Diabetes mellitus and its complications in Najaf city, Iraq

B. A. Almayahi

School of Physics, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia
basimnajaf@yahoo.com

Abstract: Background: In this study focused on studying diabetes and its complications on the number of patients. Methods: Blood samples of 200 patients with statistical questionnaires form are collected from the Center of Diabetes and Endocrinology at Al Sadr Hospital in Najaf city. The statistical questionnaires form designed especially for this study contains the age, weight, height, sex, marital status, occupation, type of diabetes, family history, and the period of the disease, housing, environment and complications of diabetes. Results: Statistical data from 2007 to 2013 years found that diabetes is growing significantly in Najaf city. The highest glucose concentration was 464 mg dl-1, whereas the lowest was 60 mg dl-1 in male blood samples. The average glucose concentration in male blood was 238.43± 9.58 mg dl-1, whereas that in female blood was 229.13± 7.55 mg dl-1. The result illustrates the increasing rates of diabetes in interval from 2007 to 2013 with good correlation coefficient of R = 0.93. Conclusions: This study showed that one hundred thirteen patients are dependence on insulin medication (antihypertensive of diabetes) and the effect of genetic factor for patients with diabetes is non-hereditary. The results showed that the neuropathy is more vulnerable to damage, followed by retinopathy for male and female. Heart diseases have no relationship with diabetic.
[B. A. Almayahi. **Diabetes mellitus and its complications in Najaf city, Iraq.** *Life Sci J* 2017;14(7):88-92]. ISSN: 1097-8135 (Print) / ISSN: 2372-613X (Online). http://www.lifesciencesite.com. 14. doi:10.7537/marslsj140717.14.

Keywords: Diabetes, blood, Najaf, statistical questionnaires, Sadr hospital

1. Introduction

Diabetes mellitus (DM), known as simply diabetes, is a group of metabolic diseases in which there are high blood sugar (glucose) levels over a prolonged period [1] This high blood sugar produces the symptoms of frequent urination, increased thirst, and increased hunger. Untreated, diabetes can cause many complications [2]. Acute complications include DM ketoacidosis and nonketotic hyperosmolar coma [3]. Serious long-term complications include heart disease, stroke, kidney failure, foot ulcers, and damage to the eyes [2]. DM is a metabolic syndrome that results in continually increased blood glucose (hyperglycaemia) due to defects either in insulin secretion consequent to the loss of beta cells in the pancreas (DM type 1) or to loss of insulin in target organs in the presence of normal insulin secretion (DM type 2). Long term hyperglycaemia leads to a number of serious health-threatening pathologies, or complications in the kidney, heart, retina, and peripheral nervous system [4]. The costs of DM type 1 and 2 are growing in most world countries. The disease management of diabetes patients-related chronic complications is expensive. Each year, about 4 million deaths are attributable to diabetes, constituting 6.8% of the total global mortality [5, 6]. DM is the fourth leading cause of disease-related death and about 80 % of diabetes-related deaths almost occur almost in developing countries. The incidence of microvascular complications is increasing among the growing number of patients suffering from diabetes [7, 8, 9]. Microvascular complications are the results of multiple causative factors. Genetic susceptibility is one of the reasons proven in previous studies [10, 11]. The pathogenesis of diabetic nephropathy is comprised of metabolic, hemodynamic and genetic factors. Many studies have revealed that genetic factors contribute in the development of diabetic nephropathy [12, 13, 14, 15] DM is a common cause of peripheral neuropathy worldwide. In previous studies, the incidence of neuropathy in diabetic patients varies between 10 and 50 %; a wide variability is related to the lack of consistent criteria in the definition of peripheral neuropathy [16]. The growing number of patients with diabetes means a great loss in human resources, which requires the intensification of studies to Prevention. This study is aim to the knowledge or study of the complications caused by diabetes.

