ORIGINAL ARTICLE

Drug Adherence and Self-management Practices among Diabetic Population in Letang, Nepal

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ABSTRACT

Background: Diabetes mellitus (DM) is one of the growing non-communicable diseases in developing countries. The recent surveys by the International Diabetes Federation suggest that the South-East Asian region is home to more than 72 million adults with diabetes in 2013 and is expected to exceed 123 million in 2035. Adherence to medication and self-management practices both predicts the outcome of diabetes. The aim of this study is to assess adherence and self-management practices using the Morisky Medication Adherence Scale (MMAS-4) and diabetes self-management questionnaire (DSMQ), respectively.

Methods: A cross-sectional study was done in Letang Municipality of Morang District. Data were collected from 214 respondents. Face to face interview was done with the respondents who were under at least one oral hypoglycemic agents using a pre-structured questionnaire. The questionnaire consisted of MMAS-4 and DSMQ scale to assess adherence and self-management practices.

Result: More than half of the participants (56.9%) fell under 40–59 years, and 55% of the total participants were male. Seventy-nine percentage of the participants lived below the poverty line. Among the respondents, 95.4% were diagnosed with diabetes by the doctor and 59.6% of them were diagnosed in private clinics. Fifty-five percentage of the respondent were nonadherent to the drug. The majority of the respondents (87%) did not know about diabetic patients being prone to tuberculosis (TB). Only a small proportion (1.8%) of the respondents developed TB after DM. Adherence was found to increase with an increase in the age of the participants; literate participants living above the poverty line were found to have greater adherence than their counterparts. However, the association between different socio-demographic factors and medication adherence was nonsignificant. The DSMQ score of the participants ranged from 11 to 39. The mean DSMQ score was 23.51 with a standard deviation of 4.458.

Conclusion: Major proportions (55%) of participants were found to have poor adherence to their medication. Adherence was found to increase with an increase in the age of the participants; literate participants living above the poverty line were found to have greater adherence than their counterparts. However, the association of adherence was not found to be statistically significant with the variables studied. There were poor self-management practices among the diabetic population.

Key words: Diabetes mellitus, drug adherence, self-management practice

INTRODUCTION

Approximately 463 million people are living with diabetes worldwide.[1] The estimated prevalence of diabetes was 8.3% in 2014 which is projected to increase to 10% in 2030.[2] In 2014, diabetes caused 4.9 million deaths costing 612 billion dollars in health care.[2] Low- and middle-income countries reported 80% of diabetes deaths. The recent surveys by the International Diabetes Federation suggest that the Southeast Asian region is home to more than 88 million adults with diabetes in 2019 and is expected to exceed 115 million in 2035 and 153 million in 2045.[1] Systematic review and meta-analysis done from 2000 to 2014 found the prevalence of type 2 diabetes to be 8.1% and 1.0% in urban and rural areas of Nepal, respectively.[2]

Excess mortality is mainly due to diabetes-related diseases developed because of poorly controlled diabetes. Over time, diabetes can increase the risk of health-related problems, including blindness, kidney damage, nerve damage, amputation of lower limbs, and cardiovascular disease.[3] Although diabetes cannot be cured, the disease can be managed by non-pharmacological and pharmacological strategies, where improvements in glycemic control are important factors in delaying the onset and progression of diabetes-related complications.[4] Oral hypoglycemic agents (OHAs) are the major and most common treatment for type 2 diabetic patients and these

agents are targeted for intensive blood-glucose control which leads to a decrease in microvascular complications, such as nephropathy and retinopathy.[5]

However, it is evident that patients are nonadherent to many aspects of health-care advice. Nonadherence to dietary recommendations has been well described, and nonadherence to OHAs remains as one of the most serious problems facing diabetes care delivery.[6] Poor and inadequate glycemic control among patients with Type 2 diabetes mellitus (DM) constitutes a major public health problem globally and accelerates the development of diabetes complications.[7] In 2003, the World Health Organization (WHO) launched a landmark report which clearly defined "adherence" as the extent to which a person's behavior including taking medication, corresponded to agreed recommendations from a health-care provider.[7]

