Preventive advice given by patients with type 2 diabetes to their offspring

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ABSTRACT

Background

Patients' advice-giving behaviour could be a useful preventive strategy for type 2 diabetes.

Aim

To investigate the conditions under which patients offer advice to their offspring and to assess the factors that facilitate advice giving.

Design of study

Cross-sectional observational study.

Setting

A general hospital with a diabetes clinic in a metropolitan suburb in Japan.

Method

Parents with type 2 diabetes (n = 221) who had offspring aged 20–49 years inclusive without diabetes completed a self-administered questionnaire containing items relating to advice-giving behaviour, demographic characteristics, risk perception, and their disease status.

Results

A total of 184 (83.3%) patients responded that parental advice-giving behaviour is needed for their offspring, while 138 (62.4%) actually advised their offspring. Multiple logistic regression analysis showed that patients who were female (odds ratio [OR] = 1.94, 95% confidence interval [CI] = 1.03 to 3.65, P = 0.041), living with their offspring (OR =1.92, 95% CI = 1.04 to 3.57, P = 0.038), had complications (OR = 2.74, 95% CI = 1.25 to 6.00, P = 0.029), or perceived that their offspring had a high risk of developing diabetes (OR =1.45, 95% CI = 1.09 to 1.93, P = 0.011) were most likely to advise their offspring.

Conclusion

Patients with type 2 diabetes recognised the need to give advice about preventive behaviour to their offspring but were not necessarily engaging in advice-giving behaviour. Advice-giving behaviour was affected by the parents' own disease status, their perception of their offspring's risk of developing diabetes, and the relationship between the patients and their offspring.

Keywords

diabetes mellitus, type 2; family; parent–child relations; primary prevention.

INTRODUCTION

In recent years, the number of patients with type 2 diabetes has been increasing so rapidly that the active development and implementation of preventive strategies is urgently required. Effective prevention requires the identification of individuals who are at high risk of developing type 2 diabetes. Epidemiological studies have clearly shown that offspring of patients with type 2 diabetes are at increased risk of developing the disease,[1,2] as they are likely to share the same genetic predisposition and have similar lifestyle habits to their parents. In addition, recent studies have suggested that the Japanese population is genetically predisposed to type 2 diabetes,[3,4] so adoption of appropriate lifestyle habits seems likely to be particularly effective for the offspring of Japanese patients with diabetes.

Offspring of patients with type 2 diabetes are obviously at high epidemiological risk of developing diabetes, but previous studies have shown that such individuals tend to underestimate that risk.[5,6] As having an appropriate understanding of risk and the seriousness of diabetes represent the first steps toward behavioural changes for

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How this fits in

The active development and implementation of preventive strategies is urgently required for relatives of patients who have type 2 diabetes because they are at higher risk of developing type 2 diabetes than people whose relatives do not have the disease. Patients' advice for their offspring aimed at preventing them from developing diabetes would be a practical and cost-effective preventive strategy, but little research into its effectiveness has been conducted. This survey aimed to fill that gap and suggests that patients' advice-giving behaviour would facilitate risk education of their offspring.

prevention,[7] the offspring of patients with diabetes may not find taking appropriate preventive actions easy. As such, some form of intervention may be warranted to facilitate the implementation of needed preventive behavioural changes. Previous research has shown that the most effective way to prevent diabetes in offspring of parents with diabetes is to intervene directly;[8,9] this theory has also been based on established preventive strategies for populations at high risk of developing other conditions, such as obesity or pre-diabetes.[10–13] However, direct intervention by medical professionals into the lives of healthy offspring is difficult, due to a lack of opportunities to make contact with them.

