

## Brief Research Article

# Non-adherence to Life-style Modification and its Factors Among Type 2 Diabetic Patients

\*Shirin Jahan Mumu<sup>1</sup>, Farzana Saleh<sup>2</sup>, Ferdous Ara<sup>3</sup>, Fadia Afnan<sup>3</sup>, Liaquat Ali<sup>4</sup>

<sup>1</sup>Assistant Professor, Department of Epidemiology, Bangladesh University of Health Sciences, <sup>2</sup>Associate Professor, Department of Community Nutrition, <sup>3</sup>Senior Lecturer, Department of Community Nutrition, <sup>4</sup>Honorary Professor, Department of Biochemistry and Cell Biology, BUHS, Dhaka, Bangladesh

### Summary

Non-adherence to preventive and therapeutic life-style recommendations among patients with diabetes is special challenge in the management of these patients. This study aimed to measure the proportion of non-adherence to life-style modification and factors associated with these among a group of Bangladeshi type 2 diabetic patients. Under an analytical cross-sectional design 374 type 2 diabetic patients (age >20 years), diagnosed for at least 1 year, were selected from different health care centers operated by the Diabetic Association of Bangladesh. Non-adherence rate were assessed for: Diet (88%), exercise (25%), routine blood glucose testing (32%), foot care (70%), smoking (6%) and betel quid chewing habit (25%). Binary logistic regression suggests that higher education group ( $P = 0.013$ ), rural area ( $P = 0.013$ ) and attendance to diabetes education classes ( $P = 0.043$ ) showed good adherence to diet and non-attendance to diabetes education class ( $P = 0.014$ ), older age ( $P = 0.037$ ) are associated to non-adherence to exercise. Unemployed patients showed more non-adherence to blood glucose testing ( $P = 0.045$ ) than others. Non-attendance to diabetes education class ( $P = 0.037$ ) and business occupation group ( $P = 0.039$ ) showed significant association to smoking and betel quid intake habit respectively.

**Keywords:** Adherence, Diabetes, Diet, Exercise, Lifestyle modification, Non-adherence

Diabetes mellitus is a rapidly emerging public health concern across the world and increasingly been diagnosed in the developing countries including Bangladesh. It is a complex disorder that demonstrates the need for therapeutic life-style modification and self-care management to achieve good control. To optimize patients' health, constant attention is required to diet, glucose monitoring, regular physical activity, foot care and medication.<sup>1,2</sup> Although life-style modification can

reduce diabetes-related morbidity and mortality, the extent of the management benefits is limited due to non-adherence.<sup>3</sup> Non-adherence to life-style modification recommendations can be defined as it happens when patient deviates partially or completely from the mutually agreed collaborative approach to behavior/life-style changes that are known to improve health status.<sup>2</sup> This poor adherence is more prevalent than previously thought and thus, the burden of this disease is increasing day by day.<sup>4</sup> Several studies focusing especially on diet and exercise non-adherence concluded that the non-adherence of type 2 diabetic patients is high (48-77%<sup>1,5-6</sup> and 34-52%,<sup>1,5-8</sup> respectively) The problem of non-adherence to life-style modification recommendations among patients with type 2 diabetes is very complex and multi-faceted in nature. There are many factors that may influence this poor adherence, such as age, duration of disease, lack of communicative relationship between the patient and health care providers, health beliefs and perceptions that are incompatible with the recommendations and socio-economic factors.<sup>9,10</sup> Diet, exercise, life-style modification, understanding the

**\*Corresponding Author:** Shirin Jahan Mumu,  
Department of Epidemiology, Bangladesh University of Health Sciences (BUHS), 125/1 Darussalam,  
Mirpur, Dhaka 1216, Bangladesh.  
E-mail: [shirinmumu@yahoo.com](mailto:shirinmumu@yahoo.com)

#### Access this article online

Website: [www.ijph.in](http://www.ijph.in)

DOI: 10.4103/0019-557X.128165

Quick Response Code:



