ORIGINAL RESEARCH

Self-Reported Health Beliefs, Lifestyle and Health Behaviours in Community-Based Patients with Diabetes and Hypertension

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ABSTRACT

OBJECTIVE: This study describes self-reported health and lifestyle behaviours and health risk beliefs among community patients diagnosed with type 2 diabetes and hypertension.

METHODS: Patients with both type 2 diabetes and hypertension were recruited from community family practices across 3 Canadian Maritime provinces. Patients completed a survey targeting health risk beliefs, and health and lifestyle behaviours. Analyses examined differences in patient beliefs by age and sex, as well by health and lifestyle behaviour.

RESULTS: Overall, 90.8% of patients believed that controlling both blood pressure and blood glucose were important, particularly women ($p<0.01$), and 92.8% felt that having both conditions put them at high risk for cardiovascular problems. Older patients reported higher antihypertensive medication adherence ($p<0.0001$). Most (90.8%) believed that prescription drug use was most helpful for controlling blood pressure, and this belief was associated with medication adherence ($p<0.0001$). Overall, patients who believed in the benefits of a given lifestyle behaviour were more likely to demonstrate the behaviour.

CONCLUSION: The majority of patients surveyed were knowledgeable about their increased risk for cardiovascular problems. Patient lifestyle behaviours tended to mirror their health beliefs. These results provide important insight into the health beliefs and lifestyle behaviours of patients who receive the majority of their care in the community.

KEYWORDS: health beliefs, hypertension, type 2 diabetes

RÉSUMÉ

OBJECTIF : Cette étude décrit les comportements liés à la santé et au mode de vie et les croyances en matière de risque pour la santé signalés par des patients en milieu communautaire souffrant à la fois de diabète de type 2 et d'hypertension.

MÉTHODES : Des patients atteints de diabète de type 2 et d'hypertension ont été recrutés parmi les clients de cabinets de médecins de famille en milieu communautaire dans trois des provinces maritimes canadiennes. Les patients ont rempli un questionnaire sur les croyances en matière de risque pour la santé et les comportements liés à la santé et au mode de vie. Des analyses ont été effectuées pour examiner les différences entre les croyances des patients en fonction de l'âge et du sexe, ainsi que des comportements liés à la santé et au mode de vie.

RÉSULTATS : Dans l'ensemble, 90,8 % des patients (en majorité des femmes) croyaient qu'il était important de maîtriser tant la tension artérielle que la glycémie ($p < 0,01$) et 92,8 % croyaient être à haut risque de troubles cardiovasculaires parce qu'ils souffraient des deux maladies. Les patients d'un certain âge étaient plus fidèles à leur traitement médicamenteux antihypertensif ($p < 0,001$). La plupart (90,8 %) des patients croyaient que la prise d'un médicament de prescription était le facteur qui contribuait le plus au contrôle de la tension artérielle, et cette croyance était associée à la fidélité au traitement médicamenteux ($p < 0,0001$). Dans l'ensemble, les patients qui croyaient aux bienfaits d'un comportement lié au mode de vie donné étaient plus susceptibles d'avoir ce comportement.

CONCLUSION : La majorité des patients ayant rempli le questionnaire savaient être exposés à un risque accru de troubles cardiovasculaires. Les comportements liés au mode de vie avaient tendance à refléter les croyances des patients en matière de santé. Ces résultats donnent d'importants renseignements sur les croyances en matière de santé et les comportements liés au mode de vie de patients qui reçoivent la majorité de leurs soins en milieu communautaire.

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MOTS CLÉS : croyances en matière de santé, hypertension, diabète de type 2

INTRODUCTION

Diabetes on its own is associated with many health risks (1), but for those who have also been diagnosed with hypertension, the risk of stroke, coronary artery disease, peripheral vascular disease and retinopathy is even greater (2,3). Unfortunately, these 2 preventable diseases are often comorbid: in Canada, a national cross-sectional study of patients with type 2 diabetes found that 63% also had hypertension (4). A community-based study from Canada's 3 Maritime provinces reported that 79% of patients with type 2 diabetes had hypertension as well (5).

Patient lifestyle behaviours, such as physical activity and nutrition, have been shown to play an important role in reducing the complications related to hypertension and diabetes (6-8). However, in order to embrace such lifestyle changes, patients must have an understanding of the potential health risks associated with their conditions, as well the potential positive effects of lifestyle modification (9). Research that targets not only patients' understanding of the health risks associated with diabetes and hypertension but also their ability to effect change is relatively rare.

