

ROLE OF INTERNET INFORMATION IN AWARENESS GENERATION AND QUALITY OF LIFE AMONG PATIENTS WITH DIABETES IN URBAN AREA OF A DISTRICT IN HARYANA, INDIA

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Abstract

Background: In patients with diabetes mellitus, lack of medical facilities as well as less awareness affects quality of life. Internet and social media technology can help to improve outcomes of patients with diabetes through enhanced education and support. So, this study aimed to evaluate the level of awareness and quality of life in patients with diabetes who were active internet user and non-internet user. **Materials and Methods:** A community based, cross-sectional study was conducted among 400 patients with diabetes mellitus in urban areas of India from April 2020 to September 2021. Diabetes Knowledge Questionnaire (DKQ-24) for awareness and SF-36 questionnaire for quality of life was used. Data was analyzed using SPSS version 20 and MS Excel spreadsheet. **Result:** Out of 400 participants, 67.75% used internet. Internet was used significantly more by younger age group ($p=0.02$), male, ($p=0.0002$), literate ($p=0.00001$), employed ($p=0.004$) and those with small family ($p=0.009$). Mean knowledge level was significantly more among internet users ($p=0.005$). Internet usage played a significant role in general health ($p=0.002$) and emotional wellbeing ($p=0.04$) of patients with diabetes. **Conclusion:** The present study concludes that knowledge/awareness of diabetic patients by internet usage helps in improvement of their physical and mental quality of life.

INTRODUCTION

Diabetes is common prevalent chronic disease which is responsible for 3.1% mortality.^[1] It is the 9th leading cause of death worldwide and an is the 6th leading cause of death in lower middle-income countries like India.^[2] In 2017, DALY (disability-adjusted life- years) accounted approx. 67.9 million worldwide.^[3] India with 11.2 million DALY topped the world followed by China (10.0 million), Indonesia (4.4 million), United States (3.9 million), and Mexico (2.6 million).^[3]

In 2019, National Diabetes and Diabetic Retinopathy Survey report released by Ministry of Health and Family Welfare, India, the prevalence of Diabetes was found to be 11.8% in people over the age of 50 years.^[4] In adults below the age of 50 years, the prevalence of diabetes was 6.5% and pre-diabetes was 5.7%.^[4] Prevalence was higher in urban compared to rural areas.^[5] Rapid urbanization, sedentary lifestyles, unhealthy diets, tobacco use

and increasing life expectancy are contributing factors.^[5]

In diabetes not only lack of medical facilities but also lack of awareness affects quality of life. From diagnosis to treatment, awareness of the patient plays a direct role in appropriate management. Lack of awareness and unhealthy lifestyle are major contributors in disease progress and its complications.^[6] Long term implications of diabetes including complications can be modified based on the patient's awareness for the same.

The effects of diabetes on vital organs have a major impact on the patient's quality of life. One with a poor quality of life may feel irritated, depressed, helpless and dependent on others. If one's lifestyle is physically as well as mentally healthy, it will help them control this dreadful disease better. Diabetes affects the quality of life of a patient which in turn affects the diabetes control, complications and morbidity.

Internet and social media technology can help to improve outcome of patients with diabetes through

enhanced education and support. India has 624.0 million internet users up to January 2021, which represents Internet usage in India up to 45.0%.^[7] The number of internet users in India increased by 47 million (+8.2%) between 2020 and 2021.^[7] It can prove to have effect on patient's knowledge about their disease, depending on the understanding of the patient. So, the first objective of this study was to evaluate the level of awareness about diabetes among active internet users and non-internet user diabetic patients in urban areas of a district of Haryana, India. The second objective was to evaluate the quality of life among active internet users and non-internet user diabetic patients in urban areas of a district of Haryana.

MATERIALS AND METHODS

It was a descriptive, cross-sectional study which was conducted in urban field practice areas of Rohtak attached to the Department of Community Medicine, Pt. B. D. Sharma PGIMS, Rohtak over a period from April 2020 to September 2021.