Self-management of diabetes involves a number of considerations and choices that the patient with diabetes must make on a daily basis. It requires that patients are able to reconcile their resources, values, and preferences with a therapeutic regimen of a healthy diet, exercise, no smoking, low alcohol intake, glucose monitoring and, for some patients, medication.[8] Handling diabetes in everyday life is subject to certain social rules that related to how diabetes was best managed. The rules of self-management were about adjusting one's behavior to fit into different social contexts, while still being compatible with the treatment regimen.[9] Self-management of diabetes is closely connected to the self-care concept, which can be related to the practice of activities that individuals initiate and perform on their own behalf in maintaining life, health, and well-being.[10,11]

Despite growing accessibility to government and private health services, uncontrolled diabetes poses a great challenge. This research aims to assess the non-adhering diabetic population and self-management practices and will explore associated factors that play a role in adherence and self-management of diabetes.
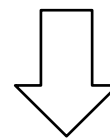
METHODS

This observational cross-sectional study was conducted in Letang Municipality.

Sampling Techniques

Out of 9 wards in Letang Municipality
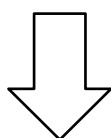
4 wards were selected randomly (ward no 6, 7, 8, and 9) with population of 2827, 3149, 3097, and 3538, respectively

Population proportionate sampling was done and 35, 39, 38, and 44 participants were selected from 4 wards.

All type 2 diabetic patients on at least one OHAs for at least 1 month and who were over 18 years of age living in Letang for a minimum of 6 months were taken. The sample was selected from house to house survey by interview techniques using a pre-structured questionnaire.

This study considered 95% confidence interval and 80% power for sample size calculation. According to the literature review, Shrestha *et al.,* the prevalence of diabetic patients not adhering to the hypoglycemic drug is 38%. Using the formula, $N = 4pq/l^2$ the required sample size was 156. The tools used in this research for assessing adherence (Morisky Medication Adherence Scale-4 [MMAS-4]) and self-management practices (Diabetes Self-management Questionnaire [DSMQ]) are both validated and reliable tools used in many previous researches. A study done by Schmitt provided evidence that the DSMQ is a reliable and valid instrument and enables an efficient assessment of self-care behaviors associated with glycemic control.[12] This instrument contains four subscales, "glucose management (GM)," "dietary control (DC)," "physical activity (PA)," and "health-care use" (HU), as well as a "sum scale" (SS).

A study on MMAS concluded it to be a simple and effective tool to address nonadherence in patients. Despite the subjective flaws of the tool, its use has been validated by clinicians and health professionals for different chronic conditions across several countries.[13]

Data Analysis

Data were entered into Microsoft Excel and converted into Statistical Package for the Social Sciences for statistical analysis. Data were entered daily and entered data were stored in an online storage platform and regularly updated. Data were presented in graphs and tables. For descriptive, percentage, ratio, mean, standard deviation, median, and inter-quartile range, were calculated. For inferential statistics, bivariate analysis was done using the Chi-square test for categorical variables. An independent sample *t*-test was used to compare the mean score of DSMQ among different subscales. $P < 0.05$ was considered statistically significant.

RESULTS

In our study, almost half of the participants (56.9%) belonged to the age group of 40–59 years. More than half (55%) of the participants were female while almost two-third of them (76.6%) followed Hinduism. More than half of the participants (61.5%) were literate. The majority of the participants (78.9%) were below the poverty line [Table 1]. Majority of diagnosis (95.4%) were diagnosed by doctors, almost half of the place of diagnosis (59.6%) were made in a private hospital. The majority of participants (77.1%) were under more than one OHAs. Only a small number of participants (11.5%) were enrolled in insurance. Almost half of the participants (54.1%) were found to adhere to the medications [Table 2]. Majority of the participants (87.2%) did not know that diabetes mellitus patients are prone to develop tuberculosis. Only a small number of participants (1.8%) developed TB after diabetes [Figures 1 and 2].

Among the participants, 53.7% of the participants were smoker and among them, 62.38% of participants were smoker. More than half of participants (62.4%) were consumed smokeless tobacco once in their lifetime and among them, half of the participants were currently consuming smokeless tobacco [Table 3].

The mean score among the subscales of DSMQ was higher for GM (7.59) and lower for PA (4.00) [Table 4]. The DSMQ score of the participants ranged from 11 to 39. The mean DSMQ score was 23.51 with a standard deviation of 4.458.

