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Relation between serum and whole blood magnesium levels with migraine headache from Qurna district, Basrah city

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ABSTRACT

Migraine is one of the common varieties of headache .The objective of the present study on 41 patients(16 males and 25 females) were attending the emergency department in Qurna hospital ,Basrah direction during the period 5/2008-11/2008 and 30 healthy (11male and 19 female) control of similar ages (15-≥50),body mass index (BMI ;mean 25.0 kg/m^2.rang 24.7-31.89 kg/m^2).Magnesium levels in serum and whole blood were studied during the onset of headache in each 41 patients .Twenty-five of 41 (61%) were female 9(56%), 16(64%), with and without aura respectively, and 16 (39%) were male that 7(44%), 9(36%) with and without aura respectively. Twenty five (61%)of cases where between 31and 45 years old .In this age rang 14(56%)were female and 11(69%) male. Serum and whole blood magnesium levels in patients were significantly lower than control (p≤0.01),.In amultiple linear regression model with age ,BMI, and smoking status as covariables (p≤0.01).

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INTRODUCTION

Migraine is neurological syndrome characterized by altered bodily perceptions headaches and nausea or other symptoms of neurological dysfunction [(1)].The typical migraine headache is unilateral and pulsating ,lasting from 4 to72 hours ,associated with nausea,vomiting, visual and olfactory, photophobia and hyperacusis[(2,3)].Approximately one third of people who suffer migraine headache perceive an aura(visual)or olfactory announcing the headache(without aura) [(4)]. Neumerous of investigations has revealed that 4-6%of men ,13-16%of women are afflicted with migraine .Although it may be seen from childhood ,however it usually begins in adolescence ,in more than 80% of cases it begins before the age of 30 years[(2,5)].The effects of migraine may persist for some days after the main headache has ended ,many sufferers report a sore feeling in the area where the migraine,and some report impaired thinking for a few days after the headache has passed [(6)]. Various pathophysiologic mechanisms have been described for migraine ,some believe in vascular mechanisms and describe the aura phase to intracranial vasospasm ,and headache attacks to extracranial vasodilatation [(7)].Others correlate it with vasomotor activity ,resulting in vasodilation or vasoconstriction of either intra or extracranial arteries secondary to release of vasoactive neuropeptides trigeminal peripheral nerve endings [(8)],another

opinion has been shown that decreased magnesium (Mg) levels cause neural and neuromascular excitability ,it may cause hyperventilation and hypersensitive cerebral arteries to the effects of hypocarbia[9].However,some workers showed the prevalance distribtion pattern and associated imaging characteristics of infratentorial hyperintense lesion (IHLs)and the risk of with attack frequency[10]. Magnesium is the fourth most abundant mineral in the body , and the most abundant intracellular divalent cation ,and essential for a diverse rang of physiological function [11].The activities of magnesium in the body include preventing blood vessel spasm ,inhibiting blood clotting and stabilizing cell membranes ,all of which are involved in migraine development [12],magnesium concentration exerts an effect on neurotransmitter production and receptors ,pro inflammatory molecules and other migraine related chemicals in the brain[13].Recent evidence suggests up to 50 percent of migraine patients have level of tissue magnesium during an acute migraine attack[14],in some patients injection of Mg relived headache rapidly .Some studies suggest that oral use of Mg in long term also have revealed that intravenous (IV) use of magnesium sulfate comparing with placebo may diminish frequency of migraine headache [15].Considering all these facts we decided to conduct a study on migraine on migraine patients Qurna district and measure serum and whole blood magnesium levels between and during attacks and compared with control as healthy peoples.

