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Hyper- and Hypoglycemic Coma among Diabetic Patients in Arar, Northern Saudi Arabia

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ABSTRACT

Background: Diabetic coma is a reversible form of coma found in people with diabetes mellitus. It is a medical emergency. Three different types of diabetic coma are identified; Severe low blood sugar in a diabetic person, diabetic ketoacidosis (usually type 1) advanced enough to result in unconsciousness from a combination of a severely increased blood sugar level, dehydration and shock and exhaustion, hyperosmolar non ketotic coma (usually type 2) in which an extremely high blood sugar level and dehydration alone are sufficient to cause unconsciousness. **The aim of this study** was to determine the prevalence of diabetic coma among the studied diabetic patients and to illustrate the relationship between type of diabetic coma and type of DM, period of diabetes and place of management of coma. **Methods:** A cross-sectional study was carried out on 113 diabetic patients (both type I and II DM) in Arar city, Northern Saudi Arabia, KSA, during the period from 1 December to 30 June 2017. Data collected by a pre-designed online self-administered questionnaire.

Results: The mean age of participants was 35.62 (±21.62) years and 67.3% were females. The prevalence of diabetic coma among the studied diabetic patients was 57.5% and the type of coma was hypoglycemic in 70.7% and hyperglycemic in 29.3%. 42.1% of hyperglycemic coma patients had type I diabetes and 57.9% had type II. While, 50% of hypoglycemic coma patients had type I diabetes. On the hand, 21.1% of hyperglycemic coma patients treated in the emergency department, 10.5% admitted to the hospital and 68.4% treated at home. While 34.8% of hypoglycemic coma patients treated in the emergency department, 6.5% admitted to the hospital and 58.7% treated at home. There was no significant relation between type of DM and type of diabetic coma (P= 0.562) or between period of diabetes and type of diabetic coma (P= 0.060). **Conclusion:** The prevalence of diabetic coma among the studied diabetic patients was 57.5% and the type of coma was hypoglycemic in 70.7% and hyperglycemic in 29.3%. We recommend to spread awareness of the diabetic patients about causes and manifestations of diabetic coma to guard against it. Also we recommend a large scale and more detailed researches.

Keywords: Hyper and Hypoglycemic Coma; Type I and Type II diabetes; Diabetes emergency; Arar, Northern Saudi Arabia

INTRODUCTION

The complications of diabetes mellitus are far less common and less severe in people who have well-controlled blood sugar levels. They represent the major causes of morbidity and mortality that are associated with this chronic metabolic disorder [1].

The term diabetic coma refers to the diagnostical dilemma posed when a physician is confronted with an unconscious patient about whom nothing is known except that they have diabetes [2].

At the present time three main types and one 'mixed' type of diabetic coma are recognized known as hypoglycemia, ketoacidosis and hyperosmolar hyperglycemic state [3].

Easily the most common variety of diabetic coma is that associated with gross and excessive over-production of 'ketone bodies' which-because they are also strongly acidic lead to the characteristic syndrome of 'ketoacidosis' [4].

The aim of this study was to determine the prevalence of diabetic coma among the studied diabetic patients and to illustrate the relationship between type of diabetic coma and type of DM, period of diabetes and place of management of coma.

PARTICIPANTS AND METHODS

A cross-sectional study was carried out on 113 diabetic patients (both type I and II DM) in Arar city, Northern Saudi Arabia, KSA. This study was conducted during the period from 1 December 2017 to 30 June 2017, on general population in Arar, KSA.

Data collection: by a pre-designed online questionnaire which was distributed among the population. It was self-administered by participants after a brief introduction or explanation of the idea of the research. The questionnaire included the relevant questions to collect data about:

- Socio-demographic characteristics of the participants including age, marital status and educational status
- If the patient has DM or previous diabetic coma or both.

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- Questions about risk factors, symptoms and complications.

Statistical analysis

Collected data were coded and analyzed using statistical package for the social sciences (SPSS, version 15). Descriptive statistics for the prevalence and quantitative variables was used. Relationship between type of diabetic coma, type of DM, period of diabetes and place of management of coma was determined using the chi-square test. P-value of less than 0.05 was considered statistically significant.

Ethical considerations

Permission to conduct the study was obtained from the Research and Ethics Committee at the College of Medicine, Northern Border University, Arar, Saudi Arabia. The questionnaire had a brief introduction explaining the aims and significance of the study.

RESULTS

As represented in table (1); the mean age of participants was 35.62 (±21.62) years old and 67.3% were females. 69.9% were married and 64.6% were highly educated.

The prevalence of diabetic coma among the studied diabetic patients was 57.5% and the type of diabetic coma among the studied diabetic patients was hypoglycemic in 70.7% and hyperglycemic in 29.3%, 53.1% were type II DM and 46.9% type I. About 38% had diabetes for more than 10 years.

