Diabetics and its Relationship to other Diseases

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Abstract

The current study was conducted to find out the relationship of type 1 and type 2 diabetes with the chronic diseases, as blood samples from patients with diabetic and healthy people of Erbil governorate for the period from 2-1-2019 to 9-1-2020 were collected, the number of patients in both sexes was 62 patients, in addition to 31 healthy people as a control group, blood glucose was estimated using the relevant device. Information about   patients was collected using questionnaire form.

The results of the study showed that there is an increase in the concentration of glucose in people with diabetes, also showed that the age group (41-50) years is the most affected by the disease of both sexes, and it was found that males are more infected than females with both types.

The results also showed that the dependent treatment is insulin as an injection, while the second type depends on tablets therapy.

The current study also showed that diabetes is main cause of most of complications of body causing some chronic diseases such as hypertension, arteries disease, inflammation of the respiratory system, kidney diseases.
This study aimed to estimate the level of glucose in the blood of people with both types of diabetes, and to determine the difference between the first and second type in terms of blood glucose concentration and the type of treatment for each of them, as the current study showed the various pathological complications of diabetes, and to reveal the effect of some factors (Smoking, diet, gender, and age).

Keywords : Diabetes mellitus, other diseases, Age, Gender, Erbil

داء السكر وعلاقته بالأمراض الأخرى
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الملخص

أجريت الدراسة الحالية لمعرفة علاقة داء السكر من النوع الأول والنوع الثاني بالأمراض المزمنة، حيث اخذت عينات دم من الاشخاص المصابين وغير المصابين بمدينة اربيل للفترة (من 2-1-2019 ولغاية 9-1-2020)، تضمنت الدراسة الحالية 62 من المرضى المصابين بداء السكري، بالإضافة إلى 31 شخصًا سليمًا. قيست نسبة الجلوكوز في الدم باستخدام الاجهزة ذي الصلة، ثم جمعت المعلومات من هؤلاء الأشخاص وفقًا لاستمارة الاستبيان.

أظهرت نتائج الدراسة أن هناك زيادة في تركيز الجلوكوز عند الذكوروالاناث المصابين بداء السكري من النوع الأول والنوع الثاني. كما أوضحت الدراسة أن الفئة العمرية (41-50) سنة هي الأكثر تأثراً بالمرض لدى كلا الجنسين وخاصة المصابين بالنوع الثاني، كما تبين أن إصابة الذكور أكثر من الإناث بالمرض.

كما أظهرت النتائج أن العلاج المعتمد هو الأنسولين كحقنة للنوع الأول، بينما النوع الثاني يعتمد على العلاج بالأقراص.

كما أظهرت الدراسة الحالية أن مرض السكري هو السبب الرئيسي لمعظم مضاعفات الجسم المسببة لبعض الأمراض المزمنة مثل ارتفاع ضغط الدم وأمراض القلب والشرايين والتهاب الجهاز التنفسي وأمراض الكلى والتهاب المسالك البولية.

هدفت الدراسة الحالية الى تقدير مستوى الكلوكوز في دم المصابين بكلا النوعين من داء السكر، وتحديد الفرق بين النوع الاول والنوع الثاني من حيث تركيز الكلوكوز في الدم ونوع العلاج لكل منهما، كما اظهرت الدراسة الحالية المضاعفات المرضية المختلفة لداء السكري، والكشف عن تاثير بعض العوام مثل (التدخين، الغذاء، العمر، والجنس) على المرض.

الكلمات المفتاحية : داء السكري، أمراض أخرى، العمر، الجنس، اربيل

Introduction

Diabetes Mellitus (DM)

Diabetes occurs as a result of a hormonal disorder and an imbalance in the metabolism of sugars and proteins with an abnormal rise in the concentration of glucose in the blood, either because of a decrease in the secretion of insulin, or because of a defect that prevents insulin from performing its work or both [1,2] diabetes is known as a metabolic disorder caused by known causes, including insufficient pancreatic secretion of insulin. Classification of diabetes types depends on the type of the causative factor and not on the type of the treatment used for this disease [3].

Type 1: Insulin Dependent Diabetes Mellitus (IDDM)

This type is caused by non-production of insulin by beta cells in the Lancherans islands of the pancreas, which leads to loss insulin completely, it is also classified as an autoimmune disease, and it is more prevalent in children than in adults [4, 5].

