

Knowledge, Practice, and its Associated Factors of Type 2 Diabetic Patients towards Dietary Therapy at University of Gondar Specialized Hospital, Northwest, Ethiopia 2017

Halima MI, Fisseha Z, Tarkie AW and Abere WA*

Department of Medical Nursing, University of Gondar Health Centre, Ethiopia

*Corresponding author: Abere Woretaw Azagew, Department of Medical Nursing, University of Gondar Health centre Ethiopia, Tel: +251896261264; E-mail: wabere@gmail.com

Received date: May 11, 2019; Accepted date: June 23, 2019; Published date: June 28, 2019

Copyright: © 2019 Halima MI, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Background: Diabetic Mellitus (DM) is the leading endocrine disorder worldwide. Its severity depends on the practice of dietary therapy. Healthy eating is an important standard in diabetic nutritional management.

Aim: To assess the knowledge, practice, and its associated factors of Type 2 DM (T2DM) patients towards dietary therapy in the University of Gondar Specialized Comprehensive Hospital Diabetic Care Clinic.

Methods: A cross-sectional study was conducted from March 28 to June 9, 2017. A systematic random sampling technique was employed to select study participants. Logistic regression analysis was used to identify factors associated with the knowledge and practice of diabetic patients towards dietary therapy. P-values < 0.05 were considered to be statistically significant.

Results: A total of 422 participants were enrolled with a response rate of 410 (96.8%). The prevalence of good knowledge and good practice of T2DM patients towards dietary therapy were 46.8% and 40.7% respectively. Urban dwellers [Adjusted Odds Ratio (AOR)=2.5, 95% CI: 1.3, 4.9] and attending formal education [AOR=1.6, 95% CI: 1.1, 2.5] were factors associated with good knowledge of dietary therapy. Participants who had formal education [AOR=2.5, 95% CI: 1.6, 4.0], had adequate dietary therapy information [AOR=1.8, 95% CI: 1.2, 2.9], and good knowledge of dietary therapy [AOR=1.6, 95% CI: 1.0, 2.5] were more likely to have good practice towards dietary therapy.

Conclusions: The prevalence of good knowledge and good practice of T2DM patients towards dietary therapy were found to be low. Being an urban dweller and having some form of formal education were factors associated with good knowledge regarding recommended dietary therapy. Similarly, attaining formal education, having adequate dietary therapy information, and good knowledge of dietary therapy was positively associated with good dietary therapy practice.

Keywords: Dietary Therapy; Knowledge; Practice; Type 2 Diabetes Mellitus; Ethiopia

Abbreviations: AOR: Adjusted Odds Ratio; CI: Confidence Interval; COR: Crude Odds Ratio; DM: Diabetes Mellitus; GUH: Gondar University Hospital; IDF: International Diabetics Federation; T2DM: Type 2 Diabetes Mellitus

Introduction

Diabetes Mellitus is a group of metabolic disorders characterized by increased blood glucose levels [1]. Globally, an estimated 422 million adults were living with diabetes. The global prevalence of diabetes is nearly doubled since 1980 which rises from 4.7% to 8.5% in the adult population in 2014. It is the leading endocrine disorder and one of the four priority non-communicable diseases targeted by the world leaders. Globally, around 90% of adults suffered from T2DM [2,3]. In Ethiopia, the prevalence of DM among adults ranges from 0.3 to 7% [4]. Those above 45 years of age, obesity, family history of DM, high blood pressure, and history of gestational DM are the most common

risk factors for T2DM [3-6]. Uncontrolled T2DM resulted in retinopathy, nephropathy, neuropathy, and micro and macrovascular problems [5]. People with diabetes have a mortality rate two times higher than non-diabetics, reduced life expectancy by 10-15 years, decreased quality of life, and increased medical care cost by 2-3 times [7].

