Original Article *Egyptian Journal of Health Care, 2016 EJHC Vol.7 No.2*

Obesity and The Risk of Type 2 Diabetes Mellitus in Women: Assessment Study

MarwaNaeem*, Magda Abdel Sattar, Heba El Koteb*****
*Technical Institute of Health Suez Canal University, ** Community Health Nursing Department, Ain Shams University, Community and Family Health Nursing Department Suez Canal University.

ABSTRACT

Type 2 diabetes and obesity are connected, so much so that more than 85% of the people diagnosed with it are obese.**Aim:**The study aimed to assess obesity risk factor among women with (DM). **Design:** A descriptive Analytic design was utilized in this study. **Settings:** The study was conducted in outpatient diabetes clinics in health centers in Ismailia City. **Sample:** A purposive sample type of 306 obese diabetic women attending to previously mentioned settings. **Tool of data collection:** Data were collected by using (1) An interview questionnaire which covers Socio-demographic data and all items related to medical history, knowledge regarding to (diabetes- obesity- nutrition), and lifestyle of obese diabetic women,(2) physical assessment sheet, (3) blood sugar analysis sheet. **Results:**Themajority of the study sample were less than 35 years of age with mean of age $47.9^{+}.9.5$, More than half of obese diabetic women had unsatisfactory knowledge regarding (diabetes- obesity- nutrition) and less than half of them had satisfactory knowledge, also the majority of them had poor practice regarding (nutrition- exercise- personal hygiene), twenty of them had fair practice, while third of them had good practice. **Conclusion:** There were highly statistical significant between obese diabetic women (age- occupation- educational level) and total knowledge, there were highly statistical significant between obese diabetic women fasting blood glucose level with increasing their body mass index, also there were highly statistical significant between obese diabetic women nutritional habits and physical activity. **Recommendations:** Develop an educational programs for obese diabetic women about healthy lifestyle and risky of obesity on (DM).

Key words: "obesity", "type 2diabetes", "life style practice", and "risk of obesity".

INTRODUCTION

Obesity and type 2 diabetes are diseases that can substantially decrease life expectancy diminish quality of life and increase health care casts. The incidence of obesity and diabetes continues to rise by epidemic proportions. The term "diabesity" has been coined to describe obesity dependent diabetes. Obesity is number one risk factor for type 2 diabetes, excess body fat appears to play a strong role in insulin resistance, but the way the fat is distributed is also significant. Weight concentrated around the abdomen and in the upper part of the body (apple-shaped) is associated with insulin resistance and diabetes, heart disease, high blood pressure, stroke, and unhealthy cholesterol levels.**(WHO, 2014).**

Obesity is becoming a major health problem throughout the world and is associated with significant, potentially life-threatening co-morbidities. Obesity is associated with most of the components of metabolic syndrome **(Subhashini, 2011).** Obesity is number one risk factor for type 2 diabetes. Being overweight or obese is the

main modifiable risk factor for type 2 diabetes. It is estimated that 80% to 95% of the current dramatic increase in type 2 diabetes due to obesity **(Frank &Vasanti, 2010).**

Globally obesity is rising. The World Health Organization estimates that more than 1 billion people are overweight, with 300 million meeting the criteria for obesity. Twenty- six percent of non-pregnant women ages 20 to 39 are overweight and 29% are obese.Egypt is the 14th fattest country in the world in 2010, fattest African country, 70% of adults are overweight or obese, obesity affects about over 80% of urban and 56% of rural women **(WHO, 2014).**

Significance of obesity risk factor in diabetic women:

It has been estimated that by the year 2030, there will be 8.6 million adults with diabetes in Egypt, making it the country with the tenth largest population of diabetics in the world. Diabetes is associated with reduced life expectancy, significant morbidity due to related microvascular complications, increased risk of macrovascular complications (IHD, stroke and PVD), and diminished (QOL).**(Ahmed &Essam, 2010).**

Diabetes is more common in urban areas, probably due to the sedentary lifestyle, and higher prevalence of obesity in these areas. However, this relationship disappears completely after adjustment in the logistic regression. The well-known association between obesity and diabetes was observed in this study, with increasing prevalence of diabetes with increasing BMI. This has previously been found to be a risk factor both internationally, and in Egypt. With the growing prevalence of overweight and obesity in Egypt, national health programs are urgently required to educate the public on the importance of maintaining an optimal body weight **(Lewis et al., 2014).**

Aim of the Study

The aim of the study was to:

1- Assess effect of obesity on health of diabetic women.