2. Material and Methods

The glucose concentration in individual blood was determined using the devices (Spectrophotometer and Reflow torn plus) as shown in Fig. 1. The blood was collected by doctor who also recorded information on each blood sample, such as the age, gender, town, and smoking status of the donor (Table 1). Two hundred blood samples (100 males and 100 females) were collected from the Center for Diabetes and Endocrinology at Education Al Sadr Hospital in the city of Najaf. In this study, information was collected from patients with diabetes in Educational

Al Sadr Hospital lab for the period from December 2013 to February 2014. In each session questions to patients through a statistical questionnaire form including patient name, sex, age, white, length, marital, occupation, diabetes type (dependent on insulin or non-dependent on insulin), family history about diabetes, diabetes period, region, smoker, diabetes complications (Heart disease, Hyper tension, Neuropathy, Nephropathy, Retinopathy, Hyperlipidemia, Stroke, Skin condition, Mouth condition, Hearing problems, Foot problems) are asked. This form has been designed in this research to know complications and their effect on patients with diabetes.

Fig. 1. Spectrophotometer and Reflow torn plus used in this study

Table 1. Estimated coefficients of linear equation

Coefficients	Glucose concentration	Standard error
α	-0.7519	0.4763
β	273.0939	24.6210
R^2	0.0124	

3. Results

The glucose concentrations in the blood samples are found. The correlation between the donor's age and the observed glucose concentration in blood was determined (Fig. 2), which was linearly fitted according to Eq. (1).

$$y = \alpha x + \beta, \quad (1)$$

where y is the glucose concentration, x is the donor's age, and α and β are the coefficients (Table 1).

Fig. 3 shows the effect of the donor's age (divided into intervals 17 years-29 years, 31 years-39 years, 41 years-49 years, 50 years-59 years, 60 years-69 years, and 71 years-82 years) on the glucose concentration.

4. Discussions

The highest glucose concentration was 464 mg dl-1, whereas the lowest was 60 mg dl-1 in male blood samples. The ANOVA results in Fig. 3 were obtained using SPSS 17.0. The results in Table 2 show no statistically significant differences between the glucose concentration and the age intervals, indicating the diabetic have the same effect at any ages.

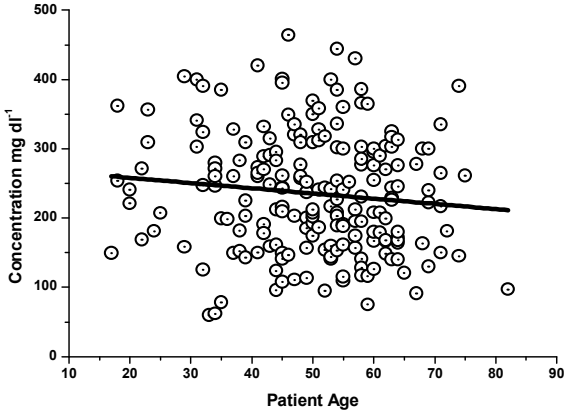

Fig. 2. Glucose concentration versus patient age

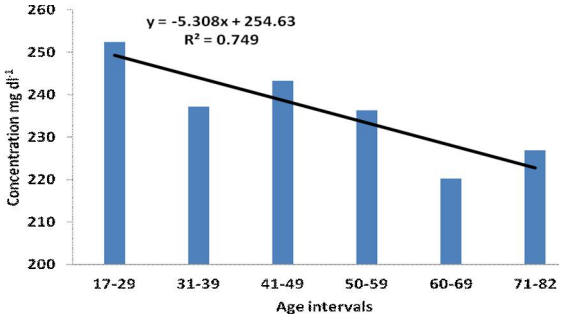

Fig. 3. Glucose concentration versus age intervals

Table 2. Analysis of variance results of alpha emission rate for donor age intervals.

Source of variation	Sum of Squares	Degrees of freedom	Mean Square	*F ratio*	*p-value*
Between Groups	17030.049	5	3406.010	0.456	0.809
Within Groups	1449098.671	194	7469.581		
Total	1466128.720	199			

Table 3 shows the mean values of the glucose concentration and the 95% confidence intervals for the mean of each age interval. The average glucose concentration in male blood was 238.43± 9.58 mg dl-1, whereas that in female blood was 229.13± 7.55 mg dl-1 (Fig. 4). The results of the study explained that the glucose concentration in males was higher than in females. This difference was not statistically significant at the 0.05 level, as shown in Table 4.

