

# Online Health Information Seeking among People with Diabetes Mellitus and Its Association with Self-Management

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## ABSTRAK

Penyakit diabetes memerlukan pengurusan sendiri yang berdedikasi untuk mencapai kawalan dan hasil rawatan yang baik kerana ini adalah penyakit seumur hidup. Internet menawarkan maklumat kesihatan dengan mudah dan ini mungkin mempengaruhi pengurusan sendiri penyakit diabetes. Tujuan kajian ini adalah untuk mengkaji kelaziman pencarian maklumat kesihatan di atas talian di kalangan pesakit diabetes dan faktor-faktor yang berkaitan. Seramai 380 peserta telah menyertai kaji selidik ini. Soal selidik yang diguna adalah hasil daripada sorotan kajian dan tinjauan ahli panel. Pengurusan sendiri diabetes dinilai dengan menggunakan soal selidik yang sedia ada iaitu DSMQ. Kajian ini mendapati bahawa kekerapan pencarian maklumat berkenaan dengan diabetes di atas talian adalah sebanyak 38.4%. Maklumat yang biasa yang dicari adalah maklumat mengenai rawatan diabetes (82.9%) pengubahsuaian gaya hidup (77.4%) dan cara pencegahan diabetes (67.3%). Sebilangan besar (93.1%) merasakan bahawa maklumat tentang diabetes yang terdapat di atas talian adalah berguna. Doktor dan bahan bacaan bercetak adalah sumber maklumat yang paling kerap diperolehi oleh pesakit diabetes (94.2% & 65.3%). Pesakit yang lebih muda (kurang dari 59 tahun, IQR = 11), mempunyai ahli keluarga yang menghidap penyakit diabetes (COR = 1.188), berpelajaran tahap universiti (COR = 6.037) dan mereka yang bekerja (COR = 3.880) adalah lebih cenderung untuk mendapatkan maklumat berkenaan penyakit diabetes di atas talian. Walau bagaimanapun, tiada persefahaman penting antara pencarian maklumat kesihatan atas talian dengan pengurusan sendiri diabetes.

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*Kajian ini mendapati bahawa, kekerapan pencarian maklumat kesihatan di atas talian di kalangan orang yang menghidap kencing manis adalah agak baik tetapi ini tidak berkait dengan pengurusan sendiri diabetes yang optimum. Doktor dan maklumat bercetak masih merupakan sumber maklumat yang popular dan perlu dikekalkan.*

*Kata kunci: atas talian, diabetes, internet, maklumat kesihatan, pengurusan sendiri*

## ABSTRACT

Diabetes requires dedicated self-management to be able to achieve good control and outcome as this is a lifelong condition. The internet offers an amazing wealth of health information which may influence diabetes self-management. The aim of this study was to determine the prevalence of online health information seeking among people with diabetes and its associated factors. About 380 participants answered the online health information seeking questionnaire developed from literature search and expert panel review. Diabetes Self-Management was assessed using the Diabetes Self-Management Questionnaire (DSMQ). The prevalence of online health information seeking among people with diabetes was 38.4%. Common information sought included diabetes treatment (82.9%) lifestyle modification (77.4%) and diabetes prevention (67.3%). A large majority (93.1%) felt that the online information on diabetes was useful. Doctors and printed reading materials were the most common sources of information for diabetes (94.2% & 65.3%). Lower median age (59 years, IQR = 11), having a family member with diabetes, (COR = 1.188) tertiary education (COR = 6.037) and those who are employed (COR = 3.880) have higher odds of seeking online diabetes related health information. However, there was no significant association between online health information seeking and diabetes self-management. Prevalence of online health information seeking among people with diabetes was at an acceptable level. However, it was not associated with optimal diabetic self-management. Doctors and printed information remain as popular sources of information and hence should be maintained.

Keywords: diabetes, health information, internet, online, self-management

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## INTRODUCTION

Asia is the main contributor to the rising world diabetic population and affects about 2.6 million adults in Malaysia. (Institute of Public Health 2011). This escalating figure will have a major impact on the type 2 diabetes

morbidity and mortality in the future if good control is not achieved. An earlier local study showed that there is an alarmingly low prevalence (22.5%) of good glucose control among people with diabetes (Rahmah & Noraishah 2011). Being a chronic health condition, the management of type 2 diabetes

requires patient's lifelong commitment. Hence it is important to examine their self-management and ways to enhance this practice to achieve good control.

