

## Heart Disease: Is Managing Stress the Key?

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**ABSTRACT** Of late, Coronary Heart Disease (CHD) has emerged as a major contributor to total global mortality and India accounts for about sixty percent of the world's heart disease cases. Stress has been identified as one of the psychosocial factors influencing the onset, development and progression of CHD. It is therefore important to keep stress at bay to ensure a reduction in CHD cases. The paper attempts to understand how stress leads to CHD and develop a model based on interviews with cardiologists, and review of literature. 63 doctors, from both government and private hospitals, were contacted for appointment for the interview out of which 37 agreed. In depth interviews with doctors suggested that stress has a severe impact on human hearts. Further, the medical reports provided by the doctors suggested that it is the daily hassles of life that is more responsible for chronic stress leading to heart diseases. The paper also suggests simple yet effective ways of coping stress as many times the prescriptions we get for stress management prove to be more problematic than the problem itself.

### INTRODUCTION

Coronary Heart Disease (CHD) has emerged as a leading cause of mortality worldwide (Kaul 2012; Bhatnagar 2015; Naghavi et al. 2015), India, notwithstanding, the country has witnessed an increase in the incidence of CHD and is the 'No. 1 killer of Indians' (Healing Heart 2011; DNA 2013; Zee News 2015). With over 3 million deaths every year due to CHD, India is set to become the 'heart disease capital of the world' in coming years (The Indian Express 2012; NDTV 2013) cholesterol, smoking, drinking, blood pressure, overweight/obesity, tobacco use, lack of physical activity and diabetes are the risk factors strongly related to CHD incidence (Marmot 1986; Thurston et al. 2013; National Heart, Lung, and Blood Institute 2014; American Heart Association 2015; Boudi 2015). However, of late it has been observed that heart attacks occur in persons who are free of these array of risk factors. Then the question arises, what explains the reasons for these heart attacks? The answer may lie not merely in physiology but in behavior (Burg 1992).

People do not respond directly to a stimulus but they respond to meaning of the stimulus in relation to their perception of the environment (Vazquez 2001; Schreuder et al. 2016). An event stressful for one person may be normal for an-

other. Hence, stress is not only a response, but also a function of individual appraisal of the situation (Carver and Connor 2010; Dumitrescu 2014; Leskovic 2013). It has been found that the way people perceive and respond as they cope with the daily stresses of life can intensely affect their hearts (American Heart Association 2014; BBC News 2004; Mead 2007; Pathak 1992; The American Institute of Stress). Psychologically, people perceive situations to be threatening and challenging and this cognitive appraisal may cause psychological disturbances like depression, anxiety, temper tantrums, and physiological disturbances such as cardiovascular problems, blood pressure, diabetes, ulcers, high cholesterol, etc. These situations may subsequently lead to chronic stress. Mediation of stress reactions takes place through hormones that are transmitted by the blood stream to different parts of the body. It is some interaction between the nervous and the endocrinal system of the human body that triggers the stress reaction. As nervous and vascular systems are the only two coordinating systems that connect all parts of the body with one another it can be assumed that stress mechanism operates through one or both of these pathways (Pathak 1992). It may thus create a vicious cycle. The interpretation of stressful events is more important than events themselves (McGrath 1976).

Canon's study led the foundation for the pathophysiological consequences of stress.

While carrying out research on digestion in animals, Canon observed that when the animals were frightened or scared certain physical changes occurred in the function of the stomach (Brown and Fee 2002). He studied various physiological reactions to stress throughout the body and inferred that when an organism perceives a threat or experiences a shock, it quickly releases hormones to survive in the situation. He also coined the term “fight or flight” response to stress (Jansen et al. 1995) and described it as a physiological reaction that occurs in response to a perceived harmful event to either fight the situation or flee (flight) from the situation (Brown and Fee 2002; Jansen et al. 1995). The term stress, however, was popularized in medical literature in 1936 by Selye who borrowed the term from physics (Seyle 1956). He suggested that stress is a non-specific response of the body to any demand. He explained his model of stress based on physiology and psychobiology as General Adaptation Syndrome (GAS) (Seyle 1956; Rosch 1998).

