Research Article **CODEN: IJPRNK** **ISSN: 2277-8713**
Prabhu M, IJPRBS, 2015; Volume 4(1): 1-12 **IJPRBS**

INTERNATIONAL JOURNAL OF PHARMACEUTICAL RESEARCH AND BIO-SCIENCE

THE IMPACT OF PATIENT COUNSELING ON THE QUALITY OF LIFE IN PATIENTS WITH TYPE II DIABETES MELLITUS

GOON WAN XIN[1], PRABHU M[2*], HAJA NAZEER AHAMED[3], RADHA R[4], SRINIVASAN N[5]

1. School of Pharmacy and Applied Sciences, La Trobe University, Bendigo, Victoria 3552, Australia.
2. Department of Pharmacy Practice, Asia Metropolitan University, Cheras, Malaysia.
3. Department of Pharmacology, Asia Metropolitan University, Cheras, Malaysia.
4. Department of Pharmaceutical Chemistry, Asia Metropolitan University, Cheras, Malaysia
5. Department of Pharmacognosy, Asia Metropolitan University, Cheras, Malaysia.

Accepted Date: 19/11/2014; Published Date: 27/02/2015

Abstract: **Background** Diabetes mellitus has been identified as one of the major contribution of mortality worldwide. A comparative intervention (concurrent control) study was conducted to determine the influences of pharmaceutical care on quality of life in Type II diabetic patients. **Materials and Method** The study was carried out at the outpatient clinic of Hospital Kuala Lumpur, Malaysia for five months by convenience sampling where 140 patients were enrolled equally into control and intervention groups. Intervention group received counseling with information leaflet whereas control group was deprived of any pharmaceutical care till the end of the study. Follow up was done one month after baseline by telephone survey. Pre-validated Diabetes-39 questionnaire was administered at baseline and follow up. Clinical parameters such as fasting blood glucose, body mass index and HbA1c were compared between groups post counseling. **Results** Independent t-test and Chi-square test were conducted and intervention group showed a reduction in the effect of diabetes on quality of life. The changes in mean score was highest in energy and mobility domain, showing a decline from 56.53±17.80 at baseline to 49.57±17.12 at follow up ($p<0.05$). The clinical parameters revealed slight reduction in intervention group. However, the differences were not significant ($p>0.05$). There were no significant changes in scores and clinical outcomes for control group ($p>0.05$). Three domains were negatively associated with quality of life where energy and mobility has the strongest association. **Conclusion** The findings revealed that the intervention program was effective in enhancing Type II Diabetes patients' quality of life.

Keywords: Diabetes Mellitus, Pharmaceutical Care, Quality of life

PAPER-QR CODE

Corresponding Author: MR. PRABHU M.

Access Online On:

www.ijprbs.com

How to Cite This Article:

Prabhu M, IJPRBS, 2015; Volume 4(1): 1-12

INTRODUCTION

Diabetes has been viewed as a global health issue besides a costly chronic disease with increasing prevalence throughout the world [1]. WHO predicted that the estimated number of people with diabetes will rise to 300 million by the year of 2025 [2]. Malaysia is the fourth nation with highest prevalence rate of diabetes patients in Asia [3]. Furthermore, diabetes was the eight in top ten causes of years of life lost besides the top fifth of the disability causes. In addition, the second National Mortality and Morbidity Survey in 2006 states that the prevalence of diabetes had increased drastically to 11% compared to 0.6% in 1960s [4]. This indicates that more than one in 10 Malaysian adults had diabetes. Ministry of Health in Malaysia also reported that the cost of outpatient treatment for 60,000 diabetics is approximately RM 14.5 million per year[5]. There are many factors contributing to the significant increase in prevalence rate, including poor glycemic control, physical inactivity and obesity regardless of age, geographical region or the type of diabetes [6-8].

Quality of life is one of the crucial elements of health that refers to people's emotional, social and physical well being and their ability to function in the ordinary tasks of living. [9] However, diabetic individuals have lower quality of life compared to non-diabetics even though it is better compared to other chronic diseases [10-12]. Despite clinical improvements, the quality of life in diabetics has been decreasing over time. Diabetes Attitudes Wishes and Needs (DAWN) study also reported that 41% of the participants reported poor psychological well-being [13]. A reduction in quality of life is more likely due to diabetes care burden, symptoms and side effects [14]. In addition, the efforts to prevent complications often overlook the impact of diabetes and its treatment on quality of life [15].

