



RESEARCH ARTICLE

PSYCHOLOGICAL DISTRESS AND RISK OF DIABETES MELLITUS IN KSA: A CROSS-SECTIONAL STUDY

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Abstract

Background: The emotional toll that diabetes has taken on people and the healthcare system globally in recent years is staggering. Therefore, the goals of this research were to (1) quantify the incidence of diabetic distress among Saudi individuals and (2) identify the psychosocial drivers of this distress (T2DM).

Methods: A descriptive, correlational cross-sectional design was employed for this study. Since this study aims to assess relationship between psychological distress and incidence of type 2 diabetes mellitus among general population at a single point of measurement, this is the most appropriate design. This enables the researcher to measure the effect and the outcome at a single point of time. This study design gives reliable results with short time and less effort. The study was conducted at (place). Participants were selected during the period from September to November 2022. Study instruments consists of three domains. First is sociodemographic characteristics of participants. Second is psychological distress assessment. Third is determination of the presence of type 2 diabetes.

Results: Study included 774 participants from different ages and both genders. Among study participants, there were 443 males (57.2%) and 331 female participants (42.8%). The median age among study participants was 48 years. Among study participants, there were 72 participants had an existing type two diabetes mellitus (T2DM) (9.3%) in addition to 226 participants had a relative with T2DM diagnosis (29.2%). There were 22% of participants demonstrated having psychological distress (n= 170). The median random blood sugar among study participants was 177 mg/dl indicating high random blood

sugar and high risk of getting type 2 DM. As the psychological distress was prevalent among 22% among study participants, there were a strong association between type 2 DM and psychological distress ($r=0.87$, $P<0.001$). Female participants had higher percentage of psychological distress than male participants ($P=0.035$). In addition, participants who had existing type 2 DM had more psychological distress than others ($P=0.004$).

Conclusion: Study results showed prevalence of T2DM consisting with current literature. There was strong association between T2DM and psychological distress especially among female participants.

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..... **Introduction:-**

Worldwide, the number of people living with diabetes mellitus continues to rise at an alarming rate. As of 2013, 382 million people were diagnosed with diabetes worldwide [1]. The International Diabetes Federation predicts that by 2035, this number would have risen to 592 million. Diabetes mellitus is more common in developing countries like India and China than it is in industrialized countries [2]. The increasing incidence of type 2 diabetes has made it a major health concern all over the world.

Although much research has been done on the causes and treatments for diabetes mellitus, only a small amount of research has examined the link between psychological distress and the development of type 2 diabetes. Furthermore, the dearth of literature in this field served as an impetus for our study.

Before type 2 diabetes develops, some patients have changes in glucose control. Preventing type 2 diabetes during the pre-diabetic period, which may last for more than a decade, greatly reduces the risk of developing the disease [3]. Dietary changes and pharmaceutical therapies have comprised the majority of preventive efforts so far [3-5]. The link between mental health problems including depression and stress and the development of type 2 diabetes, on the other hand, has been the subject of much study. Hypothesized to have a role in the etiology of type 2 diabetes include health risk behaviors and weight gain, dysregulation of the hypothalamic-pituitary-adrenal axis, overactivation of the sympathetic nervous system, and increased chronic inflammation [6,7].

While studies associating anxiety and depression to an increased risk of developing type 2 diabetes [8-10] are promising, research on the repercussions of "general" stress and stress at work is more equivocal. Anxiety and sadness both increase a person's susceptibility to acquiring type 2 diabetes [9, 10]. The existing studies have a serious fault due to their oversimplification of the connection between psychological factors and diabetes risk (diabetes and no diabetes). Some people farther along the spectrum of health-related conditions may be more open to the influence of psychological factors, although this classification overlooks the extensive time period before the onset of disease [10].

Glucose control may shift in patients who have not yet developed type 2 diabetes. The risk of developing type 2 diabetes is greatly reduced during the pre-diabetic period, which may last for more than 10 years [3]. Until now, the majority of preventive strategies have included adjusting one's diet or taking medication [3-5]. Conversely, there has been a lot of focus in recent years on mental health problems including stress and depression that have been linked to the development of type 2 diabetes. Several factors are known to negatively influence glucose metabolism [6,7], including health risk behaviors and weight gain, dysregulation of the hypothalamic-pituitary-adrenal axis, sympathetic nervous system overactivation, and increased chronic inflammation.

