SYSTEMATIC REVIEW

Evaluating the association of childhood sexual abuse with the development of irritable bowel syndrome later in life: A systematic review

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Abstract

Objective: To review available medical literature to elucidate the association between childhood sexual abuse and the development of irritable bowel syndrome later in life.

Method: This systematic review was conducted from January to August 2022 and comprised a literature search on Medline (via PubMed), Scopus, Embase, Web of Science, and Google Scholar databases for relevant studies published between 2001 and 2021. The Newcastle-Ottawa scale was used to determine the quality of the studies. Data on the prevalence of irritable bowel syndrome were meta-analysed using a Mantel-Haenszel random-effects model in RevMan 5.4.1.

Results: Of the 7 observational studies analyzed in detail, 5 (71.4%) had a case-control design, and 2 (28.6%) were cross-sectional studies. Overall, there were 3156 subjects. The prevalence of irritable bowel syndrome in the childhood sexual abuse group was 51.86% (334/644), while it was 36.74% (923/2512) in the non-childhood sexual abuse group. The pooled odds ratio, indicating the association between childhood sexual abuse and irritable bowel syndrome, was 1.87 (95% confidence interval: 1.56-2.26). The study quality was rated as good in 3 (42.8%) cases, fair in 3 (42.8%), and poor in 1 (14.3%).

Conclusion: Childhood sexual abuse was found to be significantly associated with the development of irritable bowel syndrome later in life, further strengthening the argument that childhood sexual abuse can lead to long-term detriments extending into adulthood. However, there was no existing literature found that stratified other aspects of irritable bowel syndrome, including symptom severity and childhood sexual abuse being the exclusive cause of irritable bowel syndrome.

Keywords: childhood sexual abuse, irritable bowel syndrome, systematic review. (JPMA 74: 939; 2024)

DOI: https://doi.org/10.47391/JPMA.9542

Introduction

Childhood sexual abuse (CSA) is described as the involvement of a child in sexual activity that he or she does not fully comprehend, is unable to give informed consent to, or for which the child is not developmentally prepared and cannot give consent, or an act that violates the laws or social taboos of society.[1] It is, in fact, 1 of the 4 main types of abuse and has been proven to lead to a plethora of problems in adulthood including, but not limited to, depression, anxiety, suicidal tendencies, and several physical maladies.[2] While estimates for CSA may vary according to countries, the definition of CSA referred to, societal stigma, and the quality of data, the World Health Organisation (WHO) reports that about every 1 in 5 women and 1 in 13 men may have been sexually abused as a child aged <18 years.[3] While it is generally presumed that CSA is a rare event perpetrated against girls by male strangers, statistics show that in around 95% of the cases, the perpetrator is, in fact, someone known to the child.[4] Consequently, the victims may be subjected to a repeated cycle of physical and psychological trauma through the course of their life, leading to profound and lifelong impact on their health that may extend beyond childhood.

One such impact may be the development of functional gastrointestinal disorders (FGIDs) later in life. FGIDs consist of a range of conditions, many of which do not have a biological explanation and, therefore, cannot be detected using diagnostic modalities, such as X-rays, blood tests and endoscopies.[5] Irritable bowel syndrome (IBS), the most prevalent of the FGIDs, is a chronic condition characterised by a range of GI symptoms, including abdominal pain, alternating diarrhoea and constipation, indigestion, nausea, and vomiting, all in the absence of a demonstratable physical pathology.[6] IBS prevalence ranges from 2.1% to 22% worldwide, making it the most commonly diagnosed GI condition and, therefore, a significant healthcare burden.[7]

While the exact cause of IBS is subject to further research, the disease appears to be driven by a combination of genetic and environmental factors. Among these factors, CSA has been shown to be associated with an increased risk.[8] Adverse childhood experiences can trigger elevated levels of stress and psychological trauma, with the latter linked to a higher likelihood of psychological disorders, such as depression and anxiety. This corresponds to an

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Submission complete: 04-04-2023 **Review began:** 19-05-2023

Acceptance: 10-01-2024 **Review end:** 11-11-2023

increased risk of adult diseases of inflammatory origin.[2]

While numerous studies have explored the association between IBS and childhood abuse, a consistent limitation in the literature has been the absence of an international cohort large enough to definitively establish a connection with CSA specifically, independent of other forms of abuse. Odds ratio (OR) data indicating this association has not consistently been significant across studies that have assessed CSA and IBS. Moreover, the majority of these studies are currently retrospective and employ varying methodologies. Therefore, due to the lack of a standardized approach, conflicting findings, and a scarcity of pathophysiological evidence at present, the current systematic review was undertaken to determine whether existing studies can establish an evidence-based association between CSA and IBS.

