of household contacts about the disease decreased, p < 0.001.

CONCLUSION: Knowledge of household contacts of diabetic patients in Buraibah city, Saudi Arabia, about diabetes was overall adequate with some identified deficient facts. The increase in the level of knowledge was accompanied with more glycemic control.

Introduction

Diabetes mellitus (DM) is a major cause of morbidity and mortality and poses a great burden on community health and economic status [1].

The prevalence of diabetes among adults was estimated to be 6.4% in 2010 worldwide in 2010 and will raise up to 7.7% by 2030 which means an increase of 69% in numbers of diabetic adults in developing countries and a 20% in developed countries [2]. In addition, the International Diabetes Federation estimated that 642 million will be diabetics by 2040 [3].

The World Health Organization documented that Saudi Arabia ranks the secondhighest country in the Middle East, and seventh in the world as regard the prevalence of DM [4]. The prevalence of DM in Saudi Arabia is 23.9%. However, the worldwide average figure is lower than that figure (8.3%) [5]. Type 2 diabetes represents 90% of cases [6]. An estimated 40% of patients with DM over the age of 30 are unaware of their disease. Furthermore, 25.5% of those aged over 30 years are displaying signs of pre-diabetes [7]. It has been estimated that by the year 2035, 7.5 million Saudi patients aged between 20 and 79 years will be present [8].

Diabetes is a complex, chronic illness requiring continuous medical care with multifactorial risk-reduction strategies beyond glycemic control. Ongoing patients and their household care givers self-management education and support are critical to preventing acute complications and reducing the risk of long-term complications [9].

As most of a patient’s diabetes management usually done at homes [10]. Therefore, investigating the knowledge of family households for diabetic patients regarding different aspects of diabetes is essential.

Despite, household contacts of diabetic patients can play an essential role in a disease management and including them in self-care interventions may influence
patient's diabetes outcomes in a positive way, the evaluation of their knowledge about diabetes was not sufficiently studied all over the world. Therefore, the aim of this study is to assess the knowledge of household contacts about different aspects of diabetes to improve the patient's glycemic control.

Materials and Methods

A cross-sectional analytic design was conducted in Buraidah city, which is the capital of Al-Qassim Region, North central Saudi Arabia. It has a population of 614,093, according to 2020 estimated census [11], [16]. The study was carried out specifically at Buraidah diabetic center, Ministry of Health, which includes more than 60 clinics/week (Type 1, Type 2, gestational, insulin pump, medication consultation, endocrinology, health education, nutrition, diabetic foot, and retinopathy). Household contacts of diabetic patients (Type 1 or 2) who are officially registered in the Buraidah diabetic center and attending it during the study period were eligible for inclusion.

As provided officially by the statistical office of Buraidah Diabetic Center, the total number of patients during 2021 was 65147 patients. Using Roasoft statistical online program, the sample size was calculated. By estimating the prevalence of sufficient knowledge about diabetes as 50% (since there is no figure from Saudi Arabia in this regard), the confidence interval of 95%, and a margin of error of 5%, the calculated sample size was 382 and by adding 10% to compensate for possible non-response, the total sample size was approximately 420 persons. A convenience sample of household contacts of all diabetic patients attending outpatient clinics of Buraidah Diabetic center was invited to participate in the study, till the required sample size was achieved.

Data were collected using a valid self-administered questionnaire adopted from a study carried out by Prasad [12], [17]. It is translated into Arabic and retranslated again into English and will be validated by three consultants in Diabetes and community medicine. It includes question about sociodemographic characteristics of the participants such as gender, age, marital status, nationality, residence, level of education, and job status. Furthermore, it included questions on patient's diabetic characteristics such as duration of diabetes, family history, family support, diabetic complications, and source of information on diabetes. In addition, the last level of HbA1c has been obtained from patient’s medical files. In addition, knowledge questions regarding diabetes definition, symptoms, diagnosis, management, and complications were included. Permission to use the questionnaire will be requested from the author through an e-mail communication.

Knowledge score was created in the way that correct answers were given a score of “1” whereas wrong answers were assigned a score of “0”. Then, total score and its percentage were computed. Score was classified as adequate if answered correctly by >75%, fair if answered correctly by 50–75%, or inadequate if answered correctly by <50%.

The researchers gave a hard copy of the questionnaire to the selected participant in the waiting area after taking a written consent. For illiterate participants, the researchers themselves or trained nurse read the questionnaire as it is written to the participant and write their answers. The researchers were available in the waiting area and collect the questionnaire back. Then, they checked the file of each participants. Gathering the results of HbA1c, we filled from files either from the electronic version or the paper version.