Type 2: Non-Insulin Dependent Diabetes Mellitus (NiDDM)

This type of diabetes is known as adult diabetes and it is the most prevalent, as it is 80-90% of the total incidence of diabetes [6]. This type is characterized by the normal level of insulin, and there may be a relative deficiency in the level of insulin, but there is a resistance to it [7].

Gestational Diabetes Mellitus (GDM)

This type is known as a high concentration of glucose in the blood during pregnancy and appears in approximately (2-4%) of pregnancy cases [8]. This type may disappear after birth, or it may be developed into the second type of major diabetes types during (3-5) years, at a rate of (30-40%) [9], but it rarely turns to the first type of diabetes [10,11], and that the increase in the concentration of glucose during pregnancy is due to sudden changes in the concentrations of some hormones such as the prolactin hormone as well as growth hormone and others, and the incidence increases in overweight and older women [12, 13] .

The most common symptoms of diabetes include: increased urination, severe thirst, severe malaise, ketosis, hunger and weight loss, high blood cholesterol and triglycerides, muscle weakness and general weakness [14, 15].

The pancreas is a gland , extends after the first part of the small intestine, and it consists of soft-touched lobes, and the head of the pancreas is on the duodenal sprain and its body extends to the spleen [16,17].

Insulin Hormone, It is a polypeptide hormone with a molecular weight of 8580 Dalton [18] insulin

is necessary for the body to be able to benefit and use sugar and energy in food, It consists of 51 amino acids in the form of two chains, [19,20]. Among the most important tissues that are the target of the hormone insulin are the liver, muscles and fatty tissues, as it works to take excess sugar in the blood and store it [21]. The hormone insulin affects the metabolism of carbohydrates through its action in transporting and storing glucose and the formation of clicogen. The hormone insulin increases the rate of protein building and inhibits its demolition [22,23]. Most people with type 2 diabetes suffer from insulin resistance associated with hypertension and high fat [24].

Hyperglycaemia

Insulin deficiency in diabetes mellitus or its inefficiency leads to a decrease in the consumption of glucose in the body cells and thus high level of blood in a way that exceeds the ability of the kidneys to absorb glucose, and thus an imbalance in the glomerular filtration process and thus an increase in the level of sugar leads to an increase in the generation of free radicals in the electronics transfer chain in mitochondria [25].

Glycosylation

The high concentration of glucose sugar in the blood creates covalent bonds between glucose sugar and free amine groups that are not bound in cellular proteins in the presence of copper or iron in a process called Glycosylation, and this process works to give an electron to the oxygen atom and thus produces free radicals [26].

Average result of glucose metabolism sorbitol.

High sugar levels stimulate the polyol pathway in fat metabolism and sorbitol production, which in turn increases oxidative stress [27], it is observed in a number of tissues such as the nerves and peripheral cells of the capillary vessels of the retina and the kidneys that do not need insulin in the transport of glucose as it causes the cells to swell and then break them down or low muscle inositol content and weak effectiveness of Na+/K* ATPase enzyme [28].

Complications of Diabetes Mellitus

Atherosclerosis.

Atherosclerosis is defined as thickening of arterial walls as a result of the deposition and oxidation of fats represented by oxidation of lipoproteins such as oxidation of lipoproteins and low-density cholesterol (LDL-C) This process leads to a decrease in the concentration of high-density lipoproteins for cholesterol (HDL-C) and an increase in the concentration of low-density lipoproteins for cholesterol. This difference increases arteriosclerosis [29].

Diabetic Neuropathy

Nerve injury is a common complication of diabetes that appears early on the patient and the severity of symptoms varies from one patient to another, where the patient shows weak sensory functions in the extremities such as feeling paresthesia and numbness in the fingers, and they become swollen as well as joint pain in general, and we notice these symptoms in several parts of the body [30,31].

Diabetic Foot Ulcer

Foot injury is caused by a group of complications of diabetes such as skeletal muscular atrophy of the legs and feet, peripheral neuropathy and peripheral arteriosclerosis. The interpretation of these ulcers as a result of chronic infection with diabetes, that the person with ulcers is not sensitive to the ulcer

infection even if it is exposed to external factors and that the secondary complications resulting from the diabetic foot are fungal infection, cracks and inflammation around the nails [32].

Diabetic Ketoacidosis (DKA)

The lack or loss of insulin means that there is no benefit or that glucose does not enter some tissues of the body, such as muscles, liver and fatty tissue, which leads to an increased delegation of fat for the purpose of its use within cells, and that some hormones such as growth hormone and glucagon and the activity of the lipase enzyme or their effect on the release of large amounts of free fatty acids and the decomposition of triglycerides, increase the concentration of glucose and cholesterol in the serum [33].