Materials and Methods

This systematic review was conducted from January to August 2022 in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.[9]

The literature search was conducted on Medline (via PubMed), Scopus, Embase, Web of Science, and Google Scholar databases for relevant studies published between 2001 and 2021. Medical Subject Heading (MeSH) terms and keywords used for the search in various combinations were 'childhood abuse', 'irritable bowel syndrome', and 'sexual abuse'. Studies were also identified through manual searching and snowballing by checking the reference sections of all relevant articles for possible related studies. All grey literature, including conference abstracts, was searched as well. There were no restrictions on the language of publication. All relevant observational studies, studies with a control group, and studies where the past occurrence of CSA was recorded and mentioned independently of other forms of child abuse were included. Both hospital and community-based settings were considered in the included studies, and no study was excluded due to low sample size or a low response rate. Studies in which an indication of IBS was not specified, or where numbers for child abuse were reported as an aggregate of sexual abuse and other types, were excluded from this review.

Two independent reviewers screened the initially identified studies based on titles and abstracts using the online systematic review manager Rayyan.ai.[10] All the shortlisted studies subsequently underwent a thorough full-text review based on the inclusion criteria. Any discrepancies were resolved by consensus or by consulting a third reviewer. The studies selected had examined independent, non-overlapping cohorts.

Data extracted included study participants' characteristics, year of publication, country and study setting, IBS diagnostic criteria, number of study participants with IBS in CSA and non-CSA groups, and questionnaires and definitions used for determining CSA. ORs were manually calculated for studies that did not report them using 2*2 contingency tables by taking development of IBS in adulthood as the outcome and CSA as the exposure.

To determine the risk of bias, two independent reviewers assessed the quality of the selected studies using the Newcastle-Ottawa Scale (NOS) for observational studies.[11] No study was excluded based on the results of the quality assessment, and any conflicts were resolved by consensus or by consulting a third reviewer. Publication bias was not assessed because the systematic review had <10 studies.[12]

Statistical analysis was carried out using Review Manager version 5.4.1. Pooled ORs indicating the association between CSA and IBS were reported with a 95% confidence interval (CI), and a forest plot was generated to illustrate the prevalence of IBS in individuals exposed and unexposed to CSA. To address heterogeneity among the studies, such as differences in demographic variables and study settings, we employed a Mantel-Haenszel random-effects model. Heterogeneity was assessed using the Higgins I2 statistic. Sensitivity analyses were also conducted to account for the impact of lower-quality studies. Additionally, subgroup analysis based on study design was performed.

Results

Of the 9834 studies initially identified and imported for screening, 7 (0.07%) were incorporated into the systematic review (Figure 1).[13-19] Overall, these studies consisted of

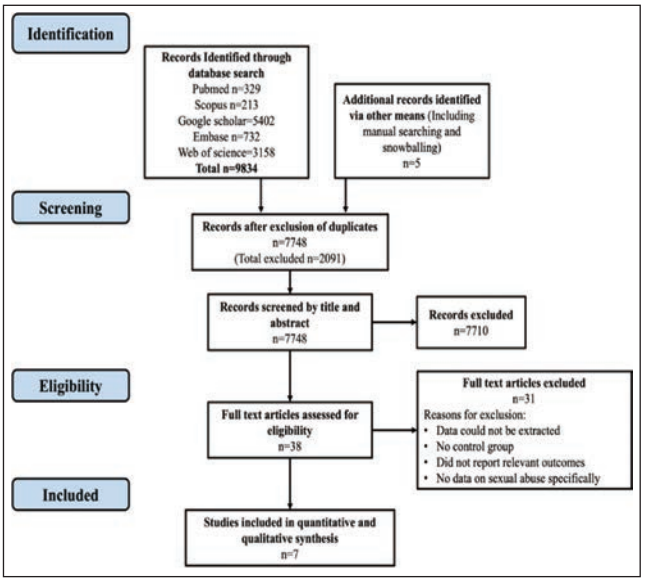

Figure-1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flowchart.

