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Chronic abdominal pain in children aged 5 - 15 years: An insight of psychosocial factors

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***Abstract*---**Background: Mostly, chronic abdominal pain (CAP) is detected with no abnormality. Therefore, focuses on psychosocial issues of children with CAP may throw light on etiology of this disorder and inputs for management. Objective: To study the psychosocial factors related with CAP and association between them in children. Methodology: In a prospective, hospital-based case control study, 199 children (aged 5-15 years) were enrolled. Children were split into cases (n=50, with CAP) and controls (n-149, without CAP). Cases were further divided into organic and nonorganic groups based on their symptoms. Baseline investigations like urine and stool routine, ultrasound (abdomen and pelvis) was done for cases. Psychosocial assessment was done in all patients. Results: Around 88% children in cases group had nonorganic pain and 12% had organic pain. Most children with nonorganic pain were females (52%). A significant association noted between type of stool, USG abdomen results, and characteristic of pain with type of abdominal pain (organic and nonorganic) (P<0.001). A significant difference noted between cases and controls in term of birth order, school refusal, distribution of scores of all psychosocial assessment scales (P <0.05); and in the score distribution for all the psychosocial assessment scales between control group and nonorganic and organic pain cases separately (P <0.001). A significant difference noted in the distribution of scores of (pediatric symptom checklist) psc-i, psc-t and separation anxiety between organic pain and nonorganic pain cases (P <0.001) with higher score in nonorganic pain group. Conclusion: Different psychosocial and clinical factors are linked with an increased chance of CAP in children. Understanding of individual CAP risk factors would be helpful in evaluation and further management of CAP.

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***Keywords*---**Abdominal pain, Anxiety, Child, Stress, Social problems.

Introduction

The chronic abdominal pain (CAP) is an outpatient pediatric disorder that pediatricians are facing worldwide. It affects child's overall wellbeing and their day to day life, especially education.[1] The CAP prevalence among children ranges from 0.5% to 19% worldwide and varies based on their age.[2] In India, approximately 10% young and school going children suffer from CAP.[1]

Children with CAP are represented by a heterogenous population which is a mix of both organic and nonorganic (functional) CAP.[3] The CAP is nonorganic (functional) when the cause is unexplainable and it is the most common source for the occurrence. Children with nonorganic CAP are susceptible to develop high anxiety disorders during young adulthood.[4] About 5-10% of children with CAP have organic causes, i.e. organic CAP, which is usually an abdominal pain caused by underlying organic diseases or any underlying pathological condition like intestinal problems viz. lactose intolerance, ulcers, heartburn, parasitic infections; anatomic, metabolic or neoplastic disorders. Due to advanced investigations, the incidences of organic abdominal pain are also on rise.[5]

Considering recent advances, CAP is suggested as a modified sensation of pain as a result of brain-gut axis dysfunction occurring because of composite interaction between psychological, social, and biological factors. Pain, behavior, emotion, and gut function are interrelated in the appearence of CAP.[6] Children with CAP have more depressive symptoms, anxiety disorders, and other somatic complaints.[7] When compared to unaffected children, they have experienced more negative events in their lives.[7]

Considerable studies have focused on establishing psychosocial causes behind CAP in the past. [4] But only few studies have concentrated on the CAP and psychosocial factors association.[8] Hence, this study intended to assess the psychosocial factors associated with CAP and association between them (in children aged 5-15 years).

Materials and method

Study design

With the Institutional Ethics Committee approval, this single-centered, hospital-based, prospective, case-control study was performed in the Department of Pediatrics, at a tertiary care hospital in Karad (Maharashtra) during a period of six months (November 2018 - April 2019). A written informed consent was taken from the parents/authorized guardian of all the subjects included in the study. Using G*Power software, at 5% level of significance, 85% power, assuming moderate group effect size (0.5) and allocation ratio of 3, we got sample size of groups as 49 and 145 for cases and controls, respectively. Hence, 50 subjects were considered for case and 149 for control group.

Selection criteria

Two hundred children aged 5 to 15 years of either sex, attending the outpatient Department of Pediatrics during the study duration were enrolled in the study. Fifty children having abdominal pain presenting continuously or occurring weekly for a minimum period of two months (Rome III Criteria) were kept in the case group.[9] One hundred and fifty children without any abdominal pain, matched for age and sex were selected randomly included in control group. Out of 150 children in control group, one child does not belong to the age group 5-15 years. Hence, 149 children were used for analysis as control group, with the total study size of 199 subjects.