In this study, the results showed that the neuropathy is more vulnerable to damage, followed by retinopathy of a total of 200 patients (male and female). The high rate of glucose in the blood has a detrimental effect on microvascular in all organs of the body, especially the retina as shown in Fig. 5. Increasing incidence of diabetic retinopathy disease with increasing duration of diabetes, where almost the incidence rate of 80% after 15 years of diabetes. The retinopathy leads to incidence of diabetic retinopathy to visual loss. This result also showed that heart diseases have no relationship with diabetic. Fig. 6 shows that people with diabetes (113 patients out of 200) dependence on insulin medication antihypertensive of diabetes. The effect of genetic factor for patients with diabetes was non-hereditary as shown in Fig. 6. Fig. 7 illustrates the increasing rates of diabetes in interval from 2007 to 2013 with good correlation coefficient of R = 0.93. The results in Table 5 show statistically significant differences between diabetes patients number in the city of Najaf for the 7 years from 2007 to 2013, indicating the diabetes patient numbers have increasing each year. Table 6 shows the mean diabetes patients and the 95% confidence for the mean of each year.

Table 3. Summary statistics and 95% confidence intervals for mean alpha emission rate in teeth for each age interval.

Source of variation	**Sum of Squares**	**Degrees of freedom**	**Mean Square**	***F ratio***	***p-value***
Between Groups	4324.500	1	4324.500	0.580	0.447
Within Groups	1475915.820	198	7454.120		
Total	1480240.320	199			

Table 4. Analysis of variance results of the glucose concentration for two genders.

Age interval	**N**	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Min.**	**Max.**
					Lower Bound	**Upper Bound**		
17-29	13	252.46	83.722	23.220	201.86	303.05	149.00	404.00
31-39	27	237.18	97.196	18.705	198.73	275.63	60.00	400.00
41-49	48	243.22	86.746	12.520	218.04	268.41	96.00	464.00
50-59	62	236.35	92.171	11.705	212.94	259.76	75.00	444.00
60-69	41	220.17	66.053	10.315	199.32	241.01	91.00	325.00
71-82	9	226.88	95.478	31.826	153.49	300.28	97.00	391.00
Total	200	235.42	85.834	6.0690	223.45	247.38	60.00	464.00

