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Original Research Paper

Evaluation of some biomarkers levels in women suffering from irritable bowel syndrome

Doaa Najem Abood[1], Haider Salih Jaffat[2]

[12] *Department of biology, Faculty of Science, University of kufa, Kufa, Iraq.*

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*Corresponding Author: Haider salih , *Department of biology, Faculty of s*cience, University of kufa, Kufa, Iraq;
Email: hayder.alshafie@uokufa.edu.iq

Abstract: This study was conducted to provide an approach for the diagnosis and prognosis of irritable bowel syndrome , with a particular focus on serotonin . The research was conducted in Najaf Governorate, Iraq, from July 1, 2025, to December 1, 2026 . **Methods:** A total of 90 participants were enrolled, including 60 patients diagnosed with IBS and 30 healthy individuals as controls. The results were stratified into subgroups according to age, body mass index , disease duration , diagnosis status (newly diagnosed or under treatment), familial or non , constipation or diarrhea , physical activity and non-physical activity. **Results:** The results revealed a significant decrease in serotonin level among patients compared to the control group. The present results revealed significant decrease in serotonin in women patients in compare with control. In ages groups that results showed significant decrease in ages group (20-29) years than other groups , also significant decrease in diarrhea group in compare to constipation . The results also indicated a significant decrease in new diagnosed patients than treated ,also body mass index revealed a significant decrease in obese patients than overweight . Shorter duration of disease less than (1 year) showed significant decrease than long more than 1 year . both physical activity and familial status showed a significant decrease than non physical activity and non familial. **Conclusion:** the study suggests that serotonin is a novel biomarker for irritable bowel syndrome It may serve as a valuable diagnostic and prognostic tool.

Keywords: Irritable bowel syndrome ; age ; disease duration ; BMI .

1. Introduction

Irritable bowel syndrome (IBS) is a chronic functional pathology of the gastrointestinal tract (GIT), this disease is characterized by chronic abdominal pain, bloating, and altered bowel habits, which can significantly impair the quality of life , also the severity of symptoms varies in different individuals with some experiencing severe disease whereas others experiencing mild symptoms. The pathophysiology of IBS is not completely understood; however, it is believed to be a multifactorial pathology[1] . Serotonin (5-hydroxytryptamine; 5-HT) is an evolutionarily conserved monoamine neurotransmitter that plays critical roles in various physiological systems, functioning as a neurotransmitter, hormone, and paracrine signaling molecule [2].

5 -HT is widely distributed in both the CNS and peripheral tissues, where it performs diverse regulatory functions in the nervous, endocrine, and immune systems , in recent years, advances in molecular biology, neuroscience, and immunology have further elucidated the mechanisms underlying 5-HT synthesis and metabolism as well as its roles in the physiological regulation of multiple systems , in addition to its fundamental biological roles, 5-HT has attracted

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enormous attention because of its clinical relevance in central and peripheral disorders, including depression, irritable bowel syndrome (IBS), neurodegenerative diseases, metabolism, and other syndromes [3,4].

2. Methodology

Samples collection

Subjects (women patients and control group)

The current study included ninety women population (90) devided into sixty (60) women patient and (30) control . Samples were collected from Specialized Hospital for Gastrointestinal and Liver Diseases and Surgery in Al-Najaf Al-Ashraf / Iraq, and private Laboratories . from a period 1/9/2025 to 1/2/2026 in Faculty of Science Department of biology. Control group (apperantly healthy) numbers (30) were matched with ages with women patients. women patients were subdivided into seven subgroup according to age, BMI, duration of disease, treatment or new, familial or non-familial, constipation or diarrhea, physical activity or non-physical activity.

Inclusion criteria

The current study included age, body mass index, duration of disease, treatment or new, familial or non-familial, constipation or diarrhea, physical activity or non-physical activity.

Exclusion criteria

Colon cancer, gastric ulcer, liver disease, digestive system disorder, diabetes, hypertention, and types of cancer, endocrine disease.

Blood collection

Each patients and control group undergo a drawn of blood samples from venous at 5 milliliters and left at room temperature for 10 minutes for collecting and then centrifuged at 3000 rpm for 15 minutes for given a serum then 1.5 milliliters was transferred to Eppendorf tube for salusin-α, serotonin profile measurement.