Patient-centered management is the cornerstone of DM management plan that improves clinical outcomes, health status, and quality of life of the patient [8]. Lifestyle modifications, such as nutritional therapy, weight reduction, regular physical activity, and psychological care are basic tools in the diabetic care plan [9]. Since diabetes is a chronic disease, it requires a lifelong nutritional management plan. Self-monitoring or regulating carbohydrate intake remains a key strategy for glycemic control [10]. Dietary modification is one of the cornerstones of diabetes management and is based on the principle of healthy eating [11]. Patients with T2DM should restrict calories, foster regular eating, increase fiber intake, and limit the intake of refined carbohydrates and saturated fats [12]. For T2DM patients, assessing the knowledge and practice of self-dietary therapy is

important to prevent diabetic-related complications. Even though patient behavior has a crucial role in the success of diabetes diet therapy, it is influenced by social, cultural, and psychological issues [13]. There is limited evidence of the knowledge and practice of T2DM patients towards dietary therapy. Therefore, the aim of the present study was to determine the knowledge, practice, and associated factors of T2DM patients towards dietary therapy.

Materials and Methods

Study area: The study was conducted at the University of Gondar Specialized Comprehensive Hospital among T2DM patients in the Diabetic Care Clinic. Gondar is one of the historical towns in Ethiopia. It is about 750 km away from Addis Ababa. The University of Gondar Specialized Comprehensive Hospital is one of the referral Hospitals in the Amhara Region established in 1954. The Hospital serves for more than five million people in the Gondar town and neighboring regions. The Diabetic Care Clinic was established in the hospital in 1985, and at the moment, there were around 2500 registered T2DM patients receiving health care.

Study design: An institution based cross-sectional design was conducted. All T2DM patients attending in the University of Gondar Specialized Comprehensive Hospital were the target population and those patients who were on follow up were considered as the study population.

Sample size and selection of study participants: The sample size was determined by using the single population proportion formula through the EPI info Stat Calc program with the assumption of a 95% confidence level, 5% of marginal error, and 50% prevalence of good knowledge and good practice of T2DM patients towards dietary therapy. With these assumptions, the estimated sample size was 384. Considering a 10% non-response rate, the final sample size was 422. A sampling frame was developed according to the order of the patient attending the diabetic clinic. Systematic random sampling technique was used to select study participants by calculating a sampling interval as a total population to divided by sample size ($2500/422=6$) which showed each participant selected every sixth person pattern.

Study variables: Knowledge and practice of T2DM patients towards dietary therapy were the dependent variables, whereas socio-demographic and clinical factors were the independent variables.

Operational definitions: Good knowledge of dietary therapy was considered as study participant who scored greater or equal to the

mean (mean value ≥ 6.38) from the total knowledge related questions, whereas poor knowledge of dietary therapy was a score of less than the mean (mean value <6.38). Good dietary therapy practice was considered as T2DM patients scored greater or equal to the mean (mean value ≥ 4.2) from the total practice-related questions, whereas poor dietary therapy practice who scored less than the mean (mean value <4.2).

Data collection tools and procedures: The data collection tool was prepared by reviewing similar literatures which were composed of socio-demographic, knowledge, and practice of dietary therapy related questions [14]. Three nurses (two data collectors and one supervisor) participated in the data collection. To maintain the quality of the data the questionnaire was pretested and a half day training was given to data collectors. The questionnaire was first developed in English and translated to Amharic (local language) and back to English for its consistency. An interviewer-administered method was used to collect data from March 28 to June 9, 2017.

Data processing and analysis: Data were entered into EPI info version seven and exported to SPSS version twenty for analysis. Descriptive statistics, such as means, medians, frequencies, and percentages were calculated. All variables were entered into the multivariate logistic regression model to identify the effect of each independent variable on the outcome variables. P value ≤ 0.05 was considered statistically significant and AOR with a 95% CI was calculated to see the presence of associations.

Ethical considerations: Ethical approval was obtained from the University of Gondar Research Review Board and permissions were taken from the University of Gondar Specialized Hospital. Informed consent was obtained from each participant and personal identifiers were avoided to maintain confidentiality.

