Mathematical Engineering Model for Studying the Interrelated among Effective Factors in the Sugar Blood Estimation Test

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Abstract

It is a chronic metabolic disease, which is characterized by high blood sugar, as a result of a defect in the pancreas weakens the production of insulin to the body, and spread type 2 diabetes in humans all over the world, where there are more than a million and a half million people with diabetes. The most important factors contributing to the spread of this disease is eating unhealthy, excessive obesity, lack of exercise, psychological tension and genetic factor, so it is the responsibility of the state, as it must provide health education to its population, and urge them to eat healthy food and reduce excess weight, and encourage them on the practice of r Intifada activity, urging them to westernize the marriage, if any diabetes in the family. Therefore, the independents and dependent variables are included using a statistical program to be analyzed and to find the degree of correlation and impact of the variables among them and to analyze and discuss the results.

Keywords: *Effective, Factors, Mathematical Engineering Model, Sugar Blood*

Introduction

Diabetic type I that affects children and young people, and is caused by the loss of insulin in the body as a result of a defect in the pancreas, and makes the person infected with insulin doses for a lifetime. Type II: is the type that affects adults, and is the most prevalent in the world, and is caused by insulin secretion rate is insufficient to the body, or because of the start of other body cells to resist insulin. Other types: gestational diabetes. [1] to [3].

Diabetes symptoms are dehydration of the throat, drinking excessive amounts of water, feeling hungry shortly after eating, frequent urination to urinate, low or excessive weight loss, and vision problems such as poor vision, fatigue, fatigue, itching, Wounds do not heal quickly, cold symptoms such as loss of appetite and body pallor, weakness in gum teeth, short stature, and slow growth if children develop diabetes. For anyone with diabetes, a blood glucose self-test (blood glucose) may be a necessary means of treatment plan and ways to prevent long-term diabetes complications. A blood glucose test can be done at home using a portable electronic device (glucose meter), which measures the level of sugar through a small drop of blood. A blood glucose test - or self-monitoring of your blood glucose - provides useful information for controlling diabetes. It helps the tester to:

• Assess the extent to which the general objectives of treatment are achieved.

• Learn how diet and exercise affect blood sugar levels.

• Identify how other factors, such as illness or stress, affect blood sugar levels.

• Track the impact of diabetes medications on blood sugar levels.

• Determine high or low blood sugar levels.

Methodology of the Tests

However, there are several factors that obviously increase your risk of diabetes, including:

• Age: Age greater than or equal to 45.

Weight: Overweight defined as BMI greater than or equal to 25.

• Genetics: a close relative of a family with diabetes.

• Race: certain ethnic groups known to have a high risk of developing diabetes.

• Physical activity: lack of physical activity.

• Hypertension / hypertension: defined by blood pressure values higher than 90/140 mmHg.

• Hypercholesterolemia: LDL is harmful

• High level of triglycerides in the blood: It is one of the types of fat found in the body. Values higher than 250 mg / dL.

• Polycystic ovary syndrome.

• Vascular diseases: a personal history of these diseases.

• The birth of a child with a large weight: a personal history of women, including the birth of a child with a weight greater than 4.1 kg (the weight of the child immediately after birth).

• Gestational diabetes: a personal history of gestational diabetes.

• Hemoglobin glycosylate values: HBA1C greater or equal to 5.7%.

• Glucose tolerance: Impaired glucose tolerance

• Glucose values: those with glucose impairment in the post-fasting examination impaired fasting glucose

When these factors appear - hypertension, hyperglycemia and hyperlipidemia above the normal level - together with obesity (excess weight) a relationship arises, together, with insulin resistance. Factors of gestational diabetes during pregnancy, the placenta produces hormones that help and support pregnancy. These hormones make cells more resistant to insulin. In the second and third trimesters of the pregnancy, the placenta grows and produces large amounts of these hormones that make insulin work harder and make it more difficult. In normal situations, the pancreas reacts by producing additional insulin to overcome that resistance. Sometimes, however, the pancreas is unable to keep up with the pace, resulting in too little sugar (glucose) reaching the cells, while much of it accumulates in the bloodstream. Thus gestational diabetes (diabetes during pregnancy) is formed. Any pregnant woman may develop gestational diabetes, but there are women who are more likely than others.