Diabetic Nephropathy

Nephropathy is a serious complication of diabetes, especially in patients with high blood pressure, as the function of the kidney is to get rid of harmful substances that lead to an increase in the concentration of blood glucose to increase glomerular filtration, and then an increase occurs in the thickness and stiffness of the glomerular membranes and leads in the end leads to renal failure [34,35].

Diabetic Retinopathy

It is a very serious complication of diabetes that leads to blindness, and occurs in large ages in the form of tears, retinal detachment, opacity of the eye and cyanosis with visual loss in one of the eyes,

and this condition is more common in patients with type 2 diabetes [36].

Materials and Methods

Collecting sample of this study

This study was conducted in Erbil and some districts of Erbil city, including the Primary Care Centre / Eastern / Erbil Awinat Health Centre and some private laboratories, for the period from 2/1/2019 until 9/1/2020. The concentration of blood glucose was estimated after collecting information from patients with diabetes and healthy people according to questionnaire (1) on 93 people of both sexes (59 males and 34 females) and ranged in age from (30-70) years and were divided into three groups:

1- First group consists of (31) people have type 1 diabetes and includes (19 males and 12 females).

2- Second group consists of (31) people have type 2 diabetes and includes (18 males and 13 females).

3. Third group consists of (31) healthy people and includes (22 males and 9 females) and it was considered as a control group as shown in the following diagram:

Device used in this study

The concentration of glucose was estimated using the ACCU-check active device as shown in figure 1: whose trademark is Roche UK, It is a device used to determine the concentration of glucose in the blood by a drop of blood that ranges in size (0.3-1) l using special device strips made of plastic and contains the enzyme of glucose oxidase and other components to detect sugar and gives the level of sugar in the blood (mg/dl).

Questionnaire (1)

No.:   Date:

Name:

Age:

Sex: male ☐   female ☐

Smoking: smoker ☐   non-smoker ☐

Food: very good ☐   good ☐   medium ☐   weak ☐

Genetics: positive ☐   negative ☐

Marital status: married ☐   single ☐

Job: employed ☐   unemployed ☐

Geographic location: city ☐   countryside ☐

Heart attacks or chronic diseases: Yes ☐   No ☐

Type of infected disease:

Did the patient receive any diabetic treatment?   Yes ☐   No ☐

Type of treatment: tablets ☐ insulin injections (mixed) ☐ pure insulin ☐

Type of diabetic: insulin dependent diabetic ☐   non-insulin diabetic ☐

Blood glucose concentration F.B.S. =   mg/dl

Hypertension   =   mm/Hg

Duration of diabetes: =

Results

 In this study the average blood glucose concentration in males was 255.684mg/dl, with 177% increase in type 1 diabetic, as for the females, the blood glucose concentration was 233.583 mg/dl with an increase of 151%, and the blood glucose concentration for the second type of males was higher than the first type. 258.389 mg/dl with an increase of 180%, and the average blood glucose concentration for females was 222.769, with an increase rate of 139% compared to healthy people, as shown in Table (1).

Table (1) Percentage rates of glucose concentrations in diabetes compared to healthy people (control group)

Studied groups	No.	Glucose blood concentration average (F.B.S.) (mg/dl)	Glucose concentration %	Increase% (+)
Healthy people (control group)				
Males	22	92.227	100	-
Females	9	93.111	100	-
Total	31	92.669	100	-
Type 1 diabetic				
Males	19	255.684	277	177+
Females	12	233.593	251	151+
Total	31	244.583	264	164+
Type 2 diabetic				
Males	18	258.389	280	180+
Females	13	222.769	239	139+
Total	31	240.579	260	160+
Two types diabetic				
	62	242.581	262	162+

As this study showed the concentration of glucose in the females blood was (271.0 mg/dl), and (223.7 mgLdl) in male blood, for the age group (51-60), with a percentage of 32% of the first type ,while the concentration of glucose in the blood of female and male was (271.0 mg/dl , 243.4 mg/dl)consecutively of the second type of diabetes with percentage of 23% , as shown in Tables (2) and (3).

