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State Anxiety is linked to Need to Control Thought in Functional Gastrointestinal Disorder

URMITA CHAKRABORTY
Faculty Member, Undergraduate Level
Department of Psychology
HMM College for Women, Kolkata, India
Phd Candidate
Department of Applied Psychology
University of Calcutta, India
Prof. SADHAN DAS GUPTA
Professor & Former Head
Department of Applied Psychology
University Of Calcutta, India

Abstract:

Theoretical and Conceptual Framework: *Structural diseases of gastrointestinal tract can be sited easily, and remedy can be applied successfully. But the nonstructural symptoms that are described as "functional" remain unexplained and untreated in many cases. In the present study we have included patients suffering from Functional Bowel Disorder (Unspecified) and Abdominal Pain-related Functional Gastrointestinal Disorders (mainly Functional Dyspepsia and Irritable Bowel Syndrome) as sub-groups of* ***Functional Gastrointestinal Disorder*** *that is* ***FGID*** *(Rome III classification).The two psychological variables that we have studied in these patients are Meta-Cognition and Anxiety.* ***Meta-Cognition*** *refers to the cognitive control and monitoring of all sorts of cognitive processes like perception, action, memory, reasoning and emotion.* ***Anxiety*** *denotes psychological and physiological state characterized by somatic, emotional, cognitive and behavioral components. Primarily it reflects our displeasing feelings of fear and concern.*

Methodology: *The key idea is to find out whether any relation exists between the domain of meta-cognition and that of anxiety in these patients of FGID.13 patients (8 being male, 5 being female) have been studied for this purpose. The age range of the sample was 23-52*

years. Meta-Cognitions Questionnaire 30(Wells and Cartwright-Hatton, 2004) and State Trait Anxiety Inventory (form X, Spielberger, Gorsuch and Lushene, 1970) have been administered As the sample size was small(n=13), we have done non parametric statistics(Rank Difference Correlation, Kruskal Wallis H Test and Mann Whitney U Test) as well as descriptive statistics(Mean and Standard Deviation)for analysis of the data.

Ethical Consideration: *Physicians of respective hospitals have been approached, and permissions have been obtained for collecting data from patients.*

Findings: *Significant results have been found .Most interesting is that the need for control thought (NC) has been found to be significantly correlated with state anxiety ($p<0.05$).*

Implication: *Though these medical conditions are studied in gastroenterology, an attempt has been made to study the conditions from psychological approach so that healing management can be proposed from our field.*

Key words: Functional Gastrointestinal Disorder, Meta- Cognition, Anxiety.

Introduction

Functional gastrointestinal disorder

A very common experience of medical professionals is that symptoms revealed by the patients do not help to diagnose a particular disease. An objective evaluation of the subjective experiences of patients is missed. This type of symptoms is referred to medically unexplained or functional symptoms. These symptoms are associated with distress, disability and unnecessary expenditure of resources on the part of patients. In the specialty of gastroenterology, the medically unexplained or symptom based disorders are known as Functional Gastrointestinal Disorder (FGID). Recent classification system by Rome III (2006) has outlined different sub categories of this disorder. In the present study, we have taken **Functional**

Bowel Disorder (FBD, Unspecified), Functional Dyspepsia (FD) and Irritable Bowel Syndrome (IBS) (table 1) and studied two psychological variables namely **meta-cognition and anxiety**. In our field, they are equivalent to psychosomatic illnesses. Previous researches on functional gastrointestinal disorders suggest that this kind of disorder is formed as complex interactions between biological, psychological and social factors (Levy et al, 2006). The fact that in many cases, FGIDs are treated psychologically besides biological medicines, serves as a strong support for this present study.

From **epidemiological studies** we have noted that 23.48% of 4633 male subjects who were Chinese Air Force Workers had functional gastrointestinal disorder (Wu et al, 2013).In India, it has been observed that 7.9% is the prevalence rate of IBS among men while this is 6.9% among women (shah et al, 2001).But there is a recent shift in this rate. Makharia et al. (2011) noted that females (4.8%) have outnumbered males (3.2%) in rural community. Moreover, in India prevalence rate of functional dyspepsia has been found to be 30% (Shah et al, 2001). No recent study has been found in this regard.