Mathematical Analysis of Diabetic blood Test

As mentioned in the previous article, there are many important parameters that the evaluation committee relies on. Constraints of independent parameters (X_1 to X_4) are explained below:

The first parameter is the race type: X_1, Female or male.

The second parameter is age in years of the tested person: X_2, $20 < X_2 < 65$.

The third parameter, life type: X_3, rural or countryside.

The fourth parameter, fasting or none fasting case: X_4, Fasting or none.

The dependent parameter Y represents diabetic degree in the blood. The value of Y is classified into ranges 80 to 600 according to the test of the blood. These ranges have standard description usually mentioned in the graduation manuscript. Table (1) contains the dependent, independents, value ranges of parameters [4].

Table (1): Real results are recorded from the tested persons

S	Race	Age years	Life Type	Fasting or None	Result
	X1	X2	X3	X4	Y
1	Female	35	Rural	None	121
2	male	55	Rural	None	114
3	Female	37	Rural	None	95
4	male	25	Rural	None	94
5	Female	20	Rural	None	104
6	male	27	Rural	None	115
7	Female	43	Rural	Fasting	85
8	male	45	Rural	Fasting	96
9	Female	25	Rural	None	102
10	male	35	Rural	None	84
11	Female	40	Rural	None	101
12	Female	45	countryside	None	105
13	Female	85	Rural	Fasting	90
14	male	40	Rural	Fasting	105
15	male	54	Rural	Fasting	102
16	male	28	Rural	None	106
17	male	60	Rural	Fasting	97
18	male	27	Rural	None	102
19	Female	24	Rural	None	104
20	male	22	Rural	None	91

Results and Discussion

Statistical descriptive Table (2) contains four dependent variables (X_1 to X_4) and one dependent variable (Y). It is clear that the mean of the variables in the following column, the standard deviation in the third column while the fourth column contains number sample elements [5]. Table (3) explains the correlation matrix correlates among the four independent variables. When the two elements are associated with a significant of zero that means the correlation number is less than 5% and then gives a strong correlation.

Table (4) is shown the names of the variables that entered the regression equation did not exclude any variables even if they had a trace effect x_2, x_3, x_4.

Table (5) is a very important to correlate the relation between the dependent variables and independent variables as estimated by R = 0.997 and R^2 = 0.994. Independent variables have about 0.99 of variance in the degree of evaluation of the project. The coefficient values and the coefficient of selection are high indicating that the regression equation or prediction is good [6].

The following Table (7) is called the table of coefficients, it contains:

- Variable coefficients that entered the equation in column B.

- Standard deviation for each Std Error column.

- The coefficients of the independent variables that entered the equation after converting them into the standardization scores in the corresponding Beta column for each variable. In the last two columns of this table, the value of the statistic t and the significance level of the beta value test are shown. If the significant value corresponding to any Beta value is less than 0.05 means that the corresponding variable of these values has a significant statistical significance. In this Table (7).Table (9): Compare them with critical variables. Fig. 1: The repetitive histogram is followed by normality.

Fig. 2: Graphic P-P variables are traceable normality. In the Fig.3, (the propagation plate) between the observed values and the estimation errors, we observe the random propagation pattern. This indicates that the relationship between the two variables is linear and that regression analysis conditions are available, but if other data show that the propagation pattern is similar to quadratic or cubic function, Evidence that the relationship between the variants is nonlinear.

Table (2): Descriptive Statistics

Parameters	Mean	Std. Deviation	N
y	65.8750	23.37543	8
x1	5.1250	1.72689	8
x2	7.4375	3.13320	8
x3	7.4375	3.13320	8
x4	7.4375	3.13320	8

Table (3): Explains the correlation matrix correlates among the four independent variables.

		y	x1	x2	x3	x4
Pearson Correlation	y	1.000	.942	.970	.970	.970
	x1	.942	1.000	.965	.965	.965
	x2	.970	.965	1.000	1.000	1.000
	x3	.970	.965	1.000	1.000	1.000
	x4	.970	.965	1.000	1.000	1.000
Sig. (1-tailed)	y	.	.000	.000	.000	.000
	x1	.000	.	.000	.000	.000
	x2	.000	.000	.	.000	.000
	x3	.000	.000	.000	.	.000
	x4	.000	.000	.000	.000	.
N	y	8	8	8	8	8
	x1	8	8	8	8	8
	x2	8	8	8	8	8
	x3	8	8	8	8	8
	x4	8	8	8	8	8