3156 subjects (1257 IBS patients and 1899 controls). Of the included studies, 5 (71.4%) had a case-control design[14-18] and 2 (28.6%) were cross-sectional.[13,19] Four (57.1%) studies had been conducted in the United States[15-18] and 1 (14.3%) was conducted in each of the United Kingdom,[14] Canada[13] and Brazil.[19]

A diagnosis of IBS was established using various versions of the Rome Diagnostic Criteria for IBS across the studies. However, a consistent requirement in all studies was that the diagnostic tool results must be interpreted in conjunction with a clinical diagnosis. The most updated Rome IV Diagnostic Criteria defines IBS as "recurrent abdominal pain on average at least 1 day/week in the last 3 months, associated with two or more of defecation, change in frequency of stool, or change in form/appearance of stool".[20] There were 3 (42.8%) studies using the Rome III Diagnostic Criteria for IBS,[15,17,18] 1 (14.3%) study used the Rome IV Diagnostic Criteria for IBS and/or abdominal pain,[19] 1 (14.3%) study used the Rome I Diagnostic Criteria for IBS[14] and 1 (14.3%) study used either the Rome I or Rome II Diagnostic Criteria for IBS.[16] 1 (14.3%) study did not specify the tool used.[13]

Tools to measure CSA exposure were also unique to each of the included studies, with 6 (85.7%) using pre-existing validated questionnaires[13,15-19] and 1 (14.3%) using an unspecified self-reported questionnaires in conjunction with semi-structured interviews for qualitative analysis.[14] Additionally, the age cut-off for determining childhood (vs. adulthood) sexual abuse varied among studies, with 3 (42.8%) studies using <18 years,[15-17] 2 (28.6%) studies using <17 years[18,19] and 1 (14.3%) study using each of <14 years[14] and <15 years.[13] These data have been summarised in Table 1.

The quality of study was good in 3 (42.8%) cases,[14,17,19] fair in 3 (42.8%)[13,16,18] and poor in 1 (14.3%).[15] Most lower study

Table-1: Characteristics of Included Studiess.

Study	Study Design	Study Quality (NOS)	Study Location	Study Setting	IBS Patients (% Women)	Controls (% Women)	Age Cut-Off for CSA*	IBS Patient Diagnostic Criteria	Control Characteristics	Questionnaire Used for Determining CSA
Bradford et al. (2012)[17]	Case-Control	Good	Los Angeles, United States of America	Healthcare	294 (79)	435 (77)	<18 years	Rome III (participants recruited by advertisements and outpatient GI clinics)Rome III (participants recruited by advertisements and outpatient GI clinics)	No history of IBS or other chronic GI or pain conditions, and were not taking psychotropic medication or participating in psychotherapy (recruited by advertisements)	ETISR
Kanuri et al. (2016)[18]	Case-Control	Fair	St Louis, United States of America	Healthcare	272 (81)	246 (65)	<17 years	Rome III (participants recruited from outpatient GI clinics)	Non-FGID patients (recruited from outpatient GI clinic)	ELSQ
Hobbis et al. (2002)[14]	Case-Control	Good	Cambridge, United Kingdom	Healthcare	50 (100)	53 (100)	<14 years	Rome I (participants recruited from outpatient GI clinics)	Healthy non-patient controls	Unspecified Self-Reported Questionnaire and Semi-Structured Interviews
Park et al. (2016)[15]	Case-Control	Poor	Los Angeles, United States of America	Healthcare	148 (73)	154 (59)	<18 years	Rome III (participants recruited by advertisements and outpatient GI clinics)	Healthy non-patient controls without a history of IBS or other chronic GI or pain conditions, and were not taking psychotropic medication or participating in psychotherapy	ETISR-SF ACE Questionnaire
Halland et al. (2014)[16]	Case-Control	Fair	Rochester, United States of America	Healthcare	409 (83)	415 (80)	<18 years	Rome I or Rome II (participants recruited from outpatient GI clinics)	Healthy non-patient controls and/or do not meet Rome I or Rome II Criteria	ETISR-SF
Almeida et al. (2021)[19]	Cross-Sectional	Good	São Paulo, Brazil	Community	22 (73)	191 (N/A)	<17 years	Rome IV (participants recruited from public schools)	Healthy non-patient controls with no diagnosis of IBS or functional constipation	ICAST-C
Rosenblat et al. (2020)[13]	Cross-Sectional	Fair	Toronto, Canada	Healthcare	62 (N/A)	405 (N/A)	<15 years	Not Specified	Mood disorder patients without IBS	KTANQ

*Used to differentiate childhood sexual abuse from adulthood sexual abuse
NOS: Newcastle-Ottawa Scale; IBS: Irritable Bowel Syndrome; CSA: Childhood Sexual Abuse; GI: Gastrointestinal; FGID: Functional Gastrointestinal Disorders; ELSQ: Early-Life Stressor Questionnaire, ETISR: Early Trauma Inventory Self Report; ACE: Adverse Childhood Events; ETISR-SF: Early Trauma Inventory Self Report – Short Form; ICAST-C: Child Abuse Screening Tool – Children's Version; KTANQ: Klein Trauma & Abuse Neglect Questionnaire.

ratings were justified by the lack of adequately defined controls and cases, lack of a robust enough approach to ascertaining whether a participant had an exposure, and the lack of a non-response rate.