2- Assess blood glucose level among obese diabetic women.

Research Questions:

1- Are there relationship between knowledge of obese diabetic women and their socio-demographic characteristic?

2- Are there effects of obesity on blood glucose level?

3- Are there relationship between nutritional habits and physical activity among obese diabetic women?

Subjects and Methods

Technical Design:

Research design:

A descriptive design was utilized.

Settings:

The study was conducted in four outpatient diabetes clinics from seven health centers in Ismailia City because it was found in it diabetes clinic only, namely (Hye El Salam- El Sheekh Zaied- El Mostaebal and El Shohada) that provide care for diabetic patient.

Sampling:

A purposive sample consists of 306 from obese diabetic women attending the outpatient diabetes clinic in Ismailia City.

Inclusion criteria:

- Woman.

- Obesity (BMI: 30 kg/m^2- more).

- Having diabetes since one year.

- Tools of data collection:

First tool: (Appendix I) An interviewing questionnaire: It was designed by the investigator getting after reviewing related literatures to assess obese diabetic women's toward (Socio-demographic characteristics- Medical history- Knowledge regarding diabetes, obesity, nutrition- lifestyle practice), and it was consisted of four parts.

Part I: It was concerned with socio-demographical characteristics of the obese diabetic women in the study which include (age- educational level- marital status- occupation- residence- income), from question one to question.

Part II: It was concerned with medical history for obese diabetic women and their family which include (other chronic diseases- treatment of diabetes- family history of diabetes- family history of hypertension), from question 8 to question 11.

Part III: It was concerned with total knowledge of obese diabetic women regarding diabetes mellitus disease which include (definition- causes- signs and symptoms- types- complications- controlling methods), obesity which include (definition- causes- complication- effect of obesity on health), and nutrition which include (importance of nutrition- foods increase blood glucose level- foods decrease blood glucose level- useful foods- dangerous foods- importance of exercise)), from question 12to question 27.

Scoring system:

Responses of the obese diabetic women regarding their knowledge were as follows:

The total score was 48 marks (100%) for knowledge; each correct answer was given three points. The score of total items were summed-up and divided by the number of the items, giving the mean score value. These scores were converted into percent score from (60%) to (100%) were considered satisfactory knowledge, and less than (60%) were considered unsatisfactory knowledge.

Part IV: It was concerned with lifestyle of obese diabetic women regarding nutrition, exercise and personal hygiene which include: **a)** general personal hygiene and **b)** foot care, from question 28to question56.

Scoring system:

Responses of the obese diabetic women regarding their lifestyle practice were classified into three score levels, the score of total items were summed-up and divided by the number of the items, giving the mean score value. These score were converted into percent score. The total score was 58 marks (100%) for practice.

The total score for lifestyle practice among studied obese diabetic women as follow: Always mark two , sometimes mark one, never mark zero. Low practice <40%, moderate practice (40%- <60%), good practice (60%- 100%).

Second tool: (Appendix II) Physical assessment sheet for obese diabetic women.

This tool was designed to assess obese diabetic women from head to toes and it was consisted of two parts.

Part I: Obese diabetic women (BMI) guided by **Heather &Alan, (2013)** to assess obesity degree of diabetic women through measuring body weight and height by using the following formula: BMI Weight (kg)/ Height $(m)^2$.

Category of obesity BMI as follow:

Class I Obesity BMI 30- 34.9 kg/m^2

Class II Obesity BMI 35- 39.9 kg/m^2

Class III Obesity BMI >40 kg/m^2

Part II: Obese diabetic women physical assessment sheet guided by **Zator (2013)** to assess obese diabetic women health problems which includes the following items: (pulse- temperature- respiratory rate- blood pressure- dental examination: teeth; cum- lower extremities: edema; varicose vein- foot examination: brittle nails; cracks; dryness- neurological examination: sensation; joints examination), from question one to question 16.

Scoring system:

Each health problem in physical assessment sheet, if present give score 1 and if absent give score zero.

