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SELF-REPORTED RISK FACTORS AND MANAGEMENT STRATEGIES USED BY PEOPLE WITH DIABETES MELLITUS IDENTIFIED FROM THE 1997 AND 1998 NSW HEALTH SURVEYS

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This article describes a study of the prevalence of and risk factors for diabetes mellitus (DM) in the NSW adult population. The use of strategies by people with DM, such as diet, physical activity, and weight loss, are examined and compared with their self-reported diet, physical activity participation, and weight status.

BACKGROUND

DM is an increasing public health issue in NSW and Australia that contributes substantially to the burden of disease.[1,2,3] DM can result in a wide variety of complications, impaired quality of life, morbidity, disability, and loss of potential years of life, contributing to a large burden on the Australian health care system and the individual.[1,4–5]

The effective management of DM may reduce the risk of both premature mortality and developing complications. It may also improve health-related quality of life.[4] There are general recommendations for all people with DM to control their blood glucose levels by following a special diet and participating in physical activity.[4] While broad recommendations on diet and physical activity for people with DM are similar to those for the general population,[6–7] individually tailored dietary programs and exercise plans are important in the management of DM.[8,9] Weight loss and physical activity are important management strategies for people with non-insulin-dependent diabetes mellitus who are obese; benefits include increased sensitivity to insulin, reduced hyperglycaemia, and a reduced risk of coronary heart disease.[10–11]

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TABLE 1

METHOD AND DESCRIPTION OF DEFINED VARIABLES FOR DISEASE STATES AND RISK FACTORS USING THE 1997 AND 1998 NSW HEALTH SURVEY DATA

Variable	Description of definition	Method of definition
People with diabetes	All males who have been told[a] they have diabetes + all females who have been told[a] they have diabetes and weren't pregnant when first told + all females who were first told[a] they had diabetes when they were pregnant but have had diabetes apart from when they were pregnant – those who reported they no longer had diabetes when asked about diabetes management.	The Survey questions for diabetes used were: Have you ever been told[a] you have diabetes'; 'Were you pregnant when you were first told[a] you had diabetes?'; 'Have you ever had diabetes apart from when you were pregnant?'; 'What are you doing now to manage your diabetes?' [I]
Other chronic diseases		
Heart disease [b]	All those that have ever had a heart attack or been told they have angina.[a]	The Survey questions for heart disease used were: 'Have you ever been told[a] that you have any of the following conditions: 'Angina'; 'Had a heart attack'.[I] Responses to the question 'Any other heart problems' [I] could not be accessed. A derived HOIST variable[c] was used that categorises respondents according to whether they have high cholesterol using these questions: 'When did you last have your cholesterol measured?'; 'Have you ever been told you have high cholesterol?'; 'What are you doing now to manage your high choleserol?'[I] The Survey question for hypertension used was: 'Have you ever been told that you have high blood pressure sometimes called hypertension?' [I] The number of respondents that reported no longer having high blood pressure in response to the question 'What are you doing now to manage your high blood pressure/ hypertension?' [I] could not be determined.
High cholesterol	All those that have ever been told they have high cholesterol and still had a high cholesterol level.[a]	
Hypertension	All those that have ever been told they have hypertension/high blood pressure.[a]	
Adequate nutrition		The *Australian Guide to Healthy Eating* specifies a recommended range of daily serves of food groups specific for age and gender.[II] The lower and upper range limits were used to determine if respondents' diets were adequate. A derived HOIST variable [c] was used which calculated the number of serves of bread and cereals each day using these questions: 'How many slices of bread do you usually eat each day'; 'How many cups of cooked pasta, rice, noodles or other cooked cereals do you usually eat each week (not including cooked breakfast cereals)?'; 'How many cups of breakfast cereal do you usually eat each day?' [I] The question used was: 'How many serves of vegetables do you usually eat each day?' [I] The question used was: 'How many serves of fruit do you usually eat each day?' [I]
Adequate intake of breads and cereals	Recommended levels range from 3–12 serves per day depending on age and gender.[II]	
Adequate intake of vegetables	Recommended levels range from 4–9 serves per day depending on age and gender.[II]	
Adequate intake of fruit	Recommended levels range from 2–4 serves per day depending on age and gender.[II]	
Sufficient physical activity	Recommended levels of physical activity: achieving 150 minutes or more of at least moderate intensity physical activity per week.[III]	Questions establishing respondents' level of physical activity in terms of minutes spent walking, exercising moderately and participating in vigorous activity in a given time period [I] were used. The formula used to calculate the respondents' physical activity level = Walking (min/wk) + Moderate activity (min/wk) + 2 x Vigorous activity (min/wk).[III]
Overweight and obese	Overweight: 25 =< Body Mass Index <30; Obese: Body Mass Index =>30	A derived HOIST variable for Body Mass Index was used,[c] which categorises respondents into acceptable, overweight, and obese, using these questions: 'How tall are you without shoes?' and 'How much do you weigh without clothes or shoes?' [I] [Body Mass Index = weight (kg)/height (cm) ^{2}]
Smoking status	Those who smoked daily or occasionally	The question used was: 'Which of the following best describes your smoking status: I smoke daily; I smoke occasionally; I don't smoke now but I used to; I've tried it a few times but never smoked regularly; I've never smoked.' [I]