Increased risk of developing type 2 diabetes has been linked to anxiety and depression [8-10], but studies on the effects of "general" stress and stress at work are more conflicting. Anxiety and sadness raise the chance of developing type 2 diabetes. Anxiety and depression both increase the likelihood of developing type 2 diabetes, according to the available data [9,10]. [S] Some people with type 2 diabetes also experience anxiety. Current research on the link between psychological traits and diabetes risk are problematic due to their oversimplification of the issue (diabetes and no diabetes). They don't take into consideration the extended pre-disease period or the possibility that those farther along the spectrum of health-related issues are more vulnerable to the effect of

psychological elements [10]. This hypothesis is somewhat supported by the findings of a study involving 128 pre-diabetic Japanese male workers [11-18]. Participants who reported high stress levels at the onset were more likely to go on to acquire type 2 diabetes [19].

Type 2 diabetes's traditional risk factors have been related to the disease's development in a number of studies. Age, poor dietary and exercise choices, excess weight, a high-fat diet, tobacco use, and excessive alcohol use are all risk factors [20, 22]. New research, however, reveals that emotional discomfort also has a significant role. The relationship between emotional distress and insulin resistance has been shown in previous studies [23, 25], and it has been demonstrated that treating problems like depression may help in glucose management [26, 27]. If this correlation is confirmed, it might have far-reaching implications for the early diagnosis, treatment, and prevention of a wide range of disorders. However, there is a paucity of prospective studies examining the connection between mental health and type 2 diabetes. Moreover, there is little consistency in the findings of these studies.

It is difficult to determine which comes first, diabetes or mental anguish, due to the complex interaction between the two. Type 2 diabetes has been linked to mental discomfort and genetic risk in recent studies. Comparing high-risk and low-risk groups for their relationships with type 2 diabetes has received less attention. The connections between dyslipidemia and depression have been studied [28, 29]. The purpose of this study was to investigate if there is a correlation between mental health problems and the onset of type 2 diabetes mellitus.

Methods:-

Study design and settings

A descriptive, correlational cross-sectional design was employed for this study. Since this study aims to assess relationship between psychological distress and incidence of type 2 diabetes mellitus among general population at a single point of measurement, this is the most appropriate design. This enables the researcher to measure the effect and the outcome at a single point of time. This study design gives reliable results with short time and less effort. The study was conducted at (place). Participants were selected during the period from September to November 2022.

Population

General population at city.

Sampling and sample size

Study participants were selected by non-probability convenient sampling technique. Sample size was determined according to the total number of adults population in city with a confidence level of 95% and marginal error of 5%. According to Epi-Info sample size is 774 participants.

Data collection and Procedures

Data was collected using a questionnaire filled through a self-administered approach. Participants of the current study were assessed for random blood glucose.

Instruments

Study instruments consists of three domains. First is sociodemographic characteristics of participants. Second is psychological distress assessment. Third is determination of the presence of type 2 diabetes.

Statistical analysis

Data obtained from questionnaire were entered and analyzed using SPSS program version 23 computer software. Sociodemographic data are presented using descriptive statistics as means, median, percentages and standard deviation. Independent T test and one-way Anova are used to show statistical significance among participants characteristics. Chi square test is used to show relationship between categorical variables.

Ethical consideration

An approved permission was gained from (institution) to collect quantitative data from adults population. After explanation of study objectives, participants were asked to volunteer to participate at our study. In addition, verbal informed consent was gained from participants before asking questions.

Results:-

Study included 774 participants from different ages and both genders. Among study participants, there were 443 males (57.2%) and 331 female participants (42.8%). The median age among study participants was 48 years. However, age ranged from 18 to 85 years. The most frequent age group was 41 to 59 years (n= 324, 41.9%). Figure 1 shows age groups distribution among study participants.