Several studies have assessed patient knowledge of the health risks associated with hypertension. Although this work does not necessarily represent the views of patients with comorbid diabetes, results indicate many do not understand the health consequences of their condition and would benefit from additional knowledge (10,11). Available evidence also suggests that patients with diabetes are not fully aware of the health risks associated with comorbid diabetes and hypertension (12).

As part of a larger community-based study focused on drug-prescribing intensity and blood pressure (BP) in patients with type 2 diabetes (5), participants were asked to complete a survey to supplement the clinical information that had been extracted from their records. Survey questions focused on clinically relevant, changeable behaviours such as diet, physical activity and medication adherence, as well as patient beliefs about the health risks associated with diabetes and hypertension. The objective of this article is to describe these survey findings, with a specific focus on patient lifestyle, health risk beliefs and health behaviours.

METHODS

The information presented here comes from a cross-sectional, observational, practice-based study focusing on BP control, which has been previously described (5). Participants were recruited from rural and urban family practices in the 3 Canadian Maritime provinces (New Brunswick, Nova Scotia and Prince Edward Island). Eligible participants were identified by physicians during routine care visits and included all patients with clinical diagnoses of both type 2 diabetes and hypertension. Prior to survey administration, eligible study participants must also have undergone a BP measurement using an automated oscillometric BP monitor (BpTRU, VSM MedTech Ltd, Vancouver, British Columbia) during their most recent visit. For this sub-study, information was limited to data collected from the survey only. Ethical approval of the larger community-based study was provided by all research ethics boards that had jurisdiction over the participating practices.

Table 1. Respondent characteristics

Characteristic	*Frequency (%)**
Sex	
Men	307 (52.2)
Women	281 (47.8)
Age	
<65 years	269 (45.7)
≥65 years	319 (54.3)
Marital status	
Married/common law	400 (68.0)
Single/separated/widowed/divorced	188 (32.0)
Drug insurance	
No drug insurance	67 (12.4)
Provincial plan only	162 (29.9)
Other drug coverage only	241 (44.5)
Both provincial and other drug coverage	72 (13.3)
Ethnicity	
White	505 (85.9)
Other	14 (2.4)
Unknown	69 (11.7)
Education	
Grade 8 or less	96 (17.0)
Grade 9–11	169 (29.8)
Graduated high school	105 (18.6)
Technical or trade school	70 (12.4)
College or university	126 (22.3)
Duration of diabetes	
<5 years	171 (29.1)
5–10 years	165 (28.1)
>10 years	244 (41.5)
Unknown	8 (1.4)
Duration of hypertension	
<5 years	133 (22.6)
5–10 years	167 (28.4)
>10 years	284 (48.3)
Unknown	4 (0.7)

*Frequencies may not add to 588 due to missing responses; percentages may not total 100% due to rounding

Patient survey

The patient survey incorporated questions modified from valid, reliable instruments such as the Canadian Community Health Survey (13), National Population Health Survey (14) and International Physical Activity Questionnaire (15), as well as questions adapted from other

surveys (12,16) and items specific to this study. Questions focussed on patients' history and care of diabetes and hypertension; awareness of the importance of controlling BP and blood glucose; beliefs about the relationship between diabetes, high BP and cardiovascular risk; ability to manage BP and blood glucose levels; adherence to prescribed antihypertensive medications; use of non-prescribed, complementary and alternative medicines; lifestyle factors, such as diet and physical activity; and sociodemographics. Because many patients may not have understood the meaning of the term *hypertension*, we chose to refer to this condition as *high BP*. Adherence to antihypertensive medications was evaluated using the Morisky Medication Adherence Scale, a moderately valid and reliable self-reported measure of medication adherence among patients with hypertension (17). Individuals with a high score on the Morisky scale were significantly more likely to have their BP under control compared to individuals with a low score (17).

Prior to administration, the survey was first reviewed and modified by the research team and healthcare professionals with expertise in diabetes and hypertension, and then pilot tested in a convenience sample of 10 patients with known diagnoses of both diabetes and hypertension.

Procedure

Survey administration followed a modified Dillman method (18) and occurred between July 2008 and December 2009. A letter of invitation, survey package and reminder notice were sent by mail from physicians' offices. Survey packages and reminder notices were re-sent to those who had not responded within 5 weeks of the initial invitation. To ensure a relatively short time period between participants' BP measures and survey responses, the invitation was sent within 6 months of each potential participant's most recent BpTRU measure (a requirement for the larger study).

Analysis

Statistical analyses were primarily descriptive. Frequencies, measures of central tendency and variation were examined for each survey item. Cross-tabulations and chi-square statistics were used to examine differences in patient beliefs by age and sex, as well as assess the association between beliefs and health and lifestyle behaviours. All analyses were performed using SAS version 9.1 (SAS Institute Inc, Cary, North Carolina).