MATERIALS AND METHODS

This study was conducted on 41(16 males and 25 females)migraine patients who were attending the emergency department in Qurna hospital ,Basrah Government during the period 5/2008-11/2008 and 30 healthy (11males and 19 females) control of similar ages (15-≥50),body mass index (BMI ;mean 25.0 kg/m^2.rang 24.7-31.89 kg/m^2).The selected subjects were non – smokers but having 16 out of 41 patients that 10 diabetes mellitus (6 male and 4 female) and 6 patients with hypertension (1 male ,5 female). For study groups ,serum and whole blood magnesium levels were measured upon presentation before starting treatment .Magnesium was determined by atomic absorption (Model (AA-670),Shemadzu, Japan) was employed to determine Mg concentration in the samples according to the method described by Varley *etal* [16] .A mixture of acetylene and oxygen gases were used as the fuels and oxidants, using the 285.2 nm line of magnesium hallow cathode lamp.

STANDARD PREPARATION

Magnesium stock solution ,that make via magnesium sulfate ampoule ready made completed to 1L in a volumetric flask to give stock solution .Determination of free Mg in the serum and whole blood were carried out ,the concentration of the Mg then calculated according to the Coritti and Corioti equations as µg/mL.

RESULTS

Showed in tables(1,2), the general characteristics of migraine patients and controls .They have similar age ,gender distribution and BMI .Nine (56%)0f female and 7(44%) of male patients with aura ,compared with the patients that without aura there was 16(64%) and 9(36%) for the female and male respectively (table1). Data shown in table 2 and figures(1,2)a revealed that 25(61%) of patients were female and 16(39%) male. The youngest patient was 15 years old and

the oldest≥ 80,most the patients were in age rang 31-45 with mean age of 36 years .In this age range 14(56%) were female and 11 (69%) male . A very highly significant correlation ($p \leq 0.01$)for mean BMI 25.0 kg/m^2 (range 27.79-31.41 kg/m^2) in the age groups 31-45 years compared with another age group Mean whole blood Mg levels during attack of headache was no significant difference between with and without aura migraine patients, while were highly significant between patients and control group ($p \leq 0.01$) Although the mean serum Mg levels in migraine patient was lower than revere to the control subjects. There was significant difference between serum Mg level during headache and control group($p \leq 0.01$),table3 and figure 3

DISCUSSION

Migraine is an extremely common condition which will affect 12-28%of people at some point in any their live[17].Based on the results of a number of studies, one year prevalence of migraine ranges from 6-15%in adult men and 20-43% in women ,these figures vary substantially with age ,approximately 2-4%of children aged under 15 years suffer from migraine ,with little apparent difference between boys and girls[18].By early middle age ,around 35% of women experience a migraine compared with fewer than 17%of men .After menopause, attacks in women tend to decline dramatically , so that in the over 55s there are approximately equal numbers of male and female sufferers with prevalence retuning to around 5%[17].all these finding were same as observed in this present study.Magnesium deficiency is thought to be at least one important factor in migraine attacks ,many studies suggest that magnesium might be a common denominator in both the vascular and the neural theories of migraine [19].In this study ,whole blood and serum magnesium levels in migraine patients was lower significantly with respect to healthy .The results obtained in the present work was in accordance with other works ,in a study on 30 migraineurs (3males and 27 females) with an 19 as controls it has shown that low serum Mg levels[20] .It is shown that decrease Mg level in a brain neurous and serum causes decreased physiologic threshold for migraine attack[21] .Furthermore ,magnesium plays a role in stabilization of membrane and it is known mediators and to exert direct action on cerebral vascular[17].Galli etal, demonstrated that in youngest migraine sufferers changes RBC magnesium level did not differ significantly from intricate values[22] . Serum Mg concentrations are dependent on dietary intake and intestinal absorption as well as kidney function .Kidney filtration and reabsorption are essential to maintain stable serum levels between 0.75 and0.96 mmol/L ,a range observed for healthy adult subjects[11] .Serum Mg level is the most frequently performed analysis and whilst some histochemical studies have found correlations between serum and tissues values[23].Decrease in serum Mg level can be observed when drugs are taken ,particularly diuretics ,otherwise ,lower serum Mg values indicate deficiency and impaired metabolic control as observed in diabetes ,renal tubular disorders and malabsorption[11]. The role of Mg on pathogenesis of migraine and suggested that daily dose of 600 mg (50meq) of Mg tablet may be effective on prevention of headache [24]. In another study compared the result of IV injection of 1gm magnesium sulfate in 15 minute with 10 mL of NaCl in 30 migraineurs (15 in each group),15 patients in study group had complete recovery and 2 partial improvement of pain ,in control group only partial recovery encountered ,they concluded that parenteral use 1 gm of