Results

Socio-demographic characteristics of study participants

A total of 422 participants were enrolled with a response rate of 96.8%. More than half (56.6%) of the participants were females. The mean (SD) age of the respondents was 56.16 (± 11.45) years. The majority (86.8%) of the participants were urban dwellers, 378 (92.2%) were Orthodox Christian, and 254 (62.0%) were married. Nearly half (51.2%) of the study participants had attained formal education (Table 1).

Variables	Category	Frequency (n)	Percent (%)
Age in years	21-40	45	11
	41-60	230	56.1
	>60	135	32.9
Sex	Male	178	43.4
	Female	232	56.6
Marital status	Single	23	5.6
	Married	254	62
	Divorced	50	12.2

	Widowed	83	20.2
Religion	Orthodox	354	86.3
	Muslim	52	12.7
	Catholic	3	0.7
	Other	1	0.2
Residence	Urban	356	86.8
	Rural	54	13.2
Ethnicity	Amhara	378	92.2
	Tigre	13	3.2
	Kimant	17	4.1
	Other	2	0.5
Educational status	No formal education	210	48.8
	Formal education	200	51.2
Occupation	Employed	139	33.9
	Unemployed	271	66.1
	<500ETB	91	22.2
House hold monthly	500-999ETB	81	19.8
Income	≥1000ETB	238	58
Attending Diabetic	Yes	167	40.7
Regular Diabetic	Yes	115	28
Counseling	No	295	72
Member of diabetic	Yes	181	44.1
Association	No	229	55.9
Nutritional training	Yes	77	18.8
Received	No	333	81.2

Table 1: Socio demographic characteristics of T2DM patients at University of Gondar Specialized comprehensive Hospital Northwest Ethiopia, 2017 (n=410).

Knowledge of T2DM patients towards dietary therapy

The prevalence of good knowledge of type II Dm patients towards dietary therapy was found to be 46.8% (95% CI; 42, 51.2), with the mean knowledge score of >6.38 towards

Factors associated with the knowledge of T2DM patients towards dietary therapy

In this study residence and educational status were significantly associated with knowledge of T2DM patients towards dietary therapy. Type 2 DM patients who were urban dwellers were 2.5 times [AOR=2.5, 95% CI; 1.3, 4.9] more likely to have good knowledge compared to those rural dwellers. Similarly, participants who attended

formal education were 1.6 times [AOR= 1.6, 95% CI: 1.1, 2.5] more likely to have good knowledge compared to those who had no formal education (Table 2).

The practice of T2DM patients towards their dietary therapy

This study revealed that 40.7% (95% CI; 36.7, 45.1) of the participants had good dietary therapy practice with the mean practice score of >4.2. The overall good practice is lower (35.9%) among males.

Variables	Category	Frequency (n)	Percent (%)
Total number of years	<5	222	54.1
Since first DM diagnosis		115	28.1
	>10	73	17.8
DM follow-up duration(in years)	<5	222	54.1
	5-Jan	115	28.1
Any co morbidity other than DM	Yes	203	50.5
Type of co-morbidity	Hypertension	111	54.6
	Visual problem	45	22.2
	Chronic renal disease	37	18.2
Asthma	10	5	
Type of diabetic treatment	Oral anti diabetics agent	278	67.8
	Insulin with oral anti diabetics agent	101	24.6
	Insulin	31	7.6
Current fasting blood sugar(mg/dl)	<126	111	27.1
	>126	299	72.9

Table 2: Clinical characteristics of T2DM patients at University of Gondar Specialized Comprehensive Hospital, Northwest Ethiopia, 2017 (n=410).

Factors associated with the Practice of T2DM patients towards dietary therapy

The study revealed that; education status, having adequate dietary information, and good knowledge of dietary therapy were found to be significant factors. Participants who had attended formal education were 2.5 times [AOR=2.5, 95% CI: 1.6, 4.0] more likely to have good dietary therapy practice compared to those who had no formal education. Similarly, participants who had adequate dietary therapy

information were 1.8 times [AOR= 1.8, 95% CI; 1.2, 2.9] more likely to have good dietary therapy practice as compared to those who had no adequate dietary therapy information. Furthermore, participants who had good knowledge of dietary therapy were 1.6 times [AOR=1.6, CI: 1.039, 2.462] more likely to have good dietary therapy practice compared to those who had poor knowledge of dietary therapy (Table 3).