The serum transported to new Eppendorf tubes and stored at-20 co unlit was used.

Experimental design

Women patients were subdivided at the following:

1-Aged group N=17 age (20-29), N=16 age (30-39), N=12 age (40-49), N=15 age (50-59).

2- Body mass index N=23 (normal weight), N=16 (overweight), & N=21 (obese).

3- duration of disease N=20 (1 year <), N=40 (1-10) years.

4- Patients with and without treated (N=20 without treatment), **(**N=40 with treatment).

5- familial or no N=40 (familial IBS), N=20 (non-familial).

6- constipation or diarrhea (N=28 diarrhea), (N=32 constipation).

7- physical activity and non-physical activity N=25 (with physical activity), N=35 (without physical activity).

3. Results and discussion

Serotonin level in women irritable bowel syndrome patients and control

Figure 1 Showed significant decrease in P<(0.0001) in serotonin level in irritable bowel syndrome women patients (64.31± 2.658) in compare with control group (157.9 ± 1.789).

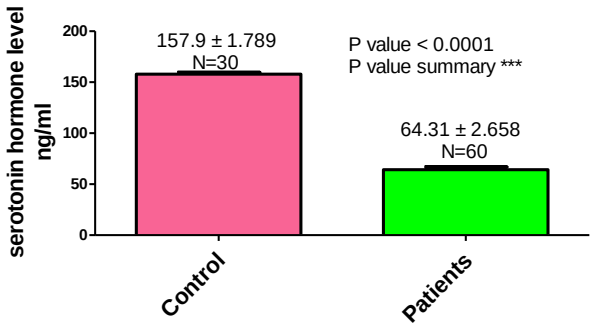

Fig1: mean of Serotonin level in patients compare with control group

Comparison between serotonin level in women irritable bowel syndrome patients according to ages

Figure 2 indicated significant decrease (P<0.0001) in ages (20-29) years (43.49 ± 4.938) than in compared

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with (30-39) years (62.78±2.289) and (40-49) years (78.91 ± 4.252) and (50-59) years (76.80±3.489).

The currant results also showed non significant difference (P<0.0001) between (40-49) years and (50-59)

From the same figure reveled significant decrease (P<0.0001) in ages (20-29) years that (30-39) years.

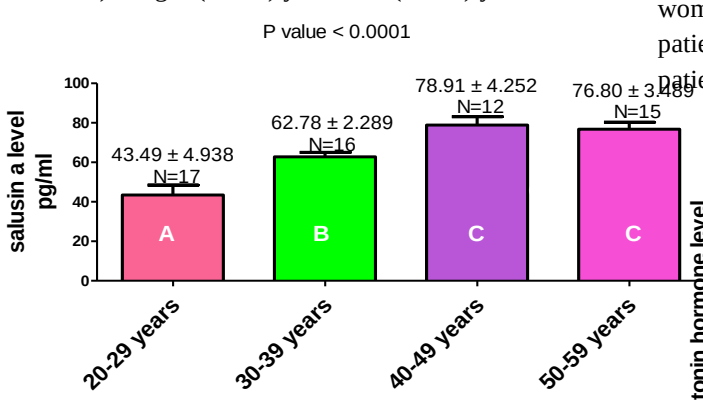

Fig 2: mean of Serotonin level in patients according to ages

comparison between serotonin level in women irritable bowel syndrome patients according to stool morphology (constipation and diarrhea)

In figure 3 documented significant decrease (P<0.0001) in women irritable bowel syndrome patients diarrhea (51.22±3.805) as compared with constipation (75.07± 2.366).