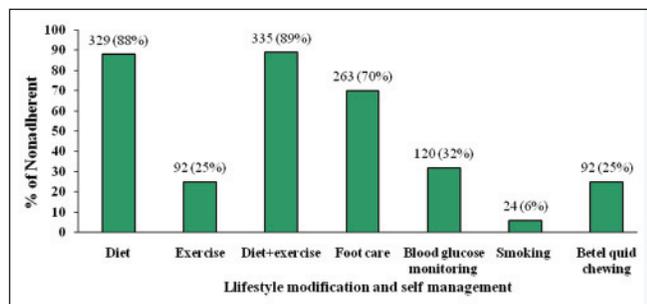
factors of non-adherence to life-style changes can help to plan and implement more intensive interventions to assist patients' long-term task of achieving beneficial life-style changes. To best of our knowledge, very few studies have been performed on these issues particularly in developing country like Bangladesh. This study aimed to measure the proportion of non-adherence to life-style modification and its associated factors among a group of Bangladeshi type 2 diabetic patients.

A cross-sectional design was adopted and 374 type 2 diabetic patients (age >20 years), diagnosed for at least 1 year, were conveniently selected from all nine health care centers of in and around Dhaka city operated by the Diabetic Association of Bangladesh (DAB). The total number of health care center is nineteen. Among them nine are situated in and around of Dhaka city and rest of them are in northern part of Bangladesh. Average 90 patients take treatment each month from each nine urban health care center and about half of them are from 41 to 60 age group followed by one-third from 21 to 40 years age group and more than half of the patients are female. In this study, the minimum required sample size was calculated using formula  $n = z^2pq/d^2$  (where,  $n$  = the required sample size;  $p$  = the prevalence of non-adherence to diet from previous study,<sup>7</sup> i.e., 63.5;  $q = 1-p$  and  $d$  = error (precision) i.e. 5%. Thus the calculated sample size was,  $n = 374$  after adjusting 5% non-response. Almost same number of patients was selected from each health care centers considering inclusion and exclusion criteria. Patients who had other medical complications or were unable to answer a short list of simple questions (socio-demographic information such as name, address, disease complications, etc.) were excluded from the study. Data were collected by a pre-tested, interviewer-administered questionnaire in an out-patient department setting. The questionnaire consisted of two parts. The first part was aimed at collecting socio-demographic, sources of information, co-morbidities. The second part was aimed at assessing the patients' adherence to life-style modification and self-management (diet, exercise, blood glucose testing, foot care, smoking, betel quid chewing). Three-point scale (always, sometimes, never) were used to assess patient adherence to life-style measures (diet and exercise).<sup>7</sup> Anthropometric measurements were carried out by using appropriate tools and all biochemical data were collected from record book. Information sheet were used for recording anthropometric and biochemical data.

Patients were considered compliant if patients had adhered to a recommended dietary chart, maintained specific time and quantity of food intake. Exercises were considered adhered if they did exercise >30 min/day. With respect to foot care, non-adherence means if patients did not follow their recommended foot care practice provided by DAB. In case of blood glucose testing, the health care providers write subsequent date of blood testing on patient guide book according to patients' physiological condition and patients were considered non-adhered if they missed or did not perform blood glucose testing. In case of smoking and betel quid chewing habit, patients were advised to quit these habits by their health care providers and they considered as non-adhered if they continued these. Data were analyzed by univariate, bivariate as well as multivariate statistics using the Statistical Package for Social Sciences (SPSS version 11.5, Inc. Chicago, IL, USA) software. Chi-squared and logistic regression analysis was performed to find the relationships between variables. Informed written consent was obtained from all respondents after a full explanation of the nature, purpose and procedures used for the study. Ethical approval was obtained from the local ethics committee and research review committee.

Of the respondents 58% were females. The mean (standard deviation [SD]) age was 51 ( $\pm 11.3$ ) years, about 35% were aged between 40 and 49 years, 46% had completed high school with monthly income (median [range]) US\$ 285 (14-1800) and 75% lived in urban areas. Mean body mass index (BMI) was 25.7 ( $\pm 3.6$ ) kg/m<sup>2</sup> and about 77% were overweight or obese according to Asian BMI cut-off value.<sup>11</sup> Proportion of obesity was higher among female than male (39% and 19% respectively). Mean fasting serum glucose and serum glucose after breakfast (ABF) were 8.4 ( $\pm 3.4$ ) mmol/l and 11.53 ( $\pm 4.57$ ) respectively. About 58% patients' hemoglobin A1c level was >7%. About 62% patients attended diabetes education class at least once followed by 24% who never attended.

