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A Theoretical Framework on Stress Dynamics in Functional Gastrointestinal Disorder and Corona Virus Disease

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Abstract

People do a lot worry for their physical changes than anything else. Among various health concerns, people feel more distress when the symptoms persist or appears after a certain time. Functional Gastrointestinal Disorder (FGID) is a type of gut related complications where individuals feel disguised mental tension at gastrointestinal tract regions. This condition has perpetuating nature and medication solely is not the answer for intervention. However, Corona Virus Disease (COVID 19) or SARS COV 2 or simply Corona Virus Pandemic is a never forgettable phenomenon of this century. It is a widely spreading condition causing damage to multiple organs. Therefore, end of an infected person's life may happen. An adequate, scientifically curable and proven treatment is still in search. Various branches of health care are trying to resolve the urgent matter. Over the months what has been established as etiology of this malicious disease is quite unique. COVID 19 causes neurological impairment. Besides, neuronal damage, other significant changes include Neuro-inflammation, CNS and PNS related severe manifestations, and immune injury. This disease also primary to cause Post Traumatic Stress Disorder, Brain Lesions, Brain Ischemia, Neuron Necrosis, and Neuromuscular problems (Singhal, 2020). Therefore, how stress has been caused in a human body can enlighten the understanding of the mentioned manifestations. The present study aims at understanding various stress models for FGID and in the context of Corona Pandemic. A critical analysis of relevant Stress Models will be significant for knowing psychological healing strategies. Stress is widely studied aspect with psycho physiological importance. It can be generated by mental stressors (anger), physical excretion or community events (pandemic or natural disaster). Stress is seen in a person's body as a demand is perceived (Kumari *et al*, 2009). The present study has an exploratory research design. A rapid systematic review of recent studies and academic webinars has been made by the researcher. The study will discuss relevance of Stress Models namely Diathesis Stress Model, Effort Distress Model, Job Stress Model, Stage Model of Stress, epidemiological Model of Stress, Psychological Model, Biological Model, Stress based Animal Model, The stimulus based Model of Stress, The Response based Model of Stress, The Transactional Model of Stress, Stress Disequilibrium Model of Chronic Disease development, Animal Model of Anxiety, Animal Model of diseases, Mouse model of disease. The deeper understanding of Stress Models will enable Psychologists and other professionals to develop treatment tools. This study will show the relevance of considering MBSR or Mindfulness Based Stress Reduction and RIBT or Rational Emotive Behavior Therapy as suitable therapeutic ways for the resolution of the addressed problem.

Keywords: Stress, inflammation, exploratory research design

Introduction

Stress is a common term across disciplines. Stress can be understood as a crisis or lack of ability for the time being. It is caused by stressors. An event or situation (generally aversive) examines our physiological or psychological resources for dealing it. As a consequence, subjective state of tension arises. This tension is psychological or physiological in nature depending upon the nature of stressor. The stress responses provides adaptive capacity, short term benefits, and changes in levels of hormones (Anisman and others, 1999) ^[1]. Stressors can be of many types. It is Psychogenic, Neurogenic, Environmental, Processive, Systematic, Ethological, Controllable, Uncontrollable, Multidimensional, Acute, and Chronic. Stress induced primary diseases are obesity, asthma, diabetes, headache, Alzheimer, trauma and stress related disorders.

Functional Gastrointestinal Disorder originates by multiple reasons namely early life changes, psychosocial conditions and physiological conditions (Drossman, 2016) ^[22]. Specific factors are genetic factors, trauma, infections, cultural habits, parental behavior, stress, personality traits, immune dysfunction, altered microflora, gut motility and gut sensations (Drossman, 2016) ^[22]. A person with this FGID faces complications which deteriorates quality of life and daily function. Various types of FGID as per Rome IV Classification are Esophageal Disorder, Gastroduodenal Disorder, Bowel Disorder, Centrally Mediated Disorder of Gastrointestinal Pain, Gallbladder and Sphincter of Oddi Disorder, Anorectal Disorder, and Childhood Functional GI Disorder (Drossman, 2016) ^[22].