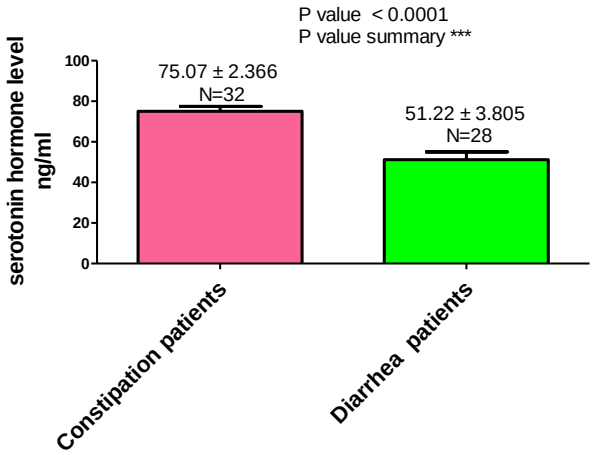

Fig 3: mean of Serotonin level in women patients according to stool morphology (constipation and diarrhea)

comparison between serotonin level in women irritable bowel syndrome patients according to diagnostic states (new or treatment)

Figure 4 indicated significant decrease (P<0.0001) in women irritable bowel syndrome patients new diagnostic patients (45.09±3.744) in compared with treatment patients (74.04± 2.330).

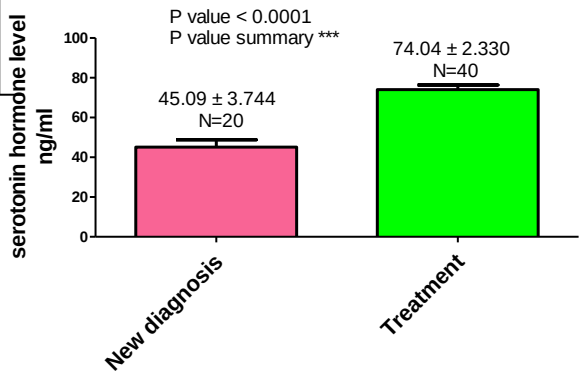

Fig 4: mean of Serotonin level in patients according to diagnostic states (new or treatment)

comparison between serotonin level in women irritable bowel syndrome patients according to Body Mass Index (BMI)

Figure 5 revealed significant decrease (P<0.0001) in obese in women irritable bowel syndrome patients (51.30 ± 3.913) and overweight (58.66 ± 4.536) in compared with normal weight (81.13 ± 2.842)

The currant results also showed non significant difference (P<0.0001) between obese and overweight level.

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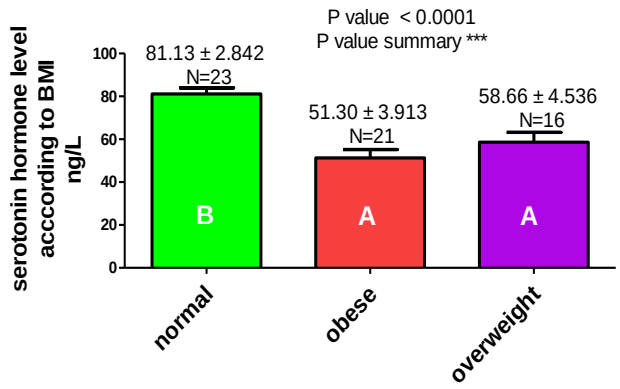

Fig 5: mean of Serotonin level in patients according to Body Mass Index (BMI) Conclusion

comparison between serotonin level in women irritable bowel syndrome patients according to duration of disease

Figure 6 proved significant decrease (P<0.0001) in women irritable bowel syndrome patients having duration of disease less than 1 year (50.80 ± 4.354) than duration of disease more than 1 year (71.81 ± 2.889).

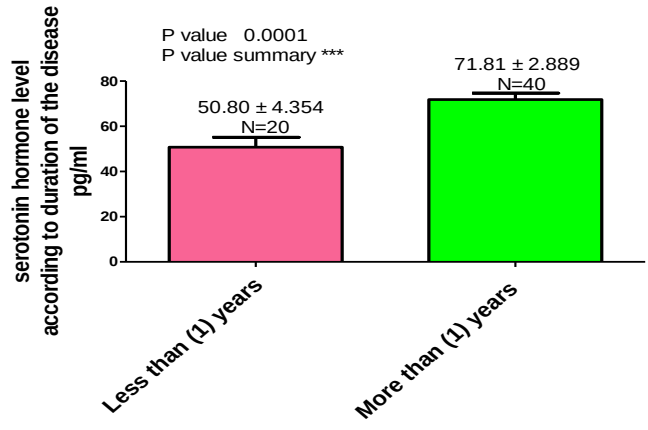

Fig 6: mean of Serotonin level in patients duration of disease

comparison between serotonin level in women irritable bowel syndrome patients according to physical activity

In figure 7 indicated significant decrease (P<0.0001) in women irritable bowel syndrome patients having active (nonphysical activity) patients (49.25 ± 3.910) than physicaly active patients (73.93 ±2.288).