There was no significant correlation between type of DM and type of diabetic coma (P= 0.562) or between period of diabetes and type of diabetic coma (P= 0.060).Regarding the relationship between type of diabetic coma, type of DM, 42.1% of hyperglycemic coma patients had type I diabetes and 57.9% had type II. While 50% of hypoglycemic coma patients had type I diabetes and 50% had type II. On the hand, 21.1% of hyperglycemic coma patients treated in the emergency department, 10.5% admitted to the hospital and 68.4% treated at home. While 34.8% of hypoglycemic coma patients treated in the emergency department, 6.5% admitted to the hospital and 58.7% treated at home. (Table 3).

Table (1): Socio demographic characteristics among studied diabetic patients, Arar, KSA

Variable	Frequency (N=113)	Percent
Age (in years)		
Minimum - maximum	11 – 60	
Mean (±SD)	35.62 (±21.62)	
Sex		
• Female	76	67.3
• Male	37	32.7
Marital status		
• Single	27	23.9
• Married	79	69.9
• Divorced and widow	7	6.2
Educational level		
• Illiterate	3	2.7
• Primary	14	12.4
• Preparatory	4	3.5
• Secondary	19	16.8
• University or more	73	64.6
Average monthly income		
• Excellent	18	15.9
• Very good	32	28.3
• Moderate	36	31.9
• Good	22	19.5
• Low	5	4.4

Table (2): diabetes related characteristics, other chronic diseases, Smoking, obesity and receiving health education about diabetic coma among studied diabetic patients, Arar, KSA

Variable	Frequency (N=113)	Percent
Type of DM		
Type II	60	53.1
Type I	53	46.9
Period of diabetes (in years)		
< 1	7	6.2
1-	31	27.4
5-10	16	14.2
> 10	43	38.1
Don't know	16	14.2
Diabetic complications	46	40.7
Type of diabetic complications		
Diabetic food	3	2.7
Diabetic neuropathy	12	10.6
Diabetic retinopathy	27	23.9
Diabetic nephropathy	4	3.5
Other chronic diseases		
Hypertension	25	22.1
Hypercholesterolemia	8	7.1
Cardiac diseases	4	3.5
Psychological diseases	2	1.8
Cerebrovascular stroke	1	.9
Smoking	14	12.4
Obesity	37	32.7
Receiving health education about diabetic coma		
Yes	90	79.6
No	23	20.4

Figure (1): Prevalence of diabetic coma among the studied diabetic patients, Arar, 2017

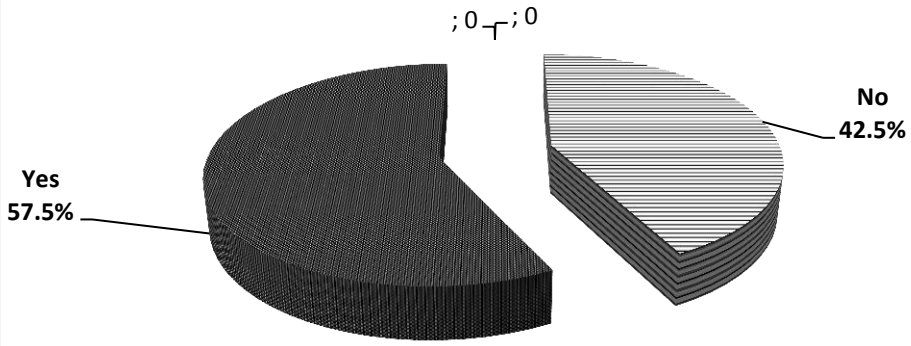

Figure (2): Type of diabetic coma among the studied diabetic patients, Arar, 2017

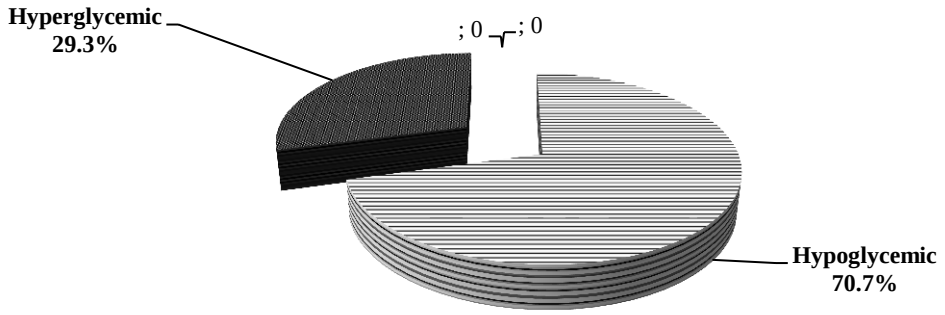

Table (2): Type of diabetic coma, eating before coma and management of coma

		Frequency (N=113)	Percent (%)
Diabetic coma	• No	48	42.5
	• Yes	65	57.5
Type of Coma	• Hyperglycemic	19	29.2
	• Hypoglycemic	46	70.7
Eating before coma	• No	58	89.2
	• Yes	7	10.8
Management of coma	In the emergency department	20	30.8
	Admitted to the hospital	5	7.7
	Managed at home	40	61.5

Table (3): Relationship between type of diabetic coma, type of DM, period of diabetes and place of management of coma

