Role of Stress in Development of Cardiovascular Diseases

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Abstract		**Original Research Article**

In the year 2012 total 56 million deaths were recorded globally, out of which NCDs constituted 38 million deaths that are 67.85 %.CVDs contribute to a major portion of death caused by NCDs. An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke. According to Million death study CVD are the major cause of death in INDIA (1.8-2.0 million per year). There are various risk factors associated with CVDs; they can be classified in to local and systemic factors. Systemic factors are further divided in to modifiable and non modifiable factors. Modifiable factors consist of physical inactivity, smoking and many others whereas non modifiable factors consist of gender, age and genetic predisposition. The main objective of this research survey was to establish role of stress in development of CVDs and to make people about stress and its relationship with CVDs and other diseases. There are many factors which are associated with development of cardiovascular disease and stress is one of them, stress is both harmful and useful for the body as small amount of stress is also necessary to maintain consciousness of an individual. If stress level is increased and if remains for a long duration it may cause affect to various body organs like brain, kidney, GIT system (stomach ulcers), thinking and memory problems, sleep disorders and which may even lead to death. In this research survey a questionnaire of 13 questions was used to collect data from population of 120 people out of which 103 people's data was screened out and analyzed, it consist of both male and female and people of different age group and occupation. In results it was found that most of the population knows the meaning of stress, but very less follow any kind of physical activity on the daily basis, preference for fast and processed food and method to release stress differs from person to person. Due to increasing in CVDs worldwide many technical development are done to measure factors which cause it like stress measuring devices which determines amount of stress hormones in blood with the help of different mechanisms. Various agencies like WHO are also taking initiative to fight against CVDs by introducing various health programs like Global hearts and many more to increase awareness about CVS diseases among the people and aims to provide better facilities to patients as well as normal human beings in economically efficient way. These agencies are collaborating with various government agencies of different countries to conduct various awareness programs.
Key Words: Cardiovascular Diseases, stress, Risk factor, GIT system (stomach ulcers), thinking and memory problems, sleep disorders.

INTRODUCTION

Hypertension, myocardial infarction, atherosclerosis, arrhythmias and valvular heart disease, coagulopathies and stroke, collectively known as cardiovascular diseases (CVDs), contribute greatly to the mortality, morbidity and economic burden of illness in many countries. The most common types of CVD include coronary heart disease (CHD) and cerebrovascular disease. These are related to the narrowing of the blood vessels supplying the heart muscle and brain, respectively, with blood and oxygen. In general, this narrowing result from atherosclerotic plaques made of cholesterol and fats building up in the endothelium of the arteries. As per World Health Organization (WHO), Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels and they included such as a Coronary heart disease, Cerebrovascular disease, Peripheral arterial disease, Rheumatic heart disease, Congenital heart disease, Deep vein thrombosis and pulmonary embolism etc., Heart attacks and strokes are usually acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fatty deposits on the inner walls of the blood vessels that supply the heart or brain. Strokes can also be caused by bleeding from a

blood vessel in the brain or from blood clots. The cause of heart attacks and strokes are usually the presence of a combination of risk factors, such as tobacco use, unhealthy diet and obesity, physical inactivity and harmful use of alcohol, hypertension, diabetes and hyperlipidaemia [1].

Risk Factors Associated With Cardio Vascular Disease

The physiology of cardiovascular diseases (CVDs) is complex and has many causing factors associated with it. Endothelial dysfunction, which is the main initiator of the low-grade inflammation in the vascular wall, is the result of a combined action of local and systemic factors interfering with the dysfunctional endothelial cells.
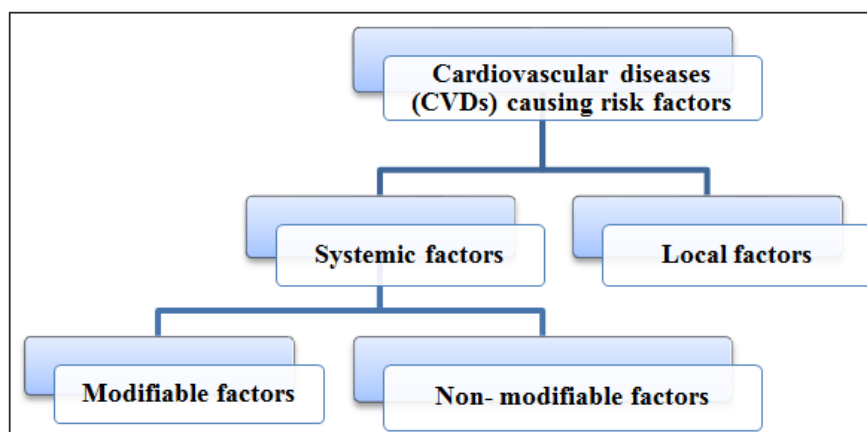