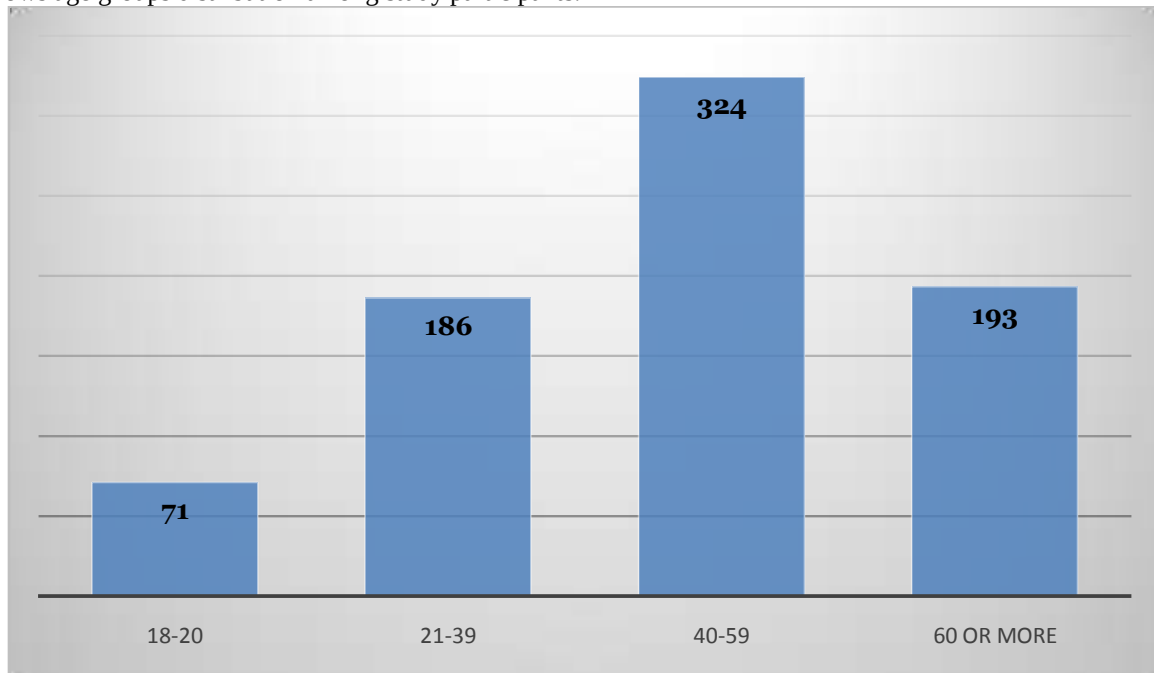


Figure 1:- Age groups distribution among study participants.

Most of participants were employed (n= 555, 71.7%) and were from urban residency area (n= 508, 65.6%). Most of participants had good monthly income (n= 495, 64%) (Figure 2). Quarter of study participants had a university degree (n= 194, 25.1%) (Figure 3).