Stress has been defined as a condition in which an individual is confronted with an environmental demand related to him and he perceives the outcome as uncertain but important (Cooper et al. 1988; Greenberg and Baron 2003; Huczynski and Buchanan 2001; Robbins 2002). This uncertainty is a cause for anxiety which leads to stress. Stress is not a new concept rather it's reference can be located in Indian Vedic literature as *Dukha*, that is, grief and *Dushchinta*, that is, anxiety (Ramachandrarao 1983).

### Objective of the Paper

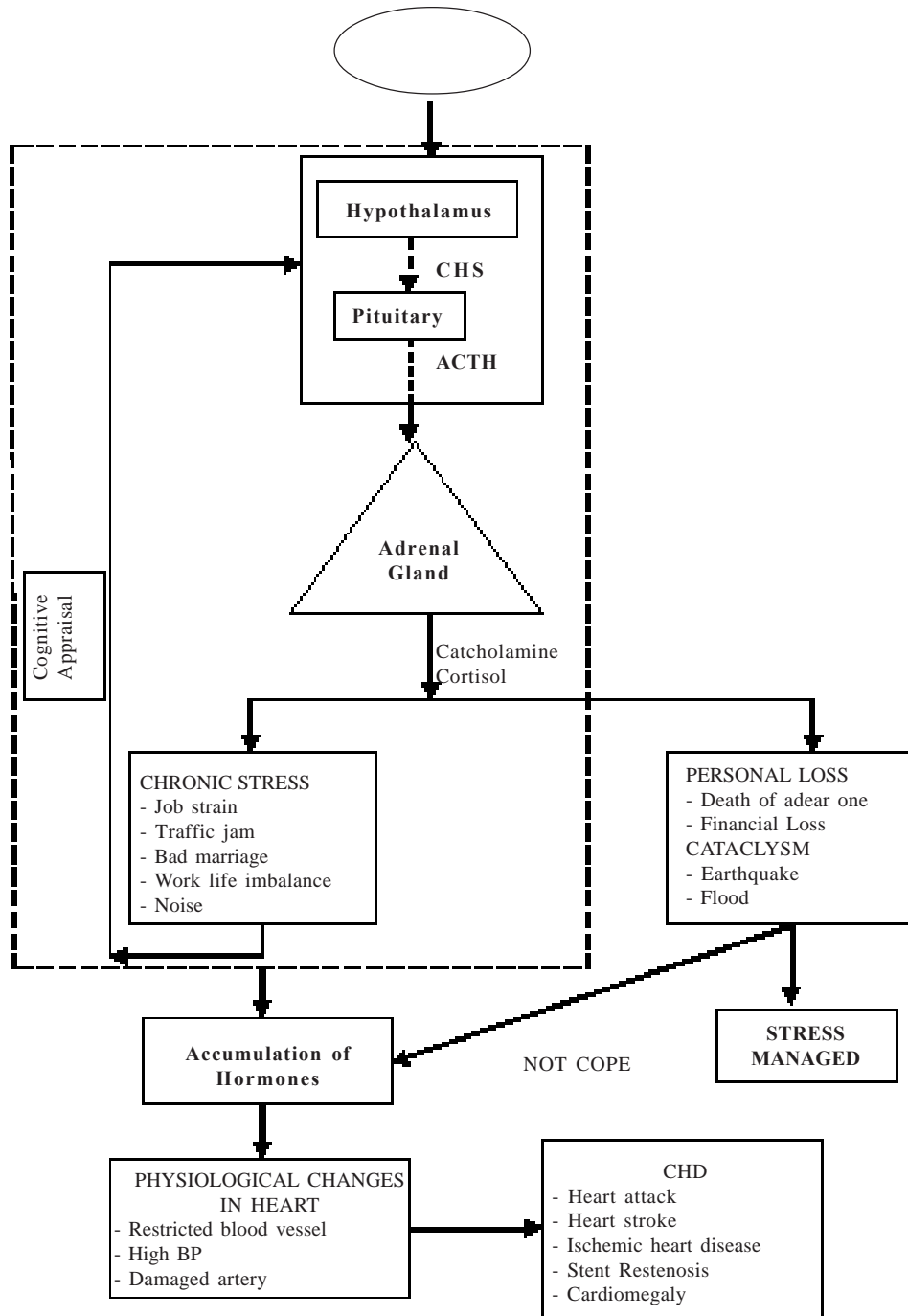
The objective of the paper is to understand how everyday stress leads to CHD and develop a model based on interviews with doctors, especially the cardiologists, and review of literature. The paper also suggests simple yet effective ways of coping stress as often times the prescriptions we get for stress management prove to be more problematic than the problem itself.