The mean score of male participants was higher in GM (7.70 ± 1.92), DC (6.05 ± 1.73), HU (4.56 ± 1.2), and SS (4.71 ± 0.86) whereas female had high mean score in PA (3.99 ± 1.37). However, the differences were not statistically significant. Those who had their partners had a higher score in subscales-GM (7.65 ± 1.99), DC (6.03 ± 1.64), HU (4.55 ± 1.34, *P*=0.04), and SS (4.72 ± 0.9) except in PA. Those living in the joint family had higher mean scores among GM (7.71 ± 2.01), PA (4.08 ± 1.35), HU (4.64 ± 1.27), and in SS (4.74 ± 0.81). Those who were living above the poverty line had higher score in GM (7.62 ± 2.03), PA (4.01 ± 1.44), and HU (4.57 ± 1.14) [Table 5].

On bivariate analysis, there was no significant association found with any of the independent variables. However, adherence was higher (57.1%) among 60–79 years of age and in males (56.4%). Those who were living with a partner had higher adherence to medication (55.2%) than those living without a partner (50.0%). Those who were literate had higher adherence (55.5%) to medication than those who were illiterate (53.9%). Those participants living above the poverty line had higher adherence (61.0%) to medication. Those who were living in the nuclear family had higher adherence (57.9%) than those living in a joint

family (51.1%). Those who were under more than one drug had higher adherence (66.0%). Participants who had never smoked (58.5%) or never drank alcohol (61.4%) had higher adherence than those who never did [Table 6].

DISCUSSION

This cross-sectional study assessed the adherence to diabetic medication and self-management practices among 218 diabetic participants. More than half of the participants

Table 1: Sociodemographic characteristics of the participants

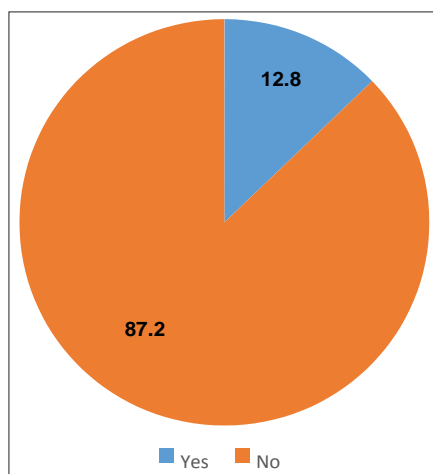| Characteristics	Category	Frequency (N)	Percentage
Age in years	<40	14	6.4
	40–59	124	56.9
	60–79	69	31.7
	>80	11	5
Gender	Male	120	55
	Female	98	45
Religion	Hindu	167	76.6
	Muslim	3	1.4
	Buddhist	12	5.5
	Others	36	16.5
Type of family	Nuclear	121	55.5
	Joint	97	44.5
Ethnicity	Brahmin	69	31.7
	Chhetri	19	8.7
	Madhesi	3	1.4
	Janajati	84	38.5
	Dalit	23	10.6
	Others	20	9.2
Marital status	Never married	4	1.8
	Married	205	94
	Widowed	8	3.7
	Divorced	1	0.5
Education	Illiterate	84	38.5
	Literate	134	61.5
Literate	Less than primary	46	21.1
	Primary	36	16.5
	Secondary	36	16.5
	Higher Secondary	9	4.1
	Bachelor and above	7	3.2
Employment	Government	8	3.7
	Non-government	17	7.8
	Self-employed	82	37.6
	Homemaker	52	23.9
	Retired	4	1.8
	Unemployed	35	16.1
	Others	20	9.1
Poverty	Below poverty line	172	78.9
	Above poverty line	46	21.1

Figure 1: Knowledge about diabetes mellitus patients prone to develop tuberculosis
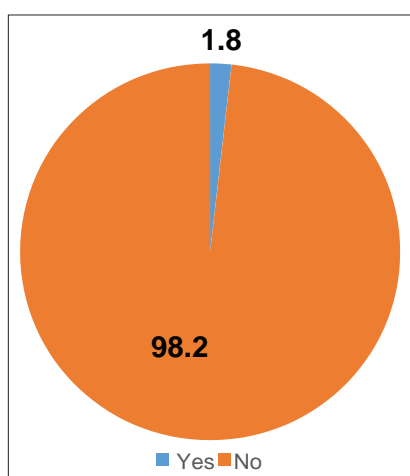
Figure 2: Developed tuberculosis after diabetes mellitus