Variables	Category	Knowledge		COR (95%CI)	AOR (95%CI)
		Good	Poor		
Sex	Male	90	88	1.303(0.881,1.929)	0.998 (0.54-1.543)
	Female	102	130	1	1
Marital status	Single	10	13	0.868(0.342-2.200)	0
	Married	128	126	1.146(0.698-1.883)	0
	Divorced	15	35	0.484(0.230-1.016)	0
	Widowed	39	44	1	0
Residence	Urban	177	179	2.571 (1.368-4.831)	2.540 (1.310-4.925)
	Rural	15	39	1	1
Educational Status	Formal education	77	123	1.934(1.304-2.866)	1.615 (1.057-2.467)
	No formal education	115	95	1	1

Duration since DM Diagnosed	<5years	100	122	1.111 (0.651-1.894)	0
	5-10 years	61	54	1.530 (0.847-2.764)	0
	>10 years	31	42	1	0
Follow up duration	<5years	102	123	1.133 (0.661-1.943)	0
	5-10 years	60	54	1.519(0.836-2.760)	0
	>10 years	30	41	1	0

Note: AOR: Adjusted Odds Ratio, COR: Crude Odds Ratio

Table 3: Factors associated with knowledge of dietary therapy among T2DM patients at University of Gondar Specialized Comprehensive Hospital Northwest Ethiopia, 2017.

Discussion

The prevalence of good knowledge and good practice of T2DM patients towards dietary therapy were found to be 46.8% [95% CI; 42, 51.2] and 40.7% [95% CI; 36.7, 45.1] respectively. Residence and educational status were factors associated with the knowledge of T2DM patients towards dietary therapy. Similarly, educational status, having adequate dietary therapy information, and good knowledge of dietary therapy were significant factors of dietary therapy practice of type 2 diabetic patients.

The knowledge of dietary therapy in the present study is in line with a study conducted in Nepal (50%) [15]. On the other hand, the finding of this study is higher than the results of other various studies conducted in the United Arab Emirates (24%, 33%) [16,17], and Nairobi, Kenya (30.7%) [18]. The variation may be due to differences in sample sizes, study periods, methods of data collection and the tools used. To the contrary, the finding of this study is much lower than those of studies done in Hara, Ethiopia (93.2%) [19], Nigeria (79.5%) [20] and Malaysia (85%) [14]. The possible explanation for this variation might be the difference in socio-demographic characteristics of participants, study setting, health care systems, and training levels of health care professionals.

Type2 diabetic patients who were urban dwellers were nearly three times more likely to have good knowledge of dietary therapy compared with rural dwellers [AOR= 2.5, 95% CI; 1.3, 4.9]. This is in line with a study conducted [21]. The possible reason is urban dwellers of are T2DM patients able to get adequate information. They may access information from TV, radio, magazines, and easily accessing health care services.

In this particular study, T2DM patients who had formal education were nearly two times more likely to have good knowledge towards dietary therapy compared to those who had no formal education [AOR= 1.6, 95% CI: 1.1, 2.5]. This result is supported by that of a study conducted in Atlanta USA [22]. The rationale for this similarity is formal education may help type 2 diabetic patients' acquisition of more information relating to their disease through online searching, reading different books as well as medical magazines.

The dietary practice of type 2 diabetic patients of dietary therapy was 40.7%, which is in line with that of a study conducted in Harar Ethiopia (39.2%) [23], Bahrain (39.3%) [24], Punjab, Pakistan (36.5%)

[25]. On the other hand, the finding of the current study is lower than that of a study conducted in Addis Abeba, Ethiopia (48.6%) [26], Riyadh, Saudi Arabia (59.9%) [27] and Bangladesh (77%) [28]. these discrepancies may be the result of variation in study settings and socio-demographic characteristics of the participants. Besides, the dietary therapy practice of the current study is higher than that of a study conducted in Hodeida city, Yemen (21%) (8)[21], Addis Ababa Ethiopia (21.2%) [29], Bahir Dar, Ethiopia (35.9%) [30]. that is because the current study used a longer time to collect the data.