Children with any chronic physical or psychiatric disease, mental retardation were excluded from the study. Children in the case group were further divided into two groups- namely, CAP-organic and CAP- nonorganic. Children satisfying all the three criteria were categorized as organic CAP: an organic cause demonstrated, clinical and laboratory response towards treatment, sustained clinical remission after treatment for at least three months.[3] The children not satisfying these criteria have nonorganic CAP.

Data collection

Data regarding detailed history, physical examination was collected. Cases were further subjected to baseline investigations like urine routine examination, stool routine examination, and ultrasound abdomen and pelvis.

Psychosocial assessment

Psychosocial assessment was done for both case and control groups using questionnaire for assessing family and child factors (separation anxiety, social phobia, obsessive compulsive disorder, panic, physical injury, general anxiety), pediatric symptom checklist (psc)-17, Spence children anxiety scale (SCAS) and Child depression rating scale (CDRS).[10, 11, 12] Validated scales were used in the study with good psychometric properties.

Statistical analysis

Data were recorded in Microsoft Excel and expressed as frequency with percentage. Continuous variables were represented by mean ± SD. Qualitative variables were analyzed to check the association among attributes using Chi-square test of independence and strength of association was measured by Mann Whitney U test by using R Software version 3.6.0. Data was considered statistically significant if P value is ≤0.05.

Results

The overall mean age of 199 children in the study divided into case and control groups was 8.98 ± 2.90 years. Most children with nonorganic pain were females (52%). The overall male: female ratio in the study (1.48:0.97) showed a male

preponderance. Table 1 shows the demographic profile of cases and control groups.

Table 1
Demographic profile of cases and controls

Age (years)	Cases (n=50)				Control (n=149)	
	Non-organic		Organic			
	Male f (%)	Female f (%)	Male f (%)	Female f (%)	Male f (%)	Female f (%)
5 - 8	8 (16)	12 (24)	2 (4)	2 (4)	48 (32.22)	26 (17.44)
9 - 15	10 (20)	14 (28)	1 (2)	1(2)	51 (34.22)	24 (16.12)
Total	18 (36)	26 (52)	3 (6)	3 (6)	99 (66.44)	50 (33.56)

f (%): Frequency (percentage)

Most children (88%) in cases group had nonorganic pain and remaining (12%) had organic pain. Majority children in nonorganic group were 9-15 years older while in organic group the children were much younger.

Table 2
Association of different variables with type of abdominal pain (organic and nonorganic pain) in cases

Variables	Sub-Category	Type of abdominal pain		Total (n=50)	*P* value [c]
		Organic (n=6) f (%)	Nonorganic (n=44) f (%)		
Age (years)	5-8	4 (66.6)	20 (45.4)	24	0.4063
	9-15	2 (33.3)	24 (54.5)	46	
Gender	Female	3 (50)	26 (59)	29	1
	Male	3 (50)	18 (41)	21	
Abdominal pain since (age in years)	2	1 (16.6)	9 (20.4)	20	0.1589
	3	3 (50)	19 (43.1)	22	
	4	0	13 (29.5)	13	
	5	1 (16.6)	2 (4.5)	3	
	6	1 (16.6)	1 (2.2)	2	
Bowel Disturbance	Yes	3 (50)	23 (52.2)	26	1
	No	3 (50)	21 (47.7)	24	
Type of stool	Abnormal	4 (66.6)	0	4	**0.0005***
	Normal	2 (33.3)	44 (100)	46	
Urine Examination	Abnormal	1 (16.6)	0	1	0.1174
	Normal	5 (83.3)	44 (100)	49	
USG abdomen	Cystitis	1 (16.6)	0	1	**0.0004***
	Enteritis	4 (66.6)	0	4	
	Mysenteric Lymphadenitis	1 (16.6)	0	1	

results	Normal	0	44 (100)	44	
Site of abdominal pain	Generalized	1 (16.6)	13 (29.5)	14	0.8651
	Lower Abdomen	0	4 (9.0)	4	
	Umbilical	4 (66.6)	22 (50)	26	
	Upper Abdomen	1 (16.6)	5 (11.3)	6	
Characteristic of pain	Dull Pain	2 (33.3)	38 (86.3)	40	**0.0160***
	Specific Pain	4 (66.6)	6 (13.6)	10	