Self-management is a complex phenomenon which constitutes many different aspects of healthcare involving interaction of bio-psychosocial factors (Tan & Magarey 2008). The knowledge regarding diabetes mellitus may influence self-management practices and affect the overall impact of this disease (Al-Qazaz et al. 2011). The internet has become an increasingly popular source of health information over the past few years due to its easy access (Andreassen et al. 2007). Recent literature shows that internet is the preferred source for information on diabetes mellitus especially among younger and those with higher education level. Hence there may be a shift from passive to active online health information seeking which could influence proper diabetes mellitus self-management (Kuske et al. 2017). Current available evidences suggest that the impact of seeking online health information may be equivocal. Some evidence points towards a positive outcome such as empowerment and greater control of disease (Broom 2005). Empowerment is important as diabetes mellitus is a chronic disease and requires proper self-management to ensure good health outcome. Individuals with chronic diseases may be empowered when seeking online health information but it may not result in increased use of existing online health services hence may reduce the chances of better self-management (Rita 2016)

The aim of the present study was to determine the prevalence of online health information seeking among patients with diabetes mellitus, type of information sought and its effect on proper diabetes mellitus self-management. This information would highlight patients' current needs in health information and provide insight for future interventions in managing this condition.

## MATERIALS AND METHODS

A cross-sectional study was conducted in a university teaching hospital in Kuala Lumpur from June until August 2017. Participants between 18 to 75 years of age with type 2 diabetes of at least 6 months duration were selected using convenient sampling. Health care workers, foreigners and those who lacked proficiency in the national language (Bahasa Malaysia) or English were excluded. Sample size was calculated with single proportion formula using prevalence of 44% prevalence of health information seeking behaviour from previous study (Yan, 2010) (CI: 95% with an interval of 5%.

$$Z = 1.96$$

p = prevalence of internet health information seeking behaviour / 0.44

d = Level of accuracy / 0.05

$$\begin{aligned} n &= [(Z^2) \times (p (1-p))]/(d)^2 \\ &= [(1.96)^2 \times (0.44 (1-0.44))]/(0.05)^2 \\ &= 380 \end{aligned}$$

Hence, sample size for prevalence of 380 respondents was used.

Participants were approached at the waiting areas of the outpatient clinic

and dispensary of the hospital. Those who consented were given the self-administered questionnaire in their preferred language and collected upon completion.

Data was collected using a self-administered questionnaire and assistance was provided if required. The questionnaire consists of three sections. Section 1 consists of patients' socio-demographic characteristics. The second section consists of four statements assessing the online health information seeking behaviour developed from literature review (Jamal et al. 2015). Content validation was done by an expert panel consisting of two family medicine specialists and a pharmacist. The four

statements are; 'have you used the internet to search for diabetes-related information?', type of information sought, frequency of search (in the last 6 months) and perceived usefulness of the information sought. Each statement is followed by a list of answer options for patients to select. The question assessing the use of internet to look for diabetic related information has 'yes' or 'no' options. For the type of information sought, 11 statements were provided and participants could choose more than one statement. The statements are 'what is diabetes', 'how is diabetes diagnosed', 'causes of diabetes', 'symptoms of diabetes', 'treatment for diabetes', 'side effects of diabetes medications', traditional

Table 1: Socio-demographic characteristics of participants

Variable	Frequency (%) (n=380)
Gender	
Male	213 (56.1%)
Female	167 (43.9%)
Mean age of participants (years SD)	60.7 (SD $\pm$ 8.12)
Mean duration of diabetes (years SD)	11.3 (SD $\pm$ 7.7)
Ethnicity	
Malay	273 (71.8%)
Chinese	32 (8.4%)
Indian	71 (18.7%)
Others	4 (1.1%)
Education level	
None	3 (0.8%)
School	242 (63.7%)
Tertiary Education	135 (35.5%)
Monthly household income (RM)	
<3000	196 (51.6%)
$\geq$ 3000	184 (48.4%)
Employment status.	
Unemployed	76 (20.0%)
Working	97 (25.5%)
Retirees	207 (54.5%)

Note : \* School : Primary or Secondary School.