### METHODOLOGY

A graphic representation titled “A Model of the Stress and Heart Disease” is given in Figure 1. This model has been developed by the authors of this paper on the basis of review of literature and interviews of doctors, especially

the cardiologists, from both government and private hospitals of Jharkhand (Dhanbad, Ranchi, Jamshedpur), Delhi, NCR (Noida, Gurgaon), West Bengal (Kolkata, Durgapur), Bihar (Patna) and UP (Varanasi, Aligarh). Sixty-three doctors were contacted for appointment for interview out of which 37 agreed for the interview. The doctors also allowed authors to go through various medical documents and cases to gain better understanding on the topic. The data collected were content analyzed thus helping the authors develop the model. In the figure we find that the typical response by an individual to a stressful incident can take two forms. Either the individual copes with the stress and returns to the normal life or they succumb to stress finally resulting in physiological, psychological and behavioral disruptions. In this model we are focusing on the physiological effect of stress on human heart. In depth interviews with doctors suggested that stress has a severe impact on human hearts. In the course of the interviews the doctors revealed that they have come across a significant number of cases in which the patients visiting the doctors for heart ailments admitted that they were undergoing severe distress. The reasons cited for this were varied and covered a wide range of issues that included poor academic performance of children at school or colleges; sour relationship with spouse; whimsical supervisors; ailing and aging parents; unhealthy work environment; organizational politics and unsupportive colleagues; the daily grind of travelling to and from office; local bullies; mounting financial liabilities, etc. However, only a small number of patients had cited death of dear ones, or cataclysmic events like earthquakes as reasons for their distress. This suggests that it is the daily hassles that is more responsible for chronic stress leading to heart diseases. One reason may be their continuous nature. An analogy can be drawn by the following situation.

Let us say that a container containing 200 litres of water is poured on a flat wooden table. What will be observed? After sometime the water spills over, evaporates and the table gradually dries up with little or no effect. However, if the water from a container half the size is allowed to continuously drip on the table one drop at a time we can observe that after a while a permanent dent is made on the table. This explains the mechanism of stress. Cataclysmic events or personal crisis are for a short while causing acute



**Fig. 1. A model of the stress and heart disease**  
 Source: Authors

stress and the individual adapts to those and gradually tides over. However, the daily hassles of life which impact continuously create a dent into an individuals' body and mind which is reflected through is physiological ailments and behavioral disruptions

## OBSERVATIONS AND DISCUSSION

### Stress and Stress Hormones

People face a myriad of mental demands which characterize modern-day life. They have to adjust to these demands which require serious efforts, sometimes stretching their response capabilities beyond the elastic limit, thus causing stress. To combat this stress a body requires an ongoing level of stress hormones and fat. When an individual is confronted with a situation that is stressful the sympathetic nervous system (SNS) is triggered to activate a wide variety of hormonal secretions. The hypothalamus, located in brain, releases a hormone called corticotropin releasing hormone (CRH). The release of CRH triggers the secretion of another hormone called adrenocorticotropin (ACTH) from the pituitary gland, also located in the brain (Ranbir and Reetu 2011). ACTH cause the adrenal glands, situated above the kidneys, to secrete stress hormones – glucocorticoids (cortisol in humans) and catecholamine (epinephrine/ adrenaline and nor-epinephrine/ nor adrenaline) (Johns Hopkins Medicine 2005; Ranbir and Reetu 2011).

