**Original article:**

# Distress in female type 2 diabetes patients – prevalence, stressors, symptoms & its impact

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**Abstract**

**Introduction:** Distress adversely affects the outcome of treatment of any disease, condition or disorder. This study was done to assess prevalence of distress in type 2 diabetes patients, its effect on them and to know the stressors and dominant symptoms of stress perceived significantly by patients attending Government Medical College Hospital in Coimbatore.

**Materials and Methods:** Evaluation of Stress and stressors using standardized questionnaire, recording of Age, height, weight, Blood Pressure and measurement of fasting Plasma Glucose & serum Cholesterol.

**Observation & Results:** 35.7% were distressed. 89% had developed diabetes before 50yrs of age. 57% of subjects with hypertension were undiagnosed and 55.6% of those under treatment had poor control. Obesity, Hypercholesterolemia and poor glycaemia control was 76.8%, 68% and 63% respectively and a very few were on Statins. Other than easy fatigability and head ache cognitive symptoms were more common. National economical status, sickness, Interpersonal relationship and alcoholism were the stressors in descending order of frequency distribution.

**Conclusion:** In distressed age at onset of the disorder is early which provides longer time for development of vascular complications. Co morbidities need to be addressed more stringently as they expedite diabetes complications. Too many cognitive and emotional symptoms indicate need for evaluation of distress and stressors in the patient, and suggestion for counselling and stress de fusers.

**Key words**: Type 2 diabetes / NIDDM, Stress, Stressors

## Introduction

The importance of emotional issues in diabetes was first noted over 300 yrs ago in 1674 by Thomas Willis. Indian diabetic patients have one of the lowest levels of psychological well being of WHO – 5 well being Index [1].

India is leading in prevalence of diabetes to earn the name 'Diabetes Capital of the World'[2]. More than 90 % of diabetics are of Type 2 category also known as Non Insulin Dependent Diabetes Mellitus in short NIDDM[2]. The quantum of rise is beyond the level that could be accounted by changing trend in BMI, Physical Inactivity and dietary changes due to urbanization). Researchers opine that stress may be one of the factors responsible for this [3]. Though various drugs and Insulin are available 31.1% of them are under good Glucose control [4]. Stress when acute and severe is known to precipitate hyperglycemia to pathological level in latent diabetics and thus chronic stress can adversely affect diabetes control. In distressed individuals adherence to life style modification and treatment regimen is poor [1].Derived from the Latin word 'stringere' stress was popularly used in 17th century to mean hardship, strain, adversity or affliction. Hans Selye the pioneer of stress defined stress as non specific response of the body to any demand or change and the demands or stimuli as stressors. Bruce Mcween and Jaap Koolhaas opined that the term stress should be restricted to disturbed homeostatic conditions due to an environmental demand, internal or external. The great neurologist

Walter Cannon further recognized that stressors could be emotional or physical. Thus it is redefined as a state of mental, emotional or physical strain destabilizing homeostasis. Stress causes changes in internal environment of body including Blood pressure, blood glucose, serum Free Fatty Acids level, skeletal muscle efficiency and functioning of Central Nervous System. Lazarus and Folkman broadened the changes to include psychological components such as appraisal and coping. Dr L Prakasam Reddy defines it as psycho-physiological response to environmental factors called stressors developing due to demand capability imbalance to the extent to destabilize homeostasis[5]. Physiologically aging itself is a promoter of negative stress response as it impairs the ability to maintain homeostasis.

Stress is unavoidable at any age. It is classified as mental / emotional / Neurogenic (Processive Stress – ex: bereavement, failure in exams, poor business turn over) or physical strain (Systemic Stress – ex: pain, dehydration, exposure to extreme environmental temperatures)[6] and acute or chronic. The response of body to a stressful stimulus is to counteract or to cope up with the situation so that disturbed homeostasis is restored.

Generally it is considered as distress - a negative or unpleasant experience though it can be helpful by improving the physical and mental efficiency in life risked environment and in achieving goals in short term. When it is thrilling and pleasant it is positive stress. Eustressors are the stressors that we face in day to day activities like climbing hill, running, menstruation etc. The characteristic feature of Eustress is restoration of homeostasis within a short span of time by negative feedback loop as the stressor is removed. It does not leave any ill or positive effect on the body or mind too whereas chronic stress is always harmful.

**Stress Response [5]:**

It has three phases depending on the duration and severity of the stressor as appraised by the individual. In extremely intense and chronic distress the response passes successively through all three phases and it is known as General Adaptation Syndrome (GAS). The phases are

1. Alarm Phase – Detection of stressor and its consequences. If the appraisal elucidates a positive / Neutral emotion or if it is innocuous situation the organism relaxes.
2. Resistance or Adaption Phase – Determination of coping strategies to counteract the stressor
3. Exhaustion Phase – when one fails to counter despite maximum efforts and energy and counter action mediators are depleted.