Table (2) Glucose blood concentration average in diabetes and its relationship to age groups

Age groups (Year)	No. of males		Males glucose blood concentration		No. of females		females glucose blood concentration	
	Type1	Type2	Type1	Type2	Type1	Type2	Type1	Type2
31-40	6	4	171	246	3	4	195.6	247
41-50	5	9	268	272.2	7	7	227.6	193.9
51-60	7	5	223.7	243.4	5	6	271.0	227.5
61-70	5	6	322	245	5	4	198.5	295

Table (3) Effect of age in diabetic infection

Groups / Diabetic type	30-40		41-50		51-60		61-70	
	No.	%	No.	%	No.	%	No.	%
Type 1 diabetic	9	6	13	39	12	32	10	23
Type 2 diabetic	8	19	16	52	11	23	9	6

As this study showed that males are more likely to develop diabetic than females, the percentage of males with the first type, respectively, was 61% and 58%, the highest percentage of females with diabetic, as they accounted for 39% and 42%, respectively, as shown in Table (4).

Table (4) Percentage of in type 1 and type 2 diabetic according to the sex

Groups / Diabetic type	Males		Females	
	No.	%	No.	%
Type 1 diabetic	19	61	12	39
Type 2 diabetic	18	58	13	42

Table (5), showed that type I diabetics depend on insulin therapy that is taken as a subcutaneous injection, and that some patients take inactivated insulin therapy due to disease progression, while type II diabetics depend on treatment on pills to lower the blood sugar concentration.

Table (5) Percentage rate for type of treatment used by diabetes

Groups according to sex / Chronic diseases	Males	Females	Total
No.	37	25	62
Rate	60	40	100

It is shown in Table (6) that patients with Diabetes especially type 2, usually develop chronic diseases even at least one disease, it was also noted that type 1 of diabetes also associated with some chronic diseases. Also, the highest rate of blood pressure was observed in diabetics in both sexes.

Table (6) Number of patients infected with different types of chronic diseases related to diabetic

Chronic diseases / Groups according to sex	Hypertension	Heart and arteries diseases	Urinary tract infection	Retina	Arthritis	Blood diseases	Asthma	Stroke
Males	21	12	3	4	-	2	3	-
Females	19	4	2	1	2	-	3	1

As Shown in Table (7), that infection with type 1 and type 2 diabetic is positive with a rate of 65% and 55% respectively.

Table (7) Effect of family history of diabetic

Diabetic history rate / Diabetic type	Positive		Negative	
	No.	%	No.	%
Type 1 diabetic	20	65	11	35
Type 2 diabetic	17	55	14	45

The results of this study also showed that there is no direct effect of smoking on the level of glucose in the blood compared to non-smoking patients, as shown in Table (8).

Table (8) Effect of smoking on the incidence of both types of diabetic

Groups / Diabetic type	Smokers		Non-smokers	
	No.	%	No.	%
Type 1 diabetic	15	48	16	52
Type 2 diabetic	14	45	17	55

Table (9) :- Showed that the percentage of diabetic patients among the Unemployed is higher than those with the employed category.

Table (9) Effect of work on the incidence on both types of diabetic

Groups / Diabetic type	Employed		Unemployed	
	No.	%	No.	%
Type 1 diabetic	10	32	21	68
Type 2 diabetic	11	35	20	65

The results also showed that foodstuffs rich in sugars, starches and fats negatively affects patients' blood glucose levels, as shown in Table (10).

Table (10) Effect of food on the incidence of diabetic

Groups / Diabetic type	Weak		Medium		Good		Very good	
	No.	%	No.	%	No.	%	No.	%
Type 1 diabetic	4	13	4	13	18	58	5	16
Type 2 diabetic	3	10	11	35	12	39	5	16

Table (11) shows that the incidence has formed the highest rate in the city for the two types of diabetic was 48% and 71% respectively. While in the countryside the rate was the lowest and this is due to the environment.

Table (11) Percentage rate on the incidence on both types of diabetic according to the geographical area

Groups / Diabetic type	Type 1 diabetic		Type 2 diabetic	
	No.	%	No.	%
City	15	48	22	71
Countryside	16	25	9	29

Finally as shown in Table (12) that the marital status hasn't effect on the diabetes, where in the married people the rate was 97% while the unmarried people was 3%.

Table (12) Effect of marital status on the incidence on both types of diabetic

Groups / Diabetic type	Married		Unmarried	
	No.	%	No.	%
Type 1 diabetic	31	100	-	-
Type 2 diabetic	30	97	1	3

Discussion

This study showed an increase in blood glucose level in the people with diabetes compared to healthy people, it has also been observed that the age group (41-50) most affected by the disease, especially the second type, at a rate of 52% and this referred by [36,37].