Non-adherence rate for diet was 88% and for exercise 25%. Overall 89% (95% confidence interval [CI]: 87.4-91.0) had non-adhered to both diet and exercise. About 32% patients non-adhered to blood glucose monitoring and 70% to foot care. Around 6% and 25% had smoking and betel quid chewing habits [Figure 1]. The main barrier to adherence to blood glucose monitoring was that they did not feel it is important (81%). Barriers to do exercise were always being busy (26.3%), laziness (26.3%) and coexisting diseases (24.3%). On Chi-square



**Figure 1:** Distribution of the respondents according to non-adherence to life-style modification and self-management

test association was found between non-adherence of diet and habitat ( $P = 0.032$ ) and nonattendance to diabetes education classes ( $P = 0.033$ ). Gender and occupation was significantly associated with smoking habit ( $P = 0.0001$ ). In case of betel quid chewing, occupation ( $P = 0.006$ ) and education ( $P = 0.024$ ) was significantly associated [Table 1].

In an attempt to identify the factors that might predict the non-adherence to life-style modification, multivariate binary logistic regression was performed. The result showed that high school passed patients are 3 times more likely to have good adherence to diet than other groups ( $\beta = 1.20$ ;  $P = 0.013$ ; odds ratio [OR] = 3.25; 95% CI: 1.28-8.62). In addition, patients from rural area showed nearly 3 times more likely to have adhered to diet than patients from urban and semi-urban areas ( $\beta = 1.08$ ;  $P = 0.013$ ; OR = 2.95; 95% CI: 1.25-6.95). Non attending education class also showed significant association with non-adherence to diet ( $\beta = 1.03$ ;  $P = 0.043$ ; OR = 2.79; 95% CI: 1.03-7.54). Non-attendance to diabetes education class ( $\beta = 0.658$ ;  $P = 0.014$ ; OR = 1.93; 95% CI: 1.019-3.658) and older age (70+ years) ( $\beta = -2.469$ ;  $P = 0.037$ ; OR = 2.79; 95% CI: 1.03-7.54) showed significant association with non-adherence to exercise. Unemployed patients were 2 times more likely to non-adhere to blood glucose testing than other occupational groups ( $\beta = 0.884$ ;  $P = 0.045$ ; OR = 2.422; 95% CI: 1.021-5.743). Higher education group showed 5 times more likely to smoking habit than other education groups ( $\beta = 1.783$ ;  $P = 0.021$ ; OR = 5.947; 95% CI: 1.31-26.10). Non-attendance to diabetes education class ( $\beta = -2.469$ ;  $P = 0.037$ ; OR = 2.79; 95% CI: 1.03-7.54) and business occupation group ( $\beta = -1.286$ ;  $P = 0.039$ ; OR = 0.276; 95% CI: 0.082-0.94) showed significant association to smoking and betel quid intake habit respectively.

Significant relation was found between non-adherence to diet and uncontrolled fasting blood glucose (FBG)

level and blood glucose level 2 h ABF on Chi-squared test. About 72.9% patients who were non-adhered to diet had uncontrolled FBG, whether around half of the patients (53.3%) had uncontrolled FBG who adhered to diet ( $P = 0.009$ ). Similar finding was found with ABF where 17.8% adhered patients had controlled ABF in comparison to 37.8% non-adhered to diet patients ( $P = 0.005$ ). There was significant FBG and ABF control in patients who did not take betel quid ( $P = 0.048$  and  $P = 0.03$ , respectively). On  $t$ -test the mean difference of blood glucose level is significantly differed between non-adhered and adhered to regular blood glucose testing ( $M \pm SD$ ;  $12.44 \pm 4.76$  vs.  $11.11 \pm 4.43$ ;  $P = 0.01$ ).