In some diseases for which a known genetic susceptibility exists, relatives who are affected can play effective roles in the adoption of preventive behaviour by those family members who are not affected.[14,15] This is particularly true for offspring of parents with diabetes, whereby parents are the most familiar individuals who have the disease and may be the people most capable of explaining the seriousness of diabetes and transmitting to their children useful information received from medical professionals.[14,16]

Given this perspective, patients have an important role in giving advice and warning their offspring to facilitate adoption of preventive behaviour. However, little research has described the role that parents can play, and little information is available regarding whether parents with diabetes actually do advise their offspring regarding the disease.[17] The present study was conducted to investigate the precise conditions related to parents with type 2 diabetes giving advice to their offspring and to identify factors facilitating this behaviour.

METHOD

Design

Researchers conducted a cross-sectional observational study based on a self-administered questionnaire.

Participants

Patients with type 2 diabetes who were being treated at the diabetes clinic of a general hospital located in a city suburb of Japan were enrolled. Inclusion criteria were being aged <75 years and having offspring without diabetes who were ≥20 years old but <50 years old. Patients were excluded if they had linguistic problems or any severe mental disorder.

Procedures

When patients visited the clinic, a clinician assessed whether they met the inclusion criteria. The diabetes status of their offspring was based on patient recognition. Those patients who were eligible to participate in the study received an explanation of the study by one of the investigators. After giving written informed consent to participate, each patient was asked to complete a questionnaire. Patients with more than one child were asked to specify one child when answering questions.

Most patients completed and returned the questionnaire straight away, but 11 took it home because they had no time to complete it immediately. These questionnaires were returned to the investigator's office by mail. The study was conducted from October to December 2005.

Questionnaire

The questionnaire, developed by the authors, is based on the hypothesis that the following patient status factors were related to advice giving, according to previous research that interviewed medical professionals about the prevention of diabetes in offspring:[18]

- physical/disease status;
- risk perception; and
- demographic characteristics.

All questions were closed: each question had two possible responses (yes or no). To assess patient attitudes to offering advice and whether advice was actually given, the questionnaire contained two outcome measure questions:

- 'Do you think that it is necessary to advise your child to take care of his/her lifestyle habits, such as diet or exercise, to prevent themselves from developing diabetes?'; and
- 'Have you actually advised your child to take care of his/her lifestyle habits, such as diet or exercise, to prevent themselves from developing diabetes?'.

Data about physical conditions and risk

perception that could have an effect on preventive behaviours were also investigated.[7,18,19] Physical status and conditions investigated were: body weight (kg); height (cm); family history; duration of diabetes (years); current treatment (insulin treatment, yes/no; oral medication, yes/no); whether the patient had been admitted to hospital for diabetes treatment/education; and whether the patient had experienced complications related to diabetes.

Risk perception-related factors that were investigated comprised knowledge of aetiological factors and perception of risk of developing diabetes in offspring. Responders were asked to rate the aetiological factors (lack of exercise, overeating, unbalanced diet, and genetics) on a five-point Likert scale from 1 (strongly agree) to 5 (strongly disagree), as well as their offspring's risk of developing diabetes by responding to the question: 'Compared with the general population, what is the likelihood of your child developing diabetes?'. Responses were chosen from: (1) very unlikely; (2) unlikely; (3) same as the general population in Japan; (4) likely; and (5) very likely.

Demographic characteristics comprised: sex; age; educational status; and living with/without offspring. The questionnaire contained approximately 50 questions about patients and 40 questions about their offspring. Participants completed the questionnaire in 20–30 minutes. Face validity of the questionnaire was confirmed in a pilot test.

Statistical analysis

Descriptive statistics for the basic characteristics and outcome measures were tabulated, then univariate logistic regression analysis was performed to assess which factors could facilitate the provision of advice. The dependent variable (main outcome measure) was the actual giving of advice (responses were converted: 'yes' to 1; 'no' to 0). Other items, such as basic characteristics, were treated as independent variables.

After univariate analysis, multivariate logistic analysis was performed to assess the relative influence of each factor after adjusting for other variables. To obtain a simpler model, variable selection was performed in two steps. Only variables that revealed a moderate relationship, which was indicated by a lower *P*-value ($P<0.2$) on univariate analysis, were entered into the initial model, then automatic selection was conducted using the backward procedure.