Functional gastrointestinal disorders take their form in a way that is still unclear. Many researchers think that there is a **brain gut connection** in FGID. The gut responds to environmental factors and also interacts with the brain. The gut and the brain are integrated in a bidirectional fashion. This connection is further linked up by the autonomic nervous system and Hypothalamic Pituitary Adrenal Axis (HPA axis). **Limbic system** of CNS controls the gut and its vital functions. Apart from this, limbic system also involves in emotionality, perception of pain, threat avoidance, social interaction and learning (Jones et al,2007).A mind- body interaction takes place in this part of the brain. Moreover, **serotonin** influences our pain perception. It has a significant role in many extra intestinal disorders such as generalized anxiety disorder,

obsessive compulsive disorder, major depression, and thought disorders. The past research findings show us that these disorders are present in patients of functional GI as co- morbid conditions (Lydiard et al, 1993) . There is another connection. It consists of visceral hypersensitivity and abnormal gut motility which is responsible for the development of FGIDs. From the above citations, we have conceptualized that several psychological factors may be evident in functional gastrointestinal disorders. We propose that activities of limbic system and those of serotonin along with visceral sensitivity are altered by severe psychological damages to individuals. Perhaps maladaptive psychological functioning is there. The perception of symptoms, health care seeking behaviors and outcomes in these patients are influenced by psychological factors. Thus, we would find some results regarding the two variables namely meta- cognition and anxiety from this present study.

Table 1

Functional Bowel Disorder-Unspecified (FBD-Unspecified)	**Functional Dyspepsia(FD)**	**Irritable Bowel Syndrome(IBS)**
Consist of symptoms attributable to the middle or lower gastrointestinal tract. Bowel symptoms are not attributable to an organic aetiology which do not met criteria for the other categories of FBD.	Absence of structural disease in explaining the dyspeptic symptoms (postprandial fullness, early satiety, epigastric pain and epigastric burning). Pain is found in the upper abdomen. **Types** 1. Postprandial distress syndrome (PDS) – characterized by postprandial (post meal session) fullness and early satiation. 2. Epigastric Pain Syndrome (EPS)-characterized by epigastric pain or burning. **Symptoms** At least 3 months (which need not be consecutive) with onset at least 6 months previously, of 1 or more of the following : ▪ Bothersome postprandial fullness ▪ Early satiation ▪ Epigastric pain ▪ Epigastric burning ▪ No evidence of structural disease (including at upper endoscopy) that is likely to explain the symptoms.	Abdominal discomfort or pain associated with disturbed defecation. Pain is mostly in the lower abdomen. **Types** 1. IBS with constipation 2. IBS with diarrhea 3. Mixed IBS 4. Unsubtyped IBS (unspecific) **Symptoms** ➢ Recurrent abdominal pain or discomfort at least 3 days per month in the last 3 months associated with 2 or more of the following : • Improvement with defecation • Onset with a change in frequency of stool • Onset associated with a change in the form and appearance of stool ➢ Criteria must be fulfilled for at least the past 3 months with symptom onset at least 6 months before diagnosis

Meta-cognition

Meta cognition consists of knowledge (beliefs), processes and strategies that appraise, monitor or control our cognitive functions (Flavell et al, 1979). In some situations we face difficulty in recalling information previously stored. We know that the information is somewhere there in our memory system but are unable to retrieve it at that point. This attitude of us is resulted as a consequence of meta-cognition. Meta cognition involves three aspects: **Meta-cognitive Knowledge** (the beliefs and theories the individuals have about their own cognitions), **Meta-cognitive Experiences** (appraisals of the meaning of specific mental events, thoughts, meta cognitive feelings and judgments of the status of cognition) and **Meta-cognitive Control Strategies** (responses individuals make in controlling the activities of their cognitive system). A positive meta-cognition is in action when we find advantages of monitoring worry, rumination and threat. It is negative when we think that some events are uncontrollable. Both the types are responsible for psychological disturbances. Meta-cognition has gained its emphasis in fields like neuropsychology, memory functions and ageing (Metcalfe et al, 1994).