Notes: a = by a doctor or at a hospital b = 1997 only
c = variables that summarise responses for multiple questions to determine conditions or disease categories (HOIST)

[I] Report on the NSW Health Surveys 1997 and 1998, Centre for Epidemiology and Research, NSW Department of Health. Available at www.health.nsw.gov.au/public-health/nswhs/hsindex.htm.

[II] Commonwealth of Australia. *Australian Guide to Healthy Eating.* 1998.

[Iii] Armstrong T, Bauman A, and Davies J. *Physical activity patterns of Australian adults. Results of the 1999 National Physical Activity Survey.* Canberra: Australian Institute of Health and Welfare, 2000.

Source: NSW Health Surveys 1997 and 1998, Health Outcomes Information and Statistical Toolkit (HOIST), Centre for Epidemiology and Research, NSW Department of Health.

The main aim of our study was to determine whether NSW adults with DM are using management strategies in terms of their diet, physical activity, and weight loss, and how well these are correlated with their self-reported dietary intake, physical activity behaviour, and weight. This study also aimed to compare the prevalence of risk factors for DM (diet, physical activity participation, and weight) in people with DM to those without DM.

METHODS

This study used data from the 1997 and 1998 NSW Health Surveys, weighted to population estimates. Data were collected from a random sample of NSW adults aged 16 years and older, with 1,000 surveyed in each area health service, using the computer-assisted telephone interviewing system of the NSW Health Survey Program.[12] In order to improve the representation of people that speak a language other than English the survey was translated into five languages: Arabic, Chinese, Greek, Italian and Vietnamese.[12–13] The total numbers of responders in these surveys were 17,531 in 1997 and 17,494 in 1998.[14]

The survey data was accessed via the Health Outcomes Information and Statistical Toolkit (HOIST), a data warehouse maintained by the Centre for Epidemiology and Research, NSW Department of Health, and analysed using SAS version 8.1. The prevalence of DM in the NSW adult population was determined using a definition of a person with DM developed for this study (Table 1), which includes those with insulin-dependent diabetes mellitus and non-insulin-dependent diabetes mellitus. Odds ratios, using forced entry and stepwise logistic regression models, adjusting for age groups (16–39 years, 40–59 years, and 60+ years) and sex, were calculated to compare the odds of selected behavioural risk factors and other chronic diseases in those with DM to those without DM. Proportions of those with DM using specific management strategies (diet, physical activity, weight loss) were determined and compared with self-reported risk factor prevalence.

RESULTS

The weighted prevalence of self-reported DM was 4.0 per cent of male respondents and 3.1 per cent of female respondents. The prevalence increased with age, from 0.8 per cent in the 16–39 years age group, 3.3 per cent among the 40–59 years age group, and 9.3 per cent for those over 60 years. The prevalence was 3.3 per cent of those of English-speaking background and 4.5 per cent among those who spoke a language other than English at home.

Table 2 illustrates the risk factor profiles of adults with DM compared to those without DM in NSW. Two-thirds of those with diabetes reported being overweight or obese, which was significantly more than among those without DM. Those with diabetes were significantly less likely to be sufficiently active for health benefits but more likely to have an adequate diet in terms of fruit, vegetables, breads and cereals. Those with DM were slightly less likely to smoke than those without DM, but nevertheless 16.7 per cent smoked. Those with DM were more likely to report high cholesterol and hypertension and more than twice as likely to report heart disease than those without DM (Table 3).

In terms of advice received as part of their management strategy, the majority of respondents with DM reported

TABLE 2

SELECTED RISK FACTORS OF PEOPLE WITH DIABETES MELLITUS COMPARED TO THOSE WHO DO NOT HAVE DIABETES MELLITUS IN NSW,[a] 1997 AND 1998 NSW HEALTH SURVEYS

Risk factors	Diabetes mellitus %	No diabetes mellitus %	Adjusted Odds Ratio[b]	(95% CI)
BMI (*n*=33356)				
Acceptable or underweight	33.7	58.7		
Overweight	34.9	30.0	1.47	(1.27–1.71)
Obese	31.4	11.4	4.82	(4.16–5.59)
Physical Activity (*n*=35013)				
Sufficient	49.5	60.8	0.66	(0.63–0.69)
Insufficient	50.5	39.2		
Current smoker (*n*=35015)	16.7	23.6	0.81	(0.67–0.99)
Nutrition				
Adequate serves of vegetables (*n*=34857)	20.0	15.2	1.41	(1.19–1.69)
Adequate serves of fruit (*n*=34923)	48.3	38.6	1.38	(1.20–1.60)
Adequate serves of breads and cereals (*n*=34678)	68.0	59.9	1.34	(1.15–1.58)

Notes: a = weighted to NSW population b = adjusted for gender and age group.