Diabetes education is one of the main components of diabetes management and has been increasingly recognized and integrated in diabetes care [16]. There are various benefits of diabetes education. Firstly, it increases patients' understanding of diabetes. Secondly, it facilitates the self-empowerment of an individual in diabetes self-management. Thirdly, there will be improved diabetes self-management behavior that leads to greater clinical outcomes [17]. However, there are no thorough reviews of measures in determining diabetes education program in terms of the treatment type, the service provider and the process. In addition, there is no sufficient evidence of diabetes education assessing the quality of life in different domains. In short, it will be useful in disease management if a standard education program that covers various aspects can be created. Thus, a pharmaceutical intervention that focuses on non-pharmacological therapy was created and tested for its effectiveness in enhancing the quality of life in Type II Diabetes Mellitus patients.

MATERIALS AND METHODS

Study location This study was carried out in the outpatient clinic of Hospital Kuala Lumpur, Kuala Lumpur, Malaysia after obtaining the ethical clearance from National Institute of Health and Medical Research and Ethics Committee of the hospital. Informed consent was taken from participants before enrolment.

Study Population The population for this study was adults diagnosed with Type II Diabetes Mellitus that are currently taking oral hypoglycemic agents or insulin Individuals with Type I Diabetes Mellitus, pregnant women and pediatric patients were excluded. A total of 140 patients were eligible for the study.

Sampling Strategy Samples were recruited using stratified sampling and participants were randomized equally into intervention (70 patients) and control group (70 patients). Clinical parameters and medication history were recorded from the outpatient card and prescriptions of the patients. After enrolment, participants in intervention group were given education about diabetes mellitus, its management and emphasis on dietary restrictions and lifestyle modification with the aid of information leaflets. The participants in control group received counseling at the end of this study.

Survey Instrument A pre-validated Diabetes-39 questionnaire which contained 59 items and divided into two sections one of five domains of quality of life and another of overall ratings, was administered to evaluate patients' quality of life at baseline and follow up. The patients' demographic and clinical parameter details were recorded in a collection form attached to the questionnaire. Data analysis was carried out by SPSS software using independent *t*-test and Chi-square test for statistical interpretation.

RESULTS

The demographic details and clinical parameters of the participants are shown in Table 1 and Table 2 respectively. The energy and mobility scale was found to be highly reliable (15 items; α= baseline 0.873, follow up 0.866). Cronbach's alphas for the 12 diabetes control and 5 social burden items were 0.856 (follow up 0.855) and 0.866 (follow up 0.845) respectively. The anxiety and worry scale of 4 items (α= baseline 0.756, follow up 0.726) and sexual functioning of 3 items (α= baseline 0.995, follow up 0.984) are reliable. The participants in intervention group (M=49.57, SD=17.12) reported significantly higher level of quality of life at follow up as compared to baseline score (M = 56.53, SD = 17.80), $t(138) = 2.357$, $p < 0.05$, for energy and mobility domain. As for diabetes control, the intervention group (M=52.14, SD=10.05) reported greater quality of life at follow up in comparison with baseline score (M = 58.86, SD = 12.51), $t(138) = 3.501$, $p < 0.05$. Intervention group also reported significantly higher level of quality of

life at follow up (M=18.29, SD=4.53) as compared to baseline score (M = 19.81, SD = 4.61), t(138) = 1.979, p = 0.05, for anxiety and worry domain. Social burden and sexual functioning domains did not differ significantly in intervention group pre and post counseling (p=n.s). For control group, all the domains did not differ significantly at baseline and follow up (p=n.s). A chi-square test was performed for intervention group and there was significant relationship between energy and mobility and the overall quality of life, X^2 (295, N = 69) = 333.633, p =0.041. There was a significant relationship between diabetes control and overall quality of life based on Chi-square result, X2 (230, N = 69) = 266.876, p =0.048. A chi-square test was performed and found that the relationship between social burden and the overall quality of life was significant, X^2 (130, N = 69) = 157.570, p =0.050. There were significant correlations between quality of life and energy and mobility (r=-0.299, p<0.003), quality of life and diabetes control (r=-0.293, p<0.014) and quality of life and social burden (r = -0.400, p<0.001). There were non-significant correlations of -0.206 (p = n.s) between quality of life and anxiety and worry. Quality of life and sexual functioning were not correlated significantly, r=-0.146, p=n.s.