We engage in meta-cognition when we have to make a choice or decision. Thus, following the remarks of Klunte (1982), the two basic characteristics of meta-cognition are

1) The thinking person knows well about his own thinking and that of others according to his knowledge
2) The thinking person is able to monitor and regulate his own thinking.

It is a self-referenced process by which we think about our self-efficacy, self-control or self-competence (Harter, 1999). Meta-cognition starts by self-initiation or by other people (Chambres et al, 2002). It is self-induced as we pause and evaluate our own thinking when things do not make a sense to us. It may be

initiated by self when we are with others and we think a lot about our own self presentations. In cases, people cause us to think about our abilities and cognitive states. They give us cues regarding how we think or act.

Meta-cognition, may, lead to negative self evaluation. It may cause the individual to suffer from lowered self worth, self doubts or low expectations or negative beliefs about self and others. As a result, depressions, aggressions or psychosomatic illnesses are evolved. However, we delay in responding when we lose ourselves in thoughts. This delay may involve confusion about right course of action or uncertainty about proper strategies to utilize. Thus our actions are altogether stopped. This is a serious threat to our psychological equilibrium. Besides this obsessive thinking, there may be delusional thinking in function (Chambres et al, 2002). Thinking over and over about own feelings and those of others may take us to an unreal world.

Anxiety

Emotions motivate behaviors for survival of the species. On many occasions, these behaviors aim at avoiding or escaping life threatening events so that the individuals can live a longer life. Izard (1994) has proposed a multisystem model of emotion activation which comprises neural system, cognitive system, sensory motor system and motivational system. Anxiety as a type of emotion performs through these systems. It is an unpleasant emotional state that takes shape by presence of a nonspecific and non-conscious danger (May, 1977).It constitutes arousal of the Autonomic Nervous System (ANS), feelings of tension, apprehensive motives and negative thoughts (Martens et al, 1990).

Spielberger (1978) advanced a **state trait model of anxiety**. In this model he spoke about two types of anxiety, namely state anxiety (transitory emotional state) and trait

anxiety (a stable tendency on the part of the individual to react with anxiety across various contexts). This model also states that people, possessing high trait anxiety, experience higher level of state anxiety.

Mc Grath (1970) proposed a **stress process model** to show how anxiety develops within us. In stage 1, a demand, physical or psychological, is placed on an individual. Evaluation of the demand comes in stage 2. In the stage 3, the person decides to respond to that demand. If his perception of the demand in former stage is regarded as something harmful to self or beyond his actual capabilities, then his responses would involve state anxiety. Consequences of the responses made toward the demand come in stage 4. The feelings of state anxiety lead to negative self evaluation in many instances. If the individual frequently experiences state anxiety owing to perception of unnecessary demands imposed on him, formations of trait anxiety take place.

Meta-cognition and anxiety

We note, therefore, that the two psychological variables are interrelated to each other as they both have some similar functions. When we are saying that perception is important for experiencing anxieties, the concerns for meta-cognition comes in. In this case, if the monitoring process is biased, the non-harmful object may become harmful for the person. It will lead to accumulation of state anxiety in the individual. Salkovskis (1996) proposed that our emotions are expressed as a consequence of appraisal of events (metacognitive experiences). Meanings of events trigger particular emotion.

The following section outlines review of **past literatures** concerning functional gastrointestinal disorders, meta-cognition and anxiety.

