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Original Article

Relationship of Physical stress and hypertension among Cardiovascular Disease Patients

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Abstract

Objective The aim of the study is to find out amount of physical stress among cardiovascular disease (CVD) patients and its relation with hypertension. ***Background*** Physical stress is defined as a pressure – force and strain a state of physical mental tension. Stress is among the mental factors that has for some time been recorded among the potential. Furthermore, essential hazard variables of hypertension and coronary illness. ***Methodology*** A cross-sectional study was conducted in the patients of department of Cardiology at tertiary hospitals, Karachi, from January 2014 to December 2014. Sadaf stress scale (SSS) 2.0 was used to find out the physical stress. ***Results*** It showed physical stress among CVD patients about n=39 (43.3%) have moderate physical stress. which was decreased over time after 5 year of illness as compared to the patient who have disease for less than 5 years. While systolic blood pressure among subjects with severe physical stress showed an average systolic B.P. of 147mmhg, moderate have 146mmhg and patients with mild physical stress have 135mmhg. ***Conclusion*** This report concluded moderate physical stress among CVD patients which was decrease over time due different coping mechanism and blood pressures are directly related to severity of physical stress mainly systolic which lead to hypertension.

Keywords

Physical stress, Coronary Illness, Cardiovascular disease, Hypertension, Sadaf Stress Scale

Introduction

Stress is among the mental factors that has for some time been recorded among the potential Furthermore, essential hazard variables of hypertension and coronary illness (Rosengren A, et al. 2004). The susceptibility to stress varies from person to person. Among the factors that influenced the susceptibility to stress are different coping styles during the time period of a disease (Salleh, M. R, 2008). Stress is positive when it constrains us to adjust and hence to build the quality of our adjustment instruments, cautions us that we are not adapting admirably and that a way of life change is justified in the event that we are to keep up ideal wellbeing. This activity improving anxiety gives the competitor the aggressive edge and the general population speaker the energy to extend ideally. Stress is negative when it surpasses our capacity to adapt, fatigues body frameworks and causes behavioral or physical issues (Salleh, M. R, 2008). Physical stress is defined as a

pressure – force and strain a state of physical mental tension. In other word's physical stress is bodily response to substantial pressures such as exertion, noise, exercises or illness (Shamoon, N. & Sadaf, A., 2013), so illness like Cardiovascular disease can also lead to development of bodily response by causing physical stress.

Cardiovascular sickness has for quite some time been viewed as an established psychosomatic illness in that its onset or course was affected by an assortment of psychosocial factors. Psychosocial parts of CVD had been considered broadly and there is solid confirmation that mental anxiety is a noteworthy hazard figure for CVD and CVD mortality (Chockalingam A, et al. 2003; Rosengren A, et al. 2004). Tennant found a constructive relationship between life push and cardiac infarction and sudden death (Tennant C., 1999). The Inteherantt examine (Rosengren A, et al. 2004) uncovered that individuals with myocardial infarction reported higher commonness of four anxiety variables: worry at work and at home, money related anxiety and real life occasions in the previous year. The three noteworthy hazard figures regularly consented to be connected with CVD are hypercholesterolemia, hypertension and cigarette smoking.

The component fundamental the relationship amongst stress and hypertension is because of the basic patho physiological instruments which includes neuro-endocrine initiation intervened by the hypothalamic pituitary adrenal (HPA) framework (Widmaier, E.P., et al. 2006; Rutledge, T., & Hogan, B.E., 2002). Physical anxiety brings about hoisted cortisol level and catechol amines in blood plasma by the enactment of HPA hub and autonomic sensory system (Mastorakos, G., & Pavlatou, M., 2005) Initially, the neuroendocrine reaction to stress was accepted to be inferable exclusively to the arrival of catechol amines from the adrenal medulla, however Hans Selye conceptualized that components, for example, warmth or cold, constrained immobilization or work out, and in addition chemical, biological, natural, and mental variables will inspire precisely the same particular reaction of the catecholamine, as well as corticosteroids (Selye,H., 1936, 1950,1954,1976).

