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Influence of Sociodemography on Biochemical Profile of Type 2 Diabetic Patients Undergoing Zinc Supplementation

Research Article

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Abstract

This article describes socio demographic and biochemical profile of type 2 diabetic patients, an attempt to find influence of socio demography on their biochemical profile. The study was conducted on sixty type 2 diabetic patients undergoing zinc supplementation, who were recruited from Gazipur Diabetic Center (Samity), Gazipur, Bangladesh. Socio demographic data were collected using a structured pretested questionnaire by interviewing the subjects. Biochemical parameters were analyzed by spectroscopic methods using standard laboratory kits. SPSS software package was used to analyze the data. Mean age of the diabetes was 48.73 years, most of them were female (65.0%), all were married (100%), 31.7% could sign, read and write and majority (33.3%) have secondary level education. About 63% subjects were involved in household works and have had low-middle income (BDT 6220.85). Above 68% were overweight and obese. Most of the biochemical profile was found to be near to the normal values, except the fasting blood glucose (15.5 mmol/L). Zinc supplementation significantly (p<0.05) reduced biochemical values including fasting blood glucose. Socio demographic profile does not have influence on the biochemical profile of type 2 diabetes. Zinc supplementation reduces the biochemical values including the fasting blood glucose level; end line biochemical values are found to be significantly changed to lower level.

Keywords: Socio demography; Biochemical profile; Type 2 Diabetes mellitus; Influence

Introduction

Diabetes is a metabolic disorder, where body cannot use glucose. Because of insulin deficiency glucose cannot enter into the cell to be used for metabolism to produce ATP. The excess glucose in blood stream is hyperglycemia, it is diabetes. Diabetes Mellitus (DM) is a serious public health problem worldwide and it is regarded as one of the most complex chronic diseases. It is one of the most complex chronic diseases and is a leading cause of death and disability worldwide [1,2]. Global prevalence is about 8% in 2011, which is predicted to be10% by 2030. Nearly 80% of people with diabetes live in low- and middle-income countries. In 2011, China was home to the largest 90.0 million diabetes adults followed by India with 61.3 million and Bangladesh with 8.4 million populations [3].

In Bangladesh, prevalence of diabetes among adults is increasing

substantially; it was from 5% in 2001 to 9% in 2006 to 2010, which will be 13% by 2030 [4]. This pandemic is associated with rapid cultural transforms, growing urbanization, dietary changes, decreased physical activity and other unhealthy lifestyle [5]. Persons with diabetes require life-long personal care to decrease the chance of developing long-term complications. Diabetic complications affect the vital organs liver, kidney, heart of the body. The present article attempts to evaluate the socio demographic variables and biochemical parameters of type 2 diabetic patients undergoing zinc supplementation, analysis has also made to find association between the socio demographic and biochemical profile.

Materials and Methods

Study population

This study was conducted on sixty type II diabetic patients

undergoing zinc supplementation attending Gazipur Diabetic center (samity), Gazipur. Informed consent was taken from each subject before the beginning of the study. The study protocol was reviewed and approved by The Ethical Board of the Faculty of Biological Science, University of Dhaka.

Collection of socio demographic data

A pretested structured questionnaire was used to collect the socio demographic including anthropometric data by direct interview of the diabetic patients. Well trained enumerators collected and recorded the information in the questionnaire, which was then checked and used for entry into computer.

Collection of blood sample and processing

A 10 ml fasting venous blood was collected as eptically from the antecubital vein of each of the participating diabetes in heparin tube by paramedic of the diabetic center (samity), and was placed in cool box. Blood sample was processed immediately to separate plasma, which was then aliquoted into eppendorf and stored at e -40 $^{\circ}$ C for analysis of biochemical profile.