Table (4): Variables Entered/ Removed b

Model	Variables Entered	Variables Removed	Method
1	x4, x1	.	Enter

a. Tolerance = .000 limits reached.

b. Dependent Variable: y

Table (5): Model Summaryb				
Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**
1	.997a	.994	.977	3.51324

a. Predictors: (Constant), x8, x6, x5, x1, x7
b. Dependent Variable: y

Table (6): ANOVAb						
Model		**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
1	Regression	3800.189	5	760.038	61.577	.016a
	Residual	24.686	2	12.343		
	Total	3824.875	7			

a. Predictors: (Constant), x8, x6, x5, x1, x7
b. Dependent Variable: y

Table (7): Coefficientsa									
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**Correlations**		
		B	**Std. Error**	**Beta**			**Zero-order**	**Partial**	**Part**
1	(Constant)	-54.895	20.496		-2.678	.116			
	x1	-29.114	8.099	-2.151	-3.595	.069	.942	-.931	-.204
	x4	.762	2.799	.102	.272	.811	.970	.189	.015

a. Dependent Variable: y

Table (8): Excluded Variables b						
Model		**Beta In**	**t**	**Sig.**	**Partial Correlation**	**Collinearity Statistics**
						Tolerance
1	x2	.a	.	.	.	.000
	x3	.a	.	.	.	.000s
	x4	.a	.	.	.	.000

a. Predictors in the Model: (Constant), x8, x6, x5, x1, x7
b. Dependent Variable: y

Table (9): Residuals Statisticsa					
Residuals Names	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	29.0000	97.6000	65.8750	23.29988	8
Std. Predicted Value	-1.583	1.362	.000	1.000	8
Standard Error of Predicted Value	1.782	3.513	2.965	.728	8
Adjusted Predicted Value	52.0000	94.0000	79.0192	18.78219	4
Residual	-3.77143	2.40000	.00000	1.87791	8
Std. Residual	-1.073	.683	.000	.535	8
Stud. Residual	-1.246	1.414	.127	.815	8
Deleted Residual	-5.07692	12.00000	2.98077	7.55502	4
Stud. Deleted Residual	-1.859	1.183	-.282	1.524	3
Mahal. Distance	.925	6.125	4.375	2.232	8
Cook’s Distance	.004	1.611	.499	.751	4
Centered Leverage Value	.132	.875	.625	.319	8

a. Dependent Variable: y

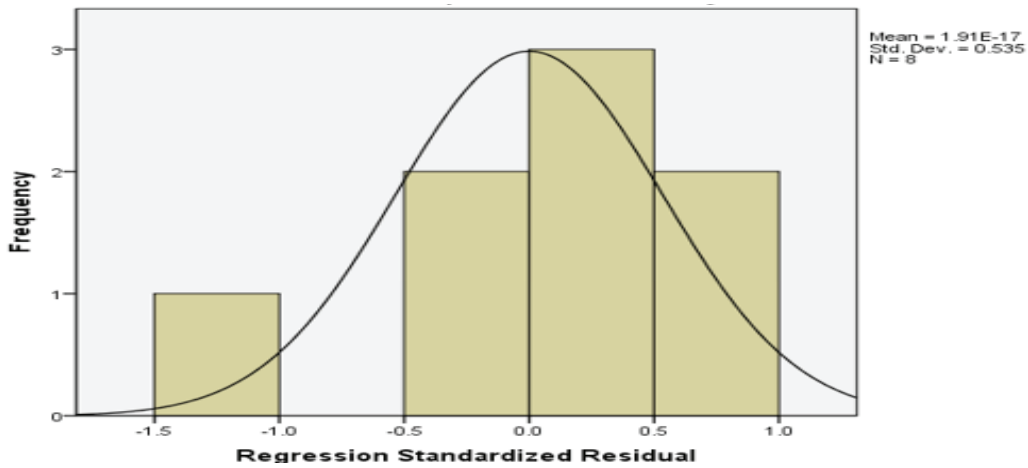

Fig. 1: Histogram of dependent variable y.