At the point when an individual is mentally or physiologically worried in an intense way i.e. disease like CVD, an unpredictable chain of response happens, coming from reactions happening inside the sympatho adrenal (SA) and hypothalamic pituitary adrenal (HPA) axis, and the parasympathetic (PNS) and sympathetic nervous system (SNS) pathways in the body. Intense mental anxiety has been appeared to inspire increments in the emission of epinephrine (EPI) and norepinephrine (NE) from the SA hub, and cortisol from the HPA hub (Schoder, et al. 2000; Chrousos, G. P., 2000a; Gerra, G., et al. 2001).

The mix of mental and physical stress has been appeared to bring about an exacerbated SA and HPA reactions over that of a solitary stressor alone (Acevedo, E. O., et al. 2006; Huang, et al. 2010a; Webb, H. E., et.al. 2011, 2010, 2013, 2008). Transient circulatory strain rises are seen after introduction to intense physical or enthusiastic worry in normotensive people and in those with fringe, early, labile, or persistent hypertension (Conway, 1986). The main objective of this study was therefore to assess the relationship between physical stress and hypertension and duration of the illness.

Methodology

A cross-sectional study was conducted in the patients of department of Cardiology at Lyari General Hospital and National Institute of Cardiovascular Diseases (NICVD), Karachi, from January 2014 to December 2014. A written informed consent was obtained from each patient. A total of 90 subjects which had cardiovascular disease were enrolled by non-probability convenient sampling majority of which were hypertensive and MI patients. The patients of both the sexes Male n=59(65.6%) and female n=31(34.4 %) ranging from >15 years were included in the study. This questionnaire based survey included both close and open ended questions along with the assessment of physical stress using Sadaf Stress Scale (SSS) version 2.0. Subjects were asked to fill the Sadaf Stress Scale (SSS) for the evaluation of physical stress while the scale includes 13 signs and symptoms that appear during physical stress.

Signs and symptoms of Physical Stress.

- Breathlessness
- Churning stomach
- Dizziness
- Dry mouth
- Excess sweating
- Fatigue
- Headache
- Increased heart rate
- Nausea
- Poor digestion
- Rapid/shallow breathing
- Tremors in hands/ legs
- Tingling in hands/legs

Results

Characteristic of study population

Overall, 90 participants were studied which were suffering from cardiovascular disease i.e. hypertension and myocardial infarction. The mean length of the study was 1 year. Nearly n=41 (45.6%) of the participants were over the age of 45. Fig. 1 shows physical stress which was calculated by using Sadaf stress scale 2.0. Mostly subjects were diagnosed with moderate physical stress n=58 (64.4%) while n=23 (25.5%) had mild and n=9 (10%) were having severe physical stress.

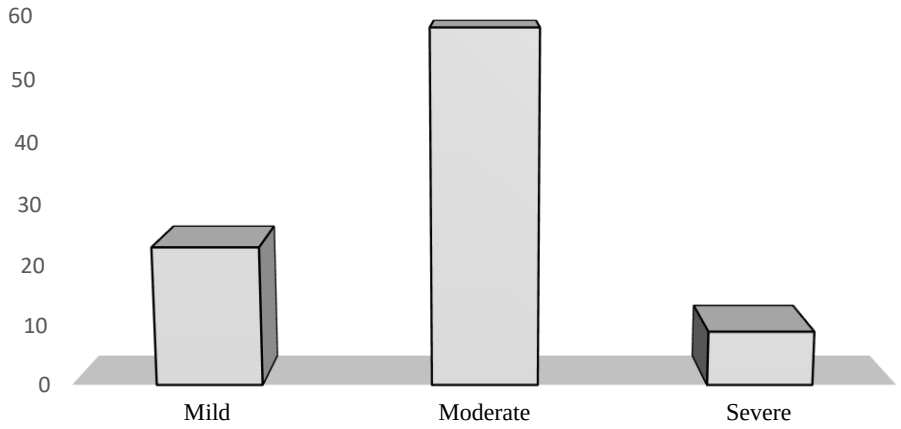
Ratio of physical stress and duration of disease

Fig 2. Shows progress of physical stress over the duration of illness which is categorize among two group of people one who had duration greater than 5 years and other less than 5 years to mark it as acute or chronic illness. Among the participants who had disease for less than 5years ratio are found to be n=39 (43.3%) have moderate physical stress, n=16 (17.7%) are mild and other n=5 (5.55%) have severe physical stress. While the other group of participants who had chronic illness with duration of greater than 5years physical stress decreased over time with n=19 (21.1%) fall in moderate category, n=7 (7.77%) are mild and only n=4 (4.44%) have severe physical stress over long period of time.