Adherence to life-style modification is essential for both preventing diabetes complication and optimal glycemic control. In this study, nevertheless, most of the respondents (88%) were non-adherent to diet which is also quite similar to the other studies.<sup>1,6-8</sup> Other studies showed an adherence to diet of 23-52%.<sup>1,5,6</sup> Moreover, in the present study, one-fourth of the respondents did not perform exercise regularly. The adherence rate values of exercise studies varied between 48% and 66% respectively.<sup>1,5-8</sup> This is really matter of concern that some respondents did not feel that exercise is important as reflects their lack of awareness. Respondents who had other coexisting diseases (mainly osteoarthritis, cardiovascular disease, asthma) were reported as reasons that interfered with recommended exercise. Thus, therapeutic life-style measures must be adapted for the individual needs in order to accommodate pre-existing co-morbidities, since each individual patient is unique in background and life-style. The reasons of non-adhering to exercise in this study are consistent with that reported in previous non-adherence study conducted in Kuwait.<sup>7</sup> Although foot problems commonly develop in diabetic patients and can quickly become serious, the rate of non-adherence to foot care was high (70%) among the study population and care should be taken in this issue. Furthermore, some 30% of the respondents were non-adhered to regular blood glucose testing, though patients were told by health care provider for checking. Patient stated the main reason for the non-adherence was that they did not feel its importance for diabetes care.

To improve adherence, it is important to know the factors which influences non-adherence. Patients who attended diabetes education classes were more likely to follow the dietary instructions, exercise and quitting

**Table 1: Association of non-adherence with different variables (n = 374)**

Variables	Non-adherence to diet no. (%)	Non-adherence to exercise no. (%)	Non-adherence to regular blood test no. (%)	Non-adherence to foot care no. (%)	Non-adherence to quitting smoking no. (%)	Non-adherence to quitting betel quid chewing no. (%)
<b>Gender</b>						
Male (n=157)	139 (88.5)	31 (19.7)	106 (67.5)	112 (71.3)	22 (14)	33 (21)
Female (n=217)	190 (87.6)	61 (28.1)	149 (68.7)	151 (69.6)	–	57 (26.3)
$\chi^2/P$	0.082/0.87	3.437/0.069	0.055/0.82	0.132/0.732	32.30/0.0001	1.37/0.271
<b>Level of education</b>						
Up to primary (n=112)	105 (93.8)	30 (26.8)	34 (30.4)	76 (67.9)	7 (6.3)	37 (33)
Secondary-higher secondary (n=174)	148 (85.1)	39 (22.4)	60 (34.5)	122 (70.1)	8 (4.6)	33 (19)
Graduate and above (n=88)	76 (86.4)	23 (26.1)	25 (28.4)	65 (73.9)	7 (8)	20 (22.7)
$\chi^2/P$	5.144/0.076	0.849/0.654	1.15/0.562	0.858/0.651	1.23/0.541	7.495/0.024
<b>Habitat</b>						
Urban (n=281)	250 (89)	74 (26.3)	93 (33.1)	205 (73)	19 (6.8)	66 (23.5)
Rural (n=48)	37 (77.1)	11 (22.9)	13 (27.1)	31 (64.6)	2 (4.2)	17 (35.4)
Semi-urban (n=45)	42 (93.3)	7 (15.6)	13 (28.9)	27 (60)	1 (2.2)	7 (15.6)
$\chi^2/P$	5.599/0.032	2.514/0.285	0.886/0.642	3.987/0.136	1.18/0.577	5.23/0.074
<b>Attending diabetes education class</b>						
Attended (n=283)	243 (85.9)	76 (26.9)	90 (31.8)	200 (70.7)	14 (4.9)	68 (24)
Not attended (n=91)	86 (94.5)	16 (17.6)	29 (31.9)	63 (69.2)	8 (8.8)	22 (24.2)
$\chi^2/P$	4.85/0.027	3.192/0.092	0.0001/0.544	0.068/0.445	1.838/0.137	0.001/0.540
<b>Family history of diabetes</b>						
Yes (n=282)	246 (87.2)	66 (23.4)	94 (33.3)	201 (71.3)	17 (6)	70 (24.8)
No (n=92)	83 (90.2)	26 (28.3)	25 (27.2)	62 (64.7)	5 (5.4)	20 (21.7)
$\chi^2/P$	0.583/0.580	0.882/0.403	1.213/0.304	0.50/0.51	0.044/1.0	0.361/0.326
<b>Occupation</b>						
Service (n=94)	80 (85.1)	18 (19.1)	29 (30.9)	68 (72.3)	12 (12.8)	13 (13.8)
Business (n=42)	39 (92.9)	11 (26.2)	12 (28.6)	27 (64.3)	9 (21.4)	16 (38.1)
Housewife (n=192)	171 (89.1)	53 (27.6)	60 (31.3)	134 (69.8)	0 (11.3)	53 (27.6)
Unemployed (n=46)	39 (84.8)	10 (21.7)	18 (39.1)	34 (73.9)	1 (2.2)	8 (17.4)
$\chi^2/P$	2.33/0.506	2.70/0.44	1.407/0.704	1.227/0.747	39.10/0.0001	12.35/0.006

