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Research Paper

Assessment of some biometrics and biochemical parameters in migraine patients

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ABSTRACT

Background: Migraine is a pulsating and recurrent headache in one or both side. It may be caused by induce of nerves in the brain blood vessels walls and its associates with photophobia. Objectives: Measure of Body mass index (BMI), blood pressure (BP), serum calcium (Ca), magnesium (Mg) and iron (Fe) in migraine patients. Methods: This study performed on 94 persons (64 migraine: 30 control), who visited Al-Duloya General Hospital, Tikrit Educational Hospital, and neurological clinics in Al-Duloya and Tkrit. Also it contains visiting participants to their homes in Salahaddin in Iraq. A socio-demographic characters, length, weight, and BP taken directly. 3-5ml blood sampled for obtaining serum. Biochemical tests analyzed by spectrophotometer in Central laboratory of Tikrit University. The study period extended from 30-7-2023 to 27-9-2023. GraphPrism9 program and T-test used for statistical analysis. Results: Patient age was 34.9(16-63) year. Higher percentages reported in female (79.6%) and family history (68.7%). BMI (29.1±5.5), (27.6±5.3) kg/m2, systolic BP (11.7±1.2), (11.5±1.1), and diastolic BP (7.5±0.8), (7.2±1.0) Cm.Hg, show non-significant elevation in migraine compare with control respectively. Mg reveals significant decrease (1.7±0.7), (2.1±0.6), but Ca (7±0.5), (7.3±0.7) and Iron (82±57), (90±52) mg/dL reveal non-significant decrease in migraine compare with control respectively. Conclusions: BMI and BP show non-significant elevation. While Mg reveals significant decrease, Ca and Iron reveal non-significant decrease in patients.

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1. INTRODUCTION

Headache affects 16% of people around the world every day [1]. It affects social, health and other conditions3. Migraine is intermitted, frequented and pulsating pain attacks that occur in one side of head. It result from stimulation of nervous fibers of blood vessel walls in the brain cover membranes [2]. Disease manifestations contain phonophobia and numbness [3]. It may complicates to brain failure [4]. Migraine types are migraine with aura, migraine without aura, silent migraine (without headache) and abdominal migraine (abdominal pain in children) [5]. This disease trigged by pregnancy, menstruation, industrial foods, drugs, fasting, stress, odors, sleep disturbance and climate changes. Its causes are unknown, but it is believed to be a temporary defect in nerve and biochemical signals and brain blood vessels [3]. There are 123 loci associate with migraine [6]. Diagnosis includes medical and family history, clinical investigation, and magnetic resonance imaging (MRI) [3].

The problem of this disease is lack of laboratory or other test, but it is diagnosed according to patient condition [7]. The prevalence of migraine is 14% globally [1], (2.6-32) % in Arabic region [8] and 44% of Iraqi women (18-35) year's age in Sulaimania province [9]. It prevalent in women more than men, and varies according to race [10]. Biometrics contain body mass index (BMI), that calculated by equation: (BMI = weight / length2). It's ideal value is (20-25Kg/m2) nearly [11]. It affected by health condition, gender, age and muscular mass. BMI used for classify persons to obese, over weight and normal. By this method we expect a chronic diseases risks such as hypertension, diabetes and cholesterol [12]. Report correlation between obesity and migraine [13]. Blood pressure (BP) is the pressure exerted by blood on the arteries walls [14].

Hypertension is the blood pressure level ≥14/9 Cm.Hg. causes and risk factors of hypertension include congenital malformation in blood vessels, sleep disorders and diabetes. Its complications contain vessel sclerosis and stroke [15]. Report that hypertension is a risk factor for migraine [16]. Biochemical parameters include calcium (Ca), it is a structural element of bones, proteins and phospholipids in cell membranes. It maintains membrane structure, controls its permeability of ions including itself, control nerve irritation, control many enzymes reactions and transfer many hormones to receptor site on cell membrane [17].

2. RELATED WORK

Note that Ca is a migraine risk factor [18]. Magnesium (Mg) acts as an enzyme cofactor for sugar metabolism, there for its decrease causes sugar imbalance [19]. Mg deficiency caused by low intake or high excretion, and it may be as a result of mutation causing migraine attacks [20]. Iron (Fe) is stored in body organs such liver and found in hemoglobin and myoglobin. This proteins transfer O2 to all body parts. Iron deficiency anemia (IDA) is caused by low body storage of Fe, malnutrition, blood loss, digestive malabsorption and pregnancy. IDA also affects children [21]. Found correlation between IDA and migraine [22]. Objectives: Because migraine causes are unknown, and there are not laboratory or other tests for it, the current study came to investigate some biometrics and biochemical variables, including: BMI, BP, Ca, Mg, and Fe, that may be used as a biomarkers specific for migraine [23].