The prevalence of IBS in CSA group was 51.86% (334/644) and it was 36.74% (923/2512) in the control group. The pooled OR denoting the association between CSA and IBS was 1.87 (95% CI: 1.56-2.26) (Figure 2), with a Higgin's I2 value denoting heterogeneity of 0%. All 7 (100%) studies had an OR >1, with 2 (28.6%) studies[14,19] having non-significant results, and the remaining showing significant associations between CSA and IBS. Subgroup analysis based on study design showed an OR of 1.82 (95% CI: 1.49-2.22) for case–control studies, and an OR of 2.33 (95% CI: 1.36-3.98) for cross-sectional studies. Sensitivity analyses yielded no significant change to the overall results (p>0.05). Given the lack of additional data stratified on the basis of abuse in the included studies, additional variables, such as IBS symptom severity, could not be quantitatively meta-analysed for CSA. Important findings from each of the included studies have been summarised in Table 2.

Table-2: Data Extracted from Included Studies.

Study	Sample Size	CSA		Non-CSA		Major Findings	Limitations
		IBS	Control	IBS	Control		
Bradford et al. (2012)[17]	729	92	78	202	357	Compared with controls, IBS patients reported a higher prevalence of general trauma (78.5% vs 62.3%), physical punishment (60.6% vs 49.2%), emotional abuse (54.9% vs 27.0%), and sexual events (31.2% vs 17.9%) (all p< 0.001). These significant differences were observed mainly in women. Of the EAL domains, emotional abuse was the strongest predictor of IBS (p< 0.001). CSA (OR: 2.08 [95% CI: 1.47-2.95]) was associated with IBS.	There was potential for recall bias due to the study's retrospective focus on childhood traumatic events. The ETI-SF questionnaire includes events of abuse, major losses, and other trauma types but doesn't distinguish between trauma types. Moreover, while it has been validated for PTSD, it has not been for IBS.
Kanuri et al. (2016)[18]	518	42	18	230	228	Severity of depression, anxiety, and somatic symptoms all were higher in IBS patients with abuse histories compared to those without abuse experiences. In turn, IBS symptom severity, including bowel-specific symptoms, and health-related quality of life were found to be significantly worse in IBS patients with abuse histories. Additionally, our results indicate that individuals enduring multiple forms of abuse endorsed more severe IBS symptoms and lower HRQOL compared to those who had fewer or no abuse experiences. CSA (OR: 2.31 [95% CI: 1.29–4.14], p=0.004) before the age of 17 was associated with IBS.	The study employed a cross-sectional design, preventing the establishment of causal relationships between abuse and IBS symptom severity or HRQOL. Many abuse experiences reported occurred decades ago. The FGID cohort was younger and predominantly female, potentially influencing recall and reporting of abuse. The study relied on self-report instruments rather than formal diagnoses for psychiatric/psychological symptom comorbidity. Moreover, some control subjects did not have active GI complaints, with a few presenting for colorectal cancer screening or polyp surveillance.
Hobbis et al. (2002)[14]	103	13	9	37	44	No significant differences were found between all four groups (idiopathic constipation patients, IBS patients, Crohn's disease patients, non-patient controls), both for measures of abuse and for psychological distress. However, patients who reported past abuse, irrespective of their FBD status, demonstrated significantly higher levels of current psychological distress. Furthermore, CSA (OR: 1.72 [95% CI: 0.66–4.47], p=0.26) before the age of 18 was not associated with IBS.	The sample size was insufficient to detect significant differences between groups. Definitions of abuse were overly restrictive. The recruitment process might have been subject to selection bias. It's unknown whether subjects who declined participation differed in demographics or psychological aspects from those who participated.
Park et al. (2016)[15]	302	29	15	119	139	IBS status was predicted by a history of emotional abuse and either a mentally ill or incarcerated household member. Multiple logistic regressions were used to predict the odds of IBS status from ACE scores while controlling for age, sex, race, and education. CSA (OR: 2.26 [95% CI: 1.16–4.41], p=0.017) was associated with IBS.	The study population was predominantly from the West Los Angeles area; there was a potential recall bias due to the focus on childhood traumatic events; it lacked information on childhood support and psychological counselling.
Halland et al. (2014)[16]	824	134	103	275	312	IBS cases were more likely to have suffered any general trauma prior to age 18 (OR: 1.56 [95% CI: 1.13–2.15], p=0.008) compared to controls. CSA (OR: 1.48 [95% CI: 1.09–2.00], p=0.012) before the age of 18 was associated with IBS.	The study involved retrospective reporting of traumas, but the questionnaires used were validated for clinical application. Recall bias might have influenced results as IBS cases might be more prone to recalling traumatic events. Another bias source might have been the gender proportion differences between the case-control and case-relative/control-relative groups.
Almeida et al. (2021)[19]	213	3	21	19	170	Functional constipation and IBS were associated with violence exposure, physical abuse, psychological abuse, and neglect in adolescent students from public schools. No association between IBS and CSA was found (OR: 1.38 [95% CI: 0.35–4.69], p=0.711).	The study had a convenience sampling method and included only adolescents from public schools in Osasco, metropolitan region of São Paulo. The study's cross-sectional nature prevents establishing a cause-and-effect relationship between exposure to violence, abuse, neglect, and functional gastrointestinal disorders. Recall bias might have also influenced the results.
Rosenblat et al. (2020)[13]	467	21	66	41	339	CSA was strongly associated with an increased prevalence of IBS in BD; BD participants with history of sexual abuse had a significantly higher rate of IBS (38%) compared to the overall sample rate (14%) and the prevalence of IBS in the general population (~11%). This association was not observed in MDD. Overall, a significant association was found between CSA and IBS (OR: 2.63 [95% CI: 1.46, 4.74]).	The study was retrospective and cross-sectional, preventing causal inferences. It used self-reports for the history of IBS and ACEs, posing risks of both under and over-reporting. The sample size was small, and there was a lack of a healthy control group*. Moreover, the study was conducted on patients with pre-existing mood disorders so the relationship between CSA and IBS could be subject to significant confounding.

