A case-control study of childhood trauma and recent adverse life events in the development of irritable bowel syndrome

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Research

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Abstract

Background: Childhood trauma has been found to be associated with irritable bowel syndrome (IBS) in adulthood, whereas whether recent adverse life events affect the effect of childhood trauma on IBS is still poorly understood.

Methods: 56 IBS and 50 healthy controls were enrolled. The Childhood Trauma Questionnaire (CTQ), Life Event Scale, IBS – Quality Of Life (IBS-QOL), IBS – Severity Scoring System (IBS-SSS) and MOS 36-item Short-Form Health Survey (SF-36) were completed in IBS patients and healthy controls. The logistic regression model, correlation analysis and student t-test were used to investigate the relationship among childhood trauma, recent adverse life events and IBS.

Results: Gender, emotional abuse and recent adverse life events were independent predictors for IBS in adulthood. The overall CTQ was highly correlated with IBS-QOL and mental component summary in SF-36, but was moderately and weakly correlated with IBS-SSS and physical component summary in SF-36 respectively. The similar correlation of overall CTQ with IBS-QOL, physical component summary and mental component summary was found in both subgroups stratified by recent adverse life events. However, the correlation between overall CTQ and IBS-SSS was blunted in IBS patients with recent adverse life events. There was no significant difference on severity of symptoms and life quality between IBS patients who had experience of childhood trauma with or without recent adverse life events.

Conclusions Female gender, emotional abuse and recent adverse life events were associated with a higher prevalence of IBS in adulthood. Childhood trauma might enhance severity of symptoms and worsen quality of life in IBS patients. However, recent adverse life events might dilute this correlation of childhood trauma with severity of symptoms, but not strengthen the effect of childhood trauma on symptoms.

Background

Irritable bowel syndrome (IBS), a common functional gastrointestinal disorder with chronic abdominal pain or discomfort and altered bowel habits, has been found to affect 7% to 21% of the general population[1]. The pathophysiology of IBS has not been completely understood. Increasing evidences have supported the relationship between psychological stress and formation of IBS[2-6], and a latest systematic review has reported that psychological interventions might improve mental and physical outcomes in IBS patients[7].

There is a large amount of literature on exploring the relationship between childhood trauma, one of psychological stress in early life, and IBS. A systematic review has demonstrated that childhood trauma was potential early life mediators of IBS in adulthood[8]. In addition, a case-control study has reported that higher incidence of childhood trauma was found in IBS patients compared with controls, but there were no differences in incidence of childhood trauma between IBS relatives and controls[9]. Moreover, a

recent study has demonstrated that the general trauma and emotional abuse in early life were associated with higher incidence of IBS in adulthood and enhanced the severity of symptoms in IBS patients[10].

The chronic stressful life events experienced in adulthood are also found to be one of risk factors of IBS[11-13]. Many previous pre-clinical rodent studies have also demonstrated that chronic stress in adulthood might induce visceral hypersensitivity, which was the key clinical features of IBS[14-16]. Additionally, acute stress in adulthood has been reported to sustain hypothalamic-pituitary-adrenal (HPA) axis activity and increase the gastrointestinal symptoms in IBS patients[17]. Moreover, a recent randomized, placebo-controlled study has proved that oral hydrocortisone, one of stress mediators of the HPA axis, significantly decreased the visceral pain threshold and impaired visceral pain-related emotional learning[18]. All of these researches demonstrated the negative effect of adverse life events in adulthood on IBS. However, most of previous studies have only focused on the single stressor, either early life stress or stress in adulthood, and whether acute or chronic stress in adulthood might affect the effect of childhood trauma on IBS is still poorly understood.