DISCUSSION

The management of Type II Diabetes Mellitus requires thorough counseling to enhance patient involvement and compliance, besides providing appropriate pharmacological measures. This study determined the impact of education on the quality of life in Type II diabetic patients, which resulted significant differences in the quality of life of the participants in intervention group in comparison with control group. The 140 respondents were divided equally where there were 70 subjects in both groups. Males and participants aged between 40 to 59 years old comprised the majority in both groups. Based on the total population ratio, Indians has the highest rate of developing Type II Diabetes in both groups. As seen in both group, majority of the subjects were married, employed and have good literacy rate, as they received formal secondary or college education. Hence, counseling provided will be beneficial to the participants.

In this study, majority of the respondents were of normal body mass index, followed by overweight individuals. This could be due to "metabolically obese" phenotype among normal weight individuals, renders higher susceptibility for T2DM, as highlighted in several studies conducted in Asian populations [18-24]. There were approximately half of the respondents that are non-smoker and non-alcoholic in control and intervention groups, which is corresponding to the results of several studies where moderate drinkers would have lower risk of getting diabetes[25-27]. As for pharmacological regimen, Metformin alone were the commonly prescribed oral hypoglycemic agent observed in this study, which is similar to the findings of several studies [28-32]. Metformin is very cost effective and safest among oral hypoglycemic agents therefore it is most frequently used in the treatment of diabetes [33]. Hypertension

remains the most common cardiac disease associated with diabetes as seen in both groups, which have a positive relationship with insulin resistance and studies suggest that elevated blood pressure deserves to be listed among the components of the metabolic syndrome [34, 35].

The present study studied the effect of pharmaceutical care on Type II diabetic patients and findings indicated significant differences in the quality of life of the respondents enrolled in the intervention group in comparison with control group. Diabetes-39 questionnaire was used to determine the quality of life pre and post counseling in both groups. A noted improvement in the quality of life was observed in intervention group for three domains which are energy and mobility, diabetes control and anxiety and worry. Glycemic control was measured in terms of clinical parameters and there were slight reductions in clinical parameters such as body mass index, fasting blood sugar and HbA1c levels. However, there were no significant differences in means between baseline and follow up for all variables in control and intervention groups as significance values are more than 0.05 ($p > 0.05$).

Chi-Square results also reveal that there was an association between the independent variables (energy and mobility, diabetes control and social burden) and dependent variable which is the QoL of individuals with T2DM. As for social burden domain, only a minority of respondents found that it is an embarrassing disease and this could be the reason of the small association between this variable and QoL [36]. The remaining variables which are anxiety and worry and sexual functioning do not have any significant association with overall QoL in T2DM individuals [37]. The sexual functioning scale has no association with QoL as many of the respondents do not have diabetes-related complications. Pearson correlation test was conducted and there were negative correlations between all independent variables and overall QoL. The highest strength of correlation was seen in social burden, followed by energy and mobility, diabetes control, anxiety and worry and sexual functioning.

The study concludes that patient counseling enhances the overall quality of life in patients diagnosed with Type II Diabetes Mellitus by stating the statistically significant difference in quality of life observed in intervention group.

The limitation in this study was follow up of the participants. However, it was minimized via a number of retention strategies, such as allowing participants to decide on the counseling session based on their availability and the researcher being easily contactable. Besides, telephone survey was conducted for follow up considering the convenience of participants.

ACKNOWLEDGEMENTS

We thank the management of Asia Metropolitan University, Malaysia for providing the necessary support and National Institute of Health and Medical Research and Ethics Committee of Hospital Kuala Lumpur for granting us the permission to carry out the study in their hospital.