Fig-1: Classification of factors causing CVDs

Local factors are disturbed blood flow and absence of normal laminar shear stress due to naturally present bifurcations, branching points, and curvatures in the arterial tree, but also in response to unfavourable serum lipid profiles [2]. Systemic factors include: Modifiable and non- modifiable factors, Physical inactivity, smoking, and systemic disorders such as dyslipidemia and high blood pressure are examples of the modifiable factors and examples of non- modifiable factors are age, gender, and genetic predisposition. Both local and non-modifiable risk factors are natural conditions involved in the development of atherosclerosis, but modifiable risk factors are highly correlated to lifestyle, and an unhealthy lifestyle has been shown to accelerate and aggravate the atherosclerotic process. Results published in 2004 from the multinational interheart study showed that nine modifiable risk factors closely linked to the modern western lifestyle (abnormal lipids, smoking, hypertension, diabetes, abdominal obesity, psychosocial factors, fruit and vegetable intake, and physical inactivity) could explain 90% of the myocardial infarctions worldwide, in both sexes and at all ages in all regions studied [3]. Stress is often described as a feeling of being over loaded, wound up tight, tense and worried. It can sometimes help to motivate us to get a task finished, or perform well. But stress can also be harmful if we become over stressed and it interferes with our ability to get on with our normal life for too long [4]. It can be also defined as a situation where equilibrium and balance between a human being and its surrounding is interrupted. In response to stress, the level of various hormones changes. Reactions to stress are associated with enhanced secretion of a number of

hormones including glucocorticoids, catecholamine's, growth hormone and prolactin, the effect of which is to increase mobilization of energy sources and adapts the individual to its new circumstance[5].

Commonly known as the fight or flight hormone, it is produced by the adrenal glands after receiving a message from the brain that a stressful situation has presented itself. Along with the increase in heart rate, adrenaline also gives you a surge of energy which you might need to run away from a dangerous situation and also focuses your attention. A hormone similar to adrenaline, released from the adrenal glands and also from the brain. The primary role of nor epinephrine, like adrenaline, is arousal. It also helps to shift blood flow away from areas where it might not be so crucial, like the skin, and toward more essential areas at the time, like the muscles, so you can flee the stressful scene.A steroid hormone, commonly known as the stress hormone, produced by the adrenal glands. The release of this hormone takes a multi-step process involving two additional minor hormones. First, the part of the brain called the amygdale has to recognize a threat. It then sends a message to the part of the brain called the hypothalamus, which releases corticotrophin-releasing hormone (CRH). CRH then tells the pituitary gland to release adrenocorticotropic hormone (ACTH), which tells the adrenal glands to produce cortisol. In survival mode, the *optimal* amounts of cortisol can be life saving. It helps to maintain fluid balance and blood pressure, while regulating some body functions that aren't crucial in the moment, like reproductive drive, immunity, digestion and growth. But when you step on a problem, the body *continuously* releases cortisol, and

chronic elevated levels can lead to serious issues. Too much cortisol can suppress the immune system, increase blood pressure and sugar, decrease libido, produce acne, and contribute to obesity and more health issues.

Types of Stress

A. Acute Stress: Acute stress is the most common form of stress. It comes from demands and pressures of the recent past and anticipated demands and pressures of the near future. Acute stress is thrilling and exciting in small doses, but too much is exhausting. Symptoms of acute stress are easily detected by people. It does not cause extensive damage as it is for short duration, so it is highly treatable and manageable. The most common symptoms are combination of anger, anxiety and depression, tension, headache, back pain, jaw pain, muscular tension, Heartburn, acid stomach, diarrhoea, IBD Transient over arousal leads to elevation in blood pressure, rapid heartbeat.

B. Episodic Acute Stress: If acute stress occurs very often then it is termed as episodic acute stress. People who are pessimistic or always see negative side of everything frequently suffer from this type of stress. Treating episodic acute stress requires intervention on a number of levels, generally requiring professional health which may take many months. Only the promise of relief from pain and this comfort of their symptoms can keep them in treatment and on track in their recovery program.