Third tool: (Appendix III) Blood analysis for sugar by using (Hemogluco test one touch), to assess fasting blood sugar and post prandial test.

Measuring fasting blood sugar normal range is 90- 130 mg/ dl. Measuring post prandial blood sugar normal range is 140-180 mg/ dl (**Lewis et al., 2014).**

The blood test fasting, post prandial were done by the investigator, using hemogluco test strips (one touch machine), first blood sample were taken from diabetic women (fasting from 6- 8 hours), second blood sample were taken after two hours from eating by the investigator.

Scoring system:

For the obese diabetic women blood analysis guided by **Kannan (2013)** scale:

Fasting blood glucose level:

Score	Fasting blood glucose level
(90- 130 mg/dl)	Normal
(130- 170 mg/dl)	Average
(>170 mg/dl)	High

Post prandial blood glucose level:

Score	Post Prandial blood glucose level
(140- 180 mg/dl)	Normal
(180- 220 mg/dl)	Average
(>220 mg/dl)	High

High level given score 2, Average level given score 1, Normal level given score zero.

The operational design:

Preparatory phase:

A review of the past, current local and international related literature converting all aspect helpful in designing and processing data collection tools using available books, journals and nursing magazines. These helped the investigator to be more acquainted with the problem.

Content validity:

Tools examined validity by five expertises from nursing and medical staff.

Pilot study:

The pilot study was applied on a group of (10%) women's from the total number to test the clarity and arrangement of the items and time needed for each sheet. The final form was achieved through rearrangement, and modification of the tools' item based on the findings of the pilot study. Some questions and items were omitted, added, or rephrased, and then the final form was developed. The patients in the pilot study were excluded from the sample.

Field of work:

Data were collected within six months period started from the first of October 2014 to the end of March 2015. Data was collected two day/ week on Saturday and Tuesday chosen randomly from 9 am to 2 pm. The researcher interviewed, ask each woman individually and the researcher fill in questionnaire, the approximate time spent with each women during interview to complete the sheet was 20 to 30 minutes depending on the response of the interview.

Ethical consideration:

Informed consent was taken from the women to participate in the study after explaining the aim of the study .They had the right to withdraw from the study at any time. Nature of the study is harmless. The information is confidential and is used only for research purpose.

Administrative design:

An official approval letter include the aim of the study was obtained from authorities of the faculty of Suez Canal University to the concerned authorities in the study setting to conduct the study.

Statistical design:

After data were collected, they were coded and transferred into a specially designed format so as to be suitable for computer feeding. Following data entry and statistical analysis were done using "SPSS version 17" statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviation for quantitative variables. Difference in the score of health promoting was tested among subgroups using chi square. When chi square was not valid for testing due to small excepted observations more than 25% of total observations, Monte Carlo Exact Test (MCET) was used. The level of significance was adopted at $P<0.05$.

Results

Socio demographic characteristics of obese diabetic women in the study:

Table (1): Distribution of obese diabetic women according to their socio-demographic characteristics (n=306).

Items	Frequency	Percent
Marital status:		
Single	4	1.3%
Married	208	68.0%
Divorced	70	22.9%
Widow	24	7.8%
Occupation:		
House wife	278	90.8%
Worker	28	9.2%
Residence:		
Urban	227	74.2%
Rural	79	25.8%
Monthly Income:		
Enough	147	48.0%
Not Enough	159	52.0%

Table (1): showed that 68% of the studied sample were married compared with 1.3% were single, 90.8% of them were housewives, and 74.2% of them were lives in urban residence. The same table showed that 52% of studied sample hadn't enough monthly income.

Physical health assessment of obese diabetic women in the study.

Table (2): Distribution of obese diabetic women's according to their physical assessment (n=306).