3. METHODOLOGY

Materials and methods: Patients and methods: An analytical descriptive cross sectional study performed on 94 individuals (64 patients and 30 control), who visited Al-Duloya General Hospital, Clinic of

Dr. Uqba Al-Jubori in Al-Duloya , Tikrit Educational Hospital, and Clinic of Dr. Abd-Al-Sattar Al-Jubori in Tkrit in Salahaddin Province in Iraq. Also it includes visiting participants in their homes in Al-Duloya. Control includes (15male:15 female). Socio-demographic characters taken by questionnaire. BMI (BMI=weight/length2) [11] and BP reported directly. 3-5ml of venous blood sampled. It left for several minutes then centrifuged 4000 rpm for 15 minutes for obtaining serum. It used for performing biochemical tests that included Ca (BioResearch kit Jordan), Mg (Agappe kit Indian) and Iron (Biolab French). Spectrophotometer used in Central laboratory of Tikrit University. The period of study extended from 30-7-2023 to 27-9-2023. Inclusion criteria: Migraine patients (headache migraine) of all ages, both genders and at all stages of the disease.

Exclusion criteria: Abdominal migraine patients were excluded, because the current study targeted headache migraine patients, who visited neurologists rather than abdominal migraine, who visited internal medicine doctors. Ethical approval: The ethics committee of the Science College in University of Tikrit in Iraq agree this study. Written agreements reported, signed and date taken from participants in this study. Statistical analysis: T-test and GraphPrism9 program used for statistical analysis at ($P \leq 0.05$). Mean (M) and standard deviation (SD) calculated for quantitative variables and percentage for qualitative parameters. 5)

4. RESULTS AND DISCUSSION

Results Socio-demographic characters: Table 1 reveals socio-demographic characters of patients. Mean and range of age are 34.9(16-63) year. Mean age of them falls into adulthood, and its deviation is high; i.e. migraine widespread at most ages. Same Table 1 reveals that male 20.3%, female 79.6% and family history of disease (migraine in relatives) 68.7%. Female have higher percentage than male, and most patients have family history of migraine.

Table 1. Socio-Demographic Characters of Migraine Patients

Character	Sub-Character	Number	Percentage
Age	34.9 (16-63) year		
Gender	Male	13	20.3 %
	Female	51	79.6 %
Family history	Relative with migraine	44	68.7 %

Biometrics: BMI of migraine and control is shown in Table 2. It reveals non-significant increase in migraine (29.1±5.5) compare with control (27.6±5.3) kg/m2. Table 2 also reveals BP in migraine and control. It reports non-significant increase in BP in migraine compare with control: systolic (11.7±1.2), (11.5±1.1), diastolic (7.5±0.8), (7.2±1.0) Cm.Hg respectively.

Table 2. Biometrics (Body Mass Index and Blood Pressure) of Migraine Patients and Control

Character	Body Mass Index (BMI) Kg/m^2	Blood Pressure (BP) Cm. Hg	
		Systolic	Diastolic
Patients	29.1±5.5	11.7±1.2	7.5±0.8
Control	27.6±5.3	11.5±1.1	7.2±1.0
P-value (0.05)	0.2	0.4	0.1
Significance (T-test)	No significant	No significant	No significant

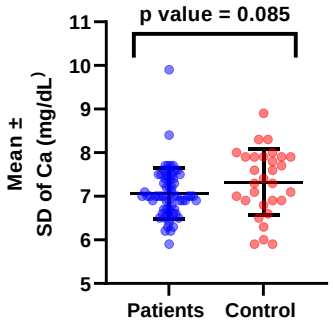


Figure 1. Reveals Serum Ca Levels in Migraine Patients and Control

Biochemical Parameters: It reports non-significant decrease in Ca level in migraine patients (7±0.5) compare to control (7.3±0.7) mg/dL. (7±0.5) (7.3±0.7) Figure 1 Calcium levels in migraine patients and control. (T-test used at P-value: 0.05).

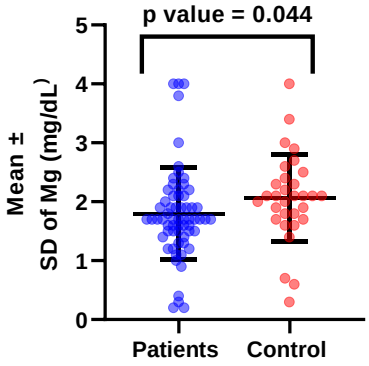


Figure 2. Reveals Serum Mg Levels in Migraine and Control

It reports significant decrease in migraine (1.7±0.7) compare with control (2.1±0.6) mg/dL. (1.7±0.7) (2.1±0.6). Figure 2. Magnesium Levels (Mg) in Migraine Patients and Control. (T-test used at P-value: 0.05)