Methods

The aim of this study was to determine if chronic stress in adulthood might influence the effect of childhood trauma on IBS in adulthood. Our study consisted of following three parts: (i) Confirming the relationship between childhood trauma as well as recent adverse life events (RALs) and development of IBS when controlling for other potential confounders using multivariate logistic regression model (ii) Determining the correlation between childhood trauma and severity of symptoms as well as quality of life in IBS patients when stratified by RALs (iii) Exploring the differences in severity of symptoms and quality of life between IBS patients who had experience of childhood trauma with or without RALs.

Data was collected from 50 healthy controls (HCs) and 56 consecutive patients who were found to have IBS in Tongji hospital and Sijing hospital in Shanghai, China from October 2017 to June 2019. This was a case-control study including basic information and medical records about childhood trauma, RALs, severity of symptoms and life quality. The diagnosis of IBS was based on Rome III. This study was approved by Ethics Committee of Tongji Hospital (2017-407) . The subjects were compensated for completion of a medical history and questionnaires.

Questionnaires

Childhood Trauma Questionnaire (CTQ) is a 28-item tool including five types of maltreatment domains (physical, emotional and sexual abuse, and physical and emotional neglect) during childhood and adolescence (before age 18). Items on the CTQ ask about experience in childhood and adolescence and the items are rated on a 5-point Likert-type scale ranging from Never True to Very Often True. The score range of 5-8, 5-7, 5-5, 5-9 and 5-7 are considered as “none or minimal” childhood trauma in the domain of emotional abuse, physical abuse, sexual abuse, emotional neglect and physical neglect respectively. In this study, IBS patients with score exceeding upper limit of “none or minimal” in any domains and overall CTQ score > 50 were regarded as patients with childhood trauma[19].

Life Event Scale (LES), which was translated for Chinese version, was used to assess the adverse life events within one year. The questionnaire consists of 48 common life events including 28 items about family and life, 13 items about work and study, and 7 items about sociality. The IBS patients recorded the events within one year and rated relevant items on a 5-point Likert-type scale ranging from 0-4 regarding the extent of influence. Meanwhile, the duration of these events was classified into 4 groups including within 3 months, 6 months, 12 months and over 12 months and ranged from 1-4. The influence score $\times$ duration score was the final score of each item. The overall score of recent adverse life events in LES was defined as summary of score on adverse items. The patients with overall score greater than 0 were regarded as recent adverse life events positive (RALs(+)).

Irritable Bowel Syndrome – Quality Of Life (IBS-QOL) was adopted and translated into Chinese version, which consisted of 34 items reflecting 8 domains. Each item was rated on a 5-point Likert-type scale ranging from Not at all to Completely. Higher values represent worse symptom and quality of life[20].

Irritable Bowel Syndrome – Severity Scoring System (IBS-SSS) was a validated scoring system using variables : current abdominal pain by visual analog scale (VAS) of 0-100 and frequency of abdominal pain; current abdominal distension by VAS of 0-100; the degree of satisfaction of evacuative behavior by VAS of 0-100; the degree of IBS interference with normal work and social activities by VAS of 0-100. Higher values represent worse symptom[21].

MOS 36-item Short-Form Health Survey (SF-36) was a validated self-reported questionnaire to measure the general health status, consisting of 36 items and 8 domains (physical functioning, physical role, bodily pain, general health, vitality, social functioning, emotional role and mental health). The physical component summary (PCS) included the first four domains while the mental component summary (MCS) contained the last four domains. The higher score of each summary indicated less health-related reduction of life quality[22].

Statistical Analysis

All analyses were performed using R language ver 3.1.1 (R Foundation for Statistical Computing, Vienna, Austria). To explore the odds of IBS from childhood trauma and RALs, the multivariate logistic regression analysis using backward stepwise selection was used to identify the risk of childhood trauma and RALs when adjusting for other potential confounders such as age, gender, body mass index, education background and marital status. Linear regression model and Pearson's correlation were used to evaluate the relationship between childhood trauma and severity of symptom as well as life quality. For all correlation analysis, we considered an absolute value of coefficient below 0.3 as a weak correlation, 0.3 to 0.5 as a moderate correlation and above 0.5 as a strong correlation, as recommended by Cohen. Student t-test was used to explore the difference in severity of symptoms and quality of life between IBS patients who had experience of childhood trauma with or without RALs. All reported P values were two-sided with $P < 0.05$ defined as statistical significance.