RESULTS

In total, 704 patients with diagnoses of both diabetes and hypertension had a BpTRU measurement during their most recent visit. Of these, 48 were excluded because the BpTRU measure was beyond the 6 month time window, or due to loss to follow up (e.g. death, closure of physician's practice).

Table 2. Health and lifestyle behaviours

Survey item	*Frequency (%)**
Eat foods high in fibre	
No	114 (19.6)
Yes	468 (80.4)
Eat foods low in salt	
No	144 (24.7)
Yes	439 (75.3)
Use fats and oils such as soft margarines, low-fat mayonnaise, olive and canola oil	
No	55 (9.4)
Yes	527 (90.5)
Limit sweets to 5 or fewer servings a week	
No	149 (25.6)
Yes	432 (74.4)
Trying to lose weight	
No	178 (30.3)
Yes	410 (69.7)
Trying to manage stress	
No	223 (37.9)
Yes	365 (62.1)
Physical activity	
Not able to do physical activity	107 (18.5)
≤1 time per week	148 (25.6)
2–3 times a week	160 (27.6)
≥4 times per week	164 (28.3)
Alcohol intake	
Non- or occasional drinker	404 (68.7)
Mild drinker	170 (28.9)
Heavy drinker	14 (2.4)
Number of days missing BP medication in past 30 days, mean (SD)	1.0 (4.1)

*Frequencies may not add to 588 due to missing responses; percentages may not total 100 due to rounding; numbers are n (%) unless otherwise specified

BP = blood pressure

Of the remaining 656 eligible patients, 588 (89.6%) completed the survey.

Patient age ranged from 32 to 94 years; mean age was 65.5 years (SD 10.7). About half (52.2%) of respondents were men, the majority were married (68.0%), most had some form of drug insurance (87.6%), and many had been diagnosed with diabetes (41.5%) and/or hypertension (48.3%) for over 10 years (Table 1).

Health and lifestyle behaviours

All patients had seen their family physician in the previous year, and almost all (99.7%) reported that they usually saw their family physician about their BP. Only 8.1% had seen a specialist about their BP. Many patients reported that they checked their BP outside an office visit either sometimes (42.0%) or often (18.4%), the most common location being at home. Only 31.8% reported that they had attended an organized diabetes education program in the previous year.

Table 2 provides a summary of the health and lifestyle

Table 3. Beliefs about diabetes and hypertension

Survey item	*Frequency (%)**
Health beliefs	
Importance of controlling blood glucose and BP	
Controlling blood glucose is more important than controlling BP	24 (4.3)
Controlling BP is more important than controlling blood glucose	16 (2.8)
Controlling both blood glucose and BP is important	511 (90.6)
It is not important to control either blood glucose or BP	0 (0.0)
Not sure which is more important	13 (2.3)
Having both diabetes and high BP puts you at high risk for heart or blood vessel problems	
No	8 (1.4)
Yes	540 (92.8)
Not sure	34 (5.8)
Helpfulness of lifestyle behaviours in lowering or controlling BP	
Eating a diet high in fruits, vegetables and fibre and low in fat, cholesterol and salt	
Not helpful at all	11 (1.9)
Somewhat helpful	61 (10.4)
Very helpful	466 (79.2)
Not sure	50 (8.5)
Being physically active	
Not helpful at all	8 (1.4)
Somewhat helpful	54 (9.2)
Very helpful	474 (80.6)
Not sure	52 (8.8)
Not smoking	
Not helpful at all	19 (3.2)
Somewhat helpful	20 (3.4)
Very helpful	484 (82.3)
Not sure	65 (11.0)
Maintaining a healthy weight	
Not helpful at all	6 (1.0)
Somewhat helpful	43 (7.3)
Very helpful	493 (83.8)
Not sure	46 (7.8)
Managing stress	
Not helpful at all	9 (1.5)
Somewhat helpful	60 (10.2)
Very helpful	454 (77.2)
Not sure	65 (11.0)
Moderating alcohol intake	
Not helpful at all	46 (7.8)
Somewhat helpful	31 (5.3)
Very helpful	392 (66.7)
Not sure	119 (20.2)
Taking BP drugs as prescribed	
Not helpful at all	9 (1.5)
Somewhat helpful	18 (3.1)
Very helpful	534 (90.8)
Not sure	27 (4.6)

*Frequencies may not add to 588 due to missing responses; percentages may not total 100 due to rounding

BP = blood pressure

behaviours assessed in the survey. Many patients reported that they ate foods high in fibre (80.4%) and low in salt (75.3%), and that they limited their consumption of sweets (74.4%). Fewer reported trying to lose weight (69.7%) or manage stress (62.1%), and just over half (55.9%) participated in physical activity at least twice a week. Men were more likely to exercise 4 or more times a week than women (61.0% vs. 39.0%; $p<0.05$). Compared to younger patients, a greater number of older patients (≥65 years) reported not being able to participate in physical activity (73.8% vs. 26.2%; $p<0.0001$).