\* RM : Ringgit Malaysia (Malaysian Ringgit)

Table 2: Sources of information regarding diabetes

Sources	n (%)
Doctors	358 (94.2%)
Printed materials (magazine, newspaper, brochures, pamphlets)	248 (65.3%)
Medical support staff (nurse, dietician, pharmacist)	214 (56.3%)
Television	195 (51.3%)
Family members	188 (49.5%)
Friends	187 (49.2%)
Radio	146 (38.4%)
Internet	146 (38.4%)
Public talk	119 (31.3%)
Did not receive any information	7 (1.8%)
Others	3 (0.8%)

or alternative treatment for diabetes, complications of diabetes, prevention of diabetes, 'lifestyle modification for diabetes' and other information. For the information on frequency of internet use to seek diabetes related information, there were 4 options for participants to choose from. Usefulness of the information sought was assessed by a single question 'Do you find the online information which you sought to be useful' for which the participants select one best option in a Likert scale; very useful, somewhat useful, not sure, not useful, not useful at all. This questionnaire was developed from literature search and expert opinion. (Jamal et al. 2015, Yan 2010, Shaw & Johnson 2011). Both Bahasa Malaysia (national language) and English versions of the questionnaire were prepared and subjected to content and face validation.

The third section assessed patient's diabetes mellitus self-management using the Diabetes Self-Management Questionnaire (DSMQ) by Schmitt (Schmitt et al. 2013). This is a validated questionnaire (coefficient for Sum

Scale is 0.84) which measures patients' diabetes mellitus self-management over 8 weeks in 4 subscales (glucose management, dietary control, physical activity and health-care) using 16 items on a 4-point Likert scale. The level of self-management was assessed based on a 'sum scale' which indicates global measure of self-care. A sum scale cut-off score of >6.0 was regarded as optimal self-care (Schmitt et al. 2013). Both the Bahasa Malaysia and the English versions of the DSMQ were used after obtaining permission from the respective authors. This study received approval from the Universiti Kebangsaan Malaysia (UKM) Ethics Committee. Data was analyzed using descriptive statistics, Chi-Square, odds ratio and statistical significance was set at  $p < 0.05$ .

## RESULTS

A total of 380 participants with diabetes mellitus participated in this study. The mean age of participants was 60.7 years, ranging from 32 to 75 years. Majority were males, from

Table 3: Type of information sought and frequency of online health information seeking behaviour

Items	n (%)
Type of information sought	
Treatment for diabetes	121 (82.9%)
Lifestyle modification for diabetes (diet & exercise)	113 (77.4%)
Prevention of diabetes	99 (67.3%)
Side effect of diabetes medication	91 (62.3%)
Complication of diabetes	90 (62.1%)
Symptoms of diabetes	83 (57.2%)
Causes of diabetes	80 (55.6%)
Traditional or alternative treatment for diabetes	80 (55.2%)
What is diabetes	76 (52.4%)
How is diabetes diagnosed	62 (43.1%)
Others	16 (11.4%)
Frequency of seeking information (past 6 months)	
Not at all	28 (19.2%)
About Once	24 (16.4%)
About 2 to 3 times	54 (37.0%)
More than 4 times	40 (27.4%)

the Malay ethnic group and received formal education. Participants' socio-demographics characteristics are shown in Table 1. Health information pertaining to diabetes mellitus was mostly received from their physicians followed by printed reading materials and other medical personnel (Table 2). About 38.4% of the patients in this study used the internet to look for health information pertaining to diabetes mellitus. The most common information sought was regarding diabetes mellitus treatment followed by lifestyle modification and prevention of diabetes mellitus (Table 3).

Participants who were younger, with higher education, higher household income, employed, on lifestyle modification treatment and those who have a family member with diabetes mellitus have higher odds of seeking health information seeking online.

However, there was no association between gender, ethnicity and duration of diabetes mellitus with online health information seeking. There is also no significant association between online health information seeking behaviour and proper diabetes mellitus self-management (Table 4).