Table 2: Medical history of the participants

Characteristics	Category	Frequency (N)	Percentage
Diagnosis done by	Doctors	208	95.4
	Ayurvedic doctors	3	1.4
	Paramedics (HA/CMA)	7	3.2
Place of diagnosis	Government hospital	77	35.3
	Private hospital	130	59.6
	Ayurveda clinics	3	1.4
	Private pharmacy	8	3.7
Under more than one OHAs	Yes	50	22.9
	No	168	77.1
Enrolled in insurance	Yes	25	11.5
	No	193	88.5
Place where respondents get their medication	Pharmacy	209	95.9
	Free from health services	2	0.9
	Both	7	3.2
Adherence to medication	Yes	118	54.1
	No	100	45.9

OHA: Oral hypoglycemic agents

Table 3: Behavioral characteristics of the participants

Characteristics	Category	Frequency (N)	Percentage
Ever smoker	Yes	101	46.3
	No	117	53.7
Current smoker	Yes	63	62.38
	No	38	37.62
Ever smokeless tobacco consumer	Yes	82	37.6
	No	136	62.4
Current smokeless tobacco user	Yes	41	50.0
	No	41	50.0
Ever drank alcohol	Yes	124	56.9
	No	94	43.1
Current alcohol consumer	Yes	57	26.1
	No	67	30.7

(54.1%) were found to be adherent to their medication. A similar study done on Kenya showed almost half (45.5%) of study participants were adherent to diabetic medication.[7] Study done in India showed that 30.4% of the participants were adherent to diabetic medication.[14] Similar study done in Puducherry, India, showed half of the participants had high medication adherence.[15] Study done in Nepal by Bhattarai *et al.* showed that 44.86% of diabetic client were adherent to diabetic medication.[16] This could be explained by increasing awareness among the population about DM and its complication, over years and also different studies used different questionnaires (either MMAS-4 OR MMAS-8) for evaluation of medication adherence.

In our study, adherence was found to be higher among those participants who were ≥60 years of age. Similar findings were seen in the study done in Puducherry, India, where 61.5% of the participants ≥60 years were found to have high adherence.[15] Age had a positive influence on patients' DC which may present that older patients showed higher rates of DC than younger patients.[17] Similarly, older people tend to fear more about the outcomes and severity of disease if they do not take their medicines in

Table 4: Diabetic self-management questionnaire

DSMQ subscale	Mean score
Glucose management	7.59
Dietary control	6.02
Physical activity	4.00
Health-care use	4.51
Sum scale (total score)	4.702

DSMQ: Diabetes self-management questionnaire

time. Males (56.4%) were found to be more adherent to the OHAs than females (52.9%) in our study. Similar findings were seen in studies done in India and Saudi

Arabia.[15,18,19] These similarities can be explained with the fact that since in Nepal, men are more literate[20] and aware as they work outside the home as breadwinner for family which gives them different kinds of exposures and experiences. Our study showed those who had their partner had higher adherence to medication. This finding was similar to studies done in Kenya and Puducherry, where poor family support and lack of family cooperation was a significant factor which was associated with low medication adherence.[7,15] Hence, in addition to individual counseling, family counseling should also be an essential component in the care of DM.[15]

Table 5: Comparison of the mean score with sociodemographic variables

Category	Frequency	DSMQ subscale mean scores									
		Glucose management (mean±SD)	*P*-value	Dietary control (mean±SD)	*P*-value	Physical activity (mean±SD)	*P*-value	Health-care use (mean±SD)	*P*-value	Sum scale (mean±SD)	*P*-value
Age	<60 years (138)	7.57±1.81	0.79	5.93±1.61	0.25	3.95±1.41	0.45	4.51±1.28	0.92	4.66±0.81	0.42
	≥60 years (80)	7.64±2.31		6.19±01.65		4.10±1.43		4.53±1.41		4.76±1.01	
Gender	Male (120)	7.70±1.92	0.38	6.05±1.73	0.78	3.99±1.37	0.88	4.56±1.2	0.59	4.71±0.86	0.81
	Female (98)	7.46±2.10		5.99±1.49		4.02±1.47		4.46±1.48		4.69±0.94	
Partner	Present (205)	7.65±1.99	0.70	6.03±1.64	0.68	4±1.43	0.69	4.55±1.34	0.00	4.72±0.9	0.25
	Absent (13)	6.62±1.89		5.85±1.28		4.15±1.28		3.92±0.95		4.43±0.67	
Education	Illiterate (84)	7.60±2.21	0.98	6.02±1.55	0.99	4.23±1.32	0.06	4.6±1.57	0.50	4.78±0.97	0.27
	Literate (134)	7.59±1.86		6.02±1.67		3.87±1.45		4.46±1.15		4.64±0.83	
Poverty line	Above (172)	7.62±2.03	0.72	6.01±1.66	0.76	4.01±1.44	0.88	4.50±1.37	0.76	4.70±0.90	0.98
	Below (46)	7.50±1.89		6.09±1.48		3.98±1.30		4.57±1.14		4.70±0.84	
Type of family	Nuclear (121)	7.50±2.01	0.43	6.11±1.67	0.39	3.94±1.46	0.46	4.41±1.37	0.21	4.66±0.95	0.51
	Joint (97)	7.71±2.01		5.92±1.55		4.08±1.35		4.64±1.27		4.74±0.81	