The cortisol redistribute energy to those areas of the body that need it the most like heart, brain, muscle, reproductive organs, digestive organs, etc. and helps body regain homeostasis. Epinephrine along with norepinephrine is responsible for immediate reaction to stress. For example a person is walking on the road and suddenly a speeding bike crosses him. He immediately stops, his heart starts beating fast, breathing rate increases, muscles get tensed and he may start sweating. This is known as adrenaline rush (Brogard 2015). The epinephrine makes the heart beat faster thus pushing blood away from less crucial areas like skin towards more important areas, like the muscles, heart, brain and other vital organs. Breathing rate increases allowing more oxygen to reach inside the body and extra oxygen is sent to the brain thus increasing alertness (Harvard Health Publication 2011).

### Stress, Stress Hormones and Coronary Heart Disease- The Mechanism

For many years, there has been intensive research works to understand the relationship between stress and CHD (Harlan 1981; Esch et al. 2002; European Heart Network 2006; Thurston et al. 2013; Mercola 2014). Stress and its association with diseases has become a major focus in medicine (Esch 2002). The notion that stress affects the psychological, physiological and behavioral domains of an individual is now widely accepted (Schaufeli and Enzmann 1998; McEwen 1998; Esch et al. 2002; Childs and Stoerber 2012).

Stress is an inevitable phenomenon of today's life. It can emanate not only from some personal tragedy like death of a dear one, financial loss, irrational fears or job loss but also from daily hassles of life like an unsupportive work environment, noise, unhappy marriage, regular traffic jams, bad neighbors, poor performance of children, unsupportive boss and cataclysmic events like terrorist attacks, earthquake, and flood. Out of the three the little stressors of everyday add up and take a toll on our well-being (Twisk et al. 1999). All these events have been linked to harmful health effects. According to reports stress can pose health effects on the body—including the heart. It has been observed that people who have received shocking news like the deaths have suffered an immediate heart attack (Johns Hopkins Medicine 2005; Koulouris et al. 2010; Krantz et al. 2011; Sharkey et al. 2011; Harvard Health Publication 2013; American Heart Association 2015). This condition is known as “broken heart syndrome” or “takotsubo cardiomyopathy” (Johns Hopkins Medicine 2005; Koulouris et al. 2010; Krantz et al. 2011; Sharkey et al. 2011; Harvard Health Publication 2013; American Heart Association 2015). Interestingly, a report by Mercola (2014) revealed that more heart attacks and other cardiovascular events occur on Mondays than any other day of the week. This phenomenon known as “Monday cardiac phenomenon” has been believed to be related to work stress. It has been found that CHD is more common in individuals subjected to chronic stress due to daily hassles of life (Pathak 1992; BBC News 2004; Mead 2007; American Heart Association 2014; The American Institute of Stress). Studies suggested that