C. Chronic Stress: If acute stress increases or lasts for longer duration it becomes chronic stress. This type of stress is constant and is not easily treated. Because physical and mental resources are depleted through long term attrition, the symptoms of chronic stress are difficult to treat and may require extended medical as well as behavioural treatment and stress management [6]. It has been repeatedly shown that an inverse relationship exists between physical activity and the occurrence of CVDs (i.e., with increased physical activity, the relative risk of developing CVD is decreased). The physiological reaction to psychological stress, involving the hypothalamic–pituitary–adrenocortical and sympatho–adrenomedullary axes, is well characterized, but its link to cardiovascular disease risk is not well understood. A short-term emotional stress can act as a trigger of cardiac events among individuals with advanced atherosclerosis. A stress-specific coronary syndrome, known as transient left ventricular apical ballooning cardiomyopathy or stress (Takotsubo) cardiomyopathy.

Global scenario of cardiovascular diseases (CVDs): In the world non communicable diseases (NCDs) such as cardio vascular diseases (CVDs), stroke, cancer, chronic respiratory diseases and diabetes are one of the main cause of most of the mortalities. In the year 2012 total 56 million deaths were recorded globally, out of which NCDs constituted 38 million deaths that are 67.85 %. CVDs contribute to a major portion of death caused by NCDs. An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke. Over three quarters of CVD deaths take place in low- and middle-income countries. Out of the 16 million deaths under the age of 70 due to non communicable diseases, 82% are in low and middle income countries and 37% are caused by CVDs [7].
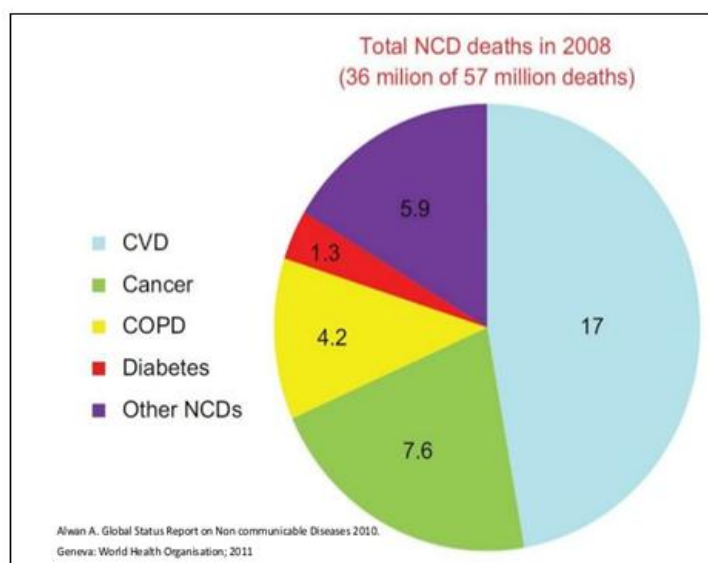

Fig-2: Total NCD death in 2008 (36 million of 57 million death) [12]

Two of the global targets directly focus on preventing and controlling CVDs. The sixth target in the Global NCD action plan calls for 25% reduction in the global prevalence of raised blood pressure. Raised

blood pressure is one of the leading risk factors of cardiovascular disease.