All necessary official approvals were fulfilled from administration of Buraidah diabetic center. Approval of the research proposal from the Local Research and Ethics Committee was obtained. An individual written consent from each participant in the study was obtained before data collection.

Data were analyzed using the Statistical Program for the Social Sciences software version 25.0. Categorical variables were expressed in frequency and percent while quantitative variables were expressed in mean and standard deviation. Categorical variables were compared with Chi-square and significance was considered at p < 0.05.

Results

Sociodemographic characteristics of the household contacts

The study included 422 household contacts of diabetic patients. The age of 44% of the participants was ranging between 20 and 39 years whereas that of 13.5% of them was 60 years or over. Females represent 55.2% of the participants. The majority of them were Saudi Nationals (96.4%). Most of them (70.2%) were married. Almost half of them (49.7%) were university graduated and 44.6% were working. Health professionals represent 14.9% of the respondents. More than half of the participants (55.2%) were parents of patients (Table 1).

Diabetes-related characteristics of patients

As shown in Table 2, the duration of diabetes exceeded 10 years among 46.4% of patients.
A history of diabetes was reported among 62.6% of patients; mostly among parents (66.3%). Most of patients (77.5%) had family support and 41% had diabetic complications. Foot fungal infection was observed among 26.5% of the patients.

Figure 1 shows that the level of HbA1c ranged between 7.1% and 10% among almost one-third of diabetic patients whereas it exceeded 10% among 12.1% of them.

Knowledge of the household contacts about diabetes

Majority of the participants could recognize that it is important for diabetic patients to take care of any injury (94.8%), wounds heal slowly in diabetic patients (87.9%), it is important for diabetic patient to check eyes periodically (87.2%), diabetes is a status that can be controlled (86.3%) and insulin should be stored in the refrigerator (86.3%). On the other hand, about half of them knew the normal blood sugar level for diabetic patients during fasting (53.2%) and the normal blood sugar level 2 h postprandial (49.5%) (Table 3).

Overall, almost two-thirds of the participants (64.4%) expressed adequate level of knowledge about diabetes whereas 12.6% had poor level of knowledge as illustrated in Figure 2.

Table 1: Sociodemographic characteristics of the participants

| Age (years) | Frequency | Percentage |
|-------------|-----------|------------|
| 20–39       | 186       | 44.0       |
| 40–49       | 99        | 23.5       |
| 50–59       | 80        | 19.0       |
| ≥60         | 57        | 13.5       |

| Gender       | Frequency | Percentage |
|--------------|-----------|------------|
| Male         | 189       | 44.8       |
| Female       | 233       | 55.2       |

| Nationality | Frequency | Percentage |
|-------------|-----------|------------|
| Saudi       | 407       | 96.4       |
| Non-Saudi   | 15        | 3.6        |

| Marital status | Frequency | Percentage |
|----------------|-----------|------------|
| Single         | 85        | 20.1       |
| Married        | 296       | 73.2       |

| Educational level | Frequency | Percentage |
|------------------|-----------|------------|
| Iliterate        | 24        | 5.7        |
| Primary school   | 42        | 10.0       |
| Intermediate/secondary school | 119 | 28.2 |
| University       | 210       | 49.7       |
| Postgraduate     | 27        | 6.4        |

| Job status | Frequency | Percentage |
|------------|-----------|------------|
| Not working | 163      | 38.6       |
| Working    | 188       | 44.6       |
| Retired    | 71        | 16.8       |

| Working as a health professional | Frequency | Percentage |
|----------------------------------|-----------|------------|
| No                                | 359       | 85.1       |
| Yes                               | 63        | 14.9       |

| Relation to the patient | Frequency | Percentage |
|-------------------------|-----------|------------|
| Parents                 | 233       | 55.2       |
| Son                     | 28        | 6.6        |
| Daughter                | 45        | 10.7       |
| Spouse                  | 57        | 13.5       |
| Others                  | 59        | 14.0       |