Table 1: Demographic details of the respondents

Variables	Control Group (n = 70)	Intervention Group (n = 69)	Total (n=139)
Gender			
Male	44 (62.9%)	43 (61.4%)	87 (62.6%)
Female	25 (35.7%)	27 (38.6%)	52 (37.4%)
Race			
Malay	24 (34.3%)	28 (40.0%)	53 (38.1%)
Chinese	25 (35.7%)	25 (35.7%)	49 (35.3%)
Indian	18 (25.7%)	15 (21.4%)	33 (23.7%)
Others	2 (2.9%)	2 (2.9%)	4 (2.9%)
Age group			
20 to 39 years	4 (5.7%)	10 (14.3%)	14 (10.0%)
40 to 59 years	33 (47.1%)	43 (61.4%)	77 (55.0%)
60 to 79 years	32 (45.7%)	15 (21.4%)	47 (33.6%)
More than 80 years	-	2 (2.9%)	2 (1.4%)
Marital Status			
Single	7 (10.0%)	17 (24.3%)	24 (17.1%)
Married	62 (88.6%)	53 (75.7%)	116 (82.9%)
Employment status			
Unable to work	1 (1.4%)	2 (2.9%)	3 (2.1%)
Retired	13 (18.6%)	8 (11.4%)	21 (15.0%)
Self-employed	9 (12.9%)	5 (7.1%)	15 (10.7%)
Employed	31 (44.3%)	41 (58.6%)	72 (51.4%)
Not working	15 (21.4%)	14 (20.0%)	29 (20.7%)
Education level			
None	3 (4.3%)	5 (7.1%)	8 (5.7%)
Primary school	6 (8.6%)	8 (11.4%)	14 (10.0%)
Secondary school	30 (42.9%)	19 (27.1%)	51 (36.4%)
College	25 (35.7%)	32 (45.7%)	56 (40.0%)
University	5 (7.1%)	6 (8.6%)	11 (7.9%)

Table 2: Clinical information of the participants

Variables	Control Group (n = 70)	Intervention Group (n = 69)	Total (n=139)
1. Body Mass Index (BMI)			
Underweight (<18.5)	-	1 (1.4%)	1 (0.7%)
Normal (18.5 - 24.9)	33 (47.1%)	32 (45.7%)	65 (46.8%)
Overweight (25.0 - 29.9)	31 (44.3%)	30 (42.9%)	61 (43.9%)
Obese (>30)	5 (7.1%)	7 (10.0%)	12 (8.6%)
2. Social History			
Non-smoker and non-alcoholic	35 (50.0%)	33 (47.1%)	68 (48.9%)
Smoker	20 (28.6%)	23 (32.9%)	43 (30.9%)
Alcoholic	7 (10.0%)	5 (7.1%)	12 (8.6%)
Smoker and alcoholic	7 (10.0%)	9 (12.9%)	16 (11.5%)
3. Medication History			
Metformin	35 (50.0%)	50 (71.4%)	85 (61.1%)
Gliclazide	14 (20.0%)	12 (17.1%)	26 (18.7%)
Glibenclamide	12 (17.1%)	2 (2.9%)	14 (10.0%)
Sitagliptin	-	1 (1.4%)	1 (0.7%)
Metformin and gliclazide	2 (2.9%)	2 (2.9%)	4 (2.9%)
Metformin and glibenclamide	3 (4.3%)	1 (1.4%)	4 (2.9%)
Metformin and rosiglitazone	1 (1.4%)	2 (2.9%)	3 (2.1%)
Metformin and sitagliptin	1 (1.4%)	-	1 (0.7%)
Acarbose, metformin and glicazide	1 (1.4%)	-	1 (0.7%)
4. Co-morbidities			
None	19 (27.1%)	30 (42.9%)	49 (35.3%)
Cardiac diseases	39 (56.5%)	28 (40.0%)	67 (48.2%)
Foot disease	2 (2.9%)	-	2 (1.4%)
Obesity	3 (4.3%)	2 (2.9%)	5 (3.6%)
Cardiac diseases and foot disease	-	1 (1.4%)	1(0.7%)
Cardiac diseases and obesity	2 (2.9 %)	5 (7.1%)	7 (5.0%)
Cardiac and eye diseases	1 (1.4%)	1 (1.4%)	2 (1.4%)
Cardiac and kidney disease	3 (4.3%)	2 (2.9%)	5 (3.6%)
Eye and foot diseases	-	1 (1.4%)	1 (0.7%)
5. Duration of Diabetes			
0 to 9 years	49 (70.0%)	52 (74.3%)	101(72.7%)
10 to 19 years	17 (24.3%)	13 (18.6%)	30 (20.1%)
20 to 29 years	3 (4.3%)	3 (4.3%)	6 (4.3%)