Indian Scenario:-Mortality data from the Registrar General of India shows that cardiovascular diseases are a major cause of death in India now .As India is one of developing countries these CVDs are increasing burden on lower and middle economic class people.
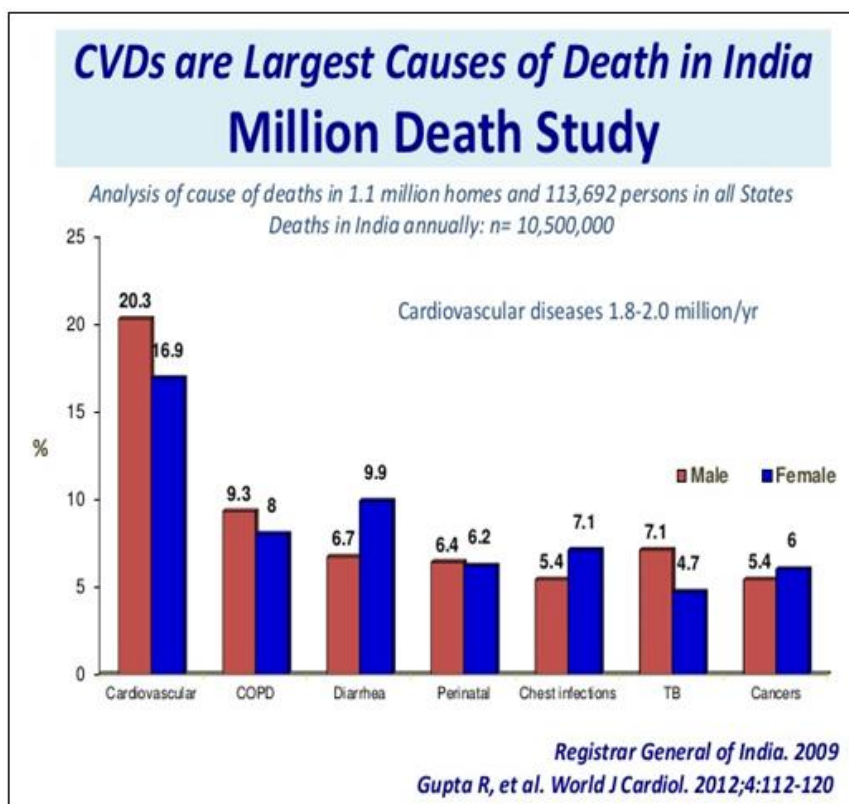

Fig-3

MATERIAL AND METHOD

In This Study Questionnaire Was Used as a Tool for the Collection of Data from the Population. A Questionnaire Leaflet Of 13 Questions Was Framed. The questions were based on basic life style, psychology of individual for answering any given question and to get idea what the basic information an individual has about the stress and its related factors. The final questionnaire was prepared by editing sample questionnaire which was previously prepared which contains 20 questions with the help of valuable guidance, suggestions and support provided by mentor. Some of The Questions Were Omitted and Existing Questions were modified in Terms of Language and Options to Make It Simple and Understandable to The Population. Final Questionnaire Was Again Cross Checked If Any Errors Exist Then it was Finally Approved for Survey. There were Certain Criteria and Parameters Followed during Conduction of Survey. Individuals who were ready to answer the questionnaire were enrolled in our survey study. Both females and males were included in our survey. People who are having any of CVS disease or encountered it in past were also included in our study survey. Individual of age below 20 years were excluded from our survey.

Population was divided in to 4 groups i.e. Below 25 and 25 years, 25 to 45 years, 45 to 65 years, 65 years and above. This study was carried out in various hospitals, public places and educational institutes of Kanpur, Uttar Pradesh (INDIA). Our study was conducted on total 120 individual which were from family, friends, neighbours, relative etc of different gender, age group, occupations and which belongs from different education background in order to obtain a wide range of information. Questionnaire was distributed in the form of hard sheets and through mails. People were asked to fill the questionnaire honestly and in relax mode with the help of pen or pencil. Different space was provided where people can share their ideas and different views related to our topic if they want.

After the collection of data and its over view was taken. The pattern of people selecting an option and their attitude towards the question was observed. Opinions and suggestions provided by individuals additionally to the questionnaire were carefully studied. Later the data was statistically analysed with the help of SPSS software.

RESULT

A total of 120 people were selected for our survey out of them data of 103 people was screened out for final analysis and for obtaining results. 17 people were excluded due to some reasons like inappropriate response towards questionnaire, unable to understand the theme of survey. For the statistical analysis, data was assumed to be normal distributed. Various parametric and nonparametric tests were applied to the data by using SPSS (STATISTICAL PACKAGE FOR THE SOCIAL SCIENCES) software.

Table-1: Age group distribution

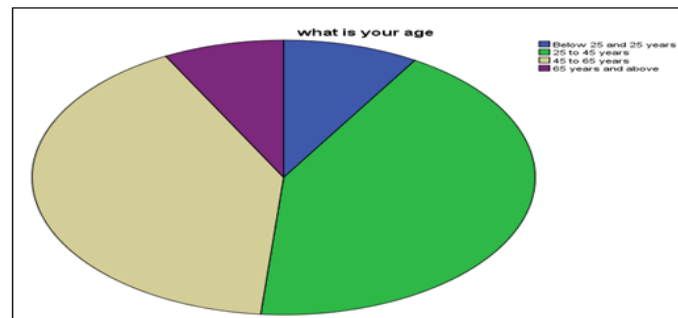| Sl.No:	Age	Total
1.	Below 25 and 25 years	9
2.	25 to 45 years	44
3.	45 to 65 years	42
4.	45 to 65 years	8
Total		103

Fig-3: Age group distribution

Inference 1:- From the table no. 3.1 and fig no. 3.1 it is clear that 42.71% of total population belongs to age group 25 to 45 years, 40.77% belongs to age group 45 to 65 years, and rest very less proportion of population belongs to age group below 25 and 65 years and above age group, so most of the people in our survey belongs to age group of 25 to 45 years.