Past Literatures

Most of the studies in functional diseases have been carried out on anxiety component. In one study of **Hartono et al. (2012)**, a high prevalence of anxiety has been noted in patients of functional gastrointestinal disorder (P<0.001). Another recent study (**Hood et al, 2008**)) has shown that IBS patients have obtained anxiety scores that are intermediate between scores of syndromal anxiety patients and normal volunteers. Significant evidence comes with the earlier study of **Alexander et al. (1993)** where trait anxiety found at higher level in functional dyspepsia patients. Here, the comparison group consisted of duodenal ulcer patients. A few studies have tried to show the role of meta-cognition in functional diseases**. Lenzo et al. (2013)** found no differences regarding meta-cognition between FBD patients and organic bowel disorder patients. But beliefs of uncontrollability and danger were found to have role in expression of fear, anger and sadness. Similar evidence has also shown in the study by **Nassif (1999)** where he claimed that generalized anxiety disorder developed because of beliefs about the uncontrollability and danger of worry. In patients of functional abdominal pain, attention regulation may be an important factor that contributes to the variability in outcomes in youth with functional abdominal pain but no specific impact of executive (meta cognition) function has been reported.(**Hocking et al, 2010**).

In the present study, we have tried to find out whether any significant relation exists between different domains of meta-cognition and that of anxiety. We also have studied the effects of gender and different illness conditions if any on these two psychological variables.

Methods

Sample & Procedure

In this study we have included patients only. No normal healthy control group has been taken. The number of patients is 13 among whom 8 are males and 5 are females. All of them have suffered from any of the three categories of functional gastrointestinal disorder namely, functional bowel disorder (unspecified), functional dyspepsia and irritable bowel syndrome. Last two categories fall under abdominal pain related FGID sub category. Among the patients, 2 had FBD (unspecified), 4 had FD and 7 had IBS. Their mean age was 36 years. Data were collected in one to one fashion from 2 privatized hospitals and one government hospital. We used purposive sampling technique. They were educated people having placed in ten standards up to a post graduation level.

Tools

We used three tools namely General Information Schedule, Meta-Cognition Questionnaire 30 (Wells and Cartwright-Hatton, 2004), and State Trait Anxiety Inventory (form X, Spielberger, Gorsuch and Lushene, 1970).

- **General Information Schedule**: It consisted of demographic information, information regarding present and past illness, significant life events and family history for similar illness.
- **MCQ 30** (Wells and Cartwright-Hatton, 2004) consists of 30 items. It comprises five subscales. They are as follows:
    1) Positive belief about worry(POS)
    2) Negative beliefs about thoughts concerning uncontrollability of danger of worry(NEG)
    3) Cognitive confidence(CC)

4) beliefs concerning the consequences of not controlling thoughts and thus a need to control thought.(NC)
5) Cognitive self consciousness(CSC)

MCQ30 was developed from the MCQ65 version. Cronbach alpha reliability coefficients have been determined .For the individual subscales of MCQ 30, they range from 0.72 to 0.93.Confirmatory factor analysis reveals similarity in factor structure between MCQ 30 and MCQ 65.Retest correlation across an interval of 22 to 118 days was found to be 0.75 for total score on MCQ 30 (Wells et al, 2004).Besides, construct validity has also been obtained (Spada et al, 2008).

Scoring: There are four response categories, namely:

Category 1 : do not agree

Category 2 : agree slightly

Category 3 : agree moderately and

Category 4 : agree very much.

For all items, each response category receives the same score. Each item receives a direct score.

- do not agree =1
- agree slightly=2
- agree moderately=3
- agree very much=4.

The thirty items are scored in five domains of meta cognition questionnaire 30 (Wells,2011).

POS	NEG	CC	NC	CSC
1	2	8	6	3
7	4	14	13	5
10	9	17	20	12
19	11	24	22	16
23	15	26	25	18
28	21	29	27	30

An overall total score can be obtained by summing the subscale totals.

- **State Trait Anxiety Inventory** (form X, Spielberger, Gorsuch and Lushene,1970) consists of 40 items. Items are divided equally into two subscales, State Anxiety and Trait Anxiety. The test-retest reliability was found to be 0.76 for male and 0.73 for females.