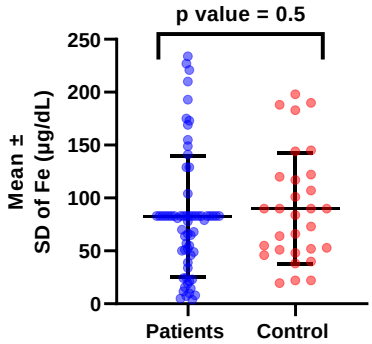


Figure 3. Reveals Serum Iron Levels in Migraine and Control

It reports non-significant decrease in iron in migraine patients (82±57), compare with control (90±52) mg/dL. (82±57) (90±52) Figure 3. Iron (Fe) levels in migraine patients and control. (T-test used at P-value: 0.05)

Discussion

Socio-demographic characters: Migraine reported at most ages. This disease trigged by many factors including: stress, concentrated odors, sleep disorders and climate changes [3]. This may be the reason for its widespread in most ages. This results agree with Tarkh and Khalaf study, (2019) in Iraq, which founds that age is 32 (15-60) years. The cause of high percentage in female is the correlation of disease with female hormone and menstrual cycle [24]. Note that female in reproductive age have significant high level of CGRP [25]. This peptide correlated with female hormones [26]. It is active vasodilator, trigger for migraine attack and stimulated during it. It has role in headache [27]. This results align with who reported that female percentage is 73 % [28]. One of risk factors of migraine is family history [3]. Aljobory, (2021) founds that a percentage of relative marriage in Salahaddin Province is 59.2%. It resulting from prevailing traditions. He also founds that genetic disease represent 68.1% of offspring of this marriage type [29]. This study parallel with who note that family history represents 53% [30]. Biometrics: Genetic, environment and manner factors cause obesity such as mutations, disease family history [31] high sugar and fat food and less exercise [32]. This result aligns with results who report BMI elevation in migraine compare with control [33], [34].

The cause and risk factors of hypertension are congenital malformation in blood vessels, gender and psycho stress. Hypertension results vasodilation [15]. Report that > 50% of migraine patients have hypertension [35]. Found decrease in systolic BP but increase in diastolic BP in migraine [36]. CGRP gene correlates with migraine, it coding for CGRP peptide receptor [37]. This peptide is vasodilator secreted by trigeminal nerves, and interfere with migraine pathogenesis [38]. Biochemical parameters: The causes of Ca decrease are failure of parathyroid hormone secretion that control Ca and imbalance of vitamin D metabolism [39]. This result agrees with results who found decrease of Ca in migraine [40] but differs from Alzubaidy (2019) who reveals significant elevation [41]. ATP1A2 gene coding for protein from ATPase family that contribute in positive ion balance and electrochemical variety of it. It is correlates with electrical irritation of nerves and muscles. Mutation in this gene may results some forms of migraine [42]. Mg decease may be results from low intake and high loss by digestive system or kidney causing migraine attacks [20]. Found mutation in TRPM7 gene, that control Mg balance then causing migraine attacks [43]. Mg decrease causes imbalance of other ions. This may be causes muscular nervous symptoms [44]. This result agrees with who found significant decrease of Mg in patients [45] but differs from who report elevation in Saudian migraine patients [33]. A risk factors of IDA include food intake pattern, female gender, parasites, low teaching level, low income, female aging [46] and menstruation (causes headache) [47]. This study agrees with who note that IDA was a common problem in migraine young females [48]. Found increase of migraine risk in IDA patients [49], [50], [51].

5. CONCLUSION

BMI and BP reveal non-significant increase in migraine compare with control. Mg reveals significant decrease, while Ca and Iron reveal non-significant decrease in migraine compare with control. Future prospective: Investigate correlations among biometrics, biochemical, gene expression and mutations causing migraine. Limitations: It includes lack of cooperation from some neurologists in the sampling process, some patients refrain from giving the sample and lack of laboratory training lessons and other statistical analysis lessons in ready-made programs in the study plan in the preparatory year. Knowledgement: Thanks for professionals in Central Laboratory in Tikrit University, especially Dr. Mohammed M., Dr. Shaimaa A. and Mr. Riath Al-Dori, for their contribution in experimental part. Thanks for neurologists, lab. technicians and training chairmen in Al-Duloya general hospital, Tikrit teaching hospital and Balad general hospital, for their contributions in sampling, especially Dr. Uqba Al-Jubori and Dr. Abd-Al-Sattar Al-Jubori. Finding: No finding was received for conducting this study.

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Author Contributions Statement

Name of Author	C	M	So	Va	Fo	I	R	D	O	E	Vi	Su	P	Fu
Faiz Ali Al-Mfrgi	✓	✓	✓	✓		✓		✓	✓	✓	✓		✓	✓
Maan Hasan Salih	✓	✓	✓		✓	✓		✓	✓	✓	✓	✓		

C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

Conflict of Interest Statement

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Informed Consent

All participants were informed about the purpose of the study, and their voluntary consent was obtained prior to data collection.

Ethical Approval

The study was conducted in compliance with the ethical principles outlined in the Declaration of Helsinki and approved by the relevant institutional authorities.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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