Study Population

Patients with type 2 Diabetes mellitus, above 18 years of age, who were on treatment for type 2 diabetes mellitus for the last 6 months and gave written informed consent, were included in the study. The exclusion criteria were patients with type 2 Diabetes mellitus who were seriously ill or bed ridden to the extent that they were not able to respond in a satisfactory manner. The total sample was divided into two groups based on internet usage viz Internet users and non-Internet users.

Taking 81.56 % as the prevalence of internet users among general population of urban areas and a relative error of 5%,^[8] the sample size came out to be 362 subjects. So, for the purpose of this study, we enrolled 400 diabetic patients residing in urban area and taking treatment for diabetes for the last 6 months.

Study Techniques

The area is having population of 37027 with 5 Urban health posts and 20 Anganwadi centers. We line listed the diabetic patients from each anganwadi area in age above 18 years with the help of MPHW (male and female), AWWs and ASHA workers and selected 20 study subjects from each AWCs by simple random sampling technique (lottery method). All the selected study subjects were interviewed by the investigator at their residence on the day of visit by the investigator. If the selected study subject was not available on day of visit, then next visit was done after contacting the selected subject about their availability by phone call. If the selected patient was not available on 2nd visit or refused to give the written informed consent, then next person from the list was enrolled till the desired sample size number was achieved.

Data Collection

Data was collected using pre-designed, pre-tested, semi-structured interview schedule by the investigator himself. The interview schedule comprised of general socio-demographic information about patient, questions on level of awareness of the disease using Diabetes Knowledge Questionnaire (DKQ-24) and questions on quality of life using SF-36 questionnaire.

Diabetes knowledge questionnaire (DKQ)

The DKQ-24, originally developed for Mexican-American adults with type 2 diabetes mellitus [9]. The instrument comprises 24 items assessing the knowledge of diabetes among the general public. Each question comprised with the option "yes," "no," and "I don't know" that requires respondents to put a tick on the applicable column. Each correct answer was given "1" mark while "0" mark was given for the wrong and don't know answer. The result was compared between two groups' social media users and non-users.^[9,10]

SF-36

Quality of life was assessed by using 36-Item Short Form Health Survey questionnaire (SF- 36). The SF-36 measures eight scales: physical functioning (PF), role physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH). There are two distinct concepts measured by the SF-36: a physical dimension, represented by the Physical Component Summary (PCS), and a mental dimension, represented by the Mental Component Summary (MCS). It consists of 36 questions which are on likert scale, where patient is supposed to choose one response. According to the response, quality of life in a patient can be assessed and compared with another group.^[11]

Operational definition for Internet user: "Active Internet User", which is defined as someone aged 2 years and above, who went online in the past 30 days. The definition was based on International Tele Communication Union (ITU), as quoted by Internet World Stats.^[12]

Statistical Analysis

Data collected was entered in the MS Excel spread sheet and analyzed using Statistical Package for Social Sciences (SPSS) software version 20. Appropriate tests of significance were applied wherever applicable and the interpretation was made accordingly.

Ethics

Ethics approval was obtained from the ethics committee of Pt. B.D Sharma UHS Rohtak with Ethical No.BREC/Th/19/Comm.Med./01 dated 30.12.2019 and written informed consent was obtained from each study participants.

RESULTS

This was a community-based study carried out in urban block of Haryana. The study subject

comprised of adult with type 2 diabetes mellitus above age 18. Total 400 study subjects were recruited out of which 271 (67.75%) used internet and 129 (32.25%) were not using internet. Among total 400 study subjects, 6.75% (n=27), 28.25% (n=113) and 65% (n=260) belonged to age group of 18-35 years, 36-55 years and above 55 years respectively. Distribution of study subjects on basis of different socio-demographic variables as well as its association with internet usage is depicted in [Table 1].