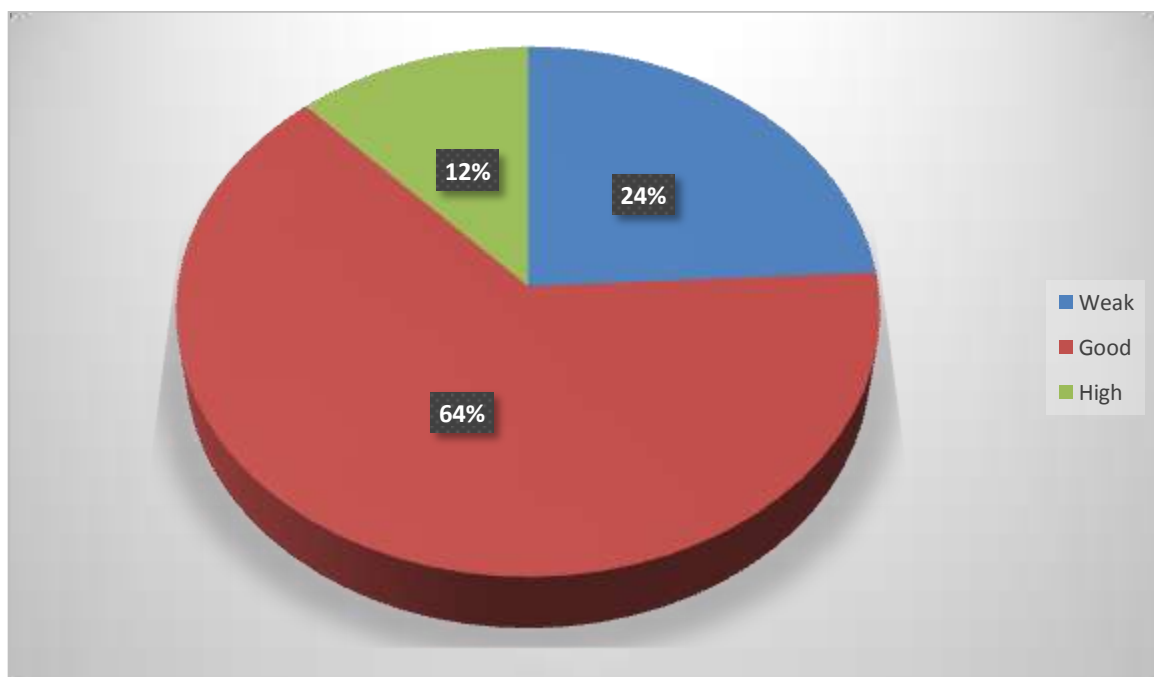


Figure 2:- Monthly income distribution among study participants.

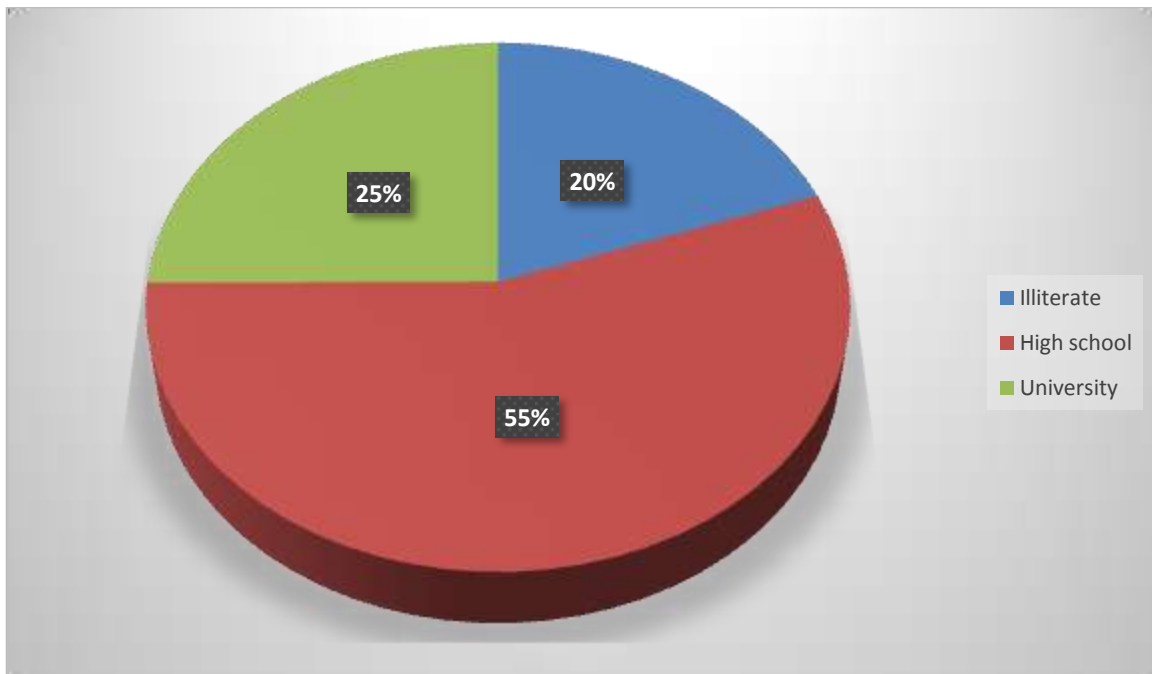


Figure 3:- Educational level distribution among study participants.

The median height among study participants was 1.67 m and the median weight was 78 kg giving a median body mass index of 27.5 kg/m^2 indicating that most of study participants are overweight. Figure 4 shows the BMI categories distribution among study participants.