SAS version 9.13 (SAS Institute, Cary, NC, US) was used for statistical analysis, and the level of significance was set at $P<0.05$.

RESULTS

Of the 233 patients who were eligible and visited the clinic during the study period, four patients declined to participate, three questionnaires were not returned, and five questionnaires were regarded as ineligible (two patients were aged >75 years, two described an adopted child, one lacked answers to more than 50% of all questions). Finally, results from 221 questionnaires (94.8%) were analysed. Table 1 shows participant characteristics.

Patient attitudes and provision of advice

Table 2 shows results for patient recognition of the necessity to give advice, and patients who actually gave advice. A total of 184 (83.3%) patients responded that they thought that giving advice to their offspring was necessary, but only 138 (62.4%) patients actually advised their offspring.

Factors facilitating the provision of advice

Table 3 shows the results of univariate logistic regression analysis for which the dependent variable was the provision of advice ('Have actually advised offspring' = 1; 'Have not advised offspring' = 0). About half of the independent variables were

Table 1. Characteristics of patients (*n* = 221).

Characteristic	*n* (%)
Sex	
Females	95 (43.0)
Males	126 (57.0)
Educational status	
Junior high school (13–15 years)	39 (17.7)
High school (16–18 years)	106 (48.0)
Tertiary education	71 (32.1)
Living with their offspring	125 (56.6)
Hospital admission related to diabetes	99 (44.8)
Under insulin treatment	49 (22.2)
Experiencing complications	59 (26.7)
Family history of diabetes	130 (58.8)
	Mean (SD)
Age, years	64.2 (6.4)
Body mass index, kg/m^2	23.8 (3.6)
Duration of diabetes, years	11.3 (9.8)

SD = standard deviation.

Table 2. Patients' attitudes and actual provision of advice on diabetes prevention (*n* = 221).

Attitude	Yes, *n* (%)	No, *n* (%)
It is necessary to advise offspring?	184 (83.3)	37 (16.7)
Have you actually given advice?[a]	138 (62.4)	82 (37.1)

[a]*Missing = 1.*

Table 3. Univariate logistic regression analysis of relationship between advice-giving behaviour[a] and parental factors (*n* = 220).

	OR	95% CI	*P*-value
Sex (reference: male)	2.09	1.18 to 3.71	0.012
Age	1.02	0.98 to 1.06	0.420
Body mass index	0.96	0.89 to 1.04	0.339
Educational status, years	1.02	0.91 to 1.14	0.747
Living with offspring	1.82	1.05 to 3.17	0.038
Having family history of diabetes	1.58	0.91 to 2.76	0.105
Longer duration of illness	1.03	1.00 to 1.07	0.032
Experience of hospital admission	1.61	0.85 to 3.05	0.144
Having insulin treatment	2.14	1.04 to 4.39	0.038
Receiving oral medication	1.75	1.01 to 3.03	0.048
Experiencing complications	3.01	1.49 to 6.11	0.002
Aetiological recognition			
Lack of exercise	1.46	1.05 to 2.02	0.024
Overeating	1.28	0.89 to 1.85	0.186
Unbalanced diet	1.43	1.04 to 1.96	0.029
Heredity	1.26	0.98 to 1.63	0.075
Risk perception	1.60	1.23 to 2.09	<0.001

[a]*Missing = 1.OR = odds ratio.*

Table 4. Multivariate logistic regression analysis of relationship between advice-giving behaviour and parental factors (*n* = 220).