Scores from the Morisky Medication Adherence Scale indicated that most patients demonstrated high (69.4%) or medium adherence (18.7%) to their antihypertensive medication regimen. Older patients (≥65 years) were significantly more likely to report high adherence compared to younger patients (58.6% vs. 41.4%; $p<0.0001$).

Over a quarter of patients reported the regular use of over-the-counter medications (27.2%) or natural health products (30.3%) that could affect their BP. All of the over-the-counter medications captured in the survey had the potential to increase BP and included products with ibuprofen, as well as cough, cold and sinus decongestant pills or nasal sprays. Natural health products selected as being used by respondents had the potential to increase or decrease BP, depending on the product.

Self-reported beliefs

Although all patients surveyed had been diagnosed with hypertension by their physician, 9.7% indicated they had not been told about their diagnosis or did not know that their BP was high. Furthermore, 13.1% of patients indicated that they had not been told or did not remember being told what their ideal BP reading should be.

Table 3 shows patients' beliefs related to diabetes and hypertension. Of particular note, 90.8% of patients believed that controlling both BP and blood glucose was important, and 92.8% felt that having both diabetes and hypertension put them at high risk for cardiovascular problems. Beliefs regarding diabetes and hypertension differed significantly by sex. Women were more likely to believe that both hypertension and diabetes together were important to control (93.8% vs. 87.7%; $p<0.01$); men tended to believe that a single condition (either high BP or diabetes) was more important (10.6% vs. 3.3%; $p<0.01$).

Patients also rated the perceived helpfulness of lifestyle behaviours and prescribed BP drugs in lowering and controlling BP. Prescription drug use was believed to be the most helpful for controlling BP overall (90.8%) and was significantly associated with medication adherence scores ($p<0.0001$). Almost all participants who indicated that moderating alcohol intake was very helpful (97.9%) reported being non-drinkers or occasional drinkers ($p<0.0001$), and 60.1% of participants who believed that physical

activity was very helpful in lowering or controlling BP reported being physically active at least 2 to 3 times a week ($p<0.0001$). Participants who believed in the benefits of eating a high-fibre diet were also significantly more likely to do so than those who did not ($p<0.01$). Similarly, those who believed in the benefits of stress management were more likely to report making efforts to engage in this behaviour ($p<0.0001$).

DISCUSSION

Compared with the general population (11) and qualitative work among patients with diabetes (12,19), a relatively high proportion of patients who responded to this survey demonstrated a notable degree of knowledge about the health risks associated with diabetes and hypertension. Most patients in our study (92.8%) believed that having both diabetes and hypertension put them at high risk for cardiovascular problems, and 90.8% felt that controlling both BP and blood glucose levels was important. Stewart et al (12) suggest that what a patient considers most important is the condition currently causing them the most trouble. This could explain why 9.2% of patients in our study did not think that both conditions were equally important. In this study, women were more likely to believe that it was important to control both hypertension and diabetes, while men tended to believe that either hypertension or diabetes was more important. In another study, focus group participants noted that they saw blood glucose control as their responsibility, but BP control as their physician's responsibility (12). The presence or absence of symptoms may also account for differences in perceived importance: a patient with uncontrolled diabetes is more likely to be aware of his or her condition due to obvious physical symptoms than a patient with uncontrolled hypertension.

Almost all patients (90.8%) believed that taking BP drugs as prescribed was the most helpful way to control BP. It appears that the message regarding adherence to BP medications has been well communicated. However, other factors affecting BP control—such as alcohol intake and stress management—were not as well known. Others have reported a low level of awareness in the general population about the association between alcohol consumption and hypertension (11).

The majority of patients in this study reported high or medium adherence to antihypertensive medication regimens. Moderately high adherence to antihypertensive medication correlated well with patient beliefs that prescribed medications were most helpful in controlling their BP. Higher adherence scores could also be a reflection of high perceived behavioural control related to taking medication, which has been identified as a major predictor of self-care behaviour among those with diabetes (20). Whether or not patients take their medication is under their personal control, and this perception of control can lead to the intent to take the medication, a predictor of self-care behaviour (21). For most, diet and exercise can also be under one's personal control. The examination of the relationship between lifestyle beliefs and recorded behaviours suggest that patients who believed in the benefits of physical activity, moderating alcohol intake, eating a high-fibre diet and managing stress were significantly more likely to participate in these positive self-care behaviours.