Estimation of biochemical parameter

The plasma collected was analyzed for the biochemical tests. The method and kit employed for are briefed as

SGPT	Liquiuv method	Human, Germany	200 µl plasma+1000 µl reagent +incubated at 37 °C, absorbance at 340 nm, concentration calculated	Derange et al. Clin. Chim.et al. 1980 [6]
SGOT	Liquiuv method	Human, Germany	200 µl plasma+1000 µl reagent +incubated at 37 °C, absorbance at 340 nm, concentration calculated	Bergmeyer et al. Clin.chim 1976 [7]
Creatinine	Colorimetric method with deproteinization	Human, Germany	100 μl plasma+1000 μl reagent, incubate 30sec, absorbance at 510 nm, concentration calculated	Rartels et al. Clinica Chemica Acta 1971 [8]
Micro albumin	Colorimetric BCG-method	Human, Germany.	10 μl+1000 μl reagent 5 min at 25 °C, absorbance at 546 nm, Albumin concentration calculated.	Rod key et al. Clin Chem 1964 [9]
HDL, LDL, cholesterol, triglyceride	Enzymatic colorimetric GPO-PAP	Boehringer- Mannheim, Germany	5 µl plasma +ddH O +5 µl standard +500 µl reagent, incubation at 37 °C for 60 min, absorbance at 500 nm, concentration calculated.	Lab Procedure Manual, Kwiterovich [10]
Serum glucose	Glucose oxidase (GOD- PAP)	Human, Germany.	5 μl plasma+250 μl reagent, 10 min at 37 °C, absorbance at 500 nm, concentration calculated	Barham et al. Analyst 1972 [11]

Data analysis

SPSS software package (version 21.0 SPSS Inc, Chicago, IL, USA) was used to analyze the data. Descriptive statistics were employed to analyze all variables. Values were expressed as frequency, percentage, mean and standard deviation as and where necessary. Association of socio demographic and biochemical profile was performed by chi-square test.

Results

Socio demography of type-2 diabetic patients undergoing zinc supplementation is described in the (Table 1). Mean age of the

diabetic patients was 48.73 years, most of them were female (65.0%), all were married (100%), 31.7% could sign, read and write and majority have secondary level education. About 63% subjects were involved in household works and have had low-middle income (BDT 6220.85). However, above 68% were overweight and obese, which is one of the risk factors for diabetes. (Table 2) presents the biochemical profile of the type 2 diabetic patients, most of which were found to be near to the normal values, except the fasting blood glucose (15.5 mmol/L). Paired test analysis showed that most of the end line values

 Table 1: Socio-demography and nutritional status of type 2 diabetic patients undergoing zinc supplementation.

Sociodemography and nutritional status	n (%)	Mean± SD	Ranges
Age in years			
35-40	12 (20)		
41-50	28 (46.7)	48.73±7.4	35-75
≥51	20 (33.3)		
Gender			
Male	21 (35.0)		
Female	39 (65.0)		
Marital status			
Married	60 (100)		
Unmarried	00 (0)		
Education			
Can sign, read and write	19 (31.7)		
SSC	11 (18.3)		
HSC	20 (33.3)		
Graduate & above	10 (16.7)		
Occupation			
Household works	38 (63.3)		
Service	13 (21.7)		
Others*	09 (15.0)		
Monthly income			
2000-4500 BDT	15 (25.0)		
4501-7000	22 (36.7)	6220.85±2466.3	2142.9- 15,000
≥7001	23 (38.3)		
BMI(Kg/m ²) 18.5-24.9 (Normal) 25-29.9 (overweight) 30-34.9 (Obese-I) 35-39.9 (Obese-II)	19 (31.7) 28 (46.7) 12 (20.0) 01 (1.7)	27.20±3.3	18.50-39.9

Others=Agriculture, NGO worker, Motor driver and business.

Biochemical parameters (n=60)	Baseline	Endline	p-value#
SGOT (U/L)	46.1±11.3	46.7±11.4	p=0.447
SGPT (U/L)	41.5±10.7	39.2±9.3	p=0.005*
Serum creatinine (mg/dl)	1.22±0.47	1.19±0.46	p=0.174
Urine microalbumin (µg/mg)	38.4±8.7	31.3±7.7	p=0.000*
LDL(mg/dl)	163.4±35.1	151.9±31.9	p=0.000*
HDL(mg/dl)	37.1±5.6	37.7±5.2	p=0.178
Cholesterol(mg/dl)	206.7±31.2	192.8±26.4	p=0.000*
Triglyceride(mg/dl)	227.9±54.6	220.4±49.4	p=0.003*
Fasting blood glucose(mmol/L)	15.5±4.7	9.4±1.7	p=0.000*

*paired sample t-test; *P<0.05

Citation: Nasrin S, Kawser M, Ahmed SUN, Saifullah Sadi SK, Islam Khan N, et al. Influence of Sociodemography on Biochemical Profile of Type 2 Diabetic Patients Undergoing Zinc Supplementation. Indian J Nutri. 2019;6(3): 210.