Stress activates Hypothalamic - Sympathetic - Adrenal Medullary System instantly to produce 'Fight or Flight / Alarm Response' when acute and Hypothalamic - Pituitary - Adrenal cortical Axis when stress is prolonged for more than a few minutes – Resistance / Adaption Stage. Positive stress, a type of acute or short term stress activates endogenous Opioid and Reward – Dopamine system [6,7,8]. Opioid System by acing on $\mu_2$, $\delta$ receptors on limbic system, peri - aqueductal gray and Substantia Gelatinosa produce euphoria, pride, reduced perception of pain and fear as occurs with runner's high, injured soldiers in battle field and during roller coaster ride, viewing of scary movies. Dopaminergic neurons of Substantia Nigra Compacta project to Forebrain neurons and nucleus accumbens of limbic system the reward centre altering behaviour and cognition. When the stress is prolonged in other words is chronic it overrides circadian rhythm of Hypothalamus affecting secretion of hypothalamic releasing hormones and the endocrine axes they control [9,10]. This results in release of stress hormones in excess and at odd hours of day due to disrupted circadian rhythm.



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The stress hormones released[5,6] are Corticotrophin Releasing Hormone (CRH), Growth Hormone Releasing Hormone, Thyrotrophin Releasing Hormone & Prolactin Releasing Factor from Hypothalamus, and in turn Corticotrophin, Growth Hormone, Thyrotrophin & Prolactin[6] from anterior Pituitary Cortisol & Aldosterone from Adrenal cortex, Thyroxin from Thyroid[5]. β adrenergic stimulation increases Glucagon secretion and blood level too.

In resistant phase of chronic stress CRH leads to behavioural changes. Corticotrophin is lipolytic and increases free fatty acid level. Cortisol and Thyroxin promote Gluconeogenesis by Glycogenolysis, Lipolysis and Proteolysis. Growth hormone and Prolactin are hyperglycaemic, lipolytic and anabolic. But Growth hormone secretion is decreased like Insulin due to sympathetic stimulation, Gonadotrophins and Insulin like growth factor – 1(IGF) in chronic stress. In association with excess cortisol this leads short stature and delayed physical maturity, the condition known as Psycho Social short stature especially in orphans. The stress hormones except thyroxin, Glucagon and epinephrine decrease peripheral utilization of glucose thus increasing Insulin resistance increasing blood glucose level further. Cortisol having permissive role on thyroxin for its vasoconstrictor action and $Na^+$ and water retention along with Aldosterone increases blood pressure; the tonicity of sympathetic system is increased by its permissive action on Catecholamine and increases cardiac output and blood pressure. Glucagon promotes Gluconeogenesis, Glycogenolysis and Lipolysis. Thus the actions of the released hormones destabilize homeostasis and the condition is known as distress manifesting as psychosomatic signs and symptoms. Thus chronic stress contributes to development of Psycho Social Illnesses which are a group of diseases / disorders due to mind acting on body. They are Essential Hypertension, Peptic Ulcer, Asthma, Atherosclerosis, Coronary Atherosclerotic Heart Disease and Irritable Bowel Syndrome, increased frequency of migraine headaches, uncontrolled hyper glycaemia and Ulcerative Colitis [11]. Depression and anxiety symptoms co exist and are associated with hyper arousal [6]. The stress response which could be life saving in short term becomes harmful and disruptive in long term. “Feelings are chemical, they can cure or kill” says Bernie Siegel MD.

If stress exposure continues the organism enters into third phase – Exhaustion Stage and this stage is lethal. This phase is triggered by depletion of energy stores when the stress regulatory systems are worn out. This leads to a subtype of depression labelled “atypical depression” which shows hypo arousal and is associated with inactivation of stress mediators [6].

**Stress Syndrome [6,9.10,12,13]:**

In resistance or adaptation phase though the organism is trying to restore homeostasis due to the hormones released in reaction to stressor a group of symptoms and signs involving a few systems appear. The changes can be physical, emotional or behavioural.

Physical: Strained forehead, tight and dry throat, Clenched jaws, increased sweating, cold hands and feet, heavy breathing, palpitation, muscle twitches, indigestion, constipation, diarrhoea, increased urination, fatigue, Insomnia, myalgia, headache, chest pain, high blood pressure, frequent illnesses.

Psychological: Irritability, anxiety, hypersensitivity, sense of impending danger or doom, anger and suspicion, slowed and muddled thinking, feeble concentration, indecisiveness and feeling of helplessness, hopelessness, worthlessness, apathy, depression, indifference



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towards things and activities that previously used to be pleasing.