It is also suggested that positive behaviours may be a reflection of a patient's self-efficacy. Social cognitive theory can play an important role in health promotion and behavioural change (22). Although this theory considers knowledge of health risks and benefits to be a prerequisite for change, self-efficacy is viewed as the most important determinant of behaviour change itself. People with high self-efficacy believe they can be successful in making a change, and they will set higher goals and make greater efforts to overcome obstacles compared to those with low self-efficacy. Previous research has indicated that the focus of public health campaigns would best be served by promoting self-management skills and beliefs to facilitate increased self-efficacy and the adoption of positive self-care behaviours (23-25).

Many patients diagnosed with both diabetes and hypertension self-monitored their BP and reported making strides to manage their diet and weight. The vast majority reported receiving care for their BP from their family physician; few had visited a specialist. This information is important: although research targeting patients in the community is often more difficult to execute than studies focused on patients enrolled in speciality programs or clinics, results obtained from community practice may provide a better reflection of the health and lifestyle behaviours and beliefs of the general patient population.

Diabetes education programs have been shown to improve patient knowledge and lifestyle practices that can affect diabetes; results are particularly beneficial if the patient attends on an ongoing basis (26-28). In this study, only 31.8% of participants indicated that they had attended an organized diabetes education program in the previous 12 months. This proportion appears consistent with the common practice in Maritime Canada of referring patients only at the time of diagnosis or when the patient is having difficulty achieving blood glucose control. Although our findings suggest that most patients were knowledgeable about the health risks associated with diabetes and hypertension, increased participation in such programs may help to translate and substantiate the vital messages provided by family physicians, and provide support and encouragement for patients to make positive self-care changes (e.g. increased physical activity, weight control, following a healthy diet and managing stress).

Natural health products and over-the-counter medications such as ibuprofen or cold and sinus remedies that could potentially affect BP (29-35) were taken regularly by up to 30.3% of patients in the 6 months prior to the survey. Although the evidence for the impact on BP of many of these products is variable, patients should be aware of the value of reporting regular use of such products to their physician.

Almost 10% (9.7%) of patients indicated that they had not been told by their healthcare provider that they had high BP, and 13.1% of patients did not know what their ideal BP should be. This illustrates the continuing need for clear conversations between healthcare providers and their patients about the risks of high BP, and encouragement of patients to stay informed about their condition, including knowledge of their target BP level. Although this gap is smaller than or similar to that reported among people with hypertension in the general population (11,36), it is especially concerning for this population with comorbid diabetes and hypertension, because target BP levels are lower than those for patients without diabetes (2).

Limitations

Limitations of this study are related to the shortcomings associated with the use of surveys, and to the patient population under study. As with many surveys, patients may be inclined to give socially desirable responses, especially for questions regarding lifestyle factors such as alcohol intake, diet or physical activity (37-39). With respect to the population of this study, it is possible that patients from participating practices may have been especially aware of the health issues related to hypertension and diabetes due to the participation of their healthcare provider. It is also possible that participating physicians were generally more interested in the topic and therefore provided more education to their patients. Nevertheless, major strengths of this study include the 90% response rate and the "real-life," practice-based design, with participants recruited from urban and rural community practices across 3 Maritime provinces.

CONCLUSION

Most patients believed that having both hypertension and diabetes put them at increased risk for cardiovascular issues, and that controlling both conditions was equally important. Also, a majority of patients believed that lifestyle change would help lower BP. Although this high level of knowledge is encouraging, even a small percentage of unaware patients is cause for concern. It is suggested that physicians not only have clear conversations about BP with their patients who have diabetes—emphasizing the importance of healthy lifestyle behaviours—but also to help arm patients with self-management skills that they can use to successfully achieve behavioural change.

The majority of care provided to patients diagnosed with diabetes and hypertension is managed in the community and not through specialty programs. Results of this study provide important insight into the health, beliefs and lifestyle behaviours of patients with comorbid diabetes and hypertension who have received most of their care in the community.

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AUTHOR CONTRIBUTIONS

BL was involved in the conception and design of the study, development of the survey, analysis of the data, interpretation of results and drafting the paper. KVA was involved in the analysis of the data, interpretation of results and drafting the paper. CL was involved in the development of the survey, acquisition of the data, interpretation of results and reviewed the drafts for intellectual content. WP and FB were involved in the conception and design of the study, acquisition of the data and reviewed the drafts for intellectual content. NN was involved in the interpretation of the data and reviewed the drafts for intellectual content.

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