C: chi-square test; f (%): Frequency (percentage); *: highly significant; USG: Ultrasonography No significant association of age, gender, abdominal pain starting age, bowel disturbance, site of abdominal pain and urine examination was observed with abdominal pain type (organic and nonorganic) (P>0.05). However, a significant association was noted between type of stool, USG abdomen results and characteristic of pain with type of abdominal pain (organic and nonorganic) (Table 2). Majority of children with organic pain had abnormal stool, enteritis, and specific pain in comparison to children with nonorganic pain (Table 2).

Table 3
Comparison of family history and psychological factors among cases and controls

Family history & psychological factors	Sub-category	Case (n=50)			Controls (n=149)	*P* value [c]
		Organic pain	Nonorganic pain	Total		
Type of family	Nuclear	6	35	41	128	0.5042
	Joint	0	9	9	21	
Death in family	Yes	1	2	3	2	0.1039
	No	5	42	47	147	
Birth order	First	3	36	39	133	0.0225
	Middle	1	1	2	0	
	Last	2	7	9	16	
Similar history in Family	Yes	1	0	1	3	1
	No	5	44	49	146	
School refusal	Yes	3	26	29	2	<0.001*
	No	3	18	21	147	
H/O Bullying	Yes	1	1	2	4	1
	No	5	43	48	145	

C: chi-square test; f (%): Frequency (percentage); *: highly significant

A significant difference was noted among cases and controls in term of birth order (P <0.05) and school refusal (P <0.001) as majority of children in cases group were first born, therefore expected to be more responsible and independent. Further, most children in cases group refused to go to school indicating that school fear could also be one of the psychological factors behind frequent abdominal pain (Table 3).

No significant difference was noted among cases and controls in terms of type of family, death in family, similar history of pain in family and history of bullying (*P* >0.05) (Table 3).

Table 4
Distribution of psychosocial assessment score among children with organic and nonorganic pain among cases

Psychosocial assessment scales		Type of pain among cases	Score	*P* value [U]
psc	psc-i	Nonorganic	4	0.0009*
		Organic	1	
	psc-a	Nonorganic	3	0.2261
		Organic	2.5	
	psc e	Nonorganic	2	0.5709
		Organic	2	
	psc - t	Nonorganic	9	0.001*
		Organic	5.5	
Separation anxiety		Nonorganic	5	0.0103*
		Organic	3	
Social phobia		Nonorganic	3.5	0.9607
		Organic	3.5	
Ob comp		Nonorganic	1	0.5899
		Organic	1	
Panic		Nonorganic	1	0.1764
		Organic	1	
Physical Injury		Nonorganic	3	0.4687
		Organic	3	
Gen anxiety		Nonorganic	3	0.6825
		Organic	3	
SCAS		Nonorganic	18	0.5296
		Organic	19	
CDRS		Nonorganic	16	0.6893
		Organic	15.5	

U: Mann Whitney U test; psc: pediatric symptom checklist- 17; SCAS: Spence children anxiety scale; CDRS: Child depression rating scale; ob comp: Obsessive-compulsive disorder; psc-i: pediatric symptom checklist-internalizing; psc-e: pediatric symptom checklist- externalizing; psc-a: pediatric symptom checklist-attention; psc-t: pediatric symptom checklist- total score; gen anx: General anxiety; *: highly significant.

A significant difference was noted in the score distribution of psc-i (pediatric symptom checklist-internalizing), psc-t (pediatric symptom checklist- total score) (*P* <0.001) and separation anxiety between children having organic pain and nonorganic pain (*P* <0.05) with higher score in nonorganic pain group. However, no significant difference was noticed in distribution of scores of other variables such as social phobia, obsessive compulsive, panic, physical injury, general

anxiety, SCAS, CDRS between children having organic pain and nonorganic pain (P >0.05) (Table 4).