Type 2 DM patients who had good knowledge of dietary therapy were nearly two times more likely to have good dietary therapy practice compared to those having poor knowledge. [AOR= 1.599, 95% CI: 1.0, 2.5]. This supported by a study conducted in Myanmar [31], and Ghana [32]. The possible explanation is that having good knowledge of dietary therapy may help patients to retain more information which leads to acquiring more skills or vice versa about dietary therapy.

The finding of this study shows that formal education was a determinant factor for dietary therapy practice in type II diabetic patients. Type II diabetic patients who had formal education were nearly three times more likely to have good dietary therapy practice compared to those who had no formal education [AOR=2.538, 95% CI: 1.6, 4.0]. This is supported by a study conducted in Addis Abeba Ethiopia [29], Bahir Dar, Ethiopia [30], Seri Lanka [33], and Ghana [34]. The possible explanation might be the fact that formal education is a stimulus for acquiring and implementing evidence on dietary practice. Formal education helps to navigate important information and easily capture health care advices.

Type 2 DM patients who had adequate dietary therapy information were nearly two times more likely to have good dietary therapy practice compared to those who had no adequate dietary therapy information [AOR=1.825, 95% CI: 1.2, 2.9]. This study is supported by a study conducted in the United Arab Emirates [16], Addis Ababa, Ethiopia [26], Pakistan [25], and Bahir Dar Ethiopia [30]. The possible explanation may be that the presence of dietary information increases the psychomotor skills of the patient to implement dietary practice [35]. The study did not determine the level of knowledge and practice. The authors used only self-reporting of dietary therapy practice of the participants, which may fail to show the actual practice of dietary therapy (Table 4).

Variable	Category	Practice		COR (95% CI)	AOR (95% CI)
		Good	Poor		
Sex	Male	60	118	0.594 (0.397-0.890)	0
Marital status	Single	8	15	0.496 (0.190-1.296)	0
	Married	93	161	0.537 (0.326-0.886)	0
	Divorced	23	27	0.792 (0.392-1.601)	0
	Widowed	43	40	1	0
Educational Status	formal education	105	95	2.638(1.758-3.960)	2.538 (1.605-4.012)
	Non formal education	62	148	1	1
Knowledge	Good knowledge	125	118	1.581(1.061-2.356)	1.599 (1.039-2.462)
	Poor knowledge	67	100	1	1
Diabetics follow up duration	<5 years	93	132	1	0
	5-10 years	51	63	1.149 (0.729-1.810)	0
	>10 years	23	48	0.680(0.387-1.195)	0
Diabetics membership	Yes	80	99	0.748 (0.503-1.112)	0.620 (0.392-0.982)
	No	85	143	1	1
Adequate dietary therapy information	Yes	118	133	1.992 (1.311-3.025)	1.825 (1.169-2.850)
	No	49	110	1	1

Note: AOR: Adjusted Odds Ratio; COR; Crude Odds Ratio

Table 4: Factors associated with practice of dietary therapy among T2DM patients at University of Gondar Specialized Comprehensive Hospital, Northwest Ethiopia, 2017.

Conclusion

The prevalence of good knowledge and good practice of T2DM patients towards dietary therapy were found to be low. Being an urban dweller and having some form of formal education were significant factors of good knowledge regarding recommended dietary therapy in the management of patients with type 2 diabetics. Similarly, attaining formal education, having adequate dietary therapy information, and good knowledge of dietary therapy was positively associated with good dietary therapy practice. Hence, strong attention should be given for T2DM patients on the knowledge and practice of their dietary therapy

Conflict of Interests

The authors declare that they have no competing interests.

Authors' Contribution

HM conceived the idea and wrote the proposal, participated in the data collection process, analyzed the data and drafted the paper. FZ and AW approved the proposal with some revisions, participated in data analysis and reviewed the manuscript. All authors revised the paper critically and approved the final draft of the manuscript.