*The control group used for the purposes of our study were mood disorder patients without IBS.

IBS: Irritable Bowel Syndrome; CSA: Childhood Sexual Abuse; GI: Gastrointestinal; EAL: Early Adverse Life Events; OR: Odds Ratio; CI: Confidence Interval, HRQOL: Health-Related Quality Of Life, FBD: Functional Bowel Disorders, ACE: Adverse Childhood Events, BD: Bipolar Disorder, MDD: Major Depressive Disorder, PTSD: Post-Traumatic Stress Disorder

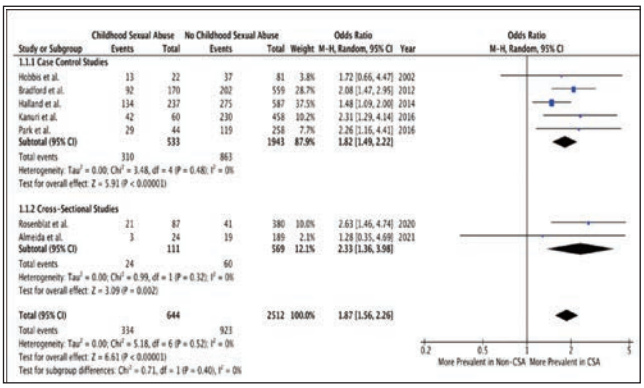

Figure-2: Forest plot of association between childhood sexual abuse (CSA) and irritable bowel syndrome (IBS).

CI: Confidence interval, P: Probability value, M-H: Mantel-Haenszel model.

Discussion

This systematic review aimed to summarize the available literature related to CSA and IBS and to establish an association between the two. The included studies suggested a significant association between CSA and the subsequent development of IBS. Additionally, the quality assessment showed variability across the studies. However, excluding poor-quality studies did not impact the established association between IBS and CSA.