Results

Logistic regression analysis for formation of IBS.

In univariate analysis, gender (OR (95%CI), 2.34 (1.08-5.18), $p=0.033$), emotional abuse (OR (95%CI), 4.60 (1.54-17.08), $p=0.011$), emotional neglect (OR (95%CI), 2.92 (1.18-7.78), $p=0.025$) and RALs (OR (95%CI), 2.86 (1.24-6.90), $p=0.016$) were significantly associated with IBS in adulthood. In multivariate analysis, female gender (OR (95%CI), 2.63 (1.12-6.44), $p=0.029$), emotional abuse (OR (95%CI), 4.61 (1.39-18.65), $p=0.019$) and RALs (OR (95%CI), 3.20 (1.29-8.44), $p=0.015$) were independent predictors for a higher prevalence of IBS in adulthood (Table 1).

Table 1. Logistic regression analysis of childhood trauma and recent adverse life events relative to IBS at adulthood					
	IBS (%)	OR1(95% CI)	p1 value	OR2(95% CI)	p2 value
Age					
<40	23(62.2%)	Reference		-	-
40~50	13(41.9%)	0.44(0.16-1.15)	0.098	-	-
>50	20(52.6%)	0.68(0.27-1.69)	0.405	-	-
Gender					
Male	23(42.6%)	Reference		Reference	
Female	33(63.5%)	2.34(1.08-5.18)	0.033	2.63(1.12-6.44)	0.029
Body mass index					
18.5~24	37(53.6%)	Reference		-	-
<18.5	7(50%)	0.86(0.27-2.78)	0.804	-	-
>24	12(52.2%)	0.94(0.36-2.45)	0.904	-	-
Education background					
Undergraduate degree or above	25(58.1%)	Reference		-	-
Others	31(49.2%)	0.7(0.32-1.52)	0.366	-	-
Divorce or widowhood					
Absent	47(51.1%)	Reference		-	-
Present	9(64.3%)	1.72(0.55-5.97)	0.361	-	-
Emotional abuse					
Absent	40(46.5%)	Reference		Reference	
Present	16(80%)	4.60(1.54-17.08)	0.011	4.61(1.39-18.65)	0.019
Emotional neglect					
Absent	36(46.2%)	Reference		Reference	

Present	20(71.4%)	2.92(1.18-7.78)	0.025	2.21(0.81-6.38)	0.126
Physical abuse					
Absent	48(52.2%)	Reference	-	-	-
Present	10(62.5%)	1.59(0.54-5.03)	0.403	-	-
Physical neglect					
Absent	43(48.9%)	Reference	-	-	-
Present	13(72.2%)	2.72(0.94-9.07)	0.078	-	-
Sexual abuse					
Absent	46(50.5%)	Reference	-	-	-
Present	10(66.7%)	1.96(0.64-6.7)	0.252	-	-
Recent adverse life events					
Absent	31(44.3%)	Reference		Reference	
Present	25(69.4%)	2.86(1.24-6.9)	0.016	3.20(1.29-8.44)	0.015
IBS, irritable bowel syndrome; OR1, odds ratio in univariate analysis; p1, p value in univariate analysis; OR2, odds ratio in multivariate analysis; p2, p value in multivariate analysis; CI, confidence interval					

The correlation between childhood trauma and severity of symptoms as well as quality of life in IBS patients

Figure 1 illustrated the correlation analysis between overall CTQ score and severity of symptoms as well as quality of life. The overall CTQ was highly correlated with IBS-QOL ($r=0.664$, $p<0.001$) and mental component summary (MCS) in SF-36 ($r=-0.561$, $p<0.001$) but was moderately or weakly correlated with IBS-SSS ($r=0.363$, $p=0.006$) and physical component summary (PCS) in SF-36 ($r=-0.272$, $p=0.042$).