magnesium sulfate is an effective treatment for acute attack of migraine[25].Recently low ionized magnesium has been reported in 425 of patients with acute migraine attack ,only 23% of patients with continuous headache [26]. Ultimately we suggest to consider oral and parenteral Mg drugs as a new therapeutic way to prevent and treatment of acute migraine headache.

Age *Years*	Male		Female		Total N(%)
	N(%)	BMI(kg/m^2)	N(%)	BMI(kg/m^2)	
15-30	5(31)	24.7±0.1	7(28)	24.7±0.2	12(29)
31-45	11(69)	29.2±0.13	14(56)	30.15±0.4	25(61)
≥46	0(0)	24.4±0.59	4(16)	25.9±0.21	4(10)
Total	16(39)	/	25(61)	/	41(100)

Values are expressed as mean ±SE;N=Numbers, BMI=Body mass index(kg/m^2)

Table1:Distribution of patients according to age and BMI

Study groups	Male N(%)	Female N(%)	Total
Control	11(37)	19(63)	30
M. with aura	7(44)	9(56)	16
M. without aura	9(36)	16(64)	25

Values are expressed as mean ±SE, N= Numbers, M= Migraine patients

Table2:Distribution of patients and control according to sex

Study groups	Magnesium concentration in	
	Whole blood(µg/L)	Serum(µg/L)
Control	64.15±0.25	34.35±0.12
M. with aura	47.38±0.29	18.95±0.08
M. without aura	46.65±0.3	18.35±0.12

Values are expressed as mean± SE,N=Numbers, M=Migraine patients

Table3: Magnesium concentration (µg/L) in Whole blood and Serum from patients and control samples