Items	Frequency	Percent
***Body Mass Index (BMI):**		
Grade I(30.0-34.9).	162	52.9%
Grade II(35-39.9).	92	30.1%
Grade III (>40).	52	17.0%
***Dental Examination:**		
Affected teeth.	163	53.3%
Lost teeth.	64	20.9%
Inflamed Gum.	213	69.6%
***Lower Extremities:**		
Edema.	139	45.4%
Varicose.	162	52.9%
***Foot Examination:**		
Absent Brittle Nails.	129	42.2%
Cracks foot heals.	126	41.2%
Dryness foot heals.	125	40.8%
***Neurological Examination:**		
-Joints Examination:		
Limitation of movement	145	47.4%
-Sensation:		
Peripheral neuropathy	127	41.5%

Responses are not mutually exclusive table (2) showed that: Dental examination, 53.3% had affected teeth, 20.9% had lost teeth, while 69.6% had inflamed gum. Lower extremities, 45.4% had edema in lower extremities while 52.9% had varicose in lower limbs. Foot examination, 42.2% had not brittle foot nails, 41.2% had cracks in foot heal while 40.8% had dryness in foot heal. Neurological examination, 41.5% had numbness sensation in lower extremities, while 47.4% had limitation of movement in lower extremities.

Knowledge of obese diabetic women's regarding to (DM- obesity- nutrition).

Table (3): Total score knowledge of obese diabetic women regarding (DM- obesity- nutrition) (n=306).

Items	Satisfactory		Unsatisfactory	
	No	%	No	%
Diabetes mellitus	251	82.o%	55	18.0%
Obesity	32	10.5%	274	89.5%
Nutrition	143	46.7%	163	53.3%
Total Knowledge	123	40.2%	183	59.8%

Responses are not mutually exclusive table (3) describe 59.8% of obese diabetic women had unsatisfactory knowledge regarding (DM- obesity- nutrition), while 40.2% had satisfactory knowledge regarding (DM- obesity- nutrition).

Table (4): Total practice of obese diabetic women regarding (nutrition- exercise- personal hygiene) (n=306).

Items	Low		Moderate		High	
	No	%	No	%	No	%
Nutritional practice	81.0	26.5%	58.0	19.0%	167.0	54.6%
Exercise practice	191.0	62.4%	8.0	2.6%	107.0	35.0%
Personal hygiene Practice	104.0	34.0%	94.0	30.7%	108.0	35.3%
Total Practice	138.0	45.1%	66.0	21.6%	102.0	33.3%

Responses are not mutually exclusive table (4) describe 45.1% of obese diabetic women had low practice regarding (nutrition- exercise- personal hygiene), 21.6% had moderate practice regarding (nutrition- exercise- personal hygiene), while 33.3% had high practice regarding (nutrition- exercise- personal hygiene).

Table (5): Relationship of knowledge and socio-demographic data, (n=306).

Socio-demographic data	Total knowledge				X^2	P
	Satisfactory		Unsatisfactory			
	No	%	No	%		
Age: -Less than 35 years.	45	31.5%	98	68.5%	**11.2**	* **<0.01 (S)**
-35 up to 50 years.	56	44.4%	70	55.6%		
-50 years or more.	22	59.5%	15	40.5%		
Educational Level: -Illiterate.	76	55.9%	60	44.1%	**30.8**	** **<0.001 (HS)**
-Read&Write.	20	38.5%	32	61.5%		
-Primary school.	19	27.9%	49	72.1%		
-Diploma.	8	17.0%	39	83.0%		
-Bachelor.	0	0%	3	100%		
Occupation: -House wife.	119	42.8%	159	57.2%	**8.6**	* **<0.01 (S)**
-Worker.	4	14.3%	24	85.7%		

Table (5): represent that, there is highly statistical significant relation between knowledge and socio-demographic data (age- educational level- occupation).

Table (6): Relationship of Body Mass Index (BMI) and fasting blood glucose level, (n=306).

Fasting blood glucose level	Body mass index						T	P Value
	Grade I		Grade II		Grade III		Chi-square	
	No	%	No	%	No	%		
High: (over 170 mg/dl)	4	2.5%	2	2.2%	2	3.8%	**11.8**	* **<0.01 (S)**
Average: (130-170 mg/dl)	85	52.5%	29	31.5%	20	38.5%		
Normal: (90-130 mg/dl)	73	45.1%	61	66.3%	30	57.7%		

Table (6): represent that, there is highly statistical significant relation between BMI and fasting blood glucose level.

Table (7): Relationship of Body Mass Index (BMI) and post prandial blood glucose level, (n=306).