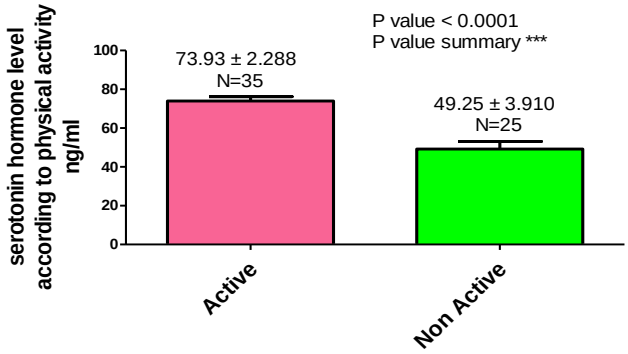

Fig 7: mean of Serotonin level in patients according to physical activity

comparison between serotonin level in women irritable bowel syndrome patients according to familial or non familial

Figure 8 showed nonsignificant decrease (P>0.05) in women irritable bowel syndrome patients famelial (59.33 ± 4.814) than nonfamelial (68.23 ± 2.949).

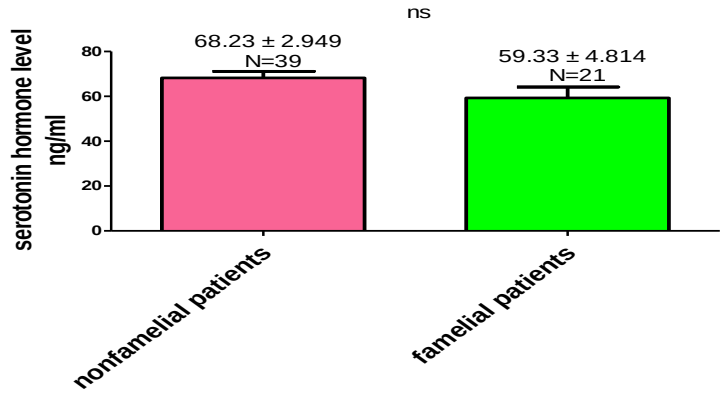

Fig 8: mean of Serotonin level in patients according to familial or nonfamilial

The results of the current study showed a significant decrease in serotonin in irritable bowel syndrome patients in compare with control group**.** In recent study

of Al-Ani and Ghanem, [5] a significant decrease in serotonin level by influence on fluid secretion and sensitivity of gut to stimulate and in IBS patients serotonin is distruputed and reduction of intestinal serotonin production may lead to weaken intestinal mucosal lining and causing constipation or diarrhea .

Many studies has been postulated many hypothesis to deficient serotonin in (IBS) patients based on deficient in electrolytes in serotonin Transporter (SERT) and second hypothesis focuses on fever entero chromaffin cells interact and third based on altered serotonin in signaling [6,7,8].

Another recent studies has been indicated an interrelation ship between serotonin and many receptors on gut and gut-brain-axis which considered a main causes of disruption in serotonin secretion [9].

In many previous studies has been showed a significant decrease in serotonin level found in IBS and found that serotonin play important roles in regulation of gut or intestinal motility and closely with pathophysiology of IBS , also role of serotonin in intestinal distention [10].

In another recent studies has been proved that serotonin reduction in both subtypes of IBS in C and D and in intestinal mucosa also various roles of serotonin in modulation of G1 secretion also absorption [11,12].

Many former studies has been indicated a fourteen different receptors of 5-HT on gut most are coupled with G-protien devided into seven families and any reduction of serotonin lead to disruption in signaling pathway [13].

In very recent study has been showed that normal flora in gut (probiotics) influenced on 5HT and serotonin regulation and expression to enzyme called tryptophan hydroxylase and controlling a secretion of serotonin therefore any disruption in normal flora distroption in the gut may influenced on serotonin secretion leading to IBS occurring [14,15].