Table-3.2: Gender distribution

Gender	Frequency	Percent	Valid Percent	Cumulative Percent
Male	43	41.7	41.7	41.7
Female	60	58.3	58.3	100.0
Total	103	100.0	100.0	

Inference 2:- From table no. 3.2 and fig no. 3.2 we can say that number of females in our survey is greater than number of males i.e. 58.3%.

Table -3: Meaning of stress

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
A state of mental or emotional strain or tension	58	56.3	56.3	56.3
Physical response of body	22	21.4	21.4	77.7
I don't know	1	1.0	1.0	78.6
A major health issue	22	21.4	21.4	100.0
Total	103	100.0	100.0	

Table-4: Body part affected by stress

Gender	Body part affected				Total
	All of the above	Digestive system	Brain	Heart	
Male	30	1	7	5	43
Female	42	0	14	4	60
Total	72	1	21	9	103

Inference 3:- Most of the people defined stress as state of mental or emotional strain or tension followed by physical response of body as second most chosen option. Very less part of population did not know the meaning of stress.

Inference 4: Most of the people said that all of the body parts are affected by the stress and some of the people said either brain or heart is affected by the stress (Table no- 3.4).

Table-5: Location of cell phone while sleeping

Gender	Location of cell phone while sleeping				Total
	Far from body	Very near to body	Below your pillow	Any other	
Male	18	14	1	10	43
Female	33	20	1	6	60
Total	51	34	2	16	103

Inference 5:- Most of the people said that they place their cell phone far from their body while sleeping in which mostly female opted this option. Very less number of people placed their phone below their pillow while sleeping.

Table-6: Role of stress in development of cardio vascular disease

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Yes	67	65.0	65.0	65.0
No	15	14.6	14.6	79.6
I don't know	21	20.4	20.4	100.0
Total	103	100.0	100.0	

Inference 6:- Most of the people said that stress has role in development of CVDs and very less people said that stress has no role in development of CVDs, 20% of population did not know that stress has role in CVDs development.

Table-7: Significance of stress

Age	Significance of stress		Total
	Harmful	Both	
Below 25 and 25 years	6	3	9
25 to 45 years	39	5	44
45 to 65 years	37	5	42
65 years and above	8	0	8
Total	90	13	103

Inference 3.7:- According to 87% of population stress is harmful in which people of age group 25 to 45 years mostly opted this option. Only 12% of population found stress is both harmful and useful.

Table-8: Impatient while waiting

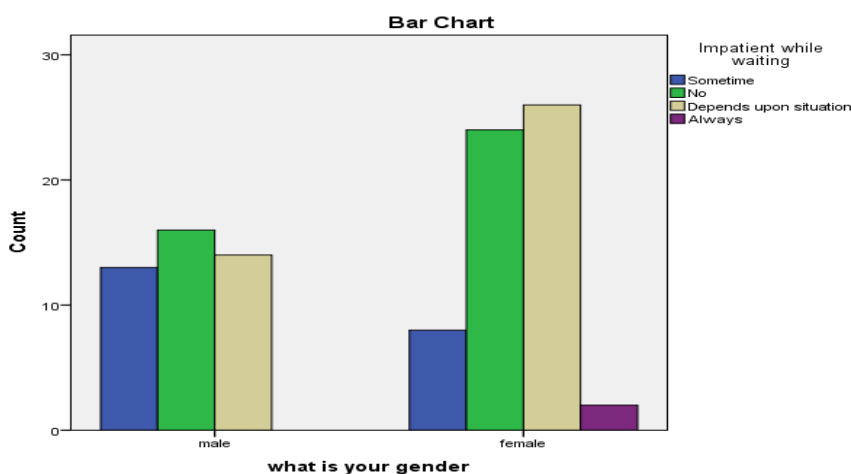| Gender	Impatient while waiting				Total
	Sometime	No	Depends upon situation	Always	
Male	13	16	14	0	43
Female	8	24	26	2	60
Total	21	40	40	2	103