Multiple studies investigating the pathophysiology of IBS have shown a close relationship between its development and various psychological disturbances, including psychological stress and abuse[21-23] Previous literature has explored the underlying pathophysiological mechanisms for the development of IBS, including gut-brain-axis dysfunction, immune activation, visceral hypersensitivity, and intestinal barrier dysfunction—all intrinsically linked to the disturbance of the gut microbiome.[24] These mechanisms have been explained using the "top- down" and "bottom-up" models. The former refers to alterations in the central nervous system (CNS), while the latter implicates external stressors on the gut, eventually leading to symptoms of IBS.[25] The "top-down" model explains that the intricate connection between the somatic, autonomic and serotonergic neural networks is disturbed due to the presence of external stressors, such as anxiety, depression, and adverse life events (i.e., types of abuse). Indeed, exposure to adverse life events, such as CSA, has been found to result in the persistence of IBS symptoms later in life rather than subsequent resolution.[8,25] A functional magnetic resonance imaging (fMRI) study also showed that patients with IBS having a history of abuse had greater severity of symptoms and worse outcomes.[26] Additionally, a study in Sri Lanka showed a significant increase in the prevalence and severity of FGIDs, such as IBS, in adolescents who had been sexually abused.[22] The current review also had similar findings.

Despite the availability of prior literature, the current systematic review emphasizes the dire need to improve the quality of studies exploring the association between childhood abuse and chronic illnesses and to ensure standardization among them. Rather than opting for a retrospective approach, there is a need to follow up on children exposed to CSA to determine their long-term health outcomes, complications, and sequelae to establish temporality rather than a bidirectional association. Moreover, a set of guidelines to define child abuse needs to be established with a standard cut-off for what classifies as a child. Since other potential confounders can also trigger IBS by causing stress, it is imperative to take them into account and stratify the data accordingly when performing such studies. Additionally, the current findings, primarily based on retrospective cohort and case-control studies, suggest a need for interventions with a comprehensive design that explores both the management of IBS and rehabilitation after the event among those with a history of CSA.

Since CSA paves the way for multiple long-term health risks for victims, it is imperative to investigate preventive strategies for CSA. While multiple preventive interventions targeting sexual abuse of minors have been proposed, very few of them have undergone the standardised process of a randomised controlled trial (RCT). Moreover, mentioning sexual attraction towards children is considered a taboo. Therefore, secondary interventions, such as helplines offering support for deviant sexual behaviour are often ineffective.[27]

The current results indicate that early action to identify and mitigate abuse is necessary for the prevention of abuse and abuse-related functional disorders. Moreover, regarding guidelines on the early detection of functional abdominal pain disorders (FAPD), such as IBS, there have been several criteria developed and refined, such as the Rome criteria and its subsequent iterations. However, considering that 90% of school-going children who have chronic abdominal pain develop it secondary to non-organic causes, there is a high chance of development of FAPD and IBS in this population.[28] While several guidelines exist for referral of IBS in a primary setting, they often do not consider additional risk factors, such as history of abuse, especially in a paediatric population. This is predominantly observed in studies from developing countries, like Pakistan, where most of the population-based studies on IBS do not even include CSA as one of the risk factors for the development of the disease.[29] Furthermore, in the context of low- and middle-income countries (LMICs), there is a lack of availability of and access to specialised services, and patients often lack awareness. Thus, given the significant

Table-3: Implications for Practice, Policy and Research.

Focus	Implications and Recommendations
Practice Implications	❍ Presents a need for creation of a robust clinical guideline for early detection and referral of patients suffering from FGDs secondary to risk factors such as history of abuse.
Policy Implications	❍ Policies should be implemented regarding training and education of primary healthcare providers to identify signs of abuse and possible sources of stress in cohorts of IBS patients. ❍ Illustrates the need for a set guideline to define child abuse with a standard cut-off for what classifies as a child.
Research Implications	❍ Suggests a need to improve the quality of studies and ensure standardization amongst future studies on similar topics. ❍ Presents a need to transition from a retrospective approach to a prospective cohort approach where victims of CSA are observed for the development of IBS. ❍ Proposes interventional studies in the future whereby, management for irritable bowel syndrome and rehabilitation are explored.

association between CSA and IBS, there is a need for robust clinical guidelines to allow detection and subsequent referral in primary care settings to mitigate the long-term effects in such high-risk populations. Additionally, primary healthcare providers need to be educated and trained regarding possible sources of stress and identify signs of abuse early on as these are known to contribute significantly to the pathogenesis of IBS.

Limitation: The current review has its limitations. There was a low number of available and relevant studies investigating and reporting CSA and IBS status. Furthermore, most available studies combined and reported their findings on child abuse without exploring further subtypes, including sexual abuse, or stratifying IBS symptom severity based on the types of abuse. Moreover, there was an absence of long-term prospective studies and observational studies that controlled for confounders when exploring the association between CSA and IBS, thereby limiting the strength and validity of the conclusions that can be drawn from this pooled analysis. Additionally, all retrieved studies were observational studies, having either a case-control or a cross-sectional design, increasing the chances of recall bias during data collection. The observational and non-randomized nature of the pooled data also made the univariate meta-analysis subject to confounding from variables like depression and other psychosomatic symptoms whose impact on IBS was not quantified.