The mean age of study subjects who were internet users (IU) was 56.36 ± 3.11 and those who were non-internet users (NIU) was 61.69 ± 10.71 . Internet users were approximately 5 years younger than non-internet users. The proportion of patient using internet increased with advancement in age i.e

internet is used more often with people belonging to younger age group than people in older age group. Males used internet significantly more than females. Internet usage increased significantly with increase in literacy level. Employment also played a significant role in internet usage of diabetic patients. Internet usage was significantly more in patients with small family in comparison to families with more than 5 members.

[Table 2 and 3] shows that good and moderate knowledge about diabetes was more among internet users and the mean knowledge level was significantly more among those who used internet.

In [Table 4], it is seen that internet usage played a significant role in general health and emotional wellbeing of the diabetic patients.

Table 1: Age wise distribution of study subjects on the basis of internet usage

Variables	Non-Internet User (NIU) n = 129 (32.25 %)	Internet User (IU) n = 271 (67.75%)	Total	p value
Age				
18-35 years	4 (14.8%)	23 (85.2%)	27 (6.75%)	0.02
36-55 years	30 (26.55%)	83 (73.45%)	113 (28.25%)	
Above 55 years	95 (36.54%)	165 (63.46%)	260 (65%)	
Gender				
Male	49 (37.98%)	156 (57.56%)	205 (51.25%)	0.0002
Female	80 (62.01%)	115 (42.43%)	195 (48.75%)	
Literacy status				
Illiterate	46 (68.65 %)	21 (31.34%)	67 (16.75%)	.00001
Primary	24 (35.3%)	44 (64.7%)	68 (17%)	
Middle	10 (25.64 %)	29 (74.36%)	39 (9.75%)	
Secondary	37 (28.9 %)	91 (71.1 %)	128 (32%)	
Higher secondary and above	12 (12.24%)	86 (87.76 %)	98 (24.25%)	
Employment Status				
Employed	57 (44.18%)	171 (63.09%)	228	.0004
Unemployed	72 (55.81%)	100 (36.90%)	172	
Number of family members				
1-5 members	54 (41.87%)	151 (55.71%)	205 (51.25%)	.009
>5 members	75 (58.13%)	120 (44.29%)	195 (48.75%)	

Table 2: Association of internet usage with study subject's knowledge about diabetes using DKQ24.

Knowledge Category	Non-Internet User (NIU) n = 129 (32.25%)	Internet User (IU) n = 271 (67.75%)	Total n = 400	p value
Poor (0-8)	8 (29.62%)	19 (70.38%)	27	0.041
Moderate (9-16)	120 (33.80%)	235 (66.20%)	355	
Good (17-24)	1 (5.56%)	17 (94.44%)	18	

Table 3: Comparison of Diabetes Knowledge as per DKQ24 among study subjects on the basis of internet usage

Knowledge category	Mean	Z value	p value
NIU	11.7 ± 2.1	-2.84046	0.005
IU	12.4 ± 2.5		

Table 4: Comparison of internet usage with quality of life on basis of 8 domains using SF- 36 among diabetic study subjects

	Non-Internet User (NIU)	Internet User (IU)	Z value	P value
Physical Functioning	51.4 ± 22.9	52.2 ± 22	-0.34	0.74
Role limitation due to physical health	46.9 ± 27.2	50.3 ± 34.6	-1.06	0.29
Role limitation due to emotional problem	54.5 ± 31.7	59 ± 35.8	-1.28	0.20
Energy	57.6 ± 16.9	59.3 ± 19.1	-0.94	0.35
Emotional wellbeing	53.9 ± 17.6	57.8 ± 19.5	-2.02	0.04
Social Functioning	53.6 ± 16.5	52.9 ± 18.3	0.40	0.69
Pain	66.7 ± 19.9	69.3 ± 22.8	-1.14	0.25
General health	49.6 ± 13.9	69.3 ± 15.9	-3.05	0.002

DISCUSSION

In the present study, internet user diabetic patients were 67.75% compared to 32.25% who were non-internet users. According to a report published in Statista.com on 17 august 2021, 50% of Indians uses internet and the internet usage is more in urban areas compared to rural areas.^[13] The 'ICUBE 2020' report by IMAI and Kantar reported that about 43% of the Indian population used Internet at least once a month and Maharashtra has the highest Internet penetration with 61% of the population using it.^[14]