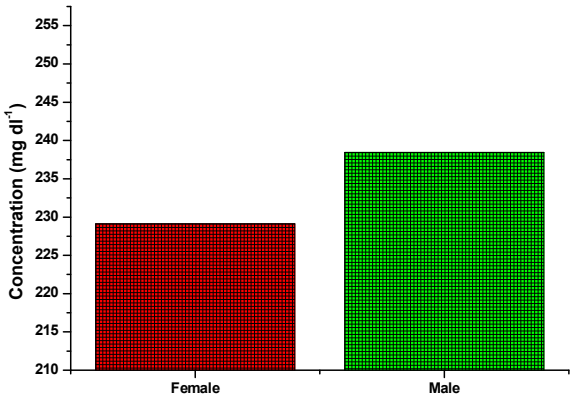

Fig. 4. Glucose concentration in blood samples as a function of gender

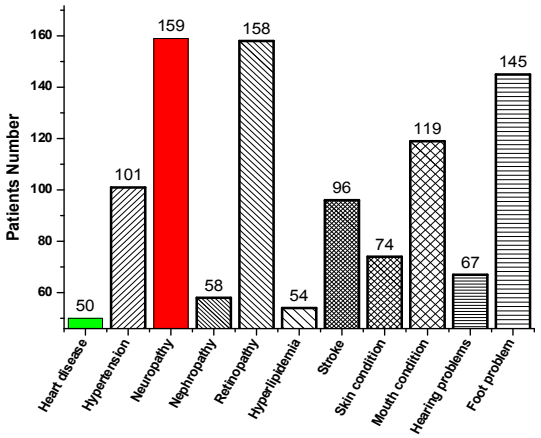

Fig. 5. Diabetic duplications

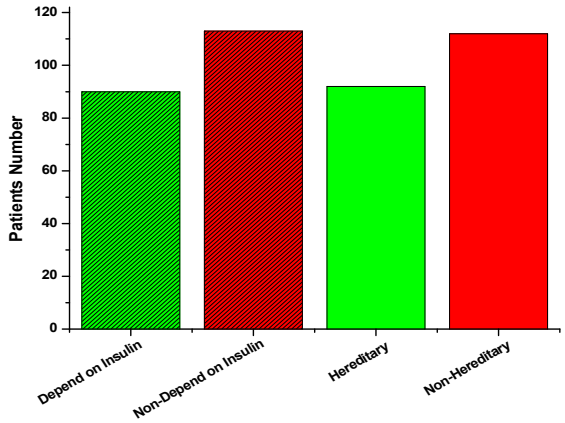

Fig. 6. Type of diabetes (depend and non-depend on insulin) and the effect of the genetic factor for patients with diabetes

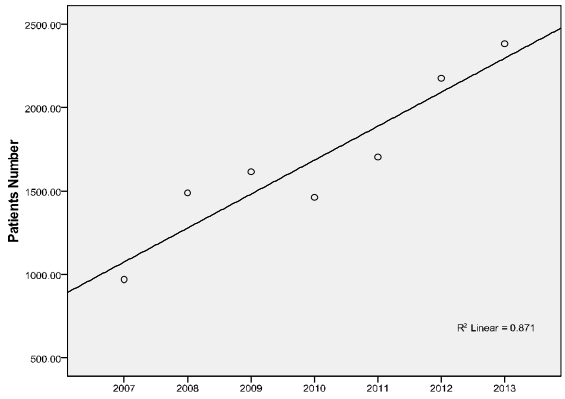

Fig. 7. Diabetes patients number in the city of Najaf as a function of years [17].

The results of this study demonstrated no considerable effect of age, and gender on the glucose concentration rates in human blood. Based on the results obtained no statistically significant differences between the glucose concentration and age intervals. Furthermore, the diabetes has the same effect at any ages. The results of the study explained that the glucose concentration in males was higher than in females. This difference was not statistically significant at the 0.05 level. The results showed that the neuropathy is more vulnerable to damage, followed by retinopathy for male and female. The high rate of glucose in the blood has a detrimental effect on the blood capillaries in all organs of the body, especially the retina. Increasing incidence of diabetic retinopathy disease with increasing duration of diabetes, where almost the incidence rate of 80% after 15 years of diabetes. The retinopathy leads to incidence of diabetic retinopathy to visual loss. This result also showed that heart diseases have no relationship with diabetic. The effect of genetic factor for patients with diabetes was non-hereditary. The results statistically significant differences between diabetes patients number in the city of Najaf for the 7 years from 2007 to 2013, indicating the diabetes patient's numbers have increasing each year. Overall, the obtained results of glucose concentrations of some blood samples are high and may cause dangerous effects on human health.

Table 5. Analysis of variance results of the diabetes for 7 years in Najaf city.

Source of variation	**Sum of Squares**	**Degrees of freedom**	**Mean Square**	***F ratio***	***p-value***
Between Groups	1.601×10^7	6	2667885.278	13.343	0.000
Within Groups	1.540×10^7	77	199944.373		
Total	3.140×10^7	83			

Table 6. Summary statistics and 95% confidence for mean diabetes for each year in Najaf city.

Years	**Mean**	**Std. Deviation**	**Std. Error**	**95% Confidence Interval for Mean**		**Min.**	**Max.**
				Lower Bound	**Upper Bound**		
2007	968.75	85.858	24.785	914.19	1023.30	818.00	1124.00
2008	1488.16	356.140	102.809	1261.88	1714.44	683.00	1881.00
2009	1614.00	312.894	90.325	1415.19	1812.80	1071.00	2059.00
2010	1460.16	289.747	83.642	1276.06	1644.26	1113.00	2210.00
2011	1702.33	514.058	148.395	1375.71	2028.95	133.00	2100.00
2012	2175.75	503.178	145.255	1856.04	2495.45	1614.00	3121.00
2013	2381.75	752.396	217.198	1903.70	2859.80	289.00	3196.00
Total	1684.41	615.101	67.113	1550.93	1817.90	133.00	3196.00

Acknowledgement:
The author acknowledges the financial support of the College of Science of the University of Kufa.