## DISCUSSION

The prevalence of diabetes mellitus related online health information seeking in this study is 38.4%. The findings of this study was almost similar to those in Saudi Arabia (29.7%) (Jamal et al. 2015). However, Western data show a higher prevalence (52.2% to 86.0%) (Shaw & Johnson 2011) and (Fox 2011). This probably due to the difference in internet penetration rate, this is defined as the percentage of internet users in a particular population

Table 4: Association between socio-demographic characteristics of participants and diabetes self-management with online health information seeking

Participant characteristics	n (380)	Online Health Information Seeking		Test	Crude OR (95% CI)	p value
		Yes n (%)	No n (%)			
Gender						
Male	213	87 (40.8)	126 (59.2)	$\chi^2$	0.791	
Female	167	59 (35.3)	108 (64.7)	1.204	(0.521-1.203)	0.289
Ethnicity						
Malay	273	105 (38.5)	168 (61.5)	$\chi^2$	1.468	
Non-Malay	107	41 (38.3)	66 (61.7)	0.001	(0.485-3.395)	0.979
Family member with diabetes						
Yes	274	114 (41.6)	160 (58.4)	$\chi^2$	1.188	
No	106	32 (30.2)	74 (69.8)	4.211	(0.507-2.783)	0.04
Education level						
Tertiary	135	88 (65.2)	47 (34.8)	$\chi^2$	6.037	
Below tertiary	245	58 (23.7)	187 (76.3)	63.395	(3.809-9.568)	<0.001
Employment status						
Working	97	59 (60.8)	38 (39.2)	$\chi^2$	3.880	
Not Working	283	87 (30.7)	196 (69.3)	27.632	(1.627-9.254)	<0.001
Monthly household income (RM)						
<3000	196	47 (24.0)	149 (76.0)	$\chi^2$	3.692	
$\geq$ 3000	184	99 (53.8)	85 (46.2)	35.681	(2.384-5.720)	<0.001
Age (years)						
60.7 (SD $\pm$ 8.12)	380	59 (11)	63 (9)	Mann U Whitney		<0.001
Duration of diabetes (months)						
11.3 (SD $\pm$ 7.7)	380	120 (121)	120 (144)	Mann U Whitney		0.889
Concomitant illness						
Diabetes only	60	18 (30.0)	42 (70.0)	$\chi^2$	1.456	
Diabetes with other illness	320	128 (40.0)	192 (60.0)	2.136	(0.485, 4.367)	0.144
Treatment						
Lifestyle modification only	10	8 (80.0)	2 (20.0)	$\chi^2$		
Oral hypoglycemic agent	200	74 (37.0)	126 (63.0)	7.521		0.023
Insulin and or combination therapy	170	64 (37.6)	106 (62.4)			
Diabetes self-management						
Optimal	279	170 (72.6)	109 (74.7)	$\chi^2$		
Suboptimal	101	64 (27.4)	37 (25.3)	0.186		0.666

Note: \*CI = confidence interval

\*Crude OR = Crude odd ratio

\* $\chi^2$  = Chi Square

\*RM : Ringgit Malaysia (Malaysian Ringgit)

(Calderaro 2009). North America has the best internet penetration rate of 88.1% followed by Europe, 80.2%, while internet penetration rate in Asia is about 46.7% (Miniwatts Marketing Group 2011). Active seeking for online information regarding the diabetes mellitus is encouraging as it suggests patient's willingness to participate in disease self-management (Longo et al. 2010).

In this study, a vast majority of the participants found that the diabetes mellitus health information obtained online was useful. This is similar to a study in Hong Kong (Yan 2010). Trust of the online information source is an important factor which may influence online information seeking and perceived usefulness (Rains 2007).

The main information sought by participants in this study was regarding treatment of diabetes mellitus and lifestyle modifications which is similar to previous studies (Jamal et al. 2015, Kuske et al. 2017; Shaw & Johnson 2011). The study by Jamal et al. found that information on symptom of diabetes mellitus was a common search. Participants in our study probably have established knowledge on symptoms and the cause of diabetes mellitus as their mean duration of disease was about 11 years. Their interest in searching for diabetes mellitus treatment and dietary advice is probably to guide them to achieve good control of their disease in the long term.

This study found that younger people with diabetes mellitus and those with tertiary education are more likely to look for online health information

as they may be more internet savvy. Older adults may have poor internet searching skills and less trust of the information online which are potential barriers (Zulman et al. 2011; Jamal et al. 2015). In the current study, people with tertiary education were found to have 6 times the odds to seek health information online compared to those who without tertiary education stressing the important relationship between education and seeking online health information.