The prevalence of internet usage in the present study was more among 18-35 years age group (85.2%) compared to 36-55 years (73.45%) and least (63.75%) among those aged >55 years. Statista.com report published by Sandhya Keelery on May 7, 2021 depicted that 54% of internet users were young between 20-39 years.^[13] Study done by Pew research center stated that 57% of Indians used internet or smartphones in age group of 18-29 years compared to 18% in >50 years age group.^[15] The average age of internet users were approximately 5 years younger than non-internet users in this study while study done by Richard W Grant et al in 2005 reported approximately 11 years age gap between IU & NIU.^[16]

In our study, proportion of females were higher than males in non-internet user group (62.01%) compared to internet user (42.43%) group which shows gender disparity in ease of using internet. This finding was in concordance to the 'ICUBE 2020' report by IMAI and Kantar where proportion of females using internet were 43% in urban India, compared to males.^[14]

It was observed that percentage of illiterate people were more in non-internet users group (68.65 %) compared to internet users group (31.34%). The proportion of study subjects using internet increased significantly as their literacy level increased which depicts that literacy plays an important role in usage of internet. Similar results were shown in study done by pew research centre, which stated that in India, 23% people with lower education use internet compared to 69% people with higher education.^[15] In an article, Offline and falling behind: Barriers to Internet adoption by Mckinsey& company (2014) stated that approximately 28% of the offline population were illiterate.^[17] This shows that Illiteracy leads to barriers such as a lack of digital literacy (that is, unfamiliarity with or discomfort in using digital technologies to access and use information) and a lack of language literacy (that is, the inability to read and write).

In our study the employed people used internet significantly more than the unemployed people. Same trend was observed in the study done by Dominik Batorski et al (2015),^[18] which stated that unemployed people used internet much less than employed people which it may be because the

unemployed people may face financial problem in buying the gadgets for internet.

Role of Internet Usage on Diabetes Awareness

Although average knowledge about diabetes of both groups falls under moderate category but the mean knowledge about diabetes of internet users was significantly more in comparison to non-internet user group which proves the role of internet in improving the knowledge of its users. A systematic review done by Turki A (2018),^[19] highlighted the potential of social networking tools to improve the management of diabetes. In the study done at Malaysia by QAMAR M et al,^[10] depicted that the mean score of awareness about diabetes mellitus among general public was 11.11 ± 6.09 . Another study done by Shrestha N et al (2015) at Nepal, the mean score of awareness among diabetic patients was 11.0 ± 3.32 .^[20]

Patients with diabetes often need a complex set of services and support ranging from glucose monitoring, anti-diabetic treatment, management of complications due to major organ involvement, psychotherapy and social support, physical activity promotion, nutrition counseling and more. Integrating these supports into a patient's therapeutic regimen on single OPD visit presents challenges that need to be addressed. Information technology is becoming an important factor for the providers to deliver healthcare. Internet access can give the health information online and thus renders self-management support.

Quality of Life Among Study Subjects on Basis of Internet Usage

The present study depicted that the mean physical functioning was more in internet users (52.21 ± 22) in comparison to non-internet users (51.39 ± 23). It means that performance of all types of physical activities including bathing or dressing due to health in diabetic patients is limited more in non-internet users compared to internet users. But this association was non-significant. According to previous studies done by Rajput M et al,^[21] Gautam Y et al,^[22] Sharma S et al,^[23] and Manjunath K et al,^[24] the mean physical functioning of diabetic study subjects was 63.7 ± 23.2 , 65.5 ± 27.6 , 74.4 ± 21.4 and 58.6 ± 18.5 respectively.