Corresponding Author:
B. A. Almayahi
School of Physics, Universiti Sains Malaysia, 11800 USM, Penang, Malaysia
E-mail: basimnajaf@yahoo.com

References

1. WHO. World Health Organization. About diabetes. Retrieved 4 April 2014.
2. WHO. World Health Organization. Diabetes Fact sheet N° 312. October 2013. Retrieved 25 March 2014.
3. Kitabchi, A. E., Umpierrez, G. E., Miles, J. M., Fisher, J. N., (2009). Hyperglycemic crises in adult patients with diabetes. Diabetes Care 32 (7): 1335–43. doi:10.2337/dc09-9032.
4. Rachel B., Ian A. Mitochondrial dysfunction and complications associated with diabetes. Biochimica et Biophysica Acta 1840 (2014) 1404–1412.
5. Roglic G. Diabetes mortality. In: Gan D., editor. Diabetes Atlas. 3rd ed. Brussels: International Diabetes Federation; 2006.
6. Roglic G., Unwin N. Mortality attributable to diabetes: estimates for the year 2010. In: Unwin N. et al., editors. Diabetes Atlas. 4th ed. Brussels: International Diabetes Federation; 2009.
7. Whiting D. R., Guariguata L., Weil C., et al. IDF diabetes atlas: global estimates of the prevalence of diabetes for 2011 and 2030 Diabetes Res Clin Pract 2011; 94:311–21.
8. Kim J. H., Kim D. J., Jang H. C., et al. Epidemiology of micro- and macrovascular complications of type 2 diabetes in Korea. Diabetes Metab J 2011; 35:571–7.
9. Guariguata L., Whiting D., Weil C., et al. The International Diabetes Federation diabetes atlas methodology for estimating global and national prevalence of diabetes in adults. Diabetes Res Clin Pract 2011; 94:322–32.
10. Raman R., Gupta A., Krishna S., et al. Prevalence and risk factors for diabetic microvascular complications in newly diagnosed type II diabetes mellitus. Sankara Nethralaya Diabetic Retinopathy Epidemiology And Molecular Genetic Study (SN-DREAMS, report 27). J Diabetes Complications 2012; 26:123–8.
11. Mehrab-Mohseni M., Tabatabaei-Malazy O., Hasani-Ranjbar S., et al. Endothelial nitric oxide synthase VNTR (intron 4 a/b) polymorphism association with type 2 diabetes and its chronic complications. Diabetes Res Clin Pract 2011; 91: 348–52.
12. Savopoulos C., Michalakis K., Apostolopoulou M., et al. Adipokines and stroke: a review of the literature. Maturitas 2011; 70:322–7.
13. Apostolopoulou M., Savopoulos C., Michalakis K., et al. Age, weight and obesity. Maturitas 2012; 71:115–9.
14. Costa V., Ciccodicola A. Is PPARG the key gene in diabetic retinopathy? Br J Pharmacol 2012;165:1–3.
15. Jang Y., Lee J. H., Kim O. Y., et al. The SNP276G>T polymorphism in the adiponectin (ACDC) gene is more strongly associated with insulin resistance and cardiovascular disease risk than SNP45T > G in nonobese/nondiabetic Korean men independent of abdominal adiposity and circulating plasma adiponectin. Metabolism 2006; 55:59–66.
16. Krendel D. A. (2002): Diabetic Neuropathy In: Neuromuscular Function and Disease.
17. Center of Diabetes and Endocrinology at Al Sadr Hospital in Najaf city, 2013. Statistics Department. Health Affairs General Directorate – Najaf, Iraq.

7/25/2017