Table 5
Distribution of psychosocial assessment score among cases and controls

Psychosocial assessment scales		Group	Score	P value [U]
psc	psc-i	Case	4	< 0.001*
		Control	1	
	psc-a	Case	3	< 0.001*
		Control	2	
	psc e	Case	2	< 0.001*
		Control	1	
	psc - t	Case	8.5	< 0.001*
		Control	3	
Separation anxiety		Case	5	< 0.001*
		Control	2	
Social phobia		Case	3.5	< 0.001*
		Control	1	
Ob comp		Case	1	< 0.001*
		Control	1	
Panic		Case	1	< 0.001*
		Control	0	
Physical Injury		Case	3	< 0.001*
		Control	0	
Gen anxiety		Case	3	< 0.001*
		Control	0	
SCAS		Case	18	< 0.001*
		Control	10	
CDRS		Case	16	< 0.001*
		Control	13	

U: Mann Whitney U test; psc: pediatric symptom checklist- 17; psc-i: pediatric symptom checklist-internalizing; psc-e: pediatric symptom checklist-externalizing; psc-a: pediatric symptom checklist- attention; psc-t: pediatric symptom checklist- total score; SCAS: Spence children anxiety scale; CDRS: Child depression rating scale; ob comp: Obsessive-compulsive disorder; gen anx: General anxiety; *: highly significant. A significant difference in the distribution of scores of all psychosocial assessment scales between cases and controls was observed (P <0.001) (Table 5).

Table 6
Distribution of psychosocial assessment score among organic pain cases and controls

Psychosocial assessment scales		Group	Score	P value [U]
psc	psc-i	Organic pain	1	0.2629

		case		
		Control	1	
	psc-a	Organic pain case	2.5	0.0636
		Control	2	
	psc e	Organic pain case	2	0.0049*
		Control	1	
	psc - t	Organic pain case	5.5	0.0010*
		Control	3	
Separation anxiety		Organic pain case	3	0.196
		Control	2	
Social phobia		Organic pain case	3.5	< 0.001*
		Control	1	
Ob comp		Organic pain case	1	0.0915
		Control	1	
Panic		Organic pain case	1	< 0.001*
		Control	0	
Physical injury		Organic pain case	3	< 0.001*
		Control	0	
Gen anxiety		Organic pain case	3	< 0.001*
		Control	0	
SCAS		Organic pain case	19	< 0.001*
		Control	10	
CDRS		Organic pain case	15.5	< 0.001*
		Control	13	

U: Mann Whitney U test; psc: pediatric symptom checklist- 17; psc-i: pediatric symptom checklist-internalizing; psc-e: pediatric symptom checklist-externalizing; psc-a: pediatric symptom checklist- attention; psc-t: pediatric symptom checklist- total score; SCAS: Spence children anxiety scale; CDRS: Child depression rating scale; ob comp: Obsessive-compulsive disorder; gen anx: General anxiety; *: highly significant

A significant difference noted in the score distribution for all psychosocial assessment scales except for psc-i, psc-a, separation anxiety and obsessive-compulsive disorder was observed between organic pain group and control group (P <0.001) (Table 6).

Table 7
Distribution of psychosocial assessment score among nonorganic pain cases and controls

Psychosocial assessment scales		Group	Score	*P* value [U]
psc	psc-i	Nonorganic pain case	4	< 0.001*
		Control	1	
	psc-a	Nonorganic pain case	3	< 0.001*
		Control	2	
	psc e	Nonorganic pain case	2	< 0.001*
		Control	1	
	psc - t	Nonorganic pain case	9	< 0.001*
		3 (0, 8)	3	
Separation anxiety		Nonorganic pain case	5	< 0.001*
		Control	2	
Social phobia		Nonorganic pain case	3.5	< 0.001*
		Control	1	
Ob comp		Nonorganic pain case	1	< 0.001*
		Control	1	
Panic		Nonorganic pain case	1	< 0.001*
		Control	0	
Physical Injury		Nonorganic pain case	3	< 0.001*
		Control	0	
Gen anxiety		Nonorganic pain case	3	< 0.001*
		Control	0	
SCAS		Nonorganic pain case	18	< 0.001*
		Control	10	
CDRS		Nonorganic pain case	16	< 0.001*
		Control	13	

U: Mann Whitney U test; psc: pediatric symptom checklist- 17; psc-i: pediatric symptom checklist-internalizing; psc-e: pediatric symptom checklist-externalizing; psc-a: pediatric symptom checklist- attention; psc-t: pediatric symptom checklist- total score; SCAS: Spence children anxiety scale; CDRS: Child depression rating scale; ob comp: Obsessive compulsive; gen anx: General anxiety; *: highly significant

A significant difference was noticed in the scores distribution for all the psychosocial assessment scales between nonorganic pain group and control group (P <0.001) (Table 7).