Table 3: Influence of sociodemography and nutritional status on baseline biochemical profile of type 2 diabetic patients undergoing zinc supplementation.

Sociodemography and nutritional status	SGPT (<46 & ≥46)	SGOT (<41 & ≥41)	S creatinine (<1.0 & ≥1.0)	Urine micro albumin (<30 & ≥30)	LDL (<169 & ≥169)	HDL (<37 & ≥37)	Cholesterol (<200 & ≥200)	Triglyceride (<200 & ≥200)
Age in years 35-40	² =1 182	א ² =1.234 P=0.897	א²=0.543 Р=0.765	א ² =0.745 P=0.507	א ² =0.387 P=0.179	א ² =0.534 P=0.187	א ² =0.987 P=0.510	א²=1.182 P=0.801
41-50	P=0.124							
≥51								
Gender		א ² =1.301 P=0.807	א ² =0.629 P=0.233	κ²=1.987 Ρ=0.664		א ² =1.892 P=0.515	א ² =0.879 P=0.807	א ² =2.012 P=0.876
Male	P=0.664				P=0.088			
Female	1 -0.004							
Education		א ² =2.452 P=0.275	א ² =0.899 P=0.357	×2 =0.505 P=0.932	א ² =2.503 P=0.083	κ²=5.734 Ρ=0.008	א ² =1.709 P=0.664	א ² =1.386 P=0.762
Can sign, read, write								
SSC	=2.341							
HSC	F = 0.094							
Graduate and above								
Occupation			א ² =0.456 P=0.131	א ² =0.345 P=0.273	א ² =0.591 P=0.314	א ² =0.649 P=0.930	א ² =0.654 P=0.442	ж²=0.498 Р=0.830
Household works	0.182×4	א ² =0.654 P=0.318						
Service	P=0.702							
Others								
Monthly income 2000-4500 BDT 4501-7000 ≥7001	א ² =0.101 P=0.987	א ² =0.754 P=0.756	א ² =0.562 P=0.751	א ² =1.782 P=0.756	κ²=0.745 P=0.978	א ² =1.345 P=0.585	א ² =1.432 P=0.279	א ² =1.982 P=0.485
BMI(Kg/m ²)								
18.5-24.9 Normal 25-29.9 overweight 30-39.9 Obese Grad I, II)	א ² =0.901 P=0.388	א ² =1.956 P=0.497	א ² =0.512 P=0.732	א ² =0.845 P=0.097	א ² =0.387 P=0.698	א ² =0.546 P=0.562	א ² =1.765 P=0.659	² =1.932 P=0.861

Chi-square test, significance p<0.05

Table 4: Influence of sociodemography and nutritional status on end line biochemical test of type 2 diabetic patients undergoing zinc supplementation.

Socio-demography and Nutritional status	SGPT (<46 & ≥46)	SGOT (<41 & ≥41)	Serumcreatinine (<1.0 & ≥1.0)	Urine micro- albumin (<30 & ≥30)	LDL (<169 & ≥169)	HDL (<37 & ≥37)	Cholesterol (<200 & ≥200)	Triglyceride (<200 & ≥200)
Age in years 35-40	א ² =0 900	² =2.221	² =1.762	κ ² =0.364 P=0.406	ж²=2.98 Р=0.243	א ² =0.712 P=0.156	א ² =1.629 P=0.935	א ² =2.854 P=0.579
41-50	P=0.962	P=0.654	P=0.229					
≥51								
Gender	2 0 404	2 4 004	א ² =0.398 P=0.664	κ ² =1.659 P=0.058	א ² =1.862 P=0.133	א ² =0.768 P=0.891	א ² =0.938 P=0.533	א ² =1.876 P=0.859
Male	P=0.329	1.901=2×א 1.901 – ס						
Female	1 -0.323	1 -0.745		1 -0.000	1 -0.135			
Education								
Can sign, read and write		א ² =1.654 P=0.122	א ² =0.739 P=0.193	κ²=0.541 Ρ=0.885	א ² =0.982 P=0.224	א ² =0.451 P=0.208	א ² =1.481 P=0.681	א ² =1.341 P=0.939
SSC	א ² =2.341 P=0.725							
HSC	1 -0.725							
Graduate and above								
Occupation		_	א ² =0.876 P=0.151	א ² =0.321 P=0.631	א ² =0.876 P=0.433	ײ=0.453 P=0.694	א ² =0.367 P=0.610	κ²=1.934 Ρ=0.857
Household works	² =0.214 P=0.560	×2 =1.382 P=0.407						
Service								
Others								
Monthly income								
2000-4500 BDT	² =1.187 P=0.290	א ² =1.568 P=0.383	א ² =0.987 P=0.864	א ² =0.726 P=0.383	א ² =0.408 P=0.877	א ² =0.719 P=0.339	א ² =0.376 P=0.147	א ² =1.835 P=0.254
4501-7000								
≥7001								
BMI(Kg/m ²)		9 א ² =1.882	א ² =0.346 P=0.558	א ² =0.198 P=0.347	א ² =1.456 P=0.634	א ² =1.419 P=0.464	א ² =2.110 P=0.902	א ² =1.129 P=0.743
18.5-24.9 Normal	א ² =0.679 P=0.280							
25-29.9 overweight		P=0.698						
30-39.9 Obese Grd I, II								