Post prandial blood glucose level	Body mass index						t	P Value
	Grade I		Grade II		Grade III		Chi-square	
	No	%	No	%	No	%		
High: (over 220 mg/dl)	0	0%	0	0%	0	0%	1.20	>0.05 (NS)
Average: (180-220 mg/dl)	11	6.8%	8	8.7%	2	3.8%		
Normal: (140-180 mg/dl)	151	93.2%	84	91.3%	50	96.2%		

Table (7): represent that, there is insignificant relations between BMI and post prandial blood glucose level.

Table (8): Relationship of nutritional practice and body mass index, (n=306).

Life style practice		Body mass index						T	P Value
		Grade I		Grade II		Grade III		Chi-square	
		No	%	No	%	No	%		
Nutritional practice	**High**	22	13.6%	27	29.3%	32	61.5%	**65.7**	** <0.001 (HS)
	Moderate	22	13.6%	25	27.2%	11	21.2%		
	Low	118	72.8%	40	43.5%	9	17.3%		

Table (8): represent that, there is statistical highly significant between BMI and nutritional practice.

Table (9): Relationship of exercise practice and body mass index, (n=306).

Life style practice		Body mass index						T	P Value
		Grade I		Grade II		Grade III		Chi-square	
		No	%	No	%	No	%		
Exercise practice	**High**	71	43.8%	75	81.5%	45	86.5%	**53.3**	** <0.001 (HS)
	Moderate	5	3.1%	1	1.1%	2	3.8%		
	Low	86	53.1%	16	17.4%	5	9.6%		

Discussion

Obesity is associated with a greater risk of disability and/ or premature death due to type 2 diabetes mellitus, cardiovascular diseases such as hypertension, stroke and coronary heart disease, gall bladder disease, certain cancers (endometrial, breast, prostate, colon) and nonfatal conditions such as gout, respiratory conditions, gastro-esophageal reflux disease, osteoarthritis and infertility. **Adnan et al., (2012).**

The present study, illustrate that there are statistical significant between age, educational level, occupation and knowledge level of studied women. In the same direction, **God et al., (2013)**Knowledge of diabetes and its associated ocular manifestation by diabetic patients, who reported that the patient's level of formal education was significantly related to patient's knowledge, patient's with post-basic education being most knowledgeable, one third of traders and one third of professional. Also, **God et al., (2013)** disagree with the present study, reported that the patient's occupation was not significantly related to patient's knowledge.

There are statistical significant relation between women body mass index and their fasting blood glucose level. While there is no relation between BMI and post prandial blood glucose level. In the same direction, study of **Charlotte et al., (2012)** Relationships between glucose, energy intake and dietary composition in obese adults with type 2 diabetes**,** who reported that strongly correlated with improvement in blood glucose level and reduction in carbohydrate intake. **Onyesom et al., (2013)** Correlation between body mass index and blood glucose levels among some Nigerian undergraduates, reported that strong significant correlation between BMI and blood glucose level among the female subjects. Study of **Petrenya et al., (2014)**Obesity and obesity-associated cardio metabolic risk factors in indigenous nenets women from the rural nenets autonomous area and russian women from arkhangelsk city**,** reported that there is significant variation in fasting blood glucose level.

Concerning relation between nutritional habits of obese diabetic women and their physical activity. The current study, revealed that, there is statistical highly significant between BMI and physical activity (nutritional practice- exercise practice). ***From my point of view***, this due to lack awareness of healthy nutritional program, most of them were housewives, they cocking food by themselves and this will increase their appetite, increasing food advertisement on TV, also they hadn't power or desire to lose weight.

Therefore, nurse should provide knowledge about differentiate healthy nutritional program to select from it which suitable for them, away from eating takeaway food, increase their activity by doing home activities by themselves, walking about half hour every day and doing exercise if suitable for them to avoid increasing their bodies weight.

In the same direction, **Farid et al., (2010)** Dietary Practice, Physical Activity and Health Education in Qassim Region of Saudi Arabia, who reported that poor dietary habits statistically significant with lack of physical activity. Also **Davison et al, (2014)**Relationship between adherence to diet, glycemic control and cardiovascular risk factors in patients with type 1 diabetes, reported that patients who adherence to diet have lower BMI. While, **David et al., (2009)** Aerobic exercise in obese diabetic patients with chronic kidney disease, disagree with the current study, reported that patients caloric intake, body weight and composition insignificant with exercise training. Also **Aydan et al., (2013)** Obesity- related abnormal eating behaviors in type 2 diabetic patients, reported that abnormal eating

behaviors were not statistically significant in obese women.