Behavioural: Impatience, argumentativeness, nail biting, teeth grinding, wringing of hand, curling or pulling out hair, tapping or pacing floor, over eating or loss of appetite, withdrawal, avoiding or neglecting responsibility, poor job performance, increased frequency of smoking and drinking alcohol, drug abuse.

**Stressors [5,6,11]:**

Stressors are classified as

1. External
2. Internal
3.Psycho Social & Environmental

External Forces: Physical environment – i.e. Climate, Pollution of Air, Noise, Debris; Biological environment leading to infections, infestations.

Internal Forces: Acute and chronic debilitating illnesses, age, malnutrition both obesity and under nutrition, fatigue, inadequate sleep and rest, exhausting physical exercise, trauma.

Psycho Social & Environmental Factors: The relentless pressures in our daily lives pertaining to our job, personal relationships, addiction to alcohol and drugs, Social customs that are unacceptable to the individual but the compulsion to follow, Economical Dependency, Illiteracy, Inability to keep abreast with latest technologies etc.

The cumulative role of every day annoyances is best illustrated by the poet Charles Bukowski..... "It is not the large things that send a man to the mad house ... no, it is the continuing series of small tragedies ... not the death of his love but a shoe lace that snaps with no time left"

**Aims & objectives**

This study aimed to assess prevalence of distress in type 2 diabetics, stressors, dominant symptoms and its impact on the individual in the variables Age at diagnosis of diabetes, Body weight, Fasting blood sugar, Systolic, Blood pressure & Serum Cholesterol and with the objective of teaching them laughter yoga to the distressed.

**Materials & methods**

This is a descriptive / observational study conducted in Coimbatore Medical College Hospital on type 2 diabetics attending outpatient care clinic of Diabetology Department in 2009 after obtaining approval from ethical committee. Female patients only were evaluated as the number of male patients was less; males were not willing to spend time required for interview. The sample included a total of 224 women randomly chosen based on their willingness to spare time. Informed consent was obtained.

**Inclusion Criteria:**

Type 2 diabetics on oral Hypo glycaemia Agents
Not on anti psychotic drugs
No past / family history of psychiatric illness
No H/O alcoholism / Drug abuse

**Exclusion criteria:**

On Insulin
Acutely ill
Acute stress
Suffering from any other chronic illness like cancer, SLE, Rheumatoid arthritis, Bronchial Ashma
On steroids
On oral Contraceptive pills
With known Micro & Macro Vascular diabetic complications

224 subjects were screened for distress by using Stress Questionnaire formulated by Dr. Hemalatha Natesan & Nandhini Menon (2002). 80 subjects had moderate to severe distress with a score of more than 10. 56 subjects reported back with lab reports. Evaluation of stressors was done for these subjects. Their personal Information and variables data was collected. Personal information on personal, Family, past, Treatment history,



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Education, occupation, Type & size of family was collected. Their Height was measured using stadiometer, weight by Krups weighing scale with a sensitivity of 500 gm; Blood pressure was recorded as the average of two readings measured 5 minutesapart in sitting posture in right upper arm by indirect method using mercury sphygmo - manometer. Plasma glucose and serum cholesterol levels were measured by enzymatic method and Glucose Peroxidase Method respectively.

**Statistical analysis**

Data was tabulated and analyzed. The variables in subjects with stress were compared with type 2 diabetics in general population of urban settings.

**Observations & results**

Following were the findings:

- 35.7% diabetics (80/224) were distressed;
- 89% of them were < 50yr of age when they were diagnosed to have diabetes (50/56).
- 37.5% of them were hypertensive (21 /56); 43% of them were under treatment (9/21). The rest were unaware of their hypertensive status and were not on any treatment. Only in 5 out of 9 known hypertensive subjects Bp was within normal range. (44.4%).
- Prevalence of obesity by BMI > 25kg/$m^2$ was 76.8% and by > 30kg/$m^2$ was 16.1%
- 62.5% had poor glycaemia control with a fasting plasma glucose level of > 140mg/dl.
- 67.9% had hypercholesterolemia.

Table 1

**Age distribution**

| **Age group** | **No of subjects** | **%** |
|---|---|---|
| 30 -39 | 5 | 9 |
| 40 - 49 | 28 | 50 |
| 50- 59 | 23 | 41 |

Table 2

**Age at diagnosis**

| **Age group** | **No of subjects** | **%** | **% in CURES - 17** |
|---|---|---|---|
| 30 -39 | 13 | 23.2 | 25.2 |
| 40 - 49 | 37 | 66.1 | 30.4 |
| 50- 59 | 6 | 10.7 | 24.9 |