daily hassles like noise pollution (Mead 2007; National Health Services 2012), traffic jams (BBC News 2004; NBC News 2009), stressful working environment (Kivimäki et al. 2002), working for unreasonable and unfair bosses (Wager et al. 2003), job insecurity (Landsbergis et al. 2003), long working hours (Sokejima and Kagamimori 1998), low control in the work environment (Bosma et al. 1997), inferred that workers were more than twice as likely to suffer from coronary heart disease. An inspection of any newspaper or journals uncovers that stress is the reason for human behavior and disease. But can stress actually cause heart disease? Remember the hormonal changes taking place in HPA axis (hypothalamus-pituitary-adrenal axis) to combat stress during stressful situation. Well, the body responds same physiologically to stress but when the work is mental the stress hormones mobilized for action are not used up. Stress also increases the heart rate and blood pressure (Sharpley 1998; Lutgendorf et al. 2000; American Heart Association 2014). The circulating stress hormones and increased turbulence in bloodstream due to high blood pressure and increased heart rate may damage the lining of the arteries. To heal the damaged walls of the arteries the blood platelets, mobilized by the stress hormones, adhere to it leading to thickening of the arterial wall thus resulting in blockage. Moreover, when bad cholesterol crosses these damaged arteries it enters the wall of the artery. The accumulating cholesterol and cells and debris become a plaque in the wall of the artery (National Heart, Lung and Blood Institutes 2014). With time, this process may also result in the development of atherosclerotic heart disease (Schneider et al. 1998; Kaplan and Manuck 1999; Castillo 2000) resulting in heart attack, heart stroke and other kinds of health problems (National Heart, Lung and Blood Institutes 2014). Stress is also found to be strongly associated with coronary artery disease (CAD) (Rozanski et al. 1988; Sharpley 1998; Negrao et al. 2000), angina (Rozanski et al. 1988; Negrao et al. 2000) and myocardial ischemia (Strike and Steptoe 2003). Stress arising from daily hassles of life like job strain, money constraint, bad experience, or any personal loss, etc might aid in the development and progression of CHD (Bomhof-Roordink et al. 2015).

#### **Coping with Stress – Coping with CHD**

A stressful life can make people adapt poor coping strategies like smoking, drinking, live

sedentary live or overeating to combat stress, which in turn may lead to various health issues including coronary heart disease. Globalization and urbanization, economic growth and growing competition, shrinking support networks, expectations from self and from others are leaving no time for recreation and relaxation (The New Indian Express 2015). The lifestyle change in recent years has acted as a catalyst to induce stress (The Health Site 2013). Technology, a boon for the 21<sup>st</sup> century, however, has led to a devastating change in people's lifestyle (Healing Hearts 2011). People instead of socializing now chat on mobile phones, instead of enjoying their hobbies prefer to watch television and instead of taking part in some outdoor games now like to play video games. The sedentary living has dominated active lifestyle (The Guardian 2013). Even at workplaces, it has been observed that stress affects both, a company's bottom line and the morale of the employees (Pathak 1992; Herrero et al. 2013). Cut throat competition has made employees spend hours sitting on their desktops doing their work. Apart from this, factors, such as relationships with supervisors or colleagues at work, workplace environment, authority at work, work demand have also added to stress levels. Nevertheless, stress both at home and workplace contributes to the onset, development, and progression of a CHD (Kobayashi 2004; Bomhof-Roordink et al. 2015).

Therefore, it is important for individuals to play an interventionist role for managing their stress, thereby, decreasing the number of cases of CHD. There are many sponsored programs for managing attitude and behaviors of people and increase the stress tolerance level. However, it is imperative to understand that prescriptions from highly institutionalized agencies or professional Yoga Gurus offering services to reduce stress in people may not always be helpful because of the rigor they demand and their general nature. Since, today people do not get enough time to follow the regimented nature of such agencies it is prudent to think of some simple user friendly stress management techniques.

#### **CONCLUSION**

The present paper suggests that it is the daily hassles of life that is more responsible for chronic stress leading to heart diseases. One reason may be their continuous nature. Cataclysmic events or personal crisis are for a short while causing acute stress and the individual adapts to those

and gradually tides over. However, the daily hassles of life which impact continuously create a dent into an individuals' body and mind which is reflected through its physiological ailments and behavioral disruptions. Stress is a risk factor for coronary heart disease. It is inevitable and will have its impact. It can neither be wished away nor can it be cordoned off. Managing stress is the key to decrease the risk of CHD. The activities mentioned in the recommendation section have been time tested and are based on years of research. If practiced regularly, it can help keep stress at bay thereby reducing the chances of CHD. Stress is certainly the greatest new age challenge but mastering it will open far greater avenues for growth. The principal strategy in fighting stress is neither to deny the existence of stress nor to be bogged down by it. The trick is to know that stress is a part of life and it can be conquered. Rather it has to be conquered. By investing little time and little effort on these small stress bursting techniques as mentioned in the paper, toll that stress takes on an individuals' heart can be highly reduced.