Fig-4: Impatient while waiting

Inference 8:-Most of the people said that their tendency to get impatient depends upon situation; out of them females were most to select this option i.e. 65%,

and very less portion of population said that they have always tendency to get impatient in given situations.
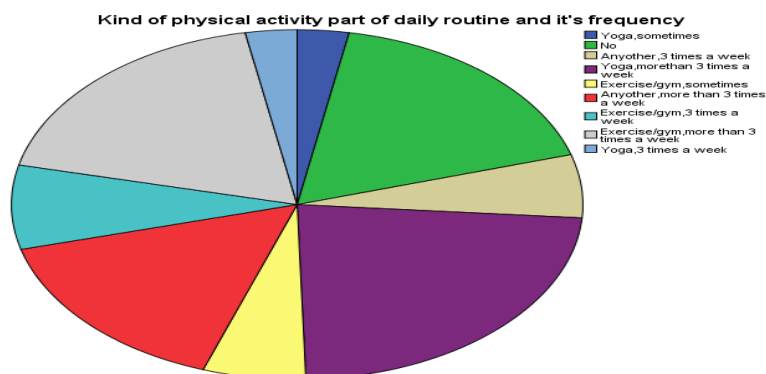
Kind of physical activity part of daily routine and it's frequency

Fig-5: Kind of physical activity followed

Inference 3.9:- Fig no-3.5 displays pattern of physical activity followed by individuals in which most of people follows yoga as part of their physical activity which is more than 3 times a week.

Table-9: Method to release stress

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Listening music	26	25.2	25.2	25.2
Watching movie	15	14.6	14.6	39.8
Medicine	15	14.6	14.6	54.4
Cooking	7	6.8	6.8	61.2
Alcohol intake	1	1.0	1.0	62.1
Any other, meditation	39	37.9	37.9	100.0
Total	103	100.0	100.0	

Inference 10:- From table no. 3.9 it is clear that most of the people selected meditation as a method to release stress, 25.2% population found listening music effective in releasing stress.

Table-10: Feeling of shakiness while using stairs

Age	Feeling of shakiness while using stairs		Total
	Sometime	No	
Below 25 and 25 years	5	4	9
25 to 45 years	22	22	44
45 to 65 years	26	16	42
65 years and above	6	2	8
Total	59	44	103

Inference 11:- From table no.3.10 it is clear that most of the People of age group 45 to 65 years are sometimes having feeling of shakiness while using stairs.

Table-11: Preference for fast and processed food

Gender	Often prefer fast and processed food				Total
	Sometime	Never	Depends upon situation	Always	
Male	20	7	13	3	43
Female	29	11	18	2	60
Total	49	18	31	5	103

Inference 3.12:- 59% of females said that they prefer fast and processed food sometime and very less people opted that they always prefer fast food (Table no- 3.11).

The main objective of this project was to find out role of stress in development of cardiovascular diseases, questionnaire was framed with 13 questions, and these questions were related to normal lifestyle of individuals, what is thinking of a person about the stress its significance and how stress could be related to other

factors. As cardiovascular diseases are the one of the most prevalent diseases amongst all NCDs and cause billions of death worldwide, stress is also found as one of the emerging cause of its development followed by

other factors. In this project stress related hormones i.e. adrenaline, nor epinephrine and cortisol and various factors associated with stress, type of stress are discussed.
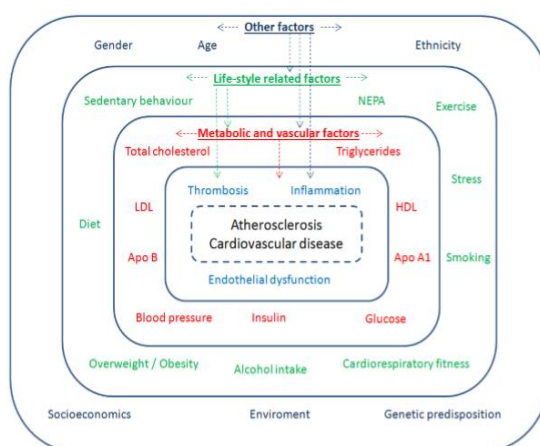

Fig-6: Interrelationship between traditional metabolic/vascular, lifestyle-related, and other factors and their association with atherosclerosis and CVD [2]

