

THE PREVALENCE OF DIABETES MELLITUS AMONG MALE WORKERS IN AN ENGINEERING FACTORY-IRAQ

*Hassan Alwan Hussien, **Hikmet Jamil *Physician in Al-Qadissyia State Establishment **Dept. of Comm. Med. Coll. of Med. Uni. of Baghdad, Iraq.

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نسبة انتشار حالة داء السكري عند العاملين الذكور في أحد المصانع الهندسية - العراق

الخلاصة

تم إجراء مسح وبائي على ١٠٩٨ شخص من الذكور الذين لهم خدمة في العمل خمس سنوات فأكثر. لقد تبين أن نسبة انتشار حالة داء السكري ونسبة قصور حمل السكريات تساوي ٢.٨٪ و ١١.٥٪ على التوالي. لقد تم اكتشاف نسبة عالية من حالات داء السكري بين العاملين. لقد كانت حالة داء السكري أكثر انتشاراً عند العاملين في قسم المعاملات السطحية. لقد وجدت علاقة احصائية بين العمر والسمنة وقيمة السكر في الدم.

SUMMARY :

A cross-sectional epidemiological survey was conducted on 1098 male employees who spent more than five continuous years in an engineering factory. The point Prevalence (PR) of diabetes mellitus (DM) and impaired glucose tolerance (IGT) among the study group was found to be 2.8% and 11.5%, respectively. The PR of newly discovered subjects in this study was found to be high. DM was found to be more prevalent among workers in surface treatment department (dept.). Age and body mass index (BMI) were correlated significantly and independantly to 2hr post-load blood glucose level, but duration of employment was not correlated to blood glucose level. Regular follow up of workers and weight reduction program is recommended.

INTRODUCTION :

The PR of DM has been difficult to quantitate accurately because the criteria for the diagnosis of non insulin-dependent diabetes (NIDD) have varied; it is hoped that the widely accepted uniform WHO and National Diabetes Data Group standard will successfully address this problem⁽¹⁾. The PR of DM differ widely among different populations, depending on ethnic group constituents, age, economic condition and probably other environmental factors⁽¹⁻⁴⁾. In the Asian region, most surveys were based on clinic or hospital patients which might underestimate the true PR in the population⁽⁵⁾. Several studies⁽⁶⁻⁸⁾ suggest that DM may be precipitated in certain

individuals by stressful situation, but whether stress could lead to permanent diabetes has not been established⁽¹⁾ yet. The effect of work on the onset of DM is rather difficult to elucidate, nevertheless, at least in one study⁽⁹⁾, certain occupational exposure may constitute an increased risk for DM. In the Iraqi Al-Kasab et. al. studied⁽¹⁰⁾, the PR of DM in a rural community in South Iraq they found 5% of the population have blood sugar of 120 mg/dl or greater. Alwan⁽¹¹⁾ studied 1175 patients suffering from DM, and found that 82.7% were NIDDM; among them the PR of obesity was found to be 74.5%. Al-Bahrani⁽¹²⁾ found that the point PR of DM among 1037 employees in electrical industries was 3.1%, and since no other study is available on Iraqi workers, this study was conducted among workers in an engineering factory to estimate the PR of DM.

MATERIAL & METHODS :

1- 1098 male employees with five or more years of employment in an engineering factory were studied.

2- Each worker was required to give his reply to the specific questionnaire designed or adapted for this study⁽¹³⁻¹⁶⁾.

3- The following clinical examination and test was carried out single handed⁽¹³⁾. This eliminates observer variability, while measurement of variation was minimized through proper standardization of instruments.

a- Weight (in Kg) and Height (in cm).

b- Blood sugar measurement test (mg/dl) was done according to the advice of the National Diabetes. Data Group (1979) and WHO Expert Committee on DM (1980)^(13,17).

4- a- Values of IGT is defined as ranging between 120-180 mg/dl (6.7-10.0 mmol/liter), whereas values less than 120 mg/dl (6.7-10.0 mmol/liter) were regarded to be a normal glucose tolerance status.

b- DM is defined as having a whole venous blood glucose level equal to or more than 180 mg/dl (10.0 mmol/liter).