DSMQ: Diabetes self-management questionnaire

Table 6: Association of adherence with other variables

Characteristics	Categorized variables	Medication adherence		*P*-value
		Non-adherence (%)	Adherence (%)	
Age	<60 years	66 (47.8)	72(52.2)	
	≥60 years	34 (42.5)	46 (57.5)	0.447
Gender	Male	48 (43.6)	62 (56.4)	
	Female	40 (47.1)	45 (52.9)	0.634
Partner present	Absent	6 (50.0)	6 (50.0)	
	Present	82 (44.8)	101 (55.2)	0.726
Type of family	Nuclear	45 (42.0)	62 (57.9)	
	Joint	43 (48.9)	45 (51.1)	0.342
Poverty	Above poverty line	16 (39.0)	25 (61.0)	
	Below poverty line	72 (46.8)	82 (53.2)	0.377
Education status	Illiterate	35 (46.1)	41 (53.9)	
	Literate	53 (44.5)	66 (55.5)	0.836
More than one drug	Present	17 (34.0)	33 (66.0)	
	Absent	71 (49.0)	74 (51.0)	0.067
Ever smoked	Yes	44 (49.4)	45(50.6)	
	No	44 (41.5)	62 (58.5)	0.268
Ever drank alcohol	Yes	36 (80.0)	56 (50.0)	
	No	32 (38.6)	51 (61.4)	0.112

In our study, those participants living above the poverty line and those who were literate had slightly higher adherence to medication. These findings are expected as those who are living above the poverty line can afford the follow-up and medications. Furthermore, those who are literate tend to be more aware as they can read the pamphlets that are available on the health center. Our findings showed that those who had ever smoked and ever consumed alcohol had low adherence than their non-smoking, non-drinking counterparts. Our findings are consistent with the other study where alcohol usage has been shown in other studies to be associated with medication non-adherence.[21]

Our study also assessed the self-management practices among diabetic participants. Age had a positive influence on all subscales of DSMQ. Those who were ≥60 years had a higher mean score than those who were <60 years. Our findings are similar to the study done in South Arabia, where the older population had higher rates of DC than the younger population.[18] Male had higher mean scores in all the subscales such as GM, DC, HU, and SS except PAs where females had a higher mean score. This could be explained as females are involved in the household chores as their main responsibility which fulfills the criteria of required minutes of daily PA and daily MET Score. Those who had their partners with them had a high mean score in subscales such as GM, DC, HUs, and SS. These findings are expected as partners tend to take care of each other in every aspect. Those who are living alone will neglect his own personal care. Our study revealed some interesting findings like those who were living below the poverty line had a high mean score in DC and HU. These could be because those who are living below the poverty line tend to eat less junk and packaged foods. They could be also concerned about the expensive treatment outcomes if they fail to adhere to self-management practices. Those living in the joint families had higher mean scores in subscales such as GM, PAs, HU, and SSs except DC. These findings are expected as its hard to cook different foods for the diabetic patient when living in joint family and people tend to eat what others are eating. In all other scales due to all kinds of family support and encouragement, those living in the joint family had higher mean scores.[15]

CONCLUSION

Major proportion (55%) of participants was found to have poor adherence to their medication. Adherence was found to increase with an increase in the age of the participants.

Literate participants, living above the poverty line, were found to have greater adherence than their counterparts. However, the association of adherence was not found to be statistically significant with the variables studied. There are poor self-management practices among the diabetic population.

Recommendation

Our study highlights the need for interventions to increase adherence to the diabetics so as to reduce the complications and associated morbidity. There is also a need for awareness and behavior change communication activities to increase the adherence and increase the self-management practices. Social health insurance scheme should be promoted as an opportunity, which may increase awareness and health seeking, ultimately increasing the adherence to the medications and self-management practices.

ACKNOWLEDGMENT

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