In result it was found that most of the population feels that stress is only harmful to the body (Table no- 7) but small amount of stress is also necessary for body it could be defined as positive stress, as it maintains awareness and consciousness of a person. It was very delightful to find that most of the population knew meaning of stress and have information that stress has role in development of CVDs, but still some of the people don't have idea that stress may lead to various disorders including CVDs (Table no-3 and Fig no- 3) As various radiations are emitted out from cell phones so it affects various body organs including its major effect on heart, considering this there was a question in questionnaire regarding cell phone usage duration per day and location of cell phone while sleeping to get idea about what is the proximity of cell phone to their body and as well as duration exposure of cell phone radiations to the body.

Physical activity which could be of any kind like exercise, gym, yoga and meditation, dancing, walking plays very vital role to maintain health of an individual but due to busy schedules and change in life style people pay very less attention towards these kind of activities which is the major cause of emerging various NCDs including CVDs. From the results of this survey it is clear that most of the people prefer yoga than other activities which is not regular but more than 3 times a week, it is helpful to relax both body and mind (Fig no-5) Fast and processed food are displacing healthy food very rapidly due to changing preference of the public, it is increasing chances of various serious conditions like obesity, high cholesterol levels which affects many body organs like liver, kidney, heart and many others. It was obtained from results of this survey that most of the people prefer this type of food

sometimes and some portion of population always prefer this type of food (Fig no- 11).

Choice of method to release stress differs from person to person it is purely based on their preference level, according to this survey most of the people found meditation an efficient way to get relief from stress (Table no- 9). There could be numerous method to release stress like watching movie, cooking, listening music, but some of the people prefer in adequate methods like smoking, alcohol intake, drugs which builds up addiction in them, these methods could release stress for short duration but make cause long term problems to the health of a individual. Many people get impatient in various conditions like waiting for buses, trains, in public places like bank, railway stations this may originate stress and stress like conditions in them.

CONCLUSION

In this research a questionnaire of 13 questions was used as a tool for survey, a total 120 individuals of different occupation, age group, gender were approached out of which 103 persons corporately answered the questionnaire. During this survey it was pleasant to find that people are very much interested in health surveys and ready to gain information about various health issues and they were having some information about stress and its association with CVDs. This health survey also served as a medium to spread information related to stress and CVDs among people and was it very delightful to clear doubts of people.

As CVDs are one of the problems worldwide many initiatives are taken by government and various agencies to improve health condition of people. Many technologies are develop to measure and regulate stress

like stress measuring devices which are easy to operate, which measures amount of stress hormones in body which can be useful to warn people in alarming conditions of increased stress in their body. Many programs are launched by various health agencies like Global hearts by WHO to fight with various diseases related to cardiovascular system and to make people aware about it. These programs not only spread information but also aim to provide better health facilities to people with economic efficiency.

We hope that this project survey will help people to get idea about stress its causing factors and its role in development of CVDs and fulfil its objective. And it may be helpful to improve health condition of people in best possible way and make people aware to inculcate healthy habits in their lifestyle like addition of a daily physical activity, placing cell phone at a proper distance from body, decreasing usage of cell phones at minimum possible levels, and making less consumption of fast food which affects heart health. At last we would like to thanks our mentors and other members for their healthy attitude and valuable support in conduction of this project. We would also like to thanks our institute for providing such a great opportunity to work on this research project and we are looking forward to work this type of projects and serve our society in future also.

FUTURE PERSPECTIVES
More than 17 million people die annually from cardiovascular disease (CVD). Many of these people have been exposed to unhealthy behaviors, including tobacco use, eating foods containing too much salt and inadequate physical activity. And many could be saved by better access to medical care for high blood pressure (responsible for the bulk of heart disease-related deaths annually), high blood cholesterol and other conditions that raise the risk for heart disease and stroke [8]. Many initiatives are taken by various health agencies to treat and decrease occurrence of CVDs worldwide, in this regard various technologies are developed.

Stress measuring devices: - A group of Japanese researchers has developed a gadget that can supposedly measure human stress levels which termed as COMPACT STRESS METER. Following the previous researches it is clear that after analyzing pulse rate waveform using chaos theory which should be maintained at certain rates it is easy to determine health condition of a person. These types of devices tunes this system, so it determines stress index, utility of this device is confirmed by measuring amount of stress hormones in blood [9].

