

## Estimation of the serotonin and melatonin hormones levels in patients with migraine in thi-qar governorate - iraq

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### Abstract

**Objective:** A common neurological disorder in humans is called migraine. The condition caused when a mechanism in the brain gets stimulated. This stimulation causes the release of what is called the pain-producing inflammatory substances in specific locations around blood vessels and nerves in the head. The study was designed to determine and compare the levels of Serotonin (ST) and Melatonin (MT) Hormones in migraine patients and apparently healthy individuals.

**Materials and Methods:** Blood Serotonin (ST) and Melatonin (MT) Hormones levels were determined in 45 migraine patients and 35 apparently healthy subjects.

**Results:** A common neurological disorder in humans is called migraine. The condition caused when a mechanism in the brain gets stimulated. This stimulation causes the release of what is called the pain-producing inflammatory substances in specific locations around blood vessels and nerves in the head ( $P \leq 0.05$ ).

**Conclusions:** In migraine patients, we finding decrease in Serotonin (ST) and Melatonin (MT) Hormones as compared to control group.

**Keywords:** Migraine, Headache, Serotonin, and Melatonin.

### Introduction

A common neurological disorder in humans is called migraine. The condition caused when a mechanism in the brain gets stimulated. This stimulation causes the release of what is called the pain-producing inflammatory substances in specific locations around blood vessels and nerves in the head, Research shows that migraine headaches occur more in female gender than their male counterparts with a ratio of 2:1 and affect adults between the age of 35 and 45 years but usually starts at puberty reason being that women are more prone to hormonal fluctuations.<sup>1</sup>

Symptoms of the condition are vast and include such as nausea, vomiting, pulsating or throbbing pain, unilateral head pain, phonophobia, photophobia, presence of slightly wavering light, blurring of vision, circles or shapes, or different colors appearance before the eyes. Additional reports from migraine patients are the presence of numbness of body parts like fingers, lips, toes, tongue, and feet or legs prior to the onset of the headache.<sup>2</sup>

This has caused a migraine to be on the top list of disability/conditions patients live with<sup>3</sup>. Headache disorders are pervasive among all age groups with statistics pointing out about 50% occurring in adults. Of which, also, 30% and above was a migraine.<sup>1</sup> Migraine can be classified based on what is called an aura. Aura is an obstruction in the vision of the patient.

Two types are well recognized which include migraine with an aura and the second is migraine with no aura; the latter is the most commonly diagnosed in clinics. This aura is reported to progress from the side down to the midline of your vision and happens in the same half side of each eye. This may cause a temporary loss of vision that can last anywhere from 5 to 60 minutes, usually 20-30 minutes in many patients. There is no report of positive visual extraordinary occurrences or extreme long tunnel vision that can lead to migraine patient having a narrow vision in the case of an aura migraine. However, in sporadic cases, the obstruction can be present for hours and could last for months and can lead to lingering disability.<sup>4</sup> Serotonin, one of the mediators in the endogenous anti nociceptive system and vasoactive substance, plays an important part in the mechanisms of primary headaches, which is confirmed by abundant clinical experience of the successful use of different serotonergic drugs for the treatment of vascular cephalgias, the key importance of this neurotransmitter in the pathogenesis of headache is emphasized in the so-called "serotonergic hypothesis" of migraine headaches, which was formulated in the late 1960s on the basis of a correlation observed between changes in plasma serotonin levels and evolution of migraine attacks<sup>5,6</sup>. Dysfunction of these neurons, resulting in changes in the endogenous level of the hormone serotonin in different areas of the patient's brain; this causes the breakdown of pain

sensitivity and tone of the intracranial vessels of the central regulatory sensors. these phenomena result in the commonly reported symptoms of migraines which are headaches and cephalgias 7, 8. Melatonin played a significant part in the regulating of circadian rhythms and is mostly produced by a gland in the body called pineal gland and, with a significant role in initiating and sustaining sleep. In the darkness, melatonin Secretion is heightened and suppressed by light; the hypothalamus regulates the process specifically the suprachiasmatic nucleus<sup>9</sup>. Besides, the benefits and importance of melatonin is magnified with improved sleep in some migraine patients. an example is seen in the connection between sleep and migraine where well-ordered sleep, rest has been reported to be linked with lowering the chronic effect of the disorder<sup>10</sup>, moreover, likewise, lack of getting adequate sleep is a real migraine trigger 11. migrain attack can be terminated by patients just getting enough sleep 11,12.