Table 2: Diabetes-related characteristics of the diabetic patients

| Duration of diabetes among patients | Frequency | Percentage |
|------------------------------------|-----------|------------|
| <2 years                           | 61        | 14.5       |
| 2–5 years                          | 68        | 16.1       |
| 6–10 years                         | 97        | 23.0       |
| >10 years                          | 196       | 46.4       |

| Family history of diabetes | Frequency | Percentage |
|----------------------------|-----------|------------|
| No                         | 158       | 37.4       |
| Yes                        | 264       | 62.6       |

| Parents | Frequency | Percentage |
|---------|-----------|------------|
| Yes     | 175       | 66.3       |
| Siblings | 36      | 13.6       |
| Others  | 16        | 6.1        |

| Most of family members | Frequency | Percentage |
|------------------------|-----------|------------|
| 37                     | 14.0      |            |

| Patient has family support | Frequency | Percentage |
|----------------------------|-----------|------------|
| No                         | 95        | 22.5       |
| Yes                        | 327       | 77.5       |

| Patient has complications | Frequency | Percentage |
|---------------------------|-----------|------------|
| No                         | 249       | 59.0       |
| Yes                        | 173       | 41.0       |

| Patial had foot fungal infection | Frequency | Percentage |
|----------------------------------|-----------|------------|
| No                                | 310       | 73.5       |
| Yes                               | 112       | 26.5       |

Table 3: Responses of the household contacts of diabetic patients to diabetes knowledge statements

Correct answer

| What is the common diagnostic definition of diabetes? (Increase in blood glucose level as a result of insulin deficiency or insufficiency) | 305 | 72.3 |
| What is the commonest type of diabetes in Saudi Arabia? (Type II) | 269 | 63.7 |
| Diabetes is a status? (that can be controlled) | 364 | 86.3 |
| Normal blood sugar level? (75–100 mg/dL) | 311 | 73.7 |
| Normal blood sugar level for diabetic patients during fasting (80–130 mg/dL) | 227 | 53.8 |
| Normal blood sugar level 2 h postprandial (<180 mg/dL) | 209 | 49.5 |
| What are the complications of uncontrolled diabetes? (vision problems, renal problems, cardiovascular problems, and foot ulcers) | 299 | 70.9 |
| Numbness and tingling are symptoms of what? (peripheral neuritis) | 274 | 64.9 |
| Is it important for diabetic patient to check eyes periodically (Yes) | 368 | 87.2 |
| Is it important for diabetic patients to take care of any injury? (Yes) | 400 | 94.8 |
| Where insulin should be stored (In the refrigerator) | 354 | 86.3 |

Overall, almost two-thirds of the participants (64.4%) expressed adequate level of knowledge about diabetes whereas 12.6% had poor level of knowledge as illustrated in Figure 2.
Factors associated with knowledge about diabetes

Socio-demographic characteristics of household contacts

The highest level of adequate level of knowledge was observed among household contacts aged between 20 and 39 years (72.6%) compared to 38.8% among those aged 60 years or above, p < 0.001. Males were more knowledgeable compared to females as adequate level of knowledge was reported among 69.3% and 60.5% of them, respectively. However, this difference was borderline insignificant, p = 0.052. Regarding the marital status, the highest level of adequate knowledge was reported among single household contacts (87.1%) whereas primary school graduates had the lowest rate (28.6%), p < 0.001. Working participants (73.4%) were more knowledgeable than not working (63.8%) or retired (42.3%) ones, p < 0.001. Concerning relationship to patients, sons and parents reported the highest rates of adequate knowledge (76.9% and 78.6%, respectively) whereas daughters reported the lowest rate (51.1%), p = 0.002. Nationality and working as a health professional were not significantly associated with level of DM knowledge (Table 4).

### Table 4: Household contacts of diabetic patient’s socio-demographic factors associated with their knowledge about diabetes