Individuals with diabetes mellitus who are employed, have almost 4 times the odds of seeking online information compared to those who are not as they may be more concerned regarding the negative impact of diabetes mellitus towards their working capability and income. Other studies did not elicit a relationship between employment status and online seeking behaviour suggesting that people with diabetes mellitus from different population may behave differently (Jamal et al. 2015; Moreland et al. 2015). Individual with diabetes mellitus who have a higher monthly household income have almost 4 times the odds to seek online information compared to those with lower income. This may be due to the fact that those from the higher social-economic level are able to afford modern devices, which in turn increase their internet accessibility compared to those who are socially disadvantaged (Yan 2010). This is can be explained by the phenomenon of 'digital divide', which is described as the gap to access Information and Communications Technology (ICT) and global network due to social inequity (Asgarkhani

2007).

Another interesting finding in this study was that individual with diabetes mellitus who had family members affected by diabetes mellitus were more involved with online health information seeking. Having a family member with diabetes mellitus may have increased their disease awareness and motivation to seek information in managing their condition. Duration of diabetes mellitus did not affect online health information seeking. This may be due to the fact that most patients in this study had been diagnosed with diabetes mellitus for about 11 years. They may have lost the enthusiasm to seek information or may have acquired this knowledge during the earlier phase of the disease. Gender did not influence the online health information seeking among the participants in this study. This finding is in contrast with studies done in Saudi Arabia, Egypt and Hong Kong, where more women sought general health information online. Women are probably more concerned and more actively involved in their health care compared to men (Jamal et al. 2015, Ghweeba et al. 2017; Yan 2010).

Our study found that individual with diabetes mellitus who are on lifestyle modification tend to seek online health information compared to those on medication. Patients who are recently diagnosed and those at early stages of the disease may be more motivated to take good care of their health or even try to delay lifelong medication by achieving good control by lifestyle modification alone.

One would expect that those who

are actively looking for information regarding their disease would in fact have proper disease self-management. However, we could not show relationship between online information seeking regarding diabetes mellitus and proper diabetes mellitus self-management, which is similar to the study by Jamal et al. (p.10). This is probably because diabetes mellitus self-management has a complex multifactorial influence beyond knowledge. Patient's beliefs, well-being, emotional status, behavioral and coping skills are other important factors (Gonzalez et al. 2016). Others factors such as family support, self-efficacy and psychosocial factors also influence self-management (Gunggu et al. 2016; Xu et al. 2008). Other contributory factors include challenges of search strategy, reliability of the source of information and the possibility of the information not meeting their need.

Interestingly, most participants in this study reported receiving information regarding diabetes mellitus from their doctors, printed reading materials and medical support staff. Similarly, studies in Iran and Hong Kong also found that doctors, medical support staffs and printed reading materials served as the major sources of health information for diabetics (Zare-Farashbandi et al. 2015; Yan 2010). These findings demonstrate that healthcare providers remain as a vital source of health information stressing on the importance of a good interpersonal relationship between patients and their physicians. Health information from medical personnel and printed material should not be

dismissed as they are important sources of accurate and reliable health information for patients with diabetes mellitus. Diabetic educators also play an important as they are able to provide quality information tailored to individual requirements.

This study was conducted at an urban tertiary health facility, hence the results from this study may not be generalised to a wider population. Using a single question of “have you ever used internet to search for diabetic related information at any point of time after you have been diagnosed?” and patient’s report of their diabetes mellitus self-management may be influenced by recall bias. A discrepancy in the perception of physical activity was noted among patients answering the DSMQ especially pertaining to extent and quantification, which may have influenced their choice of answer.

## CONCLUSION

The prevalence of online health information seeking among people with diabetes mellitus in this study is low when compared to western counterparts. The primary sources of diabetes mellitus related information among people with diabetes mellitus are from medical personnel and printed materials. Younger people with diabetes mellitus, those with family members affected by diabetes mellitus, having higher level of education, and people with diabetes mellitus who are managed with lifestyle modification appear to be more keen to seek online health information regarding diabetes mellitus. Searching for online diabetes

mellitus health information does not appear to be associated with proper diabetes self-management.

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