Chi-square test, significance p<0.05

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Table 5: Influence of sociodemography and nutritional status on fasting blood glucose of type 2 diabetic patients undergoing zinc supplementation.

	The Orthole for	Fasting blood glucose µmol/L			
Sociodemography and nutritional status	n (%)	Baseline ≤11.5 and >11.51	End line <10.0 & ≥10.0		
Age in years 35-40	12 (20.0)	ײ=1.259	² =0.136		
41-50	28 (46.7)	P=0.636	P=1.0		
≥51	20 (33.3)				
Gender			2-0.000		
Male	21 (35.0)	P=0 223	P=1 0		
Female	39 (65.0)	1 0.220	F = 1.0		
Education					
Can sign name read, write	19 (31.7)	2 0 001	κ²=1.588 Ρ=0.692		
SSC	11 (18.3)	א ² =2.201 P=0.579			
HSC	20 (33.3)	1-0.075			
Graduate & above	10 (16.7)				
Occupation					
Household works	38 (63.3)	² =1.782	² =0.659		
Service	13 (21.7)	P=0.415	P=0.853		
Others	09 (15.0)				
Monthly income			א ² =1.142		
2000-4500 BDT	15 (25.0)	² =2.277			
4501-7000	22 (36.7)	P=0.362	P=0.572		
≥7001	23 (38.3)				
BMI(Kg/m²) 18.5-24.9 (Normal) 25-29.9 (overweight) 30-39.9 Obese Grade I, II)	19 (31.7) 28 (46.7) 13 (21.6)	κ²=2.070 Ρ=0.376	κ² =0.296 Ρ=0.880		

Chi-square test, significance p<0.05

had reduced significantly (p<0.05); but SGOT, serum creatinine and HDL value remain unchanged.

Chi-square analysis indicated that baseline or end line socio demographic profile and nutritional status did not have any significance influence on the biochemical indices (Tables 3,4). However, it was indicated that HDL and LDL had apparently influenced by the education level in baseline, and urine microalbumin was influenced by gender. Socio demography or nutritional status did not show any influence on the fasting blood glucose level in either baseline or end line values (Table 5).

Discussion

Few reports discuss the influence of socio demography or nutritional status on biochemical indices, and someone reports on some biochemicals of type 2 diabetes undergoing zinc supplementation [12-18]. Some reports indicated influence and others did not find any effect. The present study showed that type diabetic patients were mostly late age, female, less educated and lower-middle income group of people, which is, to some extent, consistent with findings reported elsewhere [19,20]. Zinc supplementation significantly reduced the most of the biochemical indices including the fasting blood glucose. Similar results were also reported elsewhere [13,21,22]. The lowering of fasting blood glucose level might be because of insulin mimetic property of zinc [23].

In this study, the socio demography or nutritional status did not find any influence on the biochemical profile, except education on HDL and LDL and gender on urine micro-albumin as well as on the fasting blood glucose value. Some reports also noted the similar results, no beneficial effect [24,25].

Conclusion

In general, socio demography or nutritional status did not have influence on the biochemical profile of type 2 diabetic patients. Zinc supplementation has reduced most of the biochemical profile including the fasting blood glucose level. End line biochemical values are significantly changed to lower level.

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