COVID 19 disease and tuberculosis along hepatitis c can be counted as stress induced conditions. COVID 19 causes

neurological impairment. Besides, neuronal damage, other significant changes include Neuro-inflammation, CNS and PNS related severe manifestations, and immune injury. This disease also primary to cause Post Traumatic Stress Disorder, Brain Lesions, Brain Ischemia, Neuron Necrosis, and Neuromuscular problems (Singhal, 2020) [23]. Inflammation is a response by the immune system for an irritant or stressor often in the form of physiological wound. Inflammation is a response condition found in stress induced situations in human body, in FGID and in COVID19. Stress is a result of antigen antibody action. An antigen is a stimulant for the immune response where as an antibody is a protein released to act on that antigen. Stress as a condition involves two pathways in human body namely the Hypothalamic Pituitary Axis and the Brain Gut Axis. COVID 19 is a catastrophic disorder came from bats in to human body. This terminal illness can be understood from stress theories. Through bidirectional pathway mind and body do interact. Hence, there is a chance of mental causalities to play role in COVID 19.

Objective

A critical analysis of Stress Models to deal FGID and COVID19 related Pandemic Crisis with a remedial intention.

Design

A Rapid Systematic Review on recent researches, Webinar discussions and instructions from Health Organizations based on Exploratory Research Plan. A working paper for Postdoctoral Research.

Result

The paper has included significant stress models which could clearly ascertain the understanding of FGID and COVID 19.

Table 1: Table shows research models between 1976-2021

Model	Researchers	Year
Animal Model	McCarty Pesarico	2020 2021
Mouse Model	Hassien	2020
Animal Model of Anxiety and Stress Disorders	Campos	2013
Stress based Animal Model for Psychiatric or Somatic Disorders	Reber	2016
Stress Disequilibrium Model of chronic disease development	Karasek	2006
Stimulus based Model of Stress	Holmes and Rahe	1967
Response based Model of Stress	Selye	1979
Transactional Model of Stress	Lazarus Ben Zur	1987
Diathesis Stress Model	Chaudhary	2017
Stage Model of Stress	Cohen	2016
Epidemiological Model	Singh	2018
Psychological Model	Demke Mak <i>et al</i>	2022 2005
Biological Model	Lu	2021
Job Stress Model	Schmidt Chirico	2019 2016
Effort Distress Model	Fronkenhauser	1976
Neighborhood Stress Process Model	Aneshensel	2009
Perception Model of Stress:	Hui <i>et al</i>	1999

- **Animal Model:** This model is followed in medical studies to understand causality. Non-human samples are utilized. Immune system related diseases are researched under this model.
- **Mouse Model:** The phylogenetic relatedness is the basis for using this model for studying diseases. Instead humans, mouse is used to understand complex pathways underlying disease formation.
- **Animal Model of Anxiety and Stress Disorders:** This model has been devised to get more thorough knowledge. The clinical effects of medical drugs are studied using this model. Under this model various conflicting situations are understood to deal human anxiety. It is classified into three types namely Chronic Unpredictable Stress Model which utilizes rodents to understand human anxiety, Social Defeat Stress Model which is used to know human escape and immobility movements, and Predator Exposure based Model which is used to understand human post traumatic stress disorder. Stressors employed under Chronic Unpredictable Stress Model are light and dark environment, heating and cooling, and unpleasant noises.
- **Stress based Animal Model for Psychiatric or Somatic Disorders:** This model is a more important model. This model focuses upon behavioral, neuro-endocrine, and immunological components while studying somatic disorders. The model framework has been accepted in four contexts.
 - a) Chronic Unpredictable Stress Model which has demonstrated increased adrenal weight along depression like behavior in mice over eight week long observations.
 - b) Administration of non-invasive cortico-sterone for 28 days causes alterations in HPA axis functions. It results in dys-regulation in rodents.
 - c) Repeated contextual fear conditioning for 22 days causes disturbed sleep wake cycle and raised anxiety level.
 - d) Trans gene creates behavioral changes under chronic stress among female rats.
- **Stress Disequilibrium Model of Chronic Disease Development:** This model deals with inadequate social control as a basis for chronic disease to occur. It states that low external social control can lower internal physiological control. Improper self-regulation leads to under functioning of integrated physiological system in human beings.
- **Stimulus based Model of Stress:** Life events often cause stress of negative nature.
- **Response based Model of Stress:** This is a model deals with physiological consequences. It constitutes alarm, exhaustion and collapse components. A disease is formed at the end of prolong defending behaviors to combat an acute stressor.
- **Transactional Model of Stress:** A stress model depicts a person's capacity in dealing demands. If the demand cannot be fulfilled with existing resources, the person will feel stress.
- **Diathesis Stress Model:** Diathesis denotes tendency of an individual for some action. This model focuses upon interactive domain between an individual's innate tendencies for diseases to occur and the actual experiences of critical situations.