Patients showed that type 1 depend daily on their treatment on insulin; to adjust their blood sugar concentration and they take it by injection, as well as some of them need insulin that is disrupted due to insulin response due to the development of the disease. While the patients with type 2 depend on tablets that lower glucose concentration in blood and they take them orally, and this is referred by the researchers [38].

Diabetic is the cause of most of the complications of the body and causes some diseases and this corresponds to what [38] mentioned. Blood pressure is the highest incidence of diabetic in both sexes and is related to the second type. The first type coincides with the development of other complications of diabetic and corresponds to what [39], indicated, as well as that complications of diabetic are vascular and cardiovascular diseases. This corresponds to the study findings of [39,40].

The current study showed that infection with type 1 and type 2 diabetic is positive with a rate of 65% and 55% respectively, this means that diabetic is genetic and this what is reached by the researchers [7].

The smoking doesn't affect directly on patients with diabetic but is may increases the possibility of increasing complications of diabetic and this indicated by the World Health Organization [42]. Table (10) shows that the highest rate of diabetes food is (good food) and the rate for type 1 and type 2 diabetic was 58% and 39% respectively, which affects the disease; since the food is rich of starchy materials and sugars and also fatty materials which affect negatively on the diabetes; thus, causes corpulence, which may be a causes for diabetic [42] especially for type 2 diabetes.

Conclusions

The current study showed that the occurrence of diabetes of the first and second types leads to the patient's affliction with many chronic diseases, and that the type and quantity of nutrition directly affects diabetes of type 1 and 2.

References

[1] Jayasri MA ,Gunasekaram S, Radha A, Mathew TLAnti-Diabetic effect of costus pictus leveles in normal and diabetic rats.Int J Diabetes α Metabolism.16.(2008) :117-122.

[2] Tenpe, C. R. & Yeole. P. G. Comparative evolution of anti- diabetic activity of some Marketed Polyherbal Forum alloxan induced diabetic rats. Int. J. Pharm Tech Res. 1(1) (2009): 43-49.

[3] Kasper JS, Liu Y, Pollak M, Rifia NHormonal profile of diabetic men and the potential link to prostate cancer. Cancer Causes and control 19(7) (2008):703-10.

[4] Babington M, Katholos D, Dewitt E. The Meaning of Autoantibody Titers, Exercise, and Alcohol in a Thin 65 - Year - old man Hospitalized for cholangitis and coincidental New Diabetes. Clin Cal (2006).

[5] Fowler MJDiabetes: Magnited and Mechanisms. Clinical Diabetes, 28(1). (2010): 42-46.

[6] Sladek R, Rocheleau G, Rung J, Dina C. Agenome-wide association study identifies

novel risk loci for type 2 diabetes. Nature 05616, 445(7130). (2007):881-5.

[7] Shoback D, Gardner DG, Dolores KGreenspans basic and clinical diabetes mellitus. Trends in Neuroscience, 14. (2011): 542-5

[8] Allen, V. M. & Armson, B. A. Teratogencity associated with pre-existing and gestational diabetes. J. OGC, 200.930 (2007).

[9] Jarvela IY, Juutinen J, Koskela P, Liisa A, Knip M, Tapanainen. Gestational Diabetes identiies women at risk for permanent type 1 and type 2 Diabetes in fertile age.Amarican Diabetes Association, Diabetes Care, 29(3) (2006): 607-612.

[10] Bennett, J. C. & Plum. F. Cecil text book of medicin. 22nd ed. W.B Saunders company (2004).

[11] Al-Greti, S. H. H. Bacteriological and immunological study of bacteremia in diabetic patient at kerbala city, M. Sc Thesis, College of Medicine, Babylon University (2008).

[12] Abdennebi LC, Wei JH, Remy JJ. Maintenance of sexual immaturity in mice and duks by immunization agints N-terminal peptides of the follicle –stimulating hormone receptor.Biol.Repord(2003). : 323-327.

[13] American Diabetes Association ADA Diagnosis and classification of diabetes Millitus. Diabetes Care, 36(2010): 542-547.

[14] Ene, A.C., Nwandwo, E. A. & Samdi, L. M. Alloxan – Induced Diabetes in Rats and the Effects of Black caraway (carum carvi L.) oil on Their Body weight. Res. J. Med. and Med. Sci. 2(2) (2007): 48-52. .

[15] Gulfraze, M., Qadir, G., Nosheen, F. and Parveen, Z. Antihyper - glucemic effects of Berberis lyceumroyik in alloxan in duced

diabetic rats. Diatetologia croatica, (2007). pp: 36-3.