Variables	**Type of diabetic coma**		Total (N=65)	**Chi-Square** value	P value
	Hyperglycemic (N=19)	**Hypoglycemic (N=19)**			
Type of DM					
Type I	8	23	31	0.336	0.562
	42.1%	50.0%	47.7%		
Type II	11	23	34		
	57.9%	50.0%	52.3%		
Period of diabetes					
< 1	0	5	5	9.053	0.060
	.0%	10.9%	7.7%		
1-	6	5	11		
	31.6%	10.9%	16.9%		
5 - 10	3	10	13		
	15.8%	21.7%	20.0%		
> 10 years	5	21	26		
	26.3%	45.7%	40.0%		
Don't know	5	5	10		
	26.3%	10.9%	15.4%		
Place of management of coma					
Admitted in the hospital	2	3	5	1.311	0.519
	10.5%	6.5%	7.7%		
In the emergency department	4	16	20		
	21.1%	34.8%	30.8%		
At home	13	27	40		
	68.4%	58.7%	61.5%		

DISCUSSION

DM is a metabolic disease of multiple etiologies, characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both, and associated with disturbance of carbohydrate, fat and protein metabolism [1]. It is one of the most common chronic diseases today, both in developed and in developing countries. According to recent estimates of the World Health Organization (WHO), 422 million people in the world had diabetes in 2014, and the prevalence of people with diabetes is expected to double between the years 2000 and 2030 [2,3].

This cross sectional study was carried out among 113 diabetic patients Arar, KSA. The study aimed at determining the prevalence of diabetic coma among the studied diabetic patients and to illustrate the relationship between type of diabetic coma and type of DM, period of diabetes and place of management of coma.

As regards to types of diabetes mellitus, our study reported 53.1% of studied diabetic patients had type II diabetes mellitus and 46.9% had type I. In Saudi Arabia a descriptive review was conducted to review and analyze studies reporting the incidence and prevalence rates of diabetes [11].Two studies reported the prevalence rates of T1DM in Dhahran, Eastern KSA [12]and in Al Madina, North West KSA[13]; the prevalence rates of T1DM were very similar, 27.52 and 26.7 per 100,000 respectively. A study conducted in Riyadh found that prevalence of T2DM was 31.6%[14]. In Jeddah another study reported prevalence of T2DM of 30% [15]. Another study conducted among 380 diabetic patients of these, 102 (26.8%) had type I diabetes mellitus, and 278 (73.2%) had type II [16].

In Riyadh a cohort study carried out among 9,149 adult Saudis,The overall crude prevalence of DMT2 was 23.1%[14].In England a population-based study found that; prevalence of total diabetes for all persons in England was4.41%, Type 2 diabetes was estimated to affect (92.3%) of person and Type 1 diabetes (7.7%) [17].In South India a study among 545 patients <30 years of age yielded 314 (58%) with T2DM [18].

According to diabetic complications our study reported, Diabetic retinopathy 23.9%, Diabetic neuropathy 10.6%, Diabetic nephropathy 3.5% and Diabetic foot 2.7%.A systematic literature review of papers published on diabetes prevalence and complications in North Africa[19] found that, the prevalence of retinopathy ranged from 8.1% in Tunisia [20] to 41.5% in Egypt [21]; nephropathy ranged from 6.7% in hospital outpatient clinics in Egypt [21] to 46.3% in hospital inpatients in Egypt. The prevalence of diabetic neuropathy ranged from 21.9% in hospital outpatient clinics to 60% in hospital inpatient clinics in Egypt [21]. High prevalence of neuropathy was also found in Sudan with a prevalence of 31.5% in hospital inpatient clinics to 36.7% in outpatient clinics, respectively [17,18]. In urban China a cross-sectional hospital based survey reported the prevalence of neuropathy, nephropathy, ocular lesions and diabetic foot disease were 17.8%, 10.7%, 14.8% and 0.8%, respectively [16].Another study carried out among 1414 subjects with diabetes, the prevalence of diabetic retinopathy was 4.8%, and that of diabetic nephropathy and neuropathy was 10.5%[20].In Korea a study conducted among 1442 diabetic patients reported neuropathy (24.2%), retinopathy (24.0%), and nephropathy (15.5%)[19].

As regards to diabetic coma, our study found that 57.5% of patients had diabetic coma from them 70.7% had hypoglycemic coma and 29.2% had hyperglycemic. Another study reported, hyperglycemia was present in 38% of the patients and hypoglycemia in 12% [14].A national survey of 44 U.S hospitals, data were derived from two sources: the University Health System Consortium (UHC) Diabetes Benchmarking Project and VHA, Inc; hyperglycemia was present in 38% percent of the UHC cohort and 18% of the VHA, in cohort, hypoglycemia to <60 mg/dl was also common, with 12% of patients in the UHC cohort and 18% in the VHA [13].

CONCLUSION AND RECOMMENDATIONS

The prevalence of diabetic coma among the studied diabetic patients was 57.5% and the type of coma was hypoglycemic in 70.7% and hyperglycemic in 29.3%. We recommend spreading the awareness among the diabetic patients about causes and **manifestations** of diabetic coma to avoid health risks and unacceptable complications . Also we recommend a large scale and more detailed researches.

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