Fisher's exact test was conducted when cells have expected count &lt;5

smoking habit than patients who did not attend any class. Similar results found in a study conducted in Hungary where patients who visited their GP monthly tended to follow the diet instructions reliably.<sup>1</sup> Formal education also played significant role on adherence to recommended diet. Respondents with higher level of education showed better adherence to diet. However, opposite findings was found in case of smoking where higher education group showed more smoking habit. It was found that respondents living in urban and semi-urban areas were more non-adherent to diet than in rural areas. Older age showed barriers to adhering exercise. Unemployed patients are more non-adhered to blood glucose testing than other occupation group and business occupation group had more betel quid chewing habit than others.

It is also matter of concern that nearly three-fourth respondents were overweight or obese and among them the proportion of female was higher than male. This is

maybe due to the accessibility of the information or lack of awareness. Thus, this group should be targeted for the intervention.

Overall, in this study, there are some areas where the adherence of respondents is lower than optimal; this especially true in the areas of adherence to diet and foot care. Diabetes education and socio-demographic factors need to be considered to improve adherence to lifestyle modification and self-care. Not only this, patients also need to be empowered to identify and overcoming their barriers. However, in this study, patients of health care centers of Dhaka city was selected as study population which is not reflecting the population of whole country. Moreover, although this study reported some factors contributing non-adherence, some other factors like doctor-patient relation, patient health belief and psychological factors need to be incorporated in the further study. A large scale study is needed where these factors need to be incorporated.

## References

1. Hankó B, Kázmér M, Kumli P, Hrágyel Z, Samu A, Vincze Z, *et al.* Self-reported medication and lifestyle adherence in Hungarian patients with Type 2 diabetes. *Pharm World Sci* 2007;29:58-66.
2. World Health Organization. Report on Adherence to Long-term Therapies. Geneva: World Health Org; 2003.
3. Rubin RR. Adherence to pharmacologic therapy in patients with type 2 diabetes mellitus. *Am J Med* 2005;118 Suppl 5A:27S-34.
4. Lin EH, Katon W, Rutter C, Simon GE, Ludman EJ, Von Korff M, *et al.* Effects of enhanced depression treatment on diabetes self-care. *Ann Fam Med* 2006;4:46-53.
5. Shultz JA, Sprague MA, Branen LJ, Lambeth S. A comparison of views of individuals with type 2 diabetes mellitus and diabetes educators about barriers to diet and exercise. *J Health Commun* 2001;6:99-115.
6. Wing RR, Marcus MD, Epstein LH, Salata R. Type II diabetic subjects lose less weight than their overweight nondiabetic spouses. *Diabetes Care* 1987;10:563-6.
7. Serour M, Alqhenaei H, Al-Saqabi S, Mustafa AR, Ben-Nakhi A. Cultural factors and patients' adherence to lifestyle measures. *Br J Gen Pract* 2007;57:291-5.
8. Swift CS, Armstrong JE, Beerman KA, Campbell RK, Pond-Smith D. Attitudes and beliefs about exercise among persons with non-insulin-dependent diabetes. *Diabetes Educ* 1995;21:533-40.
9. Ciechanowski PS, Katon WJ, Russo JE. Depression and diabetes: Impact of depressive symptoms on adherence, function, and costs. *Arch Intern Med* 2000;160:3278-85.
10. Glasgow RE, Toobert DJ, Gillette CD. Psychosocial barriers to diabetes self management and quality of life. *Diabetes Spectr* 2001;14:33-41.
11. WHO Expert Consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. *Lancet* 2004;363:157-63.

**Cite this article as:** Mumu SJ, Saleh F, Ara F, Afnan F, Ali L. Non-adherence to life-style modification and its factors among type 2 diabetic patients. *Indian J Public Health* 2014;58:40-4.

**Source of Support:** Nil. **Conflict of Interest:** None.