Source: 1997 and 1998 NSW Health Surveys (HOIST). Centre for Epidemiology and Research, NSW Department of Health.

TABLE 3

CHRONIC DISEASE STATUS (HYPERTENSION, HIGH CHOLESTEROL, AND HEART DISEASE) OF PEOPLE WITH DIABETES MELLITUS COMPARED TO THOSE WHO DO NOT HAVE DIABETES MELLITUS IN NSW,[a] 1997 AND 1998 NSW HEALTH SURVEYS

Chronic disease	Diabetes mellitus %	No diabetes mellitus %	Adjusted Odds Ratio[b]	(95% CI)
Hypertension (*n*=33639)	44.4	15.9	1.90	(1.62–2.23)
High cholesterol (*n*=23806)	34.7	20.4	1.39	(1.18–1.65)
Heart disease [c] (*n*=17474)	22.8	4.8	2.39	(1.84–3.11)

Notes: a = weighted to NSW population b = adjusted for gender and age group c = 1997 only

Source: 1997 and 1998 NSW Health Surveys (HOIST). Centre for Epidemiology and Research, NSW Department of Health.

following a special diet (81.3 per cent), but few reported participating in physical activity (39.1 per cent) or attempting to lose weight (23.6 per cent) as a way to manage their DM.

Of those with DM who reported using one or more strategies to manage their DM, 14.2 per cent reported using neither diet, physical activity, or weight loss as strategies; 70.5 per cent reported using one or two of these strategies; and 15.4 per cent reported using all three strategies. Those with DM who reported using weight loss as a management strategy were nearly six times more likely to also be using physical activity as a management strategy [OR 5.86; 95 per cent CI (4.38–7.84)] and were nearly three times more likely to also be using diet as a management strategy [OR 2.79; 95 per cent CI (1.81–4.29)]. Those following a special diet were three times more likely to also be using physical activity as a management strategy [OR 3.05; 95 per cent CI (2.15–4.31)].

Table 4 shows the prevalence of management strategies according to level of risk factors among adults with DM in NSW. Only one quarter of those overweight reported they were trying to lose weight and less than half reported participating in physical activity as a management strategy for their diabetes. Those with DM who are obese were significantly more likely to report they were trying to lose weight as a management strategy than those with DM who were overweight or of acceptable weight. However, only one-third of those who are obese reported using physical activity and/or trying to lose weight as management strategies for their diabetes.

Those with DM who reported consuming an adequate vegetable intake were significantly more likely to report using diet as a management strategy than those who did not report consuming an adequate vegetable intake. However those consuming an adequate intake of fruit or breads and cereals were no more likely to report following a special diet as a management strategy than those who did not report adequate intakes.

Those with DM who reported a sufficient level of physical activity were significantly more likely to report using physical activity and weight loss as management strategies than those who reported an insufficient physical activity level. Those with DM who reported they were using physical activity or weight loss as management strategies reported an additional hour and more, respectively, of total weekly physical activity minutes of participation than those not using these strategies.

DISCUSSION

This study found a higher prevalence of DM in males than females, an increasing prevalence with age, and a higher prevalence in those who speak a language other than English at home compared to those of English-speaking background. These findings are consistent with other studies in NSW and Australia, although self-report estimates may underestimate the true prevalence of diabetes.[1,4] The prevalence estimates of DM reported in this study are slightly lower than reported in other analyses of the 1997 and 1998 NSW Health surveys [1,13] due to the exclusion of those who reported that they were told they have high blood sugar levels.

The results show a high prevalence of co-morbidity, overweight, and obesity among those with DM, and a low proportion of people with DM achieving optimal nutrition, and even moderate physical activity. Few people with DM reported participating in physical activity and there were substantial numbers of those overweight and obese who were not attempting to lose weight as a management strategy for their disease.

These results need to be interpreted with caution, given the potential for selection and response bias in the health surveys,[12] however the data are likely to be reasonably representative of management behaviours among people with DM across NSW.