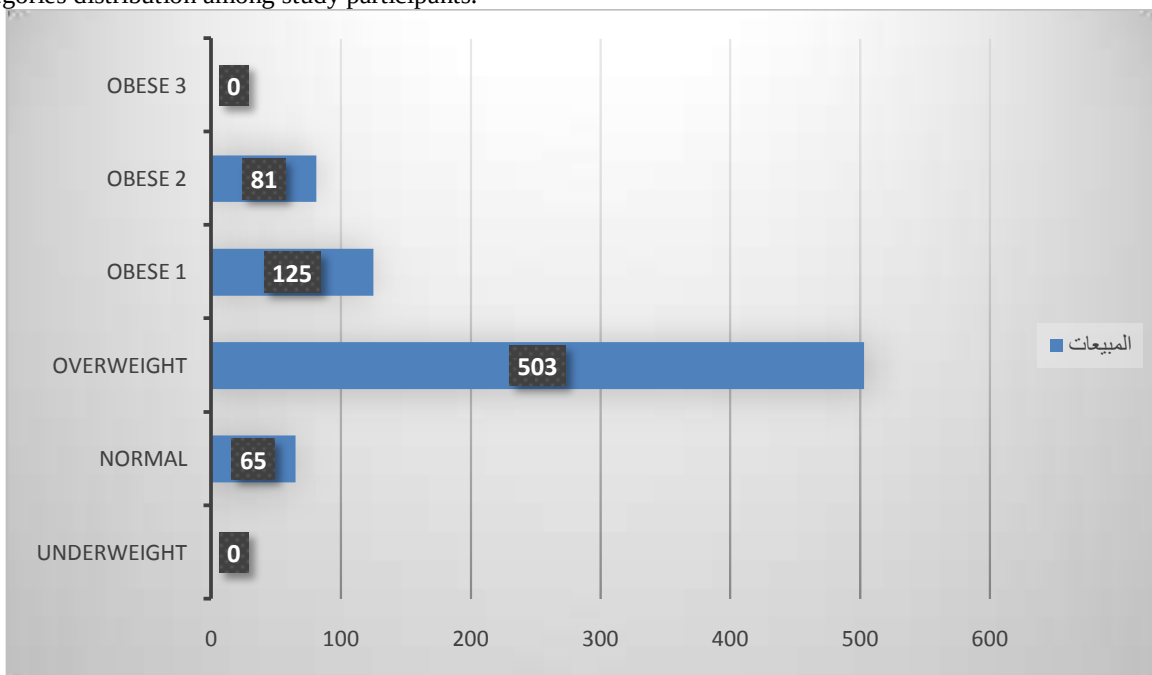


Figure 4:- Body mass index distribution among study participants.

Among study participants, there were 72 participants had an existing type two diabetes mellitus (T2DM) (9.3%) in addition to 226 participants had a relative with T2DM diagnosis (29.2%). There were some participants reported having comorbid conditions as demonstrated in table 1.

Table 1:- Comorbid conditions distribution among study participants.

Comorbid condition	Frequency	Percent
Hypertension	447	57.8%
Thyroid disease	52	6.7%
Chronic kidney disease	38	4.9%
Cardiovascular disease	196	25.3%
Asthma	48	6.2%
COPD	59	7.6%
Osteoarthritis	139	18%
Rheumatoid arthritis	25	3.2%
Psychological disease	44	5.7%

Psychological distress was assessed through a 12-items scale as presented in table 2. There were 22% of participants demonstrated having psychological distress (n= 170). Participants responses to the scale items is presented in table 2.

Table 2:- Participants' responses to the scale items.