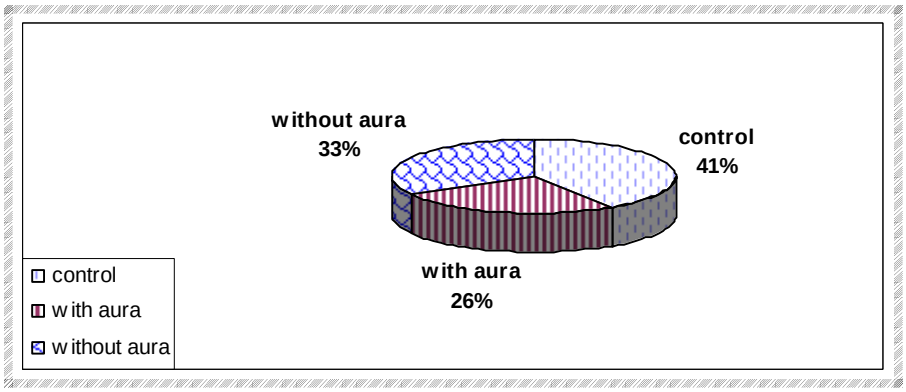

Figure 1:Distribution of male as (%) in study groups

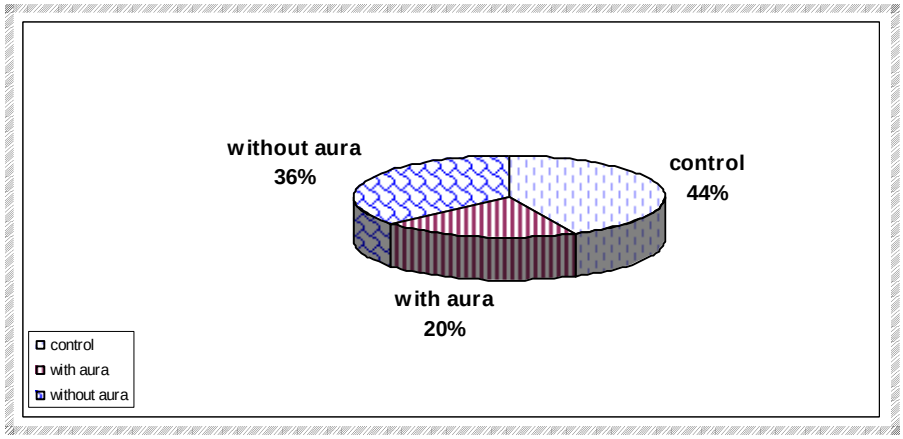

Figure 2:Distribution of female as (%) in study groups

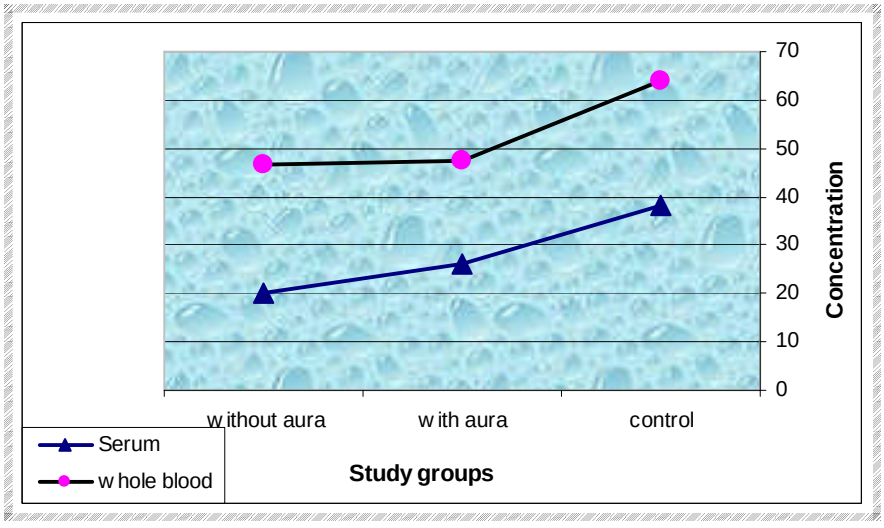

Figure 3:Compared of Magnesium concentration for study groups

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علاقة مستويات المغنيسيوم في نماذج مصل والدم الكلي لمرضى الصداع النصفي بمنطقة القرنة ضمن مدينة البصرة

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الخلاصـــة

الصداع النصفي احد الأعراض المميزة للام الرأس،أجريت هذه الدراسة على٤١ حالة مرضية(١٦ذكرا،٢٥اناث) ممن ادخلوا وحدة الطوارئ بمستشفى القرنه العام بمدينة البصرة جنوب العراق للفترة الممتدة مابين ٢٠٠٨/٥الى٢٠٠٨/١١ومقارنتهم مع ٣٠ شخصا من الأصحاء(١١ذكرا ،١٩اناث)كمجموعة سيطرة،كانت أعمار مجاميع الدراسة ضمن ١٥الى ≤٥٠سنة،كما تم حساب كتلة وحدة الجسم المعرفة(٢٥,٠كغم/م^{٢})بحيث كانت ضمن مدى (٢٤,٧-٣١,٨٩كغم/م^{٢}).

بينت نتائج الدراسة أن ٢٥مريض من أصل ٤١مريض(٦١%)كانوا إناث مقسمين ٩ (٥٦%)،١٦(٦٤%) مع أو بدون الهوس المصاحب لهذه الحالة المرضية و١٦مريض من الذكور كانوا٧(٤٤%)،٩(٣٩%)كذلك مع وبدون الهوس وعلى التوالي أيضا.أظهرت النتائج التي تم الحصول عليها من خلال هذه الدراسة أن مستويات المغنيسيوم بنماذج المصل والدم الكلي لمرضى الصداع النصفي كانت ذو فرق معنوي واطئ جدا مقارنة مع مجموعة الأصحاء .($P \leq 0.01$)

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