The protocol for this systematic review was not registered with the Prospective Register of Systematic Reviews (PROSPERO) or any other international database. Not with standing these limitations, the results of the present systematic review carry implications for practice, policy, and research (Table 3).

Conclusion

Data from the available literature suggest that CSA is significantly associated with the development of IBS later in life, further strengthening the argument that CSA may potentially lead to long-term detriments extending into adulthood. However, long-term prospective studies that control for confounders are required to validate this further. This could assist healthcare providers in identifying individuals at risk of developing IBS based on abuse history and administering preventive measures accordingly. Currently, there is no existing literature that stratifies other aspects of IBS, such as symptom severity, based on CSA exclusively. High-powered prospective studies are needed to shed light on this topic. Additionally, there is a need to further explore this issue in the context of LMICs, where primary healthcare providers typically care for children exposed to different types of abuse. Establishing guidelines to identify the latter and its subsequent manifestations will likely help prevent negative outcomes later in life.

Acknowledgements: We are grateful to Maryam Kazmi and Maria Khan who facilitated the review.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

References

1. World Health Organization (WHO). Report of the Consultation on Child Abuse Prevention, 29-31. Geneva, Switzerland: WHO Press; 1999 [Online] 1999 [Cited 2022 August 12]. Available from URL: https://apps.who.int/iris/handle/10665/65900
2. Joshee S, Lim L, Wybrecht A, Berriesford R, Riddle M. Meta-analysis and systematic review of the association between adverse childhood events and irritable bowel syndrome. J Investig Med 2022;70:1342-51. doi: 10.1136/jim-2021-002109
3. World Health Organization (WHO). Child maltreatment. News release. The WHO Media Centre. [Online] 2022 [Cited 2023 May 22]. Available from URL: https://www.who.int/news-room/fact-sheets/detail/child-maltreatment
4. Singh MM, Parsekar SS, Nair SN. An epidemiological overview of child sexual abuse. J Family Med Prim Care 2014;3:430-5. doi: 10.4103/2249-4863.148139
5. Holtmann G, Shah A, Morrison M. Pathophysiology of Functional Gastrointestinal Disorders: A Holistic Overview. Dig Dis 2017;35(Suppl 1):s5-1. doi: 10.1159/000485409
6. Mayer EA, Ryu HJ, Bhatt RR. The neurobiology of irritable bowel syndrome. Mol Psychiatry 2023;28:1451-65. doi: 10.1038/s41380-023-01972-w
7. Saha L. Irritable bowel syndrome: pathogenesis, diagnosis, treatment, and evidence-based medicine. World J Gastroenterol 2014;20:6759-73. doi: 10.3748/wjg.v20.i22.6759
8. Melchior C, Wilpart K, Midenfjord I, Trindade IA, Törnblom H, Tack JF, et al. Relationship Between Abuse History and Gastrointestinal and Extraintestinal Symptom Severity in Irritable Bowel Syndrome. Psychosom Med 2022;84:1021-33. doi: 10.1097/PSY.0000000000001141.