| Educational level | Level of knowledge about diabetes | p-value* |
|-------------------|----------------------------------|----------|
| N (%)             | Inadequate | Fair | Adequate |
| N (%)             | N = 53     | N = 97 | N = 272 |
| Age (years)       | 20–39 (n = 186) | 13 (7.0) | 38 (20.4) | 135 (72.6) | <0.001 |
| 40–49 (n = 99)    | 7 (7.1) | 27 (27.3) | 65 (65.7) |
| 50–59 (n = 80)    | 12 (15.0) | 17 (21.3) | 51 (63.7) |
| ≥60 (n = 57)      | 21 (36.8) | 15 (26.3) | 21 (36.8) |
| Gender            | Male (n = 189) | 16 (8.5) | 42 (22.2) | 131 (69.3) | 0.052 |
| Female (n = 233)  | 37 (15.9) | 55 (23.6) | 141 (60.5) |
| Nationality       | Saudi (n = 407) | 52 (12.8) | 94 (23.1) | 261 (64.1) | 0.712 |
| Non-Saudi (n = 15) | 6 (7.3) | 3 (20.0) | 11 (73.3) |
| Marital status    | Single (n = 85) | 1 (1.2) | 10 (11.8) | 74 (87.1) | <0.001 |
| Married (n = 296) | 33 (11.1) | 80 (27.3) | 182 (61.6) |
| Divorced/widowed  | 19 (66.7) | 7 (17.1) | 5 (15.6) |
| N (%)             | N = 418    | N = 86 | N = 278 |
| Illiterate        | 6 (25.0) | 5 (20.8) | 13 (54.2) | <0.001 |
| Primary school    | 18 (42.6) | 12 (28.6) | 12 (28.6) |
| Intermediate/secondary school | 16 (11.4) | 29 (24.4) | 74 (62.2) |
| University (n = 210) | 12 (5.7) | 46 (21.9) | 152 (72.4) |
| Postgraduate (n = 27) | 1 (3.7) | 5 (18.5) | 21 (77.8) |
| Job status        | Not working (n = 163) | 20 (12.3) | 39 (23.9) | 104 (63.8) | <0.001 |
| Working (n = 186) | 12 (6.4) | 38 (20.3) | 138 (73.4) |
| Retired (n = 71)  | 21 (29.6) | 20 (28.2) | 30 (42.2) |
| Working as a health professional | No (n = 359) | 46 (12.8) | 86 (24.0) | 227 (63.2) | 0.435 |
| Yes (n = 63) | 7 (11.1) | 11 (17.5) | 45 (71.4) |

### Table 5: Diabetes-related characteristics of patients associated with their household knowledge about diabetes

| Diabetes-related characteristics of patients | Level of knowledge about diabetes | p-value* |
|---------------------------------------------|----------------------------------|----------|
| N (%) | Inadequate | Fair | Adequate |
| N (%) | N = 53 | N = 97 | N = 272 |
| Duration of diabetes among patients | <2 years (n = 61) | 19 (31.1) | 9 (14.8) | 33 (54.1) | <0.001 |
| 2–5 years (n = 68) | 11 (16.2) | 20 (29.4) | 37 (54.4) |
| 6–10 years (n = 97) | 7 (7.2) | 24 (24.7) | 66 (68.0) |
| >10 years (n = 196) | 16 (8.2) | 44 (22.4) | 136 (69.4) |
| Family history of diabetes | No (n = 158) | 19 (12.0) | 42 (26.6) | 97 (61.4) | 0.397 |
| Yes (n = 264) | 34 (12.9) | 55 (20.8) | 175 (66.3) |
| Patient has family support | No (n = 95) | 12 (12.6) | 35 (36.8) | 48 (50.5) | 0.001 |
| Yes (n = 327) | 41 (12.5) | 62 (19.0) | 224 (68.5) |
| Patient has complications | No (n = 249) | 28 (11.2) | 63 (25.3) | 158 (63.5) | 0.309 |
| Yes (n = 173) | 25 (14.5) | 34 (19.7) | 116 (65.9) |
| Patient had foot fungal infection | No (n = 310) | 29 (9.4) | 71 (22.9) | 210 (67.7) | 0.003 |
| Yes (n = 112) | 24 (21.4) | 26 (23.2) | 62 (55.4) |
| HbA1c% | 6.5–7 (n = 85) | 5 (5.9) | 16 (18.8) | 64 (75.3) | <0.001 |
| >7 (n = 136) | 4 (2.9) | 29 (21.3) | 103 (75.8) |
| Patient had complications | No (n = 51) | 6 (11.8) | 10 (19.6) | 35 (68.6) |
| Yes (n = 150) | 38 (25.3) | 42 (28.0) | 70 (46.7) |
| Other source of information about diabetes | Family/friends (n = 74) | 21 (28.4) | 19 (25.7) | 34 (45.9) | <0.001 |
| Physicians (n = 240) | 19 (7.9) | 57 (23.8) | 164 (68.3) |
| Books/social media (n = 101) | 13 (12.9) | 21 (20.8) | 67 (65.3) |
| Others (n = 7) | 0 (0.0) | 0 (0.0) | 7 (100) |

Discussion

For better control and prevention of DM adverse consequences, increase awareness about DM, for patient’s household contacts is essential. Therefore, this study was carried out to assess the level of knowledge about DM and its determinants among T2DM patient’s...
household contacts attending the diabetic center in Buraidah city, North central Saudi Arabia. Findings from the study may play a role in designing appropriate interventional strategies to reduce the burden of the disease in our region.

Since most of the studies investigating knowledge about diabetes were conducted either among patients themselves or a specific group of general population with very limited studies carried out among household contacts or family members, the discussion of our finding is quite difficult. However, we tried our best to compare our findings with these few studies and justifying the difference between the present study and those studies.