Item	0	1	2	3
Able to concentrate	170 22%	221 28.6%	208 26.9%	175 22.6%
Loss of sleep over worry	131 16.9%	226 29.2%	226 29.2%	191 24.7%
Playing a useful part	263 34%	266 34.4%	123 15.9%	122 15.8%
Capable of making decisions	176 22.7%	254 32.8%	160 20.7%	187 23.8%
Felt constantly under strain	217 28%	256 33.1%	161 20.8%	140 18.1%
Couldn't overcome difficulties	219 28.3%	254 32.8%	159 20.5%	142 18.3%
Able to enjoy day-to-day activities	198 25.6%	246 31.8%	180 23.3%	150 19.4%
Able to face problems	173 22.4%	264 34.1%	157 20.3%	180 23.3%
Feeling unhappy and depressed	142 18.3%	214 27.6%	225 29.1%	193 24.9%
Losing confidence	93 12%	220 28.4%	255 32.9%	206 26.6%
Thinking of self as worthless	251 32.4%	292 37.7%	117 15.1%	114 14.7%
Feeling reasonably happy	169 21.8%	237 30.6%	161 20.8%	207 26.7%
The positive items were corrected from 0 (always) to 3 (never) and the negative ones from 3 (always) to 0 (never).				

The median random blood sugar among study participants was 177 mg/dl indicating high random blood sugar and high risk of getting type 2 DM. As the psychological distress was prevalent among 22% among study participants, there were a strong association between type 2 DM and psychological distress ($r = 0.87$, $P < 0.001$).

Female participants had higher percentage of psychological distress than male participants ($P = 0.035$). In addition, participants who had existing type 2 DM had more psychological distress than others ($P = 0.004$).

Discussion:-

Type 2 diabetes is clinically diagnosed when high plasma glucose levels are present with other metabolic abnormalities such as obesity, dyslipidemia, and endothelial and cardiovascular dysfunction. Type 2 diabetes is the umbrella term for these conditions (T2D). The variations in frequency and outcomes across races of type 2 diabetes have been hypothesized to have their roots in both lifestyle and genetics [30].

Traditional (i.e., nonpsychosocial) risk factors have been shown to have a significant impact in the development of type 2 diabetes. In this case, the citation is required The rising number of diabetic patients has not been slowed by the standard therapies for risk factors. Our central hypothesis is that chronic activation of the physiologic stress response (PSR) increases susceptibility to the onset of type 2 diabetes. Given the extensive literature on stress's part in the treatment of diabetes [31, 32], it is surprising that so little has been written on the link between these disorders. However, researchers and clinicians may gain new insights and potential avenues for management of the illness if more attention is devoted to the role that chronic stress factors play in the development of type 2 diabetes.

Similar to cardiovascular disease (CVD), the prevalence of type 2 diabetes (T2D) increases sharply as one advances downward in socioeconomic status. Changes in the prevalence of cardiovascular diseases (CVDs) by socioeconomic status (SES) and by ethnicity within a nation [33–34] and across countries [35–37] cannot be explained only to differences in genetics or to shifts in lifestyle alone, according to a large body of research. [33-34] [35-37] Despite the fact that type 2 diabetes and cardiovascular disease share a number of risk factors, stress-related exposure has just been substantially explored in relation to cardiovascular disease. Top hypotheses, however, offer processes including chronic stressor exposure (allostatic load) [38], a loss of perceived control [39], and stress-related repercussions deriving from adverse social comparisons [40]. A number of theories have been proposed to explain how hardship (such as that linked with poor socioeconomic status) might negatively impact health, however these theories have not been unanimously accepted. Although "stress" describes these processes in the overwhelming majority of studies, the vocabulary employed to describe it may differ substantially [41].

Words and Phrases Used to Highlight Tension

It's generally agreed upon [42] that stress is one of the main causes of health problems, and it's often identified as a major role in socioeconomic differences in health [43, 44]. The language barrier is particularly high in academic settings. For instance, environmental, psychological, and biological variables may all contribute to the onset of illness due to stress [46]. To define "the stimuli that cause a given condition, the subjective emotions of discomfort in this state, and the behaviors that occur in an organism while it is in this state," [45] the word "stress" has been employed. The terms "distress" and "PSR" will be used to describe the subjective experiences of discomfort while "stressor" will refer to objective occurrences or conditions that are commonly recognized to be stressful (such as traumatic life events). In this essay, both of these phrases will be used synonymously. Here, we zero down only on the PSR and its potential for generating a nullable hypothesis about the association between psychosocial risk factors and the development of type 2 diabetes.