30 to 39 years	-	1 (1.4%)	1 (0.7%)
40 to 49 years	-	1 (1.4%)	1 (0.7%)
6. Type of Treatment			
Oral hypoglycemic agent (OHA)	3 (4.3%)	1 (1.4%)	4 (2.9%)
Diet and OHA	38 (54.3%)	49 (70.0%)	87 (62.3%)
OHA and insulin	11 (15.7%)	7 (10.0%)	18 (12.9%)
Diet, OHA and insulin	17 (24.3%)	13 (18.6%)	30 (20.1%)
7. Total Insulin Doses per day			
None	41 (58.6%)	49 (70.0%)	90 (64.7%)
One	4 (5.7%)	1 (1.4%)	5 (3.6%)
Two	13 (18.6%)	17 (24.3%)	30 (20.1%)
Three	4 (5.7%)	1 (1.4%)	5 (3.6%)
Four	6 (8.6%)	-	6 (4.3%)
Five	1 (1.4%)	2 (2.9%)	3 (2.1%)

Table 3: Comparison of means by domains between intervention and control groups

No.	Scale	Time Groups	n*		Baseline	Follow up	P	
			B	F	Mean ± SD	Mean ± SD	B	F
1.	Energy and mobility	Control	70	69	53.57 ± 16.13	55.49 ± 14.71	1.928	1.771
		Intervention	70	70	56.53 ± 17.80	49.57 ± 17.12	2.127	2.047
2.	Diabetes control	Control	70	69	55.91 ± 12.30	57.64 ± 11.52	1.500	1.387
		Intervention	70	70	58.86 ± 12.51	52.14 ± 10.05	1.500	1.200
3.	Social burden	Control	70	69	18.94 ± 7.44	19.33 ± 7.33	0.889	0.883
		Intervention	70	70	20.36 ± 7.89	18.36 ± 6.35	0.944	0.758
4.	Anxiety and worry	Control	70	69	17.96 ± 4.85	18.33 ± 4.92	0.580	0.593
		Intervention	70	70	19.81 ± 4.61	18.29 ± 4.53	0.551	0.541
5.	Sexual functioning	Control	63	63	5.97 ± 3.71	5.95 ± 3.68	0.467	0.464
		Intervention	62	62	6.96 ± 4.83	6.13 ± 3.96	0.614	0.504
6.	Overall QoL	Control	70	69	4.63± 0.981	4.62 ± 0.824	0.117	0.099
		Intervention	70	70	4.49 ± 0.959	4.84 ± 0.651	0.115	0.078

Note: n: sample size; B: Baseline; F: Follow up

Table 4: Independent samples t-test for comparing scales in intervention group

Scale	Levene's Test for Equality of Variances		t-test for Equality of Means						
								95% Confidence Interval of the Difference	
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Energy and mobility	0.198	0.657	2.357	138	0.020	6.957	2.952	1.120	12.794
Diabetes control	3.519	0.063	3.501	138	0.001	6.714	1.918	2.922	10.506
Social burden	2.065	0.153	1.652	138	0.101	2.000	1.211	-0.394	4.394
Anxiety and worry	0.109	0.741	1.979	138	0.050	1.529	0.772	0.001	3.056
Sexual functioning	4.298	0.040	1.057	117.5	0.293	0.8390	0.794	-0.7333	2.411
Overall QoL	16.541	0.000	-2.577	138	0.011	-0.357	0.139	-0.631	-0.083

Note: Equal variances assumed for all variables except for sexual functioning and overall QoL as the significance values were less than 0.05.