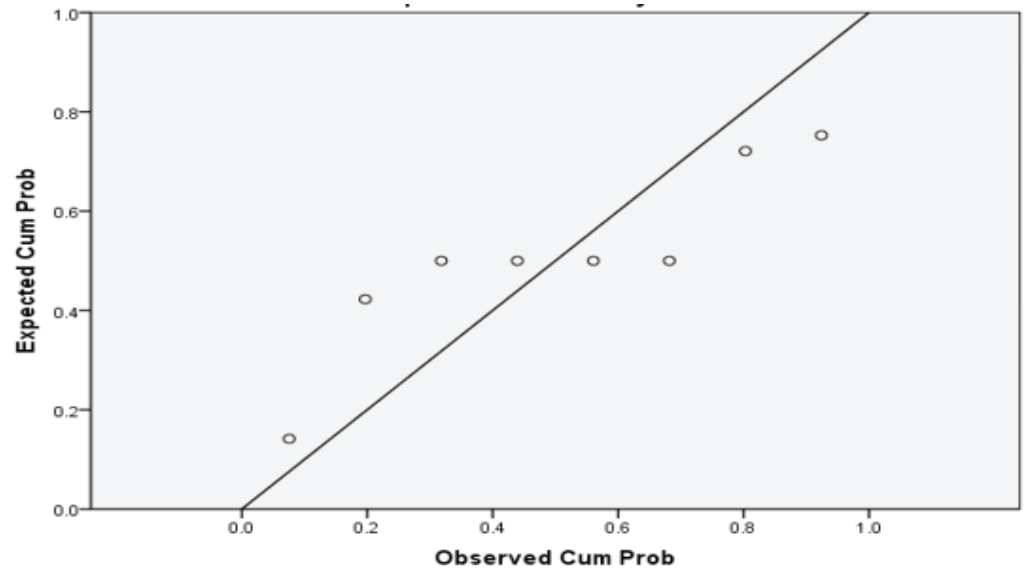

Fig. 2: Normal P-P plot of Regression Standardized Residual of dependent variable y.

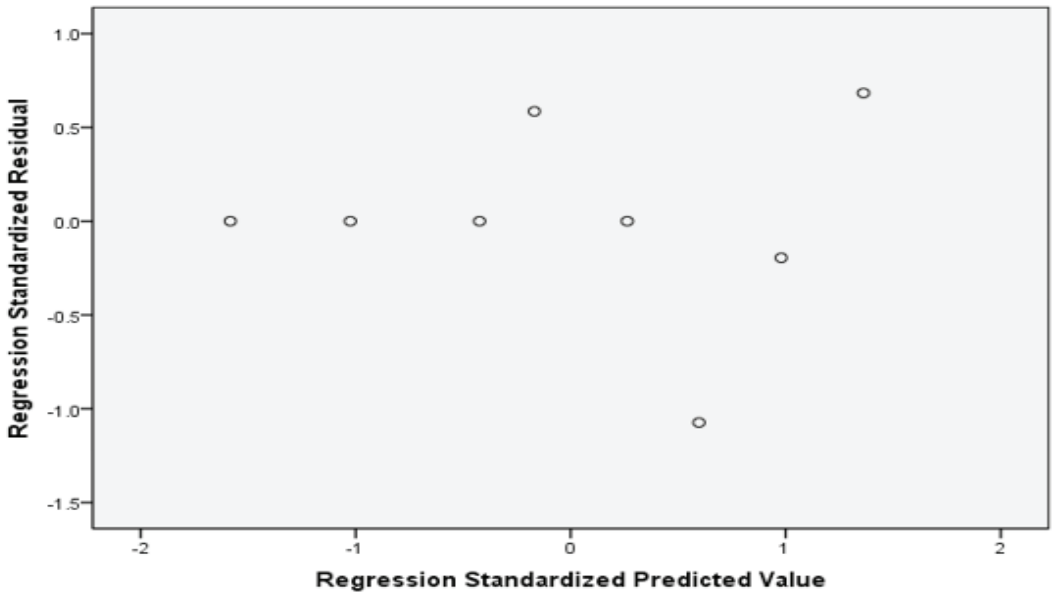

Fig. 3: Scatterplot of dependent variable y.

Conclusion

It is clear from the results presented in the nine tables as well as the four drawings that the independent variables (x_1 to x_4) have varying degrees of impact and effect on the final score value of the tests evaluation. Therefore, we conclude that the variables should be given greater importance in evaluating the test.

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the University of Diyala and all experiments were carried out in accordance with approved guidelines.

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