In subgroup analysis (Figure 2), the overall CTQ score was highly correlated with IBS-QOL ($r=0.681$, $p<0.001$, MCS ($r=-0.590$, $p<0.001$) and IBS-SSS ($r=-0.581$, $p<0.001$) and moderately correlated with PCS ($r=-0.385$, $p=0.032$) in IBS patients without RAL. The similar results were found in correlation between overall CTQ and IBSQOL ($r=0.660$, $p<0.001$) as well as MCS ($r=-0.532$, $p=0.006$) in IBS patients with RAL. However, there was no significant correlation of overall CTQ with PCS ($r=-0.207$, $p=0.321$) and IBS-SSS ($r=-0.581$, $p<0.001$) in IBS patients with RAL.

Comparing the symptoms and life quality between IBS patients who had experience of childhood trauma with or without RALs.

In order to investigate the interaction effects between childhood trauma and RALs on severity of symptoms as well as quality of life, we subdivided the IBS patients who had experience of childhood trauma into subgroups according to RALs(+). However, there were no significant differences on IBS-QOL, PCS, MCS and IBS-SSS score between RAL(-) and RAL(+) groups (Table 2).

Table 2. Comparing the severity of symptom and quality of life between RAL(-) and RAL(+) IBS patients who had experience of childhood trauma.				
	RALs(-)	RALs(+)	t value	p value
IBS-QOL	87.39(19.83)	82.40(28.63)	0.74	0.464
PCS	73.62(7.17)	73.93(11.17)	-0.12	0.904
MCS	57.22(13.63)	58.71(15.90)	-0.37	0.712
IBS-SSS	240.65(57.85)	240.8(59.58)	-0.01	0.992
RALs, recent adverse life events; PCS, physical component summary; MCS, mental component summary				

Discussion

Early stress has been considered as potential factor associated with development of IBS in adulthood and childhood trauma is one of the predictors for formation of IBS in adulthood among early stress[8-13, 23]. In addition, previous research on estimating the incidence of early stress in IBS patients demonstrated the higher prevalence of emotional abuse but not physical or sexual abuse in IBS patients while emotional abuse was also found to be the strongest predictor for IBS[10]. In our results, only emotional abuse was independent factor associated with formation of IBS in adulthood when controlling for recent adverse life and other potential confounders. The significant positive effect of emotional neglect was weakened when adjusting for other confounding factors. However, both physical and sexual trauma had no significant impact on IBS in adulthood. These results indicate a more important role of emotional abuse in childhood on IBS, which was consistent with conclusions obtained from previous studies. RALs have also been reported to be important predictors for severity of symptoms and life quality in IBS patients. Some previous studies showed higher proportion of perceived adverse life events within 3-12 months in IBS patients compared with normal controls or patients with other diseases[11-13]. In addition, the RALs were found to have an impact on hypothalamic-pituitary-adrenal response to corticotropin-releasing factor stimulation, an IBS-related process, in both IBS patients and normal controls recently[23]. In our results, RALs were independent predictor for IBS in adulthood when controlling for childhood trauma and other confounders, which was consistent with previous studies.