9. Kumpf U, Palm U, Eder J, Ezim H, Stadler M, Burkhardt G. et al. TDCS at home for depressive disorders: an updated systematic review and lessons learned from a prematurely terminated randomized controlled pilot study. Eur Arch Psychiatry Clin Neurosci 2023;273:1403-20. doi: 10.1007/s00406-023-01620-y
10. Rayyan. Powered Tool for Systematic Literature Reviews. [Online] 2022 [Cited 2023 November 30]. Available from URL: https://www.rayyan.ai/
11. Wells GA, Shea B, O'Connell D, Peterson J, Welch V, Losos M, et al. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. [Online] 2021 [Cited 2024 January 10]. Available from URL: https://www.ohri.ca/programs/clinical_epidemiology/oxford.asp
12. Higgins JPT, Thomas J, Chandler J, Cumpston M, Li T, Page MJ, et al. Cochrane handbook for systematic reviews of interventions, Version 6.3. [Online] 2022 [Cited 2023 November 30]. Available from URL: https://training.cochrane.org/handbook/archive/v6.3
13. Rosenblat JD, Mansur RB, Brietzke E, Kennedy SH, Carvalho AF, Lee Y, et al. Association of history of adverse childhood experiences with irritable bowel syndrome (IBS) in individuals with mood disorders. Psychiatry Res 2020;288:112967. doi: 10.1016/j.psychres.2020.112967.
14. Hobbis IC, Turpin G, Read NW. A re-examination of the relationship between abuse experience and functional bowel disorders. Scand J Gastroenterol 2002;37:423-30. doi: 10.1080/003655202317316051.
15. Park SH, Videlock EJ, Shih W, Presson AP, Mayer EA, Chang L. Adverse childhood experiences are associated with irritable bowel syndrome and gastrointestinal symptom severity. Neurogastroenterol Motil 2016;28:1252-60. doi: 10.1111/nmo.12826
16. Halland M, Almazar A, Lee R, Atkinson E, Larson J, Talley NJ, et al. A case-control study of childhood trauma in the development of irritable bowel syndrome. Neurogastroenterol Motil 2014;26:990-8. doi: 10.1111/nmo.12353.
17. Bradford K, Shih W, Videlock EJ, Presson AP, Naliboff BD, Mayer EA, et al. Association between early adverse life events and irritable bowel syndrome. Clin Gastroenterol Hepatol 2012;10:385-90.e1-3. doi: 10.1016/j.cgh.2011.12.018.
18. Kanuri N, Cassell B, Bruce SE, White KS, Gott BM, Gyawali CP, et al. The impact of abuse and mood on bowel symptoms and health-related quality of life in irritable bowel syndrome (IBS). Neurogastroenterol Motil 2016;28:1508-17. doi: 10.1111/nmo.12848.
19. Thomaz de Almeida CN, Tahan S, Areco KN, Morais MB. Association between abuse and neglect with functional constipation and irritable bowel syndrome in adolescents. Scand J Gastroenterol 2021;56:1146-51. doi: 10.1080/00365521.2021.1923059
20. Rome Foundation. Rome IV Criteria. [Online] 2021 [Cited 2023 July 18]. Available from URL: https://theromefoundation.org/rome-iv/rome-iv-criteria/
21. Norman RE, Byambaa M, De R, Butchart A, Scott J, Vos T. The long-term health consequences of child physical abuse, emotional abuse, and neglect: a systematic review and meta-analysis. PLoS Med 2012;9:e1001349. doi: 10.1371/journal.pmed.1001349
22. Devanarayana NM, Rajindrajith S, Perera MS, Nishanthanie SW, Karunanayake A, Benninga MA. Association between functional gastrointestinal diseases and exposure to abuse in teenagers. J Trop Pediatr 2014;60:386-92. doi: 10.1093/tropej/fmu035
23. Bhattarai Y, Muniz Pedrogo DA, Kashyap PC. Irritable bowel syndrome: a gut microbiota-related disorder? Am J Physiol Gastrointest Liver Physiol 2017;312:G52-6. doi: 10.1152/ajpgi.00338.2016
24. Mishima Y, Ishihara S. Molecular Mechanisms of Microbiota-Mediated Pathology in Irritable Bowel Syndrome. Int J Mol Sci 2020;21:8664. doi: 10.3390/ijms21228664
25. Devanarayana NM, Rajindrajith S. Irritable bowel syndrome in children: Current knowledge, challenges and opportunities. World J Gastroenterol 2018;24:2211-35. doi: 10.3748/wjg.v24.i21.2211
26. Ringel Y, Drossman DA, Leserman JL, Suyenobu BY, Wilber K, Lin W. et al. Effect of abuse history on pain reports and brain responses to aversive visceral stimulation: an FMRI study. Gastroenterology 2008;134:396-404. doi: 10.1053/j.gastro.2007.11.011
27. Kewley S, Mhlanga-Gunda R, Van Hout MC. Preventing child sexual abuse before it occurs: examining the scale and nature of secondary public health prevention approaches. J Sex Aggress 2023;29:1-33. Doi: 10.1080/13552600.2021.2000651
28. Malagelada JR, Malagelada C. Management of irritable bowel syndrome in children. J Pediatr Pediatr Med 2018;2:21–7.
29. Iftikhar B, Naveed H, ur Rehman Khalil K, ur Rehman H, Khushbagh. Prevalence of Irritable Bowel Syndrome and it's Risk Factors Among Medical Students of Peshawar, Pakistan. Pak J Med Res 2018;57:24-8.

Author Contribution:

MUJ: Conceptualizing the idea, investigation, writing and editing.
ASF: Devising the methodology, analyzing the data, writing and editing.
HR: Conceptualizing the methods, analyzing the data.
MTN, KJ: Writing and quality assessment.
KE: Oversaw the investigation.
All authors reviewed the final manuscript.