These results do not take into account individualised diet and physical activity recommendations that may vary for

TABLE 4

THE PREVALENCE OF REPORTED MANAGEMENT STRATEGIES ACCORDING TO LEVEL OF RISK FACTORS AMONG NSW ADULTS WITH DIABETES MELLITUS, 1997 AND 1998 NSW HEALTH SURVEYS

		Respondents' management strategies used for their diabetes mellitus					
		Follow special diet		Physical activity		Trying to lose weight	
		(*n*)	%	(*n*)	%	(*n*)	%
BMI							
Acceptable weight		384	85.4	383	38.9	383	12.5
Overweight		397	80.4	397	42.8	398	25.1
Obese		358	80.4	358	36.3	358	34.1**
Nutrition							
Adequate serves of vegetables	*No*	961	79.9	961	37.5	961	23.4
	Yes	241	86.3*	241	43.6	240	26.2
Adequate serves of fruit	*No*	625	81.3	625	37.3	625	22.6
	Yes	586	81.2	587	40.4	586	25.1
Adequate serves of breads and cereals	*No*	380	78.9	380	34.2	380	19.7
	Yes	807	82.3	807	41.8*	806	26.2*
Smoking status							
Smoker		205	77.1	204	36.8	204	23.5
Non-smoker		1017	82.2	1017	39.6	1017	23.7
Physical activity							
Insufficient (<150min/wk)		616	79.2	616	22.6	617	17.7
Sufficient (>=150min/wk)		606	83.5	605	55.9**	605	29.8**
Minutes/wk		*Yes*	*No*	*Yes*	*No*	*Yes*	*No*
		226.5	201.7	268.3	207.5	318.5	159.7
(mean [95%CI])[a]		(211.7–235.2)	(170.1–233.3)	(240.5–296.2)	(192.2–222.7)	(296.1–341.0)	(144.7–174.8)

Notes: * p<0.05 ** p<0.001

[a] when reported minutes were more than >840/wk recorded amount was truncated to 840 mins (2 hrs/day)

Source: 1997 and 1998 NSW Health Surveys (HOIST). Centre for Epidemiology and Research, NSW Department of Health.

people with DM according to age, lifestyle, and whether there are other complications or risk factors present.[4,7,9,11] Although important in the management of diabetes, individually tailored diet and exercise programs could not be determined in this study.[8,9] The specifications used in this study to determine whether respondents with DM were consuming a healthy diet or participating in sufficient physical activity are based on the premise that recommendations for diet and physical activity for people with DM should be similar to those for the general population,[6,8] and allowed us to compare these risk factors between those with DM and no DM. Despite the limitations described the results do highlight possible gaps in preventive management regarding the diet, physical activity, smoking, and weight loss behaviours of NSW adults with DM.

The real estimate of overweight and obese people with DM who are not attempting to lose weight as a management strategy could be even higher, given the potential for 'social desirability' bias related to this 'weight loss' question. In light of the health benefits of weight loss in this group,[10,15] reasons why those with DM who are overweight and/or obese are not trying to lose weight should be explored.

Only half of those with DM were moderately active and there are substantial numbers that were not using physical activity as a management strategy. Those who did report an adequate level of physical activity were much more likely to report using physical activity as a management strategy for their DM, suggesting that health professionals advising those with DM to be active is of benefit. However, one-fifth of those who reported that they were participating in physical activity as a management strategy for their DM did not even meet the modest recommended level of physical activity. This has important implications for increasing information about physical activity within diabetes education, given the positive effect physical activity can have on DM management.[10]

Although the majority of those with DM in this sample reported undertaking dietary management strategies, the proportion of people with DM who did not meet current recommendations for dietary intake across all the food groups is of public health concern, given the importance of nutrition in the management of DM.[6,8] Only one-fifth

of those with DM reported an adequate vegetable intake, one half an adequate fruit intake, and two-thirds an adequate intake of breads and cereals.

Smoking rates in those with DM were only slightly less than those without DM. It is essential that smoking rates be reduced among people with DM because of the complications that may result from smoking in this group.[16–18]

McKay et al. suggest that physical activity, diet, and smoking are inconsistently received as key management messages by those with DM.[19] Two significant barriers to the use of lifestyle interventions for patients with DM noted are physicians' lack of time to spend with patients and physician's limited experience with lifestyle-changing interventions.[10]

Health care professionals need to be more persistent with advice about weight loss, nutrition, and physical activity as management strategies, encouraging the involvement of interdisciplinary team members, such as behaviourally-focused dietitians, health promotion professionals, and possibly exercise scientists.[9–10,20,21] Integrated approaches that combine diet and physical activity strategies are more effective in long-term maintenance of weight loss and improved glycemic control than interventions that use either of these strategies on their own.[10]

The high prevalence of co-morbidity among NSW adults with DM, and the low proportions of those with DM achieving optimal nutrition, and even moderate physical activity, suggest that further attention is needed on the promotion of physical activity and nutrition to all NSW adults with DM. Weight loss should be recommended to those with DM who are overweight and obese. System-wide efforts should endeavour to achieve this advice for all people with DM as a population health goal.

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