Some previous researches showed significant correlation between childhood trauma and severity of symptoms as well as quality of life in IBS patients[10]. However, none of these researches included the RALs simultaneously and explored the correlation of childhood trauma in specific IBS patients with or without RALs. Whether the RALs could strengthen the effect of childhood trauma on IBS is also lack of deep research. In our study, childhood trauma was strongly correlated with IBS-QOL as well as MCS and weakly or moderately correlated with severity of symptoms and PCS. The strong correlation of childhood trauma with mental health related problems indicates the fact again that the emotional or mental aspects might constantly predominate the development of IBS from childhood to adulthood. When considering the interaction effects between childhood trauma and RALs, we found different results in subgroups stratified by RALs. The similar correlation between childhood trauma and life quality, both of physical and mental aspects, was found in IBS patients with or without RALs. However, quite different correlation between childhood trauma and severity of symptoms was found in different subgroups, which suggests that the incidence of RALs might dilute the correlation between these two factors in IBS patients. In addition, there was no significant difference between IBS patients who had experience of childhood trauma with or without RALs on both severity of symptoms and life quality. Both of blunted correlation and no significant difference indicate that RALs might have an more important impact on severity of symptoms relative to life quality and make the symptoms to a similar level regardless of experience and extent of childhood trauma, but not strengthen the effect of childhood trauma on symptoms in IBS patients.

One of the major limitations of our study is that our study population is predominantly from suburb of Shanghai, which might lead to possible selection bias. The residents of this area are not rich and undereducated in general. In our study, more than half of IBS patients and controls could not receive regular higher education, representing lack of attention to education from their parents, which might leads to more prevalence of abuse and neglect in their early life. However, the prevalence of childhood trauma in our study was similar with that in previous researches on IBS and other population[9, 10, 24-26], which suggests that the selection bias is not severe. Secondly, due to small sample size of our study, some deep analysis on interaction effects between childhood trauma and specific RALs such as emotional, mental and physical health related adverse events could not be performed.

Conclusions

In summary, we found a history of emotional abuse, but not physical or sexual abuse, and RALs were notable predictors for IBS in adulthood. The mental health related quality of life was the most correlated factor with childhood trauma compared with severity of symptoms and physical health related quality of life, though there was also weak or moderate correlation between childhood trauma and these two factors. The incidence of RALs dilutes the correlation of childhood trauma with severity of symptoms, but seems not to strengthen the effect of childhood trauma on severity of symptoms.

List Of Abbreviations

Irritable bowel syndrome (IBS); hypothalamic-pituitary-adrenal (HPA); recent adverse life events (RALs); healthy controls (HCs); Childhood Trauma Questionnaire (CTQ); Life Event Scale (LES); Irritable Bowel Syndrome – Quality Of Life (IBS-QOL); Irritable Bowel Syndrome – Severity Scoring System (IBS-SSS); MOS 36-item Short-Form Health Survey (SF-36); physical component summary (PCS); mental component summary (MCS)

Declarations

Ethics approval and consent to participate

This study was approved by Ethics Committee of Tongji Hospital (2017-407). Written or oral informed consent was obtained from all participants.

Consent for publication

Not applicable.

Availability of data and materials

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

Competing interests

The authors declare that they have no competing interests.

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Authors' contributions

ZYD and XMW contributed to the conception of the study, collected the data, performed the data analyses and wrote this manuscript. LQX, JWW and TTZ collected the data and performed the data analyses. YC collected the data and helped perform the analysis with constructive discussions. SCX contributed to the conception of the study and revised the manuscript. All authors read and approved the final manuscript.

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No.

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Figures

Figure 1

Correlation analysis of overall CTQ with IBS-QOL, PCS, MCS and IBS-SSS in IBS patients. CTQ, childhood trauma questionnaire; IBS-QOL, Irritable Bowel Syndrome – Quality Of Life; IBS-SSS, Irritable Bowel Syndrome – Severity Scoring System; PCS, physical component summary; MCS, mental component summary.

Figure 2

Correlation analysis of overall CTQ with IBS-QOL, PCS, MCS and IBS-SSS in IBS patients with or without recent adverse life events. RALs, recent adverse life events; CTQ, childhood trauma questionnaire; IBS-QOL, Irritable Bowel Syndrome – Quality Of Life; IBS-SSS, Irritable Bowel Syndrome – Severity Scoring System; PCS, physical component summary; MCS, mental component summary.