- **Stage Model of Stress:** This model deals with the three aspects namely epidemiological, psychological, and biological. The epidemiological aspect includes circumstantial effects and social factors contributing in physical and psychological health. The psychological aspect involves perception and appraisal of life events. The biological aspect sees the brain based functions during stressful time. It involves metabolic and homeostatic control during stress.
- **Epidemiological Model:** Our adaptive functions get affected during stress. This model deals with the threatening life events which cause maladaptive coping skills to adopt by a person.
- **Psychological Model:** This model emphasizes psychological system in our body. How an individual relate with the environment and others can influence occurrence of diseases to that person. Our appraisal processes and coping strategies may be responsible here. Positive appraisal of surroundings along good coping leads to proper wellbeing.
- **Biological Model:** This model comprises of brain, CNS, and spinal cord for stress perception.
- **Job Stress Model:** This model focuses upon effort reward imbalances, over commitment, job demand control, and organizational injustice.
- **Effort Distress Model:** This model considers controllable and uncontrollable stressors. During uncontrollable situations, due to excessive effort towards stressful context elevate both the levels of Cortisol and Adrenalin. However, controllable stressors elevate the level of Adrenalin only.

In the recovered COVID19 generation, probable psychological disturbances will include.

- i). Ambivalence (cannot take decision for an event or against that event)
- ii). Autism (not responding to surroundings)
- iii). Affective Disturbances (low mood)
- iv). Association Disturbances (gaps in thoughts or logical sequence)

The other Stress Models are

- a) **The Neighborhood Stress Process Model:** It describes why some people in adverse environments are affected by their surroundings whereas others remained unaffected (Aneshensel, 2009) ^[26]. This integrative model joins the Stress Process Model (Pearlin & Bierman, 2013) ^[25] with the ecological framework. It investigates the influences of social stratification and inequality within the social hierarchy (Wheaton & Clarke, 2003) ^[27].
- b) **Perception Model of Stress:** Hui *et al.* (1999) ^[28] studied the positive and negative life events in functional dyspepsia, a type of FGID and control subjects. The FGID subjects had a higher negative perception of major life events and daily stresses.

Discussion

Stress is a complex phenomenon for human life. It can be generated by mental events, physical events or by natural events. No one model is sufficient to understand FGID or Corona Virus Disease because the complex internal bodily conditions.

FGID involves complex brain gut interactions. COVID 19 induced situation has changes everyone's life. To combat the situation we need to understand the core mechanisms of this

disease. The various stress models or theories gave us some clues to know these two health problems clearly. It can be assumed with substantial theoretical background that COVID 19 is a condition following stage model of stress, stress disequilibrium model, and effort distress model very well. The FGID can be understood well by the models namely Response Based Model of Stress, Transactional Model of Stress, Neighbourhood Stress Process Model.

MBSR is Mindfulness Based Stress Reduction and RIBT is Rational Emotive Behavior Therapy. Both these therapeutic models can be followed while dealing mental problems of FGID and COVID 19 victims. A balanced view of self, sense of worth, compassion, acceptance beliefs and higher capacity of frustration combating can be achieved through the application of this procedure. A sense of social connectedness needs to be given while counseling the person. Physical distancing may create diminished external social control. Therefore, online communication may maintain the social responsiveness in us. To combat the sense of social defeat could be achieved by mindful meditation and yoga. Trust achievement is more important in FGID cases. Whereas in COVID19 condition sense of attachment is important. A true assurance is required for both the conditions.

Conclusion

The present exploratory research is important in framing psychological treatment plan along pharmacological medications. Stress Models of mentioned health conditions will enable the formation of adequate remedial steps.

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