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Table No 2

**Frequency of Dominant Symptoms of Distress in Eustressed and Distressed Subjects**

| S. No | **Symptoms of Stress** | **Eustressed** | | **Distressed** | |
|---|---|---|---|---|---|
| | | n=144 | % | N=80 | % |
| 1 | Cannot stand loud noise | 60 | 41.7 | 57 | 71.3 |
| 2 | Though not hungry get tired easily | 34 | 23.6 | 69 | 86.3 |
| 3 | Low mood | 26 | 18.1 | 49 | 61.3 |
| 4 | Difficulty falling asleep & Disturbed sleep | 26 | 18.1 | 46 | 57.3 |
| 5 | Losing temper easily | 18 | 12.5 | 52 | 65 |
| 6 | Thoughts of future being dark | 24 | 16.7 | 43 | 53.8 |
| 7 | Irritability | 22 | 15.3 | 43 | 53.8 |
| 8 | Worries about future | 24 | 16.7 | 40 | 50 |
| 9 | Being preoccupied | 24 | 16.7 | 37 | 46.3 |
| 10 | Life perceived as being a mess | 22 | 15.3 | 43 | 53.8 |
| 11 | Feeling helpless | 26 | 18.1 | 34 | 42.5 |
| 12 | Frequent Headaches | 24 | 16.7 | 37 | 46.3 |

Table no 2

**Frequency Distribution of Stressors in Distressed Subjects**

| **Stressors** | **Distressed Subjects** | |
|---|---|---|
| | **N = 56** | **%** |
| Spiralling prices of commodities | 48 | 85.7 |
| Sickness | 37 | 66.1 |
| Worries on separation from loved one | 28 | 50 |
| Monetary inadequacies and worsening financial status | 19 | 33.9 |
| Alcoholism of son, son in law or husband | 18 | 32 |
| Strained inter personal relationship with persons at home | 17 | 30.4 |
| Lack of opportunity to earn more money to supplement Family income | 15 | 26.8 |
| Inability to achieve the goal of building a house to live in | 14 | 25 |
| Economical dependence on others | 12 | 21.5 |
| Economical dependence of others on the subject | 11 | 19.6 |
| Work load being beyond capacity | 10 | 17.9 |
| Inability to accomplish some of their goals | 10 | 17.9 |
| Travelling in public transport system is tiring | 9 | 16.1 |
| Lack of public conveniences of water, electricity and sanitation | 8 | 14.3 |
| Feel Infuriated by pollution due to busy traffic | 7 | 12.5 |
| Incompatibility of partner, sexual dissatisfaction & too much of nagging by partner | 6 | 10.7 |



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**Discussion & conclusion**

World Health Survey reports that prevalence of major depression is in 10% diabetics and 1/3 of them suffer from clinically relevant depressive disorders [(14)]; DAWN Study too reports that 41% had poor psychological well being and 10% received psychological treatment [(1)]. Thus distress prevalence in this study group correlates with other studies.

CURES 17 reports a temporal shift of age at diagnosis from 54.1% of diabetics diagnosed before 50 in the year 2000 in NUDS to 62.2% in 2004[(15)]. In distressed diabetics of this study it is 89.3% of them (50/56). The very high % of early onset of disease may be partly due to selection bias as the study referred was cross sectional covering age groups up to 69 whereas in this study subjects were aged 36 – 55 only and in addition it may also be due to continuing temporal shift and the impact of stress.

Prevalence of hypertension in this group of distressed diabetics is 37.5% based on systolic Bp of > 140 mmHg and Diastolic Bp of 90 mmHg and those who were known hypertensive on anti hypertensive agents. This correlates with reported prevalence of 22.3% - 42% hypertension in diabetes by various studies [(16)] and 38% in 2002 [(17)].

Obesity was defined as BMI of > 25kg/$m^2$ for this study which may explain high prevalence. If the criterion is taken as > 30 kg/$m^2$ then the prevalence is 16.1 (9/56) and correlates with larger studies [(17)].

Good glycaemia control is in the order of 31% as evaluated by HbA1c level of <7(equivalent to130mg/dl) [(4)] in diabetes among general population. This distress impact study evaluated glycaemia control by fasting glucose level <140 mg / dl and 37.5% were under good control.

Prevalence of hypercholesterolemia in the study group was 67.9% if the criterion was > 200 mg/dl and 23.2% had > 240 mg/dl of serum cholesterol that correlates with national study [(17)]

Thus in distressed individuals diabetes seems to become overt at an earlier age at the most productive years of one's life. Longer duration of illness with unscreened or poorly controlled co morbidities gives enough time for development of chronic complications which is detrimental in the long run to the individual and a social burden too, hence need sensitization of care givers for routine screening for and stringent intervention.

National politics / economy does influence individuals' health and complaints of psycho somatic symptoms should be identified for counselling and evaluation for more serious psychiatric conditions such as depression.

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I, S Nalini solemnly assure that the information given above is true to my knowledge, the study is original work of the authors and the same was not published in any other journal.

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