[16] Frantz E, Mello VS, de-Lacerda CM. Pancreas: Anatomy, diseases and health implications.www.Immc.uerj.br,[+55 21]. (2012)

[17] Mohammad, Midhaat Hussein Khaleel Endocrinology, 3rd edition, Academic Book Printing House, Al-Ain, United Arab Emirates, (2005)P. 683.

[18] Guyton, A.C. & Hall, J. E. "Text Book of Medical physiology". 11th Edition W.B. Saunders (2006): Company Philadelphia.

[19] Gal E, Anderson J. Diabetes and other disorders of metabolism. In Kumar and Clark clinical Medicine, 6th ed. Vol.19 (2005): 1110-1112.

[20] Mayer J, Zhang F, Dimarchi R. Insulin structure and function. Biology of the cell, 88(5) (2007):687-713.

[21] Essa, Zina Essa, Studying some bio-variables of diabetes (type2). Master thesis, college of education / Ibn Al-Haitham/ Baghdad University (2006).

[22] Al-Bayati H.,Abbas S. K. Bloody, hematological, immunological and biochemical assessments in diabetics. Ph.D. thesis, College of Education (Ibn Al-Haitham), Baghdad University (2006).

[23] Al-Hameed, Mohammad B. S. Diabetics, causes, complications and treatment, 1st edition, Al-Riyadh, Kingdom of Saudi Arabia, Saudi Arabia, (2007): P.91.

[24] Zanella MT, Kohlmann O, Ribeiro AB. Hypertention.American Heart Association. 221(2014):705-708.

[25] Magaji V, Johnoston JInpatient management of Hyperglycemia and diabetes. Clinical Diabetes, 29(1). (2011):3-9.

[26] Reily C, Stewart TJ, Novak. Glycosylation in health and disease. Natural Reviews Nephrology, 15(2019): 346-366.

[27] Atalay, M. & El-Aaksonen, D. Diatetes oxidative stress and physical exercise J. spo sci and med: 1(2002):1-14.

[28] Stephen L, Aronoff MD, Berkowitz K, Apram BC, Want LGlucose metabolism and regulation: Beyond Insulin and Glucagon. Special Podcast Series 17(3). (2004):183-190.

[29] Allen SH. The manual of diabetes education. Navigating Diabetes Center. New York, USA (2003).

[30] Nascimento O, Pupe CB, Cavalcanti EB. Diabetic Neuropathy.Rev Dor.Sao Paulo, 17(1) (2016): 46-51.

[31] Bruschi LK, da Rocha D, Barboza NP. Diabetes Mellitus and diabetic peripheral Nuropathy. Endocrine and Metabolic Diseases, 7(1) (2017): 12-21.

[32] Syafril SPathophysiology diabetic foot ulcer. Earth and Environmental Science, 125. (2018):1-6.

[33] Baird JS, Schiffman JS, Skuza K. Trend in serum sodium concentration and effective osmolality during of paediatric diabetic ketoacidosis. Clinical Intensive Care, 41(1-2) (2004):19-24.

[34] Gao, W.G. Early detection of type 2 diabetes Mellitus in Chinese and Indian aduth population. Diabet Med. J.:27(2010):22-29.

[35] Vislisel J, Oetting T.Diabetic Retinopathy. Eye R.unds.org.Ophthalmology and Visual Science. (2010).

[36] Abdul-Ghani M, Abdul-Ghani T, Defronzo R. One-Hour plasma glucose concentration and the metabolic syndrome identify subjects at high risk for future type 2 Diabetes. American Diabetes Care 31(8)) 2008):23-40.

[37] Ahranjani S.A.,Tabatabaei O.,Pajouhi MDiabetes In Old Age, Areview. Iranian Journal of Diabetes and Lipid Disorders 8(1) (2009):113-128.

[38] Kuzuya T. Report of the committee on the classification and diagnostic criteria of diabetes mellitus. Pub.Med.gov.Advanced (2003).

[39] Papatheodoruo K, Banach M, Bekiari E, Rizzo M. Complications of Diabetes 2017.Journal of Diabetes Research ,10(115)(2018).

[40] Lotfy M, Adeghate J, Kalaz H, Singh J . Chronic complications of Diabetes mellitus: Amini review. Current Diabates Reviews, 13(5). (2015):3-10.

[41] Defronzo. R.A. Pathogenesis of type II diabetes Mellitus. Med. - Clin North Amer. 88(2004): 787-835.

[42] Campbeli AP.Dash Eating Plan: An eating pattern for Diabetes management. Diabetes Spectrum 30(2) (2017):78-81.