In the present study, almost two-thirds of the house-hold contacts of diabetic patients (64.4%) expressed adequate level of knowledge about diabetes whereas only 12.6% had poor level of knowledge, which are encouraging findings. Some other studies carried out in SouthAfrica[13], Ethiopia[14] and Kenya[15] indicated that diabetic patients and their family members lack sufficient knowledge on diabetes and its management. Furthermore, in a study carried out in Poland[16], more than half (56%) of family member caregivers' had no knowledge about diabetes risk factors and complications. In another study carried out in Ethiopia[17], it was observed that 78.3% of primary and secondary diabetic patient's family members had good level of knowledge about diabetes and its prevention and this was almost 3-folded that of control group. Robert et al.[18], observed that African Americans with DM family history were more aware about DM risk factors than those without such history. Difference between various studies could be attributed to participants' characteristics and using tool to assess knowledge about DM. The considerable high level of knowledge among household contacts of diabetic patient in the present study is quite expected as they have a greater chance to be in contact with diabetic patients and so expected to have better knowledge about DM. In addition, DM is a very prevalent disease in Saudi Arabia, therefore adequate knowledge about it, particularly among household contacts of patients is not a surprise.

The main source of information about DM among participants in this study was physicians, followed by books/social media. Participants who got their information from these two sources were more knowledgeable about DM compared to those obtained their sources from friends/family members. However, the highest rate of knowledge was observed among those obtained their information from the internet and mass media. Therefore, physicians should be encouraged to have more active role in providing information about the diabetes and its management to family members and household contacts of diabetic patients during follow-up visits.

The highest level of adequate level of knowledge was observed among single, working household contacts aged between 20 and 39 years. Most probably, this group is more educated than others. In accordance with others[14], [15], [17], [19], [20] more educated household contacts were more knowledgeable about DM.

In the present study, and in agreement with others[19], family members and household contacts whose diabetic patients had longer duration of diabetes were more knowledgeable about the disease as they got more experience in dealing with patients during the management of the disease.

Household contacts of diabetic patients who had no foot fungal infection were more knowledgeable about the disease. This finding could reflect the impact of knowledge of the household contact about the disease control and management on prevention of severe complications, particularly foot fungal infection.

In the present survey, it has been observed that with increasing in the level of HbA1c% among diabetic patients, the knowledge of household contacts about the disease decreased. Interestingly, the level of knowledge was lowest among household contacts who did not know HbA1c% of their patients. This finding confirms the fact that knowledgeable household contacts could play an important role in diabetes control.

Knowledgeable family members/caregivers of diabetic patients usually express more care for their patients and consequently better control and less complications. In a study carried out in Poland, Abramczyk observed that diabetic patients of more knowledgeable family members/caregivers showed more care regarding oral hygiene, self-care, self-management, in addition, they had no somatic or psychoemotional complaints, no additional medical problems and their weight, blood pressure, and triglycerides were normal[16]. However, in a systematic review carried out by Baig et al., they cannot determine how family members participation in diabetes management can affect patient's clinical outcomes[10].

This study is one of the limited studies carried out to assess knowledge of household contacts of diabetic patients in the Kingdom of Saudi Arabia. However, it has some limitations that should not addressed. The cross-sectional design adopted in this study is considered one of the limitations of the study. Furthermore, conduction of the study in one health institution in Buraidah city limits the generalization of its findings.

**Conclusion**

Knowledge of household contacts of diabetic patients in Buraidh city, Saudi Arabia, about diabetes was overall adequate with some identified deficient facts.
related to the normal blood glucose levels during fasting and postprandial. Their main source of information was physicians. Household contacts aged between 20 and 39 years, singles, postgraduate educated, working, and being sons and parents of patients were more knowledgeable about diabetes compared to their counterparts. Furthermore, those whose patients had more duration of diabetes, family support, and no foot fungal infection were more knowledgeable about the disease. With increasing in the level of HbA1c% among diabetic patients, the knowledge of household contacts about the disease decreased. Based on findings of the study, the following are recommended

- Organizing health education activities at diabetic centers and primary care settings for the whole community about diabetes, its complication, and management.
- Encourage physicians and other health-care team to give enough time to educate patients and their household contacts about different aspects of the disease.
- Further large scale interventional study to assess the impact of health education of patients and their relatives on the level of glycemic control.
- Conduction of the same study in many other areas of the Kingdom to have a clearer profile of the situation.

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