Scoring : The response categories in A-state (STAI X-1) scale are

Response categories	response	Direct score	Reverse score
Category 1	Not at all	1	4
Category 2	Some what	2	3
Category 3	Moderately so	3	2
Category 4	Very much so	4	1

The response categories in A-trait scale (STAI X-2) are

Response categories	response	Direct score	Reverse score
Category 1	Almost never	1	4
Category 2	Sometimes	2	3
Category 3	Often	3	2
Category 4	Almost always	4	1

Out of 20 items, in A-state scale, ten items are scored directly and remaining ten is scored in reverse order. The A-trait scale has seven reversed items and thirteen direct items.

Sub scale of STAI	The reversed items									
A- state scale	1	2	5	8	10	11	15	16	19	20
A- trait scale	1	6	7	10	13	16	19			

Final score on each subscale is calculated by subtracting the summated value for the reversed items from that for the direct items added by constants (for A-state scale +50 and for A-trait scale +35) (Spielberger et al, 1970).

Results

Table 1: Non parametric statistics (Mann-Whitney U)
Test Statistics(b)

	STATE	TRAIT	POS	NEG	CC	NC	CSC
Mann-Whitney U	15.000	15.000	10.000	20.000	16.500	14.000	10.500
Wilcoxon W	30.000	51.000	25.000	35.000	31.500	29.000	25.500
Z	-.738	-.736	-1.478	.000	-.514	-.882	-1.398
Asymp. Sig. (2-tailed)	.460	.462	.139	1.000	.607	.378	.162
Exact Sig. [2*(1-tailed Sig.)]	.524(a)	.524(a)	.171(a)	1.000(a)	.622(a)	.435(a)	.171(a)

a Not corrected for ties.
b Grouping Variable: GENDER

The table values reveal no significant differences regarding different domains of the two scales between male and female patients.

Table 2 : Non parametric statistics (Kruskal Wallis Test)
Test Statistics(a,b)

	STATE	TRAIT	POS	NEG	CC	NC	CSC
Chi-Square	**6.130**	2.619	3.301	4.125	.417	3.376	3.555
df	**2**	2	2	2	2	2	2
Asymp. Sig.	**.047**	.270	.192	.127	.812	.185	.169

a Kruskal Wallis Test
b Grouping Variable: ILLNESS

The three illness types have created a significant variance on the scores of state anxiety domain ($P<0.05$).

Table 3 : Non parametric statistics (Rank difference correlation)

			STATE	TRAIT	POS	NEG	CC	NC	CSC
Spearman's rho	STATE	Correlation Coefficient	1.000	.262	.137	.402	-.113	.565(*)	.475
		Sig. (2-tailed)	.	.387	.655	.173	.714	.044	.101
		N	13	13	13	13	13	13	13
	TRAIT	Correlation Coefficient	.262	1.000	.075	.474	-.047	.294	.133
		Sig. (2-tailed)	.387	.	.807	.102	.878	.329	.664
		N	13	13	13	13	13	13	13
	POS	Correlation Coefficient	.137	.075	1.000	.221	.425	.599(*)	.494
		Sig. (2-tailed)	.655	.807	.	.468	.148	.031	.086
		N	13	13	13	13	13	13	13
	NEG	Correlation Coefficient	.402	.474	.221	1.000	.388	.611(*)	.100
		Sig. (2-tailed)	.173	.102	.468	.	.190	.027	.744
		N	13	13	13	13	13	13	13
	CC	Correlation Coefficient	-.113	-.047	.425	.388	1.000	.463	-.069
		Sig. (2-tailed)	.714	.878	.148	.190	.	.111	.822
		N	13	13	13	13	13	13	13
	NC	Correlation Coefficient	**.565(*)**	.294	**.599(*)**	**.611(*)**	.463	1.000	.264
		Sig. (2-tailed)	**.044**	.329	**.031**	**.027**	.111	.	.384
		N	13	13	13	13	13	13	13
	CSC	Correlation Coefficient	.475	.133	.494	.100	-.069	.264	1.000
		Sig. (2-tailed)	.101	.664	.086	.744	.822	.384	.
		N	13	13	13	13	13	13	13

* Correlation is significant at the 0.05 level (2-tailed).