Discussion

Recurrent or CAP is a pervasive disorder that has high effect on the well-being of a child and the present health care system.[2] Therefore, the present study determined the psychosocial factors and organic causes associated with CAP in children with age 5-15 years.

Most children (88%) in cases group had nonorganic pain and remaining (12%) had organic pain in the present study. Majority of children in nonorganic group were 9-15 years older while in organic group the children were much younger. Most children with nonorganic pain were females while half children with organic pain were males and remaining half were females. This is in accordance with the study performed by Croffie et al (2000) in which 81% of children with CAP were nonorganic and 19% were of organic cause with female predominance.[13] Nonorganic or functional pain of the abdomen is the most noted (almost a quarter) cause of the CAP in comparison to organic cause and indicates that the pain is not being caused by any physical abnormality as in case of organic cause.[14] Since female children show more willingness to report somatic experiences like pain early might be one of the reason of female predominance in pain with nonorganic cause in the study . Further, ovarian hormones can modulate the process of perception of pain in viscera and the stress susceptibility.[15]

Most of children with organic pain had abnormal stool, bowl disturbance, enteritis, and specific pain in comparison to children with nonorganic pain which further helped in differentiating organic and nonorganic pain. Similar results were noted by Puzanovova et al (2008).[16] Some red flag signs are essential screening tools for differentiating organic cause of pain from nonorganic pain such as localized or specific pain, abnormal USG abdomen finding's such as enteritis, cystitis, lymphadenitis etc., recurrent bloody stools or abnormal stool, recurrent unexplained fever, etc.[17]

History of family and psychological variables like birth order (mostly first born) and school refusal were noted to be affecting the organic and nonorganic reasons of CAP which was significantly different from controls. This is in lieu with the finding of Baldwin and Dadd (2007) which showed that most of the with CAP were first born and were afraid of going to school.[18] Psychological distress and history of family such as sibling rivalry and failure in subjects causing fear for school punishment results into the repeated abdominal pain. These stressed life events are linked with high incidence of CAP.[19]

The study also revealed higher mean scores of pediatric symptom checklist-17 (psc-i, psc-t) and separation anxiety in nonorganic pain group which was statistically significant in comparison to organic pain group among cases. This is in accordance with results of study done by Campo et al (2004).[20] The psc-17 is a screening tool for general mental health which helps in determining the likelihood

of determining in a child any mental health disorder. The psc-17 score less than 5 indicates the possibility of any anxiety or mood disorder and not anything of major concern.[21]

The mean scores of all psychosocial assessment scales (psc-17, SCAS, CDRS) and questionnaire for assessing family and child factors (separation anxiety, social phobia, obsessive compulsive disorder, panic, physical injury, general anxiety) in cases group such as nonorganic pain group were significantly higher than control group. This is in line with the study findings of Croffie et al (2000) as the children with nonorganic pain showed higher score on assessment for family and child factors and psc-17, SCAS, CDRS.[13] The fact that CAP involves comorbidities of psychiatric nature such as depression and anxiety, indicates that CNS plays an essetial role in altering pain modulation whether it is emotional or cognitive. Further, the combination of stress and vulnerability factors affect the endogenous pain modulation systems efficacy and thus influence development of nonorganic CAP.[22]

Psychosocial factors have a major and unique negative impact on health-related life quality that can be reversible with appropriate psychological intervention. The present study has its own limitations. The study is lacking long-term follow-up and study included children belonging to lower socioeconomic strata only. Also, patients were not observed for somatization disorders. Further studies are obligatory to examine long-term follow-up of children and children belonging to different society strata and not just lower socioeconomic strata.

Conclusion

Majority children had nonorganic CAP that had higher comorbidity with psychiatric disorders. Female children are more prone to nonorganic pain. Most children with organic pain had abnormal stool, enteritis, and specific pain as compared to children with nonorganic pain. An association existed between birth order, school refusal and CAP. Different psychosocial and clinical factors are associated with an increased chance of CAP in children. Understanding of individual risk factors of CAP would be helpful in evaluation and further management of CAP in children.

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