Acknowledgments

The authors would like to thank the study participants and data collectors for their collaboration during the data collection. We would also like to thank the University of Gondar for providing ethical clearance.

References

- Janka HU, Michaelis D (2002) Epidemiology of diabetes mellitus: prevalence, incidence, pathogenesis, and prognosis. *J Medical Education and Quality Assurance*. 96: 159-65.
- Organization WH. Global report on diabetes: World Health Organization. 2016.
- Zheng Y, Ley SH, Hu FB (2018) Global aetiology and epidemiology of type 2 diabetes mellitus and its complications. *Nat Rev Endocrinol*. 14: 88-98.
- N Abebe TK, Addise D (2017) Diabetes in Ethiopia 2000-2016 prevalence and related acute and chronic complications; a systematic review. *African Journal of Diabetes Medicine*. 25: 1-2.
- Gizaw M, Harries A, Ade S, Tayler-Smith K, Ali E, Firdu N, et al. (2015) Diabetes mellitus in Addis Ababa, Ethiopia: admissions, complications and outcomes in a large referral hospital. *Public health action*. 5: 74-8.
- American Diabetes Association Releases 2018 Standards of Medical Care in Diabetes, with Notable New Recommendations for People with Cardiovascular Disease and Diabetes. December 8, 2017.

7. Houlden RL (2018) Diabetes Canada Clinical Practice Guidelines Expert Committee. *Can J Diabetes*. 42: S1-S5.
8. American Diabetic Association Standards of medical care in diabetes. *Journal of Clinical and Applied Research and Education*. 2018: 41.
9. Chamberlain JJ, Johnson EL, Leal S, Rhinehart AS, Shubrook JH, et al. (2018) Cardiovascular disease and risk management: Review of the American Diabetes Association standards of medical care in diabetes 2018. *Ann Intern Med*. 168: 640-50.
10. Chia CW, Egan JM, Ferrucci L (2018) Age-related changes in glucose metabolism, hyperglycemia, and cardiovascular risk. *Circulation Research*. 123: 886-904.
11. Ko SH, Kim SR, Kim DJ, Oh SJ, Lee HJ, et al. (2011) Clinical practice guidelines for type 2 diabetes in Korea. *Diabetes Metab J*. 35: 431-436.
12. Brutsaert EF (2017) Diabetes Mellitus, Endocrine and Metabolic Disorders, the MSD MSD Manual.
13. Waqas Sami TA, Nadeem SB, Mohd RH (2017) Effect of diet on type 2 diabetes mellitus: A review. *Int J Health Sci (Qassim)*. 11: 65-71.
14. Tohid FW, Saharuddin A, Mohd Radzniwan AR, Teh RJ, Noor Azimah MA (2017). Do Patients with Type 2 Diabetes Mellitus Know about Specific Dietary Recommendations *IMJM*. 17: 1-10.
15. Bhandari SSaSD (2014) Knowledge and Practice regarding Self-Care among the patients with type II Diabetes of Kapan, Kathmandu. *JOURNAL OF ADVANCED ACADEMIC RESEARCH (JAAR)*. 1: 1-10.
16. Al-Maskari F, El-Sadig M, Al-Kaabi JM, Afandi B, Nagelkerke N (2013) Knowledge, Attitude and Practices of Diabetic Patients in the United Arab Emirates. *PLOS one*. 8: 52-85.
17. Al-Kaabi J, Al-Maskari F, Saadi H, Afandi B, Parkar H, et al. (2008) Assessment of dietary practice among diabetic patients in the United Arab Emirates. *Rev Diabet Stud*. 5: 110-115.
18. Wahome EM, Makau WK, Kiboi WK (2018) Predictors of dietary practices and nutritional status among diabetic type II patients in Kiambu County, Kenya. *Int J Community Medicine and Public Health*. 5: 2726-2734.