REFERENCES

1. King H, Aubert RE and Herman WH: Global burden of diabetes, 1995-2025: prevalence, numerical estimates and projections. Diabetes Care 1998; 21: 1414-1431.

2. Wild S, Roglic G, Green A, Sicree R, King H: Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. Diabetes Care 2004; 27:1047–1053.

3. Wong E, Backholer K, Harding J, Gearon E, Stevenson C, Freak-Poli R and Peeters A: A systematic review and meta-analysis of diabetes and risk of physical disability and functional impairment - protocol. Systematic Reviews 2012; 1-47.

4. Letchuman GR, Wan Nazaimoon WM, Wan Mohamad WB, Chandran LR, Tee GH, Jamaiyah H, Isa MR, Zanariah H, Fatanah I, Ahmad Faudzi Y: Prevalence of Diabetes in the Malaysian National Health Morbidity Survey III 2006. Medical Journal of Malaysia 2010; 65: 180-186.

5. Nabilla S. Direct costs of diabetes in an outpatient setting in Malaysia. National Committee for Clinical Research 2003, 2: 19-27.

6. Mafauzy M. Diabetes mellitus in Malaysia. Medical Journal of Malaysia 2006, 61: 397-398.

7. Mafauzy M. Diabetes control and complications in private primary health care in Malaysia. Medical Journal of Malaysia 2005; 60: 212-217.

8. Ismail M, Chee S, Nawawi H, Yusoff K, Lim T and James W. Obesity in Malaysia. Obesity Reviews 2002; 3: 203-208.

9. Donald A: What is Quality of Life? Hayward Medical Communication 2010, 1.

10. Maddigan SL, Feeny DH, Johnson JA: Health-related quality of life deficits associated with diabetes and comorbidities in a Canadian National Population Health Survey. Quality of Life Research 2005; 14:1311-1320.

11. Saito, I. Inami, F. Ikebe, T. Moriwaki, C. Tsubakimoto, A. Yonemasu, K. (2006) Impact of Diabetes on Health-related Quality of Life in a Population Study in Japan. Diabetes Research and Clinical Practice, 73(1), 51-57.

12. Saito I, Inami F, Ikebe T, Moriwaki C, Tsubakimoto A, Yonemasu K, Ozawa H. Impact of Diabetes on Health-related Quality of Life in a Population Study in Japan. Diabetes Research and Clinical Practice 2006; 73: 51-57.

13. Rubin RR and Peyrot M. Quality of Life and Diabetes. Diabetes/Metabolism Research and Reviews 1999; 15: 205-218.

14. Peyrot M, Rubin R, Lauritzen T, Snoek FJ, Matthews DR and Skovlun SE. Psychosocial Problems and Barriers to Improved Diabetes Management: Results of the Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) Study. Diabetic Medicine 2005; 22: 1379-1385.

15. Hill-Briggs F, Gary TL, Baptiste-Roberts K and Brancati FL. Thirty-six-item Short Form Outcomes Following A Randomized Controlled Trial in Type 2 Diabetes. Diabetes Care 2005; 28: 443-444.

16. Bradley C and Speight B: Patient perceptions of diabetes and diabetes therapy: Assessing quality of life. Diabetes/Metabolism Research and Reviews 2002; 18: S64-S69..

17. Atak N and Arslan U: A Pilot Project to Develop and Assess a Health Education Programme for Type 2 Diabetes Mellitus Patients. Health Education Journal 2005; 64: 339-346.

18. Ramachandran A, Wan Ma RC and Snehalatha C: Diabetes in Asia. Lancet 2010; 375: 408-418.

19. Chan JC, Malik V, Jia W, Kadowaki T, Yajnik CS, Yoon KH and Hu FB: Diabetes in Asia: epidemiology, risk factors, and pathophysiology. The Journal of the American Medical Association 2009; 301: 2129-2140.

20. Lee JW, Brancati FL and Yeh HC: Trends in the prevalence of type 2 diabetes in Asians versus whites: results from the United States National Health Interview Survey, 1997-2008. Diabetes Care 2011; 34: 353-357.