A wearable wireless charging device called SIPRE which is worn on the torso or hip which detects breathing patterns and activity by using its seven streams of raw sensor data, including a three-axis accelerometer is used to measure stress levels in person. This device aims to reduce stress hormone (cortisol) and increasing release of endorphins in body. This device was founded by Jonathan Palley and Neema Moraveji, application related to this device could be installed in iPhone or iPods and costs about $149.99[10].

Fig-7: A smart phone with reader strip

Another device has been developed which can use any Smartphone to determine the concentration of cortisol in saliva within 10 minutes. This device is a reader which includes a case, light pipe and lens. The person being tested inserts a straw-like saliva collector under the tongue. The collector wicks the saliva by capillary action to an immunoassay strip housed in a cassette and the cassette is inserted into the reader. The Smartphone uses its camera and flash to take a picture of the saliva-coated strip and an algorithm converts the image's pixel density to a cortisol value [11].

Fig-8: SIPRE [10]

WHO programs:- 22 September, 2016: "Global Hearts", a new initiative from the World Health Organization (WHO) and partners launched on the margins of the UN General Assembly, aims to beat back the global threat of cardiovascular disease, including heart attacks and strokes - the world's leading cause of death. Global Hearts is part of a new effort to scale up prevention and control of CVD, especially in developing countries. It is collaboration between WHO, the United States Centres for Disease Control and Prevention (US CDC), and other partners, including the World Heart Federation, the World Stroke Organization, the International Society of Hypertension, and the World Hypertension League.

WHO Director-General Dr Margaret Chan says the Global Hearts Initiative can save many millions of lives through ramping up proven measures to prevent CVD in communities and countries, including tobacco taxation, reducing salt in foods, detecting and treating people at high risk and strengthening primary health care level services. Using such measures, the United States has reduced deaths from CVD by more than 40%, and Finland has reduced CVD deaths in men by 80%. "The Global Hearts Initiative is fair, as it aims to extend measures that have produced such dramatic results in wealthy populations to people living in countries with limited resources or in low-income groups," says Dr Chan. "Over three quarters of deaths from heart attacks and strokes occur in low- and middle-income countries. Poor and disadvantaged populations should not be denied access to interventions that can save so many lives, especially since effective interventions are also inexpensive."

The Global Hearts Initiative comprises three technical packages

SHAKE: a new set of evidence-backed policy options and examples to support governments to lower population salt consumption. If fully implemented in every country, SHAKE could save millions of lives per year and dramatically reduce the burden of NCDs on health systems.

HEARTS: This technical package gives countries the tools to incorporate cardiovascular disease management best practices at the primary health care level to reduce cardiovascular risk factors such as high blood pressure and high blood cholesterol. HEARTS aims to prevent heart attacks and strokes through equitable access to ongoing, standardized and quality care.

MPOWER: Tobacco kills around 6 million people every year. MPOWER is a set of six practical, affordable and achievable measures to help countries implement specific provisions of the WHO Framework Convention on Tobacco Control. This new push will help scale up efforts by many countries that are already implementing the MPOWER package of demand-reduction interventions for effective tobacco control.

Based on the Global Hearts technical packages, WHO, the US CDC and partners will provide governments with the technical support required to implement and scale up interventions to reduce blood pressure, and prevent heart attacks and strokes. Reducing demand for tobacco products and content of salt in foods can help millions of people avoid unnecessary death and suffering from cardiovascular disease," adds Dr Douglas Bettcher, WHO Director for Prevention of NCDs. "This can also be a major cost saving for resource-strapped governments by avoiding unnecessary healthcare costs."

Dr Etienne Krug, WHO Director for the Management of NCDs, adds: "The Global Hearts Initiative takes a comprehensive approach to address the cardiovascular disease burden. Its aim is to help countries scale up tested affordable and adaptable measures to make their health services better able to detect and treat people at risk of, or suffering from, heart disease."The Global Hearts Initiative will be initially rolled out in Barbados, Benin, Colombia, Ethiopia, India, the Islamic Republic of Iran, Jordan, Nepal, Nigeria, Philippines, Sri Lanka, Tajikistan, Thailand and Uganda – and will be open to all countries wishing to participate. Many more initiatives should be taken from government and health agencies to spread knowledge about factors which are causing CVDs like stress which is less known by population and should establish more reliable methods to release stress which provide relief for long duration. There should be conduction of various awareness programs.

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