Conclusion

Based on the finding of this study the following can be concluded:

For the relationship between knowledge and socio-demographic data was statistical significant difference between total knowledge and women's age, highly statistical significant difference between total knowledge and women's educational level, statistical significant difference between total knowledge and women's occupation, no statistical significant difference between total knowledge and marital status, no statistical significant difference between total knowledge and women's residence and no statistical significant difference between total knowledge women's monthly income.

For the relationship between BMI and fasting blood glucose level there was statistical significant difference, while there was no statistical significant difference between BMI and post prandial blood glucose level.

For the relationship between nutritional habits and BMI there was highly statistical significant difference, there was also highly statistical significant difference between BMIand exercise practice.

Recommendations

The results of the study led to the following recommendations:

* Screening of diabetic women at outpatient diabetes clinic with risk factors for developing obesity for early detection and prompt treatment through health center outpatient clinic.

* Apply health education that offer information, support and counseling on additional diet, physical activity and behavioral strategies.

Reference

Adnan, H., Yousif, A. &Israa, M (2012).Knowledge, attitude and practice regarding obesity management among family and non-family physicians working in primary health care centers in Baghdad. Iraqi Post Graduate Medical Journal, 1 (11): 2.

Ahmed, N., &Essam, G. (2010).The Epidemiology of diabetes mellitus in Egypt, Results of a national survey.The Egyptian Journal of Community Medicine.3(28): 33.

Aydan, E., &Gul, K (2013).Obesity- related abnormal eating behaviors in type 2 diabetic patients, Pakistan Journal of Medical Sciences, 6 (29): 1323-1328.

Charlotte, H., Susan, & Jamie, C (2012).Relationships between glucose, energy intake and dietary composition in obese adults with type 2 diabetes receiving the cannabinoid 1 (CB1) receptor antagonist, rimonabant. International Journal of Behavioral Nutrition and Physical Activity, 50 (11): 12.

David, J., Irfan, M., Josseph, P., Shahzad, Q& Christine, S. (2009):"Aerobic exercise in obese diabetic patients with chronic kidney disease" a randomized and controlled pilot study. Cardio Vascular Diabetology Journal, 62 (8): 51.

Davison, K., Carlos, A., Roberta, C., Alessandra, M.&Catia, S. (2014):Relationship between adherence to diet, glycemic control and cardiovascular risk factors in patients with type 1

diabetes, a nationwide survey in Brazil. Brazil Nutrition Journal, 19 (13): 40.

Farid, M., Abdul, R. &Fawzy, S (2010): Dietary Practice, Physical Activity and Health Education in Qassim Region of Saudi Arabia, International Journal of Health Science. 1 (4): 3-10.

Frank, B. &Vasanti, S. (2010):Sugar-Sweetened beverages and risk of obesity and type 2 diabetes. HHS PublicAcess Journal, 100(1): 47-54.

Lewis, S. Dirksen, S. Heitkemper, M. & Bucher, L. (2014):Medical-surgical nursing, Assessment management of clinical problems, 9th ed. Mosby co. London, PP:20-25.

God, W. Ovenseri, O. Samuel, A. Koffuor, G.& Eric, A. (2013):Knowledge of diabetes and its associated ocular manifestation by diabetic patients: A study at Karle- Bu Teaching Hospital, Ghana. Nigerian Medical Journal: 4 (54): 217-223.

Onyesom, I. Oweh, O. Etumah, O. & Fie, E (2013):Correlation between body mass index and blood glucose levels among some Nigerian undergraduates. Herbert Open Acess Journal: 4 (2): 11.

Petrenya, N. Magritt, B. Liliya, D. Fatima, B. &Gulnara, L.(2014):Obesity and obesity-associated cardio metabolic risk factors in indigenous nenets women from the rural nenets autonomous area and russian women from arkhangelsk city. International Journal of Circumpolar Health: (73): 23859.

Subhashini, Y. (2011): Obesity and Type 2 Diabetes. Journal of Diabetes Mellitus: 4(1):1-5.

World Health Organization (2014):Obesity and Overweight. Technical Report Series.