21. Lear SA, Humphries KH, Kohli S, Chockalingam A, Frohlich JJ and Birmingham CL: Visceral adipose tissue accumulation differs according to ethnic background: results of the Multicultural Community Health Assessment Trial (M-CHAT). The American Journal of Clinical Nutrition 2007; 86: 353-359.

22. Raji A, Seely EW, Arky RA and Simonson DC: Body fat distribution and insulin resistance in healthy Asian Indians and Caucasians. The Journal of Clinical Endocrinology and Metabolism 2001; 86(11): 5366-5371.

23. Chandalia M, Abate N, Garg A, Stray-Gundersen J and Grundy SM. Relationship between generalized and upper body obesity to insulin resistance in Asian Indian men. The Journal of Clinical Endocrinology and Metabolism 1999; 84: 2329-2335.

24. Yoon KH, Lee JH, Kim JW, Cho JH, Choi YH, Ko SH, Zimmet P and Son HY: Epidemic obesity and type 2 diabetes in Asia. Lancet 2006; 368: 1681-1688.

25. Shelgikar KM, Hockaday TD and Yajnik CS. Central rather than generalized obesity is related to hyperglycaemia in Asian Indian subjects. Diabetic Medicine 1991; 8: 712-717.

26. Koppes LL, Dekker JM, Hendriks HF, Bouter LM and Heine RJ. Moderate alcohol consumption lowers the risk of type 2 diabetes: a meta-analysis of prospective observational studies. Diabetes Care 2005; 28: 719-725.

27. Freiberg MS, Cabral HJ, Heeren TC, Vasan RS and Curtis Ellison R: Alcohol consumption and the prevalence of the Metabolic Syndrome in the US.: a cross-sectional analysis of data from the Third National Health and Nutrition Examination Survey. Diabetes Care 2004; 27: 2954-2959.

28. Rimm EB, Chan J, Stampfer MJ, Colditz GA and Willett WC: Prospective study of cigarette smoking, alcohol use, and the risk of diabetes in men. British Medical Journal 1995; 310: 555–559.

29. Sultana G, Kapur P, Aqil M, Alam MS and Pillai KK. Drug utilization of oral hypoglycemic agents in a university teaching hospital in India. Journal of Clinical Pharmacology and Therapeutics 2010; 35: 267–277.

30. Vengurlekar S, Shukla P, Patidar P, Bafna R and Jain S: Prescribing pattern of antidiabetic drugs in indore city hospital. Indian Journal of Pharmaceutical Sciences 2008; 70: 637-640.

31. Yurgin N, Secnik K and Lage MJ. Antidiabetic prescriptions and glycemic control in German patients with type 2 diabetes mellitus: a retrospective database study. Clinical Therapeutics 2007; 29: 316-325.

32. Johnson JA, Pohar SL, Secnik K, Yurgin N, Hirji Z: Utilization of diabetes medication and cost of testing supplies in Saskatchewan, 2001. BMC Health Services Research 2006; 6: 159.

33. John LJ, Arifulla M, Sreedharan J, Muttappallymyalil J, DAS R, John J and Basha A: Age and gender-based utilisation pattern of antidiabetic drugs in Ajman, United Arab Emirates. Malaysian Journal of Pharmaceutical Sciences 2012; 10: 79-85.

34. Edelson GW and Sowers JR. Insulin resistance in hypertension: a focused review. The American Journal of the Medical Sciences 1993; 306: 345-347.

35. Sowers JR: Insulin resistance and hypertension. Mol Cell Endocrinol 1990; 74: C87-C89.

36. Dudzinska, M. Kurowska, M. Tarach, J. Chitryn, A. Barton. B. (2008) Social problems of diabetics. The influence of diabetes on patients' daily, family and personal lives. Department of Endocrinology, 8(4): 150-156.

37. Anderson R, Grigsby A, Freedland K, Groot M, McGill J, Clouse R and Lustman P. Anxiety and poor glycemic control: a meta-analytic review of the literature. The International Journal of Psychiatry in Medicine 2002; 32: 235-247.