In our study, the mean role limitation due to physical health was more in internet users (50.3 ± 34.6) in comparison to non-internet users (46.9 ± 27.2). It means that problems with work or other daily activities as a result of physical health is more in non-internet users compared to internet users. But this association is non-significant. On comparing role limitation due to physical functioning of study subjects with previous studies done by Rajput M et al,^[21] Gautam Y et al,^[22] and Sharma S et al,^[23] it was 68.5 ± 31.1 , 58.6 ± 28.7 and 62.7 ± 21.5 respectively.

Our study depicted that the mean role limitation due to emotional problem was more in internet users (59 ± 35.8) in comparison to non-internet users (54.5 ± 31.7). This means that problems with work or other

daily activities as a result of emotional problems is more in non-internet users compared to internet users. But this association was statistically non-significant. If we compare role limitation due to emotional problem among study subjects with previous studies done by Rajput M et al,^[21] Gautam Y et al,^[22] and Sharma S et al,^[23] it was 68.9 ± 30.8 , 68.3 ± 28.6 and 59.8 ± 24.4 respectively.

The present study depicted that the mean energy among internet users (59.3 ± 19.1) was more in comparison to non-internet users (57.6 ± 16.9). This depicts that non-internet users feel tired and worn out all of the time more than internet users. But this association was statistically non-significant. According to previous studies done by Rajput M et al,^[21] Gautam Y et al,^[22] and Sharma S et al,^[23] the mean energy of study subjects was 43.5 ± 19.4 , 49 ± 20 and 47.5 ± 15.6 respectively.

Our study depicted that the mean emotional wellbeing/mental health was significantly more in internet users (57.8 ± 19.5) in comparison to non-internet users (53.9 ± 17.6) which means that internet users feel peaceful, happy and calm all the time in comparison to non-internet users. According to study conducted by Gautam Y et al,^[22] and Sharma S et al,^[23] the emotional wellbeing among study subjects were 58.7 ± 18.3 and 66.8 ± 12 respectively.

The present study revealed that the mean social functioning was more in internet users (52.9 ± 18.3) in comparison to non-internet users (53.6 ± 16.5). This means that non-internet users face frequent interference with normal social activities due to physical or emotional problems compared to internet users. But this association was non-significant. The previous studies done by Rajput M et al,^[21] Gautam Y et al,^[22] Sharma S et al,^[23] and Manjunath K et al,^[24] the mean social functioning of study subjects were 76.5 ± 26.1 , 69 ± 25.7 , 86 ± 22.3 and 45.3 ± 22.7 respectively.

Our study depicted that the mean pain was more in internet users (69.3 ± 22.8) in comparison to non-internet users (66.72 ± 19.9) which means that limitation due to pain is encountered more by non-internet users compared to internet users. But this association was statistically non-significant. According to study conducted by Rajput M et al,^[21] Gautam Y et al,^[22] and Sharma S et al,^[23] the emotional wellbeing among study subjects were 79.5 ± 28.2 , 60 ± 23.4 and 78.5 ± 18 respectively.

The present study revealed that the mean general health was significantly more in internet users ($69.28 \pm$) in comparison to non-internet users ($49.61 \pm$) which means that the personal health was significantly excellent in internet users in comparison to non-internet users. According to study conducted by Rajput M et al,^[21] Gautam Y et al,^[22] and Sharma S et al,^[23] the general health among study subjects were 47.17 ± 19.21 , 46.63 ± 15.60 and 50.27 ± 17.08 respectively.

CONCLUSION

The present study concludes that information about diabetes by internet usage significantly affects the knowledge/awareness of diabetic patients and thus helps in improvement of their physical and mental quality of life. Internet was used more by younger age group, male gender and more literate diabetic people. Number of members in family and employment status also affects the individual's internet usage.

Recommendations

As diabetes is a chronic disease with multiple major organ involvement and disability. These patients should know all available preventive as well as therapeutic services from the very beginning of diagnosis. It needs more time and resources which is less available in developing countries. Somehow, internet is very widely available in our country. Hence, we can utilize this opportunity with dedicated website in local language with appropriate and true information which should be freely available to the people.

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