



NEURO-ELECTROPHYSIOLOGICAL CHARACTERIZATION AND CLINICAL PROFILING OF IRRITABLE BOWEL SYNDROME: A HOSPITAL-BASED STUDY ON THE BRAIN-GUT AXIS

General Medicine

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ABSTRACT

Background: Irritable Bowel Syndrome (IBS) is a functional gastrointestinal disorder characterized by abdominal pain and altered bowel habits without structural abnormalities. Emerging evidence implicates brain-gut axis dysfunction and central nervous system (CNS) involvement in its pathogenesis. **Objective:** To evaluate the clinical profile of IBS patients and characterize neuro-electrophysiological patterns alongside neurological manifestations. **Methods:** A hospital-based study was conducted on 56 patients at S.N. Medical College, Agra, diagnosed using Rome III criteria. Clinical symptoms, extra-intestinal features, and neurological profiles were analyzed. Resting-state EEG recordings were performed to assess central neural dynamics. **Results:** Female predominance was observed (53.5%), with peak incidence in the 25–34 age group. Diarrhea-predominant (44.6%) and mixed-type (42.8%) were the most frequent subtypes. Neurological overlays were significant: headaches (57.1%), forgetfulness (28.6%), sleep disturbances (23.2%), and loss of concentration (16.1%). Notably, headache and forgetfulness often persisted independently of gastrointestinal symptoms. **Conclusion:** IBS is a heterogeneous disorder with substantial central involvement. Neurological manifestations highlight the need for multidimensional, personalized management strategies addressing both gastrointestinal and neurophysiological dysfunctions.

KEYWORDS

Irritable Bowel Syndrome, Brain-Gut Axis, Neuro-electrophysiology, EEG, Functional GI Disorders

INTRODUCTION

Irritable Bowel Syndrome (IBS) is a chronic functional gastrointestinal disorder presenting with abdominal pain, altered bowel habits, and absence of structural abnormalities. It predominantly affects younger populations, with a female preponderance. In tropical regions such as India, post-infectious IBS contributes significantly to disease burden due to high prevalence of infectious diarrhea.

Recent advances in neuroimaging and electrophysiology suggest aberrant brain-gut interactions as a central mechanism. PET studies reveal exaggerated cortical responses to visceral stimulation, while EEG studies demonstrate dysrhythmias and increased beta power in IBS patients. This study aims to clinically profile IBS patients and characterize neuro-electrophysiological patterns to better understand CNS involvement.

MATERIALS AND METHODS

Study Design: Hospital-based, retrospective and prospective comparative analysis

Setting: Postgraduate Department of Medicine, S.N. Medical College and Associated Hospital, Agra

Sample Size: 56 patients diagnosed with IBS using Rome III criteria

Inclusion Criteria:

- Age >14 years
- Diagnosis of IBS (all subtypes)
- Informed consent

Exclusion Criteria:

- Organic diseases (Diabetes, HIV, Abdominal Tuberculosis)
- Seizure disorders
- Medications affecting EEG (barbiturates, antipsychotics)

Evaluation Protocol:

- Clinical assessment using Rome III criteria and Bristol Stool Form Scale
- Laboratory tests (CBC, CRP, stool examination)
- Imaging (USG/CT) and colonoscopy to exclude organic pathology
- Resting-state EEG recordings to evaluate central neural dynamics

RESULTS

Demographics

Females: 30 (53.5%)

Males: 26 (46.4%)

Peak incidence: 25–34 years (n=20)

IBS Subtypes

Diarrhea-predominant: 25 (44.6%)

Mixed-type: 24 (42.8%)

Constipation-predominant: 7 (12.6%)

Clinical Features

Abdominal pain/discomfort: 91%

Abdominal fullness: 85%

Mucus in stools: 85%

Milk intolerance: 80.3%

Neurological Manifestations

Headache: 57.1%

Forgetfulness: 28.6%

Sleep disturbances: 23.2%

Loss of concentration: 16.1%

Notably, headache (20/32 cases) and forgetfulness (12/16 cases) persisted independently of gastrointestinal symptoms, suggesting sustained CNS involvement.

DISCUSSION

The high prevalence of neurological symptoms supports the hypothesis of altered brain-gut interaction. Elevated corticotropin-releasing hormone (CRH) levels have been linked to decreased alpha and increased beta EEG power in IBS patients. Nomura et al. reported EEG abnormalities in 29.2% of IBS patients compared to 4.2% of controls, correlating beta power with colonic motility.

Visceral hyperalgesia and altered cortical evoked potentials (CEPs) further indicate heterogeneous neurophysiological subgroups, including hypersensitive and hypervigilant profiles. These findings emphasize IBS as a systemic disorder with central amplification of gut sensations.

CONCLUSION

IBS is not confined to gastrointestinal dysfunction but represents a systemic disorder with significant neurological overlays. Persistent CNS symptoms independent of gut flares highlight the need for holistic management strategies targeting both gastrointestinal and neurophysiological dysfunctions.

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