Physical stress and blood pressures

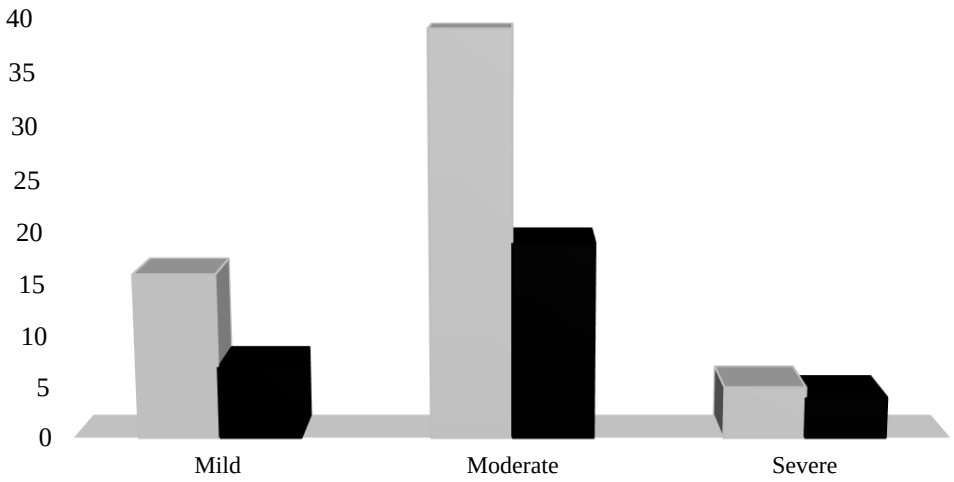
Fig 3. (A) shows systolic blood pressure among different stages of physical stress, subjects with severe physical stress showed an average systolic B.P of 147mmhg, moderate have 146mmhg and patients with mild physical stress have 135mmhg. (B) shows diastolic blood pressure which is 88mmhg in state of severe physical stress, 83mmhg in moderate and 80mmhg among subjects who have mild physical stress. Results showed a direct relation of blood pressure with severity of physical stress but systolic B.P is found to be more towards hypertensive border as compared to diastolic B.P.

Fig.1 Physical stress among participants.



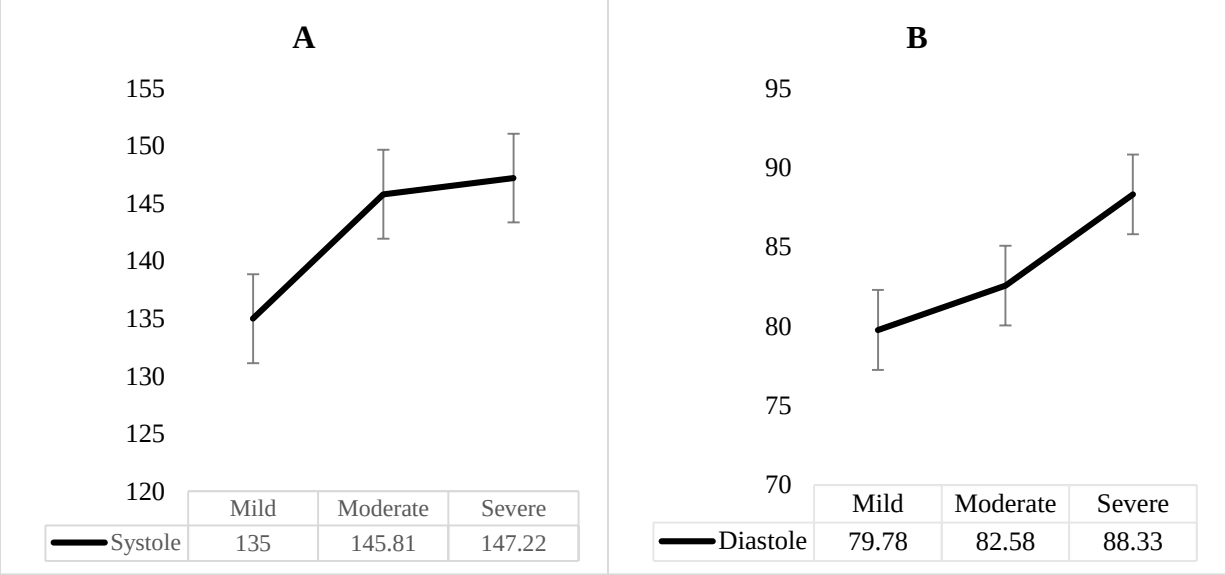
	Mild	Moderate	Severe
Physical Stress	23	58	9