	OR	95% CI	*P*-value
Sex (reference: male)	1.94	1.03 to 3.65	0.041
Living with offspring	1.92	1.04 to 3.57	0.038
Experience of hospital admission	1.61	0.85 to 3.05	0.144
Experiencing complications	2.74	1.25 to 6.00	0.012
Risk perception	1.45	1.09 to 1.93	0.011
Aetiological recognition, lack of exercise	1.32	0.92 to 1.90	0.133

OR = odds ratio.

significantly associated with the actual giving of advice, including female sex (odds ratio [OR] = 2.09, 95% confidence interval [CI] = 1.18 to 3.71, *P* = 0.012), living with offspring (OR = 1.82, 95% CI = 1.05 to 3.17, *P* = 0.038), longer duration of illness (OR = 1.03, 95% CI = 1.00 to 1.07, *P* = 0.032), having insulin treatment (OR = 2.14, 95% CI = 1.04 to 4.39, *P* = 0.038), taking oral medication (OR = 1.75, 95% CI = 1.01 to 3.03, *P* = 0.048), the presence of complications (OR = 3.01, 95% CI = 1.49 to 6.11, *P* = 0.002), recognition that lack of exercise (OR = 1.46, 95% CI = 1.05 to 2.02, *P* = 0.024) or an unbalanced diet (OR = 1.43, 95% CI = 1.04 to 1.96, *P* = 0.029) play an aetiological role, and perception that offspring are at high risk of developing diabetes (OR = 1.60, 95% CI = 1.23 to 2.09, *P*<0.001).

On multivariate logistic regression analysis, of the 13 factors showing *P*<0.2 on univariate analysis, 'Having insulin treatment' was not entered into the initial model as this factor had a strong correlation with 'Experience of hospital admission' (Spearman's rank correlation coefficient = 0.48). Variable selection using the backward elimination method resulted in a final model with six variables, of which four showed a significant OR (Table 4). The following factors were associated with giving advice to offspring: female sex (OR 1.94, 95% CI = 1.03 to 3.65, *P* = 0.041), both patient and offspring living together (OR 1.92, 95% CI = 1.04 to 3.57, *P* = 0.038), the presence of complications (OR 2.74, 95% CI = 1.25 to 6.00, *P* = 0.012), and the perception that offspring are at high risk of developing type 2 diabetes (OR 1.45, 95% CI = 1.09 to 1.93, *P* = 0.011).

DISCUSSION

Summary of main findings

The present study investigated the advice given by patients with type 2 diabetes to their offspring, determined whether patients had provided advice to their offspring, and identified factors facilitating this behaviour. Most patients who participated (>80%) recognised the need to advise their offspring, but were not necessarily engaged in advice-giving behaviours. Factors that facilitated or acted as barriers to giving advice can be summarised in three points: disease status, perception of risk, and the personal relationship between parent and child.

First, the disease status of the patient was found to be related to whether patients gave advice to their offspring. Factors that reflected disease severity, namely the use of insulin or oral treatment and the presence of medical complications, were clinically related to whether the patient had actually given advice to their offspring. Two possible explanations exist for this relationship. The more advanced the diabetes in the patient, the more the patient may think that they do not want their offspring to develop the same disease. Additionally, patients might not recognise the seriousness of their disease until they develop subjective symptoms.[20] From the perspective of early prevention, patients should be aware that their offspring are at high risk of developing diabetes and take steps to help them prevent onset as soon as the patient is known to have diabetes.

Second, the patient's perception of the risk of diabetes in their offspring influenced whether they advised them. This means that the relationship between risk perception and direct preventive behaviour, as shown in many studies, can also be applied to advice giving. This can be regarded as indirect preventive behaviour.

Third, the personal relationship between the parent and child was also related to actual advice-giving behaviour. Compared with male patients (fathers), female patients (mothers) gave advice more frequently. The rationale for this result is unclear, but it is possible that mothers pay more attention to lifestyle habits in their offspring than fathers. If this is the case, it might be important to intervene with male patients to help them pay attention to the prevention of diabetes in their offspring. The living arrangements of the parent and child was also a principal factor determining whether parents advise their offspring. Patients who live with their offspring can observe their lifestyle habits and easily give advice in a direct face-to-face manner. A separate living arrangement is, therefore, an obvious barrier to parents giving advice to their children. Under such conditions, patients require stronger motivation and support.