19. Ayele K, Tesfa B, Abebe L, Tilahun T, Girma E (2012) Self-Care behaviour among Patients with Diabetes in Harari, Eastern Ethiopia: The Health Belief Model Perspective. *PLOS One*. 7: 35-115.
20. Jackson IL, Adibe MO, Okonta MJ, Ukwe CV (2014) Knowledge of self-care among type 2 diabetes patients in two states of Nigeria. *Pharm Pract (Granada)*. 12: 404-405.
21. ALhariri A, Daud F, Almainan A, Saghir S (2017) Factors associated with adherence to diet and exercise among type 2 diabetes patients in Hodeidah city, Yemen. *Life*. 7: 264-271.
22. Rhee MK, Cook CB, El-Kebbi I, Lyles RH, Dunbar VG, et al. (2005) Barriers to diabetes education in urban patients perceptions, patterns, and associated factors. *Diabetes Educ*. 31: 410-417.
23. Ayele K, Tesfa B, Abebe L, Tilahun T, Girma E (2012) Self-care behaviour among patients with diabetes in Harari, Eastern Ethiopia: the health belief model perspective. *PloS one*. 7: e35515.
24. Najla Shamsi ZS, Zahra AlNahash, Shawq A, Faisal Al-Nasir (2013) Factors Influencing Dietary Practice among Type 2 Diabetics. *Bahrain Medical Bulletin*. 35: 1-10.
25. Ali H, Gillani ABA, Bashir S, Mohamed I, Ibrahim M et al. (2018) Associated Factors with Diet and Exercise Compliance and Smoking Habits in Diabetic Patients of Punjab, Pakistan. *Int J Environ Res Public Health*. 20: 4-12.
26. Worku A, Abebe SM, Wassie MM (2015) Dietary practice and associated factors among type 2 diabetic patients: A cross sectional hospital based study, Addis Ababa, Ethiopia. *SpringerPlus*. 4: 1-15.
27. Mohamed BA, Almajwal AM, Saeed AA, Bani IA (2013) Dietary practices among patients with type 2 diabetes in Riyadh, Saudi Arabia. *J Food Agric Environ*. 11: 110-114.
28. Saleh F, Ara F, Afnan F (2016) Assessment of Gap between Knowledge and Practices among Type 2 Diabetes Mellitus Patients at a Tertiary-Care Hospital in Bangladesh. *Advances in Public Health*. 49: 928-981.
29. Berhe KK, Demissie A, Kahsay AB, Gebru HB (2012) Diabetes self-care practices and associated factors among type 2 diabetic patients in Tikur Anbessa specialized hospital, Addis Ababa, Ethiopia-a cross sectional study. *Int J Pharmaceutical Sci Res*. 3: 4219-4229.
30. Yeshalem MD, Abiot TA, Amanu AE, (2018) Dietary practice and associated factors among type 2 diabetic patients in Felege Hiwot Regional Referral Hospital, Bahir Dar, Ethiopia. *BMC Res Notes*. 11: 434-436.
31. Lwe Say Paw Hla, Doungrut W, Pisamai O (2018) Factors Influencing Adherence to Therapeutic Regimens among People with Type 2 Diabetes Mellitus in Yangon, Myanmar *Journal of Population and Social Studies*. 26: 262-280.
32. Kpekura S, Samuel V, Jerry PK (2017) Knowledge and attitudes of diabetes patients on self-management practices in government hospitals in the Upper West Region: University of Cape Coast. 36: 474-482.
33. Senadheera PA, Sagarika E, Chandanie AW (2016) Dietary Habits of Type 2 Diabetes Patients: Variety and Frequency of Food Intake. *J Nutrition and Met*. 4: 1-6.
34. Mogre V, Tzelepis F, Natalie A, Johnson NA, Paul C (2017) Adherence to and factors associated with self-care behaviours in type 2 diabetes patients in Ghana. *BMC Endocr Disord*. 20: 12-20.
35. Klein S, Sheard NF, Pi Sunyer X, Daly A, Wylie-Rosett J, et al. (2004) Weight management through lifestyle modification for the prevention and management of type 2 diabetes: rationale and strategies. *Am J Clin Nutri*. 80: 257-263.