Three significant correlations have been obtained between state anxiety (A-state) and need to control thought (NC), between positive belief about worry(POS) and need to control thought(NC) and between negative beliefs about thoughts

concerning uncontrollability of danger of worry (NEG) and need to control thought (NC). These three relations are significant at 0.05 levels.

Table 4 Descriptive Statistics (mean & sd)

	N	Minimum	Maximum	Mean	Std. Deviation
STATE	13	38.00	59.00	46.3077	6.22340
TRAIT	13	38.00	58.00	**49.0000**	6.04152
POS	13	6.00	20.00	12.8462	4.48788
NEG	13	7.00	22.00	15.8462	4.82780
CC	13	7.00	19.00	12.3077	3.88125
NC	13	11.00	23.00	**16.6154**	4.07305
CSC	13	10.00	24.00	16.3077	3.98716
Valid N (listwise)	13				

The subjects scored high on trait anxiety domain and need to control domain.

Discussion

Meta-cognition is a complex system. Nelson et al. (1990) proposed its functioning. There are two levels for information processing in this model. When we attend stimuli, this consists of our **object level**. Information from this object level reaches **meta level.** From meta level certain information comes back to the object level. Information goes from object level to meta level through **monitoring** (input) process. From meta level a signal is sent to the object level through **control** (output) process. Any inaccuracies or distortions in monitoring process lead to psychological dysfunctions in individuals. Meta level consists of different sorts of coping strategies. If irrelevant coping strategy is being selected and applied, psychological disturbances may also start. This concept can be applied in understanding of FGIDs.

The current findings support the idea that psychological disorders are associated with some form of extended thinking that carries a sense of threat to wellbeing of the self (Wells et al, 2009). Meta-cognitions are negative when they involve negative beliefs about the thinking process. This negative meta-

cognition appraises these thoughts as dangerous. So, it communicates to us that the specific object of our thinking has also been perceived as dangerous. Perhaps this object is perceived as uncontrollable .This leads us to remain busy in the unrestricted thinking process. Thus, persistent worry and rumination probably occur. On the other hand, this involvement in the ruminating thinking delays our decisions regarding what to do with the stimulus at the moment. It also delays our future reactions to other environmental stimuli. When, the morbid thinking ends up, we find ourselves run out of time. A momentary tension prevails in the form of state anxiety. This sort of consequence drives us to arrange for controls on our thoughts in future. Thus, a need to control of the unwanted thoughts arises. So, probably for this reason State Anxiety has been found to be correlated with the Need to Control Thought domain. In addition, we appraise the object as threatening because of our biased monitoring system. Results show that our sample has a high mean score on Trait Anxiety domain. This justifies the condition that they have a tendency to react with unpleasant emotions across various situations. Thus, the stimulus to be taken as threatening is predetermined for them. Besides, any mild incapability to fulfill the demands imposed by the objects has been taken as unjustified to self. It easily leads to activations of State Anxiety mechanism.

A variance has been found on State Anxiety domain due to three illness categories. Functional dyspepsia is diagnosed as upper abdominal disorder. On the contrary, Irritable Bowel Syndrome is thought to involve the lower abdomen. Moreover, the symptom patterns are different in three illnesses. For these reasons this variance perhaps has been noted.

Conclusion

In the present study we have attempted to understand the experiences of the patients suffering from nonstructural

disorders. We have tried to understand the underlying mechanisms leading to such consequences. The present study has examined only two psychological variables and their connections with these FGIDs. More analytical studies are needed to understand the patterns of psychopathology in these patients in a finer form. This will help us to devise preventive measures from psychological field.

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