Figure: 2 Physical Stress According to Duration of Disease.



	Mild	Moderate	Severe
Less than 5 years	16	39	5
Greater than 5 years	7	19	4

Fig. 3 (A) Systolic blood pressure, (B) Diastolic blood pressure and different stages of physical stress



Discussion

The demography of the study shows that as the stressor especially physical and psychological play a vital role in the pattern of disease, more the stress more will be duration of disease and person may acquire toxic or permanent change in the natural physiological response of the body (Huang,C. J., et al. 2010) one of the study done on cardiovascular patient shows the same result as the stress increase there like hood of getting diseased increases up to 54% with an increase in disease up to 65% and a big relation was seen between pathology of disease and the stress (Webb, H. E., et. al., 2008).

Other studies performed in the CVD patients shows the same result as the physical stress increase it will also have exacerbated the disease and the combination of physical and psychological stress will lead to certain changes in the system which will increase the duration of disease (Acevedo, E. O., et. al. 2006; Huang, C. J., et al.2010; Webb, H. E., et al.,2008). Several studies also shown that the chronic stress also play a role in weakening of immune system this can lead to an imbalance in the physiological response of the body against the disease which may can lead to another factor contributing in increasing the duration and progress of disease (Huebner, E. S. 1992). Some studies also show that there is a connection between stress and depressive disorder which play an important role in increasing the duration of disease (Hammen, C. 2005) on other hand some studies show along with physical and psychological stressor other stress like mental, traumatic, marital distress, job overload and social isolation may contribute in it (Krantz, D. S., & McCeney, M. K. 2002). A meta-analysis on CVD also conform our result as it shows that stress may increase the risk of disease up to 50% (Kivimäki, M., et al. 2006).

The result of our study also shows that physical stress also enhances significant increase in blood pressure which way cause hypertension and lead to several other cardiovascular diseases (Carroll, D, et al.

2003; Stewart, J. C., & France, C. R. 2001; Treiber, F. A, et al. 2001). A met analysis comprises a total of 2,043 studies including 34,556 subjects shows the same result i.e. chronic exposure to stress significantly increases the blood pressure ≥ 3.5mmHg (Gasperin, D., et al. 2009). A cohort-study conducted on over 3,000 young subjects which shows that when subjects are being exposed to chronic stress there is a strong association of developing high blood pressure in later life other studies also show a relevant relation with financial crises and other strains in high school may lead to chronic stress resulting in increased blood pressure (Yan, L. L et al. 2004; Steptoe, A, et al. 2005).

Another study shows that the overall prevalence of hypertension was found to be 54.7% of subjects but among the total population of 212 subjects 20% have mild depressive symptom and only 9% have moderate depressive symptom and stress (Agyei, B., et al. 2014). As above studies showed stress due to any physical strain like pressure, exertion and illness lead to development of hypertension. Similarly, results that were statically analyzed by this study revealed physical stress being increased by diseased among cardiovascular patients due to the physiological changes in HPA and SA axis which lead to release of cortisol and ultimately lead to increase in systolic blood pressure and hypertension.

Conflict of Interest

Authors Declare no conflict of Interest.

Acknowledgement

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