### RECOMMENDATIONS

The following techniques have been found to be useful in helping organizations cope with employee stress.

#### Becoming Aware of the Problem

It is necessary to face the unpleasant notion of being under constant stress. Dismally, individuals have the tendency to deny the existence of stress in their life. They often shrug it off without realizing that stress is gravely impacting their own well-being or those with whom they interact professionally and personally. One ends up overusing denial and thus taxing one's defense mechanism to exhaustion. (Kubler-Ross Model) because it is easier, psychologically, to cast out the probability and deny its existence completely. This avoidance strategy develops into a vicious cycle where the failure to cope with one stressor give rise to another stressor thus adding to the woes of already existing stress.

#### Prayer and Meditation

Both prayer and meditation work wonders in reducing stress. Spending a few minutes in med-

itation can restore calm and inner peace and balance emotional well-being and the overall health. It helps in moving away from the distress of life to a more peaceful and tranquil state of mind.

#### Laughter

Laughter is a powerful antidote to stress. Besides lowering the blood pressure, it improves the immune system and relaxes the muscle. It also stimulates certain secretions in the blood stream that creates a feeling of well-being and happiness. One can read amusing books or watch humorous movies. They can also indulge themselves in conversation with friends and families. However, it has to be remembered that laughter is a spontaneous emotional response and feigning laughter in laughter clubs may not be of much help.

#### Relaxation

Relaxation is a very effective way to deal with stress. It can decrease the effects of stress on mind and body. The idea is to deviate mind off the stress, or the stressful situations and substitute it with a more tranquil and peaceful scenario. Though relaxation is an individual specific response one has to understand that genuine relaxation must result in peace of mind. It should generate a feeling akin to the state in which an individual feels as if he is lying flat on his back in a deep blue sea in which there are no sharks and he or she will not be drawn. The techniques can range from watching television to listening to music or visiting some close friends or a power nap. Relaxation not only lowers blood pressure and heart rate but also improves concentration, boosts up confidence and reduces anger and frustrations.

#### Healthy Diet

A well-nourished body is well equipped to cope with stress. The link between mood and food is established. It is said that our *swabhava* (nature) is determined by the food we eat. Certain food increases the proclivity towards aggression whereas certain food catalyzes calmness and help in release of serotonin which is also known as "happy hormone". During stress body releases cortisol into bloodstream which sends appetite-stimulating neurotransmitters

into drive. This lowers the level of serotonin and programs brain accordingly.

### Exercise

People who are physically fit are more able to handle the long-term effects of stress. Doing frequent exercise reduces extreme physiological reactions when under stress. Regular exercise decreases stress hormone cortisol and increases endorphin giving mood a natural boost. It also increases self-confidence and lower the symptoms associated with mild depression and anxiety.

### Think Positive

The constant passive feeling of 'I can't do anything' is one of the main causes of stress, anxiety and lack of wellbeing. Positive thoughts not only boost up confidence and rejuvenate mood but also increases life span, lower rates of depression and levels of distress. Individuals who are optimistic do more physical activity, follow a healthier diet, and don't smoke or drink alcohol in excess and cope better with stressful situations.

### Create Balance

Unbalanced work life and personal life often soar stress levels. Time should be taken out for socializing, relaxation or exercise. To create balance one should include activities that are relaxing and creative like watching movies, yoga, reading, sports, etc.

### LIMITATIONS

Even though the reliability of the documents shared by doctors and their views on the topic are established and fairly high, effects of situational and extraneous variables cannot be ruled out. The study involved six months of complete data collection, the time constraint and rapid changes that were taking place during that period might have also influenced the result. This study has many such limitations which open up the opportunity for further research. Same or similar kind of study can be done on a much larger population or different work settings. The opinion elicited from the research study cannot be taken as the opinion of the whole population.

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