After adjusting for the effect of other factors on multivariate analysis, these three points were confirmed to correlate with actual parental advice-giving behaviours. This model provides meaningful information to plan educational interventions for patients aimed at facilitating advice-giving behaviours, to determine who should be preferentially targeted, and to ascertain the content that should be included in the intervention. Patients — particularly those who are male and living apart from their offspring — should be educated regarding proper recognition of the seriousness of disease and the risk to their offspring.

Strength and limitations of the study

This is the first study to investigate patients with type 2 diabetes with a focus on advice giving for offspring, which is thought to represent a practical, cost-effective strategy for prevention.[21] The study achieved a high acceptance rate, even though participants were recruited from consecutive patients. This point strengthens the validity of the study.

There were some limitations, however, that need to be mentioned. All questions were answered based on the subjective perceptions of the patient. For example, interpretations of the term 'exercise' may differ among patients. More objective questions with clear definitions would be needed for further research. It was also noted that participants tend to report their own actions as being better than actual conditions. Taking this into account, patients were asked about advice giving from a perspective of both attitudes and actual actions. This method would also help patients to clarify their actual actions.

Some variables could potentially affect the provision of advice, such as psychological aspects of the parent–child relationship, along with physical, social, and psychological characteristics of the offspring of people with diabetes. Assessment of family relationships, particularly the parent–child relationship is also useful to enhance the effect of parental advice on preventive behaviour in offspring.

The design of this study displays some inherent limitations. Although the sample size was sufficient to establish a statistical model, the causal relationship between parental advice and related factors cannot be discussed based on this cross-sectional study: a prospective study is required instead. In addition, the study's external validity is limited due to the sampling method. The study was conducted at a single institution in an urban area of Tokyo. As such, bias might exist in terms of higher educational status and greater knowledge of diabetes due to higher accessibility to various information sources. Patients were also asked to specify one child only, to avoid data clustering. Whether this method causes over- or underestimation of advice giving is unclear, as it is not known whether parents selected the child with the healthiest lifestyle in the family or the child at highest risk due to factors such as obesity and/or sedentary lifestyle.

Due to the lack of a control group of adults without diabetes, it is unclear whether these findings represent specific characteristics of Japanese patients with diabetes and their offspring.

Comparison with existing literature

The current authors previously reported the impressions of health professionals regarding the advice-giving behaviours of patients with diabetes.[18] Health professionals thought that patients might not advise their offspring because they underestimate the risk of their developing diabetes or because they experience difficulty mentioning prevention to their offspring, perhaps due to their focus on managing their own diabetes. The results of the current study, which directly investigated patients, contradict the impressions of health professionals: patients are more attentive to the lifestyle habits of their offspring than suggested.

In Japan, since 2000, studies on genetic predispositions for various diseases, including diabetes, have been conducted as part of national projects[3,22] and the media have been actively reporting on lifestyle diseases. The present results may indicate that these national projects have raised the general awareness of diabetes.

Implications for future research and clinical practice

From the perspective of clinical practice, providing accurate information not only regarding proper recognition of risk and disease seriousness, but also about effective prevention strategies, is essential for understanding the controllability of disease.[23,24] Relatives of patients with type 2 diabetes tend to consume meals that are high in fat more frequently than the general population.[25] As such, a focus on the importance of lifestyle habits is crucial.

At this point in time, insufficient evidence exists regarding genetic predispositions to diabetes and lifestyle habits, such as diet intake,[26] making it difficult for health professionals to explain these issues to patients and for patients to understand.[18] However, more data are gradually being gathered on interactions between genetic predisposition, lifestyle habits, and diabetes prevention.[8,27–30] In the future, organising and presenting this information to patients and their relatives in an easy-to-understand manner will be important. This study revealed who should be preferentially targeted for intervention and demonstrated the importance of further research to investigate parent–child relationships for effective intervention.

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Ethical approval

The ethics committee of the University of Tokyo approved the study protocol (acceptance no 1236)

Competing interests

The authors have stated that there are none

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