RESULTS :

This study was carried out on 1098 male employees who comprise 41% of the total work force in AL-Qadissiya Enterprise; they work in seven departments and all have more than five years of employment in this engineering factory. The mean post-prandial blood glucose level was 104.3 mg/dl for the 1098 male workers; their mean age and BMI were 30.2 years and 24.1 kg/m², respectively. The overall PR of DM and IGT in the study group were 2.8 and 11.5, respectively. Out of 31 diabetic workers in the study group, 20 were newly diagnosed (65%). Table 1 shows the

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association between DM, IGT and other variables. Table 2 shows the multiple regression analysis by step-down method conducted on blood glucose values (2h post-prandial) as the dependent variable, with other independent variables (age, period of employment, BMI). The results reveal a high significant correlation between BMI and 2h post-prandial blood level, but there was no significant correlation with the period of employment, after controlling the other confounding factors such as age, BMI.

Table 1 Shows the association between Diabetes mellitus (D.M), impaired glucose tolerance (IGT) and other variables.

The Variables	Total workers	DM		IGT		df	X ²
		No.	PR	No.	PR		
Age (years)							
20 - 29	583	5	0.9	50	8.5	6	42.5
30 - 39	359	12	3.3	52	14.5		
40 - 49	125	11	8.8	19	15.2		
50 +	31	3	9.7	5	16.1		
Total	1098	31	2.8	126	11.5		
Smoking habits							
Smoker	364	13	3.6	35	9.5	2	2.8
Non-smoker	734	18	2.5	91	12.4		
Alcohol consumption							
Yes	90	1	1.1	9	10.1	2	1.3
No	1008	30	3.0	117	11.6		
BMI							
obesity	87	11	12.6	33	37.9	4	148.6
overweight	330	16	4.8	55	16.7		
Normal	681	4	0.6	38	5.6		
Department							
Production	646	9	1.4	74	11.5	12	25.3
Technical	94	6	6.4	9	9.6		
maintenance	106	2	1.9	13	12.3		
General service	70	3	4.3	4	5.7		
Administration	71	3	4.2	9	12.7		
Plastic molding	38	3	7.8	5	13.2		
Surface treatment	73	5	6.9	12	16.4		

* P < 0.05, ** P < 0.01, *** P < 0.005

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Table 2. Multiple regression relationship between different variables and post prandial glucose level (PPGL) and BMI

Dependent variable	Intercept	Independent variable						Coefficient of	F
Y		x1 = Age b1 t1	x2 = Employment b2 t2	x3 = BMI glucose b3 t3				determination r2	
PPGL mg/dl	23.7	0.45 4.9**	-0.01 -0.3	1.75 9.5**				0.183	60.9**
BMI kg/m ²	9.1	0.08 5.7**	0.008 0.9	0.043 9.5**				0.25	90.1**

b = Coefficient of regression, t = T-value, r^2 = Coefficient of determination, f = F-value, ** P < 0.01**DISCUSSION :**

2.8% of 1098 male workers, examined using the recent WHO screening criteria for abnormal glucose tolerance, are diabetics; while 11.5% of the total subjects are those with IGT. These results are comparable to others studies^(4,18,19). Moreover the PR of both IGT and DM in this study were not different from those reported by other studies in the USA and Western countries⁽²⁾. The relatively high PR of IGT (11.5%) supports the findings of other studies in Iraq and other countries^(12,18). The rate of newly discovered diabetic workers is 65% in this study which means that there are two cases to be newly diagnosed as compared to one case of already known diabetic by history. This suggests that poor levels of public health education for the symptoms related to diabetes may have been an important cause of late presentation⁽²⁰⁾. This study shows a significant association between overweight and obesity on one hand and IGT and clinical diabetes on the other. This finding is more emphasized by the multiple regression model between post-prandial blood glucose and BMI. It is clearly seen from the model that BMI is significantly and positively correlated with post-prandial blood level ($P < 0.01$) after controlling for the other variables in the equation. Thus, the common conclusion of this is in agreement with other international observation⁽¹⁹⁾. Our work also showed that the glucose intolerance status in neither associated with smoking habit nor with alcohol consumption; this again agrees with the finding of other studies on this field⁽²¹⁾. There is also no significant correlation between blood glucose level and the period of employment after controlling for other factors; this is in contrast to the finding of Al-Bahrani⁽¹²⁾. Interesting, however, DM and IGT are associated significantly with the work in different departments of the factory in our study. It can be assumed that important variations are likely to exist regarding the glucose tolerance status. This might be related to the stress or other possible predisposing chemical causes, although no such factors could be identified in the working environment. Regular follow up of workers and weight reduction program is recommended.

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