Many factors such as sympathetic adrenergic stimulation , decrease luminal PH , impaired intestinal motility can also regulate 5-HT and serotonin secretion [16].

Study of Nazar *et al*,(2025) has been demonstrated that serotonin hormone , CXCL-1 and TIMP-1 are diagnosed markers and differentiation of irritable bowel syndrome.

In many recent studies has suggested that gut-brain -axis play important roles in pathogenesis of IBS and highly communicated by system composed of central nervous system (CNS) , enteric nervous system (ENS) and hypothalamic -pituitary adrenal (HPA) and gut microbiota and low serotonin level [17,18].

Another previous studies has been showed that serotonin a central regulator of gut-brain-axis therefore chronic stress or distrupt homeostasis of serotonin in gastrointestinal tract (GI) or within entero-chromaffin (EC) cells lead to alter 5-HT receptors activity and HPA axis desregulation with elevation of corticotropin releasing hormones lead to reduced in serotonin metabolism lead to disruption of serotonin signaling especially in subtype C of IBS-C [19,20,21].

Another explanation showed that serotonin desregulation may effect on permeability of intestine and proinflammatory cytokines such as TNF-α , IL-β and IL-6 downregulation of serotonin transporter (SERT) expression and worsing IBS-D symptoms [22].

Many studies linked between beneficial bacteria as directly regulate serotonin biosynthesis such as Lactobacillus and Bifidobacterium wherase over growth of pathogenic bacterials in IBS lead to reduce serotonin level and impairing intestinal motility [23,24].

The current study show a significant decrease (20-29) years in serotonin level as compared with other ages also figure showed that new diagnosed patients decrease in serotonin level than treated also revealed duration of disease less than 1 year decrease than one year .

The results may be explained due to several causes because no previous study discuss a variation of serotonin level according to age . Many of women patients in present study that did not receive any types of drug were a younger age (20-29) years and these patients have been recently diagnosed also have duration of disease less than one year .

In few recent studies has been showed that therapeutic stratigies by probiotic or any drug may be modulate serotonin in level and improvement of IBS [25,26].

The low level of serotonin in new diagnosed patients means that serotonin considered as a prognostic and diagnostic biomarkers of IBS and related with a severity of disease .

The present results indicate that decrease in serotonin level in diarrhea than constipation patients . This result disagree with a result of that found increase level of serotonin in diarrhea patients and decrease in constipation patients .

The current results may be explain to a role of serotonin desregulation in increase of proinflammatory cytokines such IL-6, IL-Iβ – WF-α lead to down expression or regulation of serotonin transporter or signaling in diarrhea patients or reducing in probiotic bacteria or fungi in IBS-D may lead to down regulation of serotonin level than constipation patients , also showed significant decrease in serotonin level in obese than overweight and normal weight patients and also revealed a significant decrease in non-physical active than active patients.

No previous study linked between serotonin level and obesity or non-active physical state therefore the explanation of low serotonin level in obesity may be related to sedentary lifestyle and little physical movement lead to obesity with Lazy Bowel or slow and difficult digestion lead to constipation , diarrhea may be related by increase inflammatory state in Bowel due to obesity and immune response lead to diarrhea .

The results indicated a significant decrease in serotonin level in familial IBS than nonfamilial the results agree with very recent study that suggest alter of serotonin reuptake transporter (SERT) gene and serotonin level with severity of IBS and associated with developmental of disease

A study of [27] has showed a link between serotonin related gene variant in patients with bowel syndrome and depression or anxiety.

Conclusion

The current study concluded that both biomarkers in women considered as prognostic markers for irritable bowel disease. decrement in both biomarkers in younger age (20-29) years give idea that new diagnosed patients with shorter duration of disease play important roles in severity of irritable bowel disease. Furthermore, decrement in both biomarkers in diarrhea, obese, non active physical activity, family history of disease in women irritable bowel syndrome patients .

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Author's Contributions

First author designed the study. second author collected the data. All authors contributed to data analysis and approved the final manuscript.

Ethics

This study was conducted under approval by the medical ethics committee at the University of Kufa (2025). Samples were collected from female patients after obtaining their informed consent.

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