### Materials and Methods

Prospective study is the study design in this specific research.

The sample of this study includes patients who were hospitalized at AL-Hussein Teaching Hospital, particularly in the Counseltation department of neurology, Biochemistry Laboratory, and specialist clinics. It included (90) subjects, control (35) and patients (45) including:(25 females, 20 male).

5ml of blood samples collected from breast cancer patients. Samples were kept at room temperature in empty disposable tubes.

The serum was separated using a centrifuge at 3000xg for about 10 min and then stored at -20°C for later Serotonin and Melatonin hormones analysis. The melatonin together with serotonin in serum were estimated through method which is known as immunoassay technique. In this technique ELISA Reader is used and the kit is through Elabscience, United States of America. Moreover, the obtained results and findings were explained by mean as well as  $\pm$  standard deviations. Besides other tests such as One way ANOVA was applied for comparing parameters involved in various studied groups. When the P-values were less than 0.05, they were considered as statistically significant.

### Results

In this work we determined the effect of these disease on the Serotonin and Melatonin hormones.

The levels of serum Serotonin and Melatonin hormones were showing significant decrease in migraine patients comparing to control group.

**Table-1:** Serum Serotonin concentrations of (control) and (migraine patients) groups

Group	n	Serotonin concentrations(ng/mL) mean $\pm$ SD
control	35	62.31 $\pm$ 15.56 <sup>a</sup>
Migraine patients	45	10.96 $\pm$ 2.21 <sup>b</sup>
LSD		3.27

\* every value shows the values of mean  $\pm$  Standard deviation with non-identical superscript ( a , b or c ...etc.). When value of P  $\leq$  0.05, they were considered significantly different.

**Table-2:** Serum Melatonin concentrations of (control) and (migraine patients) groups

Group	n	Melatonin concentrations (pg/mL) mean $\pm$ SD
control	35	41.83 $\pm$ 11.12 <sup>a</sup>
Migraine patients	45	12.34 $\pm$ 3.27 <sup>b</sup>
LSD		2.92

- Legend as in table (1)

### Discussion

Known as severe neurological disarray, migraine is characterized by simple to severe single interval beats attacks of one part headaches in patients with the disorder. Diagnosis by HIS and reports indicated that migraine is two to three times more credible to occur in women. This is as a result of genetic factors and hormone imbalance. It is divided into 2 parts namely migraine with aura as well as without aura. With, with no aura which is responsible for almost 90% migraine incidence<sup>13</sup>.

Pathophysiology of migraine, have pointed out that neurotransmitter serotonin (5-HT) can be considered as the main culprit that triggers the discomfort in migraine. Moreover, the biochemical plausible explanation is based on reduction in the level of blood's serotonin and an increase in levels of 5-hydroxyindolacetic acid which is abbreviated as 5-HIAA, which is the primary metabolite present in urine test during an attack<sup>14</sup>.

Entrain enzymes influence the serotonin levels in a migraine patient's body, and this enzyme is called tryptophan hydroxylase (TPH). However, lack of genetic research evidence or hyperproduction of this enzyme TPH has also being reported to affect the serotonin levels which increase the episodes of migraine occurring <sup>15</sup>.

Reports indicated that on migraine days, adults have lower levels of the hormones melatonin as compared with none headaches days. So also, those with the chronic form of the disorder have lower

levels of melatonin in their body than their counterparts with episodic migraine 16, 17.

Claustrat B. et al., 1989 18. Were considered as the first scientists to indicate that the levels of plasma melatonin in migraine patients were lower than control groups. Lower levels were reported in migraine patients without depression when compared with the controls. However, migraine patients who suffered from superimposed depression tends to show the highest level of melatonin deficiency.

## Conclusions

In conclusion, data from this study indicated the following:

1. Attacks can be prevented in migraine patients by abiding by a simple lifestyle change, e.g. avoiding too much loud noises, too bright lights, getting and indulging in healthy diet, and avoiding alcohol totally.

2. Serotonin has a significant impact on the migraine triggers. As a result, low levels of the hormone in addition to inflammation and irritation of the brain mucosa cause the pain receptors to trigger a migraine.

3. Melatonin plays a significant role in the pathophysiology of headaches as well as a good option in the control treatment of simple headaches. We finding decrease in Serotonin(ST) and Melatonin(MT) in Migraine patients as compared to control group.

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