Traditional explanations for type 2 diabetes, like those for cardiovascular disease, have focused primarily on the importance of individuals' activities including eating habits and lack of exercise. New studies, however, highlight the importance of genetics in the onset of type 2 diabetes. Control (the sense that one is in charge of one's life), antagonism, and traumatic life experiences are all stress-related attributes that have been shown to independently connect with the onset of cardiovascular disease [47, 48]. [47] The same stress-related elements that have been linked to an increased risk of cardiovascular disease may also play a role in the onset of type 2 diabetes, according to some research.

Much of the literature included here supports the idea that stress itself is a risk factor, and that behavioral risk factors are largely to blame for the negative outcomes that result from them. However, as will be shown in the following sections, the bulk of the studies included in this review accounted for the statistical analyses of most, if not all, of the behavioral risk variables, and they still showed an influence from stress-related factors. Those of lower socioeconomic position [49, 50] or of racial minority groups [50] are at a far higher risk, according to a number of studies. This points to the existence of potential processes that are not based on behavior.

It is considered that prolonged PSR activation is the key role in contributing to health problems, rather than the acute PSR being the root cause of the problems. The parasympathetic regulatory system (PSR) is a feedback loop between the hypothalamic-pituitary-adrenal axis and the sympathetic adrenomedullary system (SAM), two systems important in maintaining physiological homeostasis (HPA). Initially, the SAM is in charge of releasing epinephrine and norepinephrine, and if the stressful situation persists, the HPA will become involved. Abdominal obesity is a major risk factor for diabetes and is linked to the disease's onset [51]. In this case, the citation is required

Bjorntorp and Rosmond [52] proposed in the early 1990s that "neuroendocrine reaction to stress-related stressors" may contribute to the development of abdominal fat. In this case, the citation is required Based on these findings,

they concluded that chronic stress reconfigures the HPA axis [53]. [53] The duration of contact with the stressor is the single most influential factor in resetting the HPA axis.

Repeated bouts of acute or chronic PSR create a chronic inflammatory process that culminates in inflammatory illnesses [54, 55], hence the hypothesized mechanism need not be dependent on behavior. This modification permits the hypothesized mechanism to shift from a behavioral one to one based on the occurrence of recurrent bouts of acute or chronic PSR, which is more in line with the current understanding that type 2 diabetes is an inflammatory illness. Stress exposure was shown to precede the onset of persistent subclinical inflammation in animal models. Animals developed type 2 diabetes, metabolic syndrome, and coronary artery disease due to insulin resistance, central obesity, dyslipidemia, elevated blood pressure, and depression [56]. In the Atherosclerosis Risk in Communities (ARIC) research cohort, subclinical increases of inflammatory markers predicted the development of type 2 diabetes [57, 58], especially during the first three years [58]. Studies in people have shown that high inflammatory markers are a strong predictor of developing type 2 diabetes in the future [57].

The mental health of people with type 2 diabetes is often lower than that of the general population [59]. Furthermore, patients with type 2 diabetes are more prone to suffer from depressive disorders [60–61], alcoholism [40], and post-traumatic stress disorder [63] than the general population. Those with type 2 diabetes are more likely to report high levels of stress at work [41] and in their personal lives [64], as well as to be exposed to more stressful life events [41]. One's likelihood of developing type 2 diabetes increases in tandem with decreasing socioeconomic status (SES) [39]. Diabetes type 2 is more likely to develop in persons who are members of underrepresented minority groups [51], especially those from weaker socioeconomic backgrounds. The great majority of these cross-sectional studies took into account behavioral risk factors for type 2 diabetes. These risk factors include being overweight, having a family history of the illness, having bad nutrition, and not getting enough exercise. Research that is cross-sectional cannot be utilized to establish any inferences on the causes or the chronological sequence of occurrences. Depression, for instance, has been linked to the management of type 2 diabetes, and may reduce motivation for healthy lifestyle choices including eating well and exercising regularly. It is possible that they'll have a pessimistic outlook on life, be extra-vulnerable to the damaging consequences of stress, and feel compelled to share their struggles openly. Therefore, our analysis will center on longitudinal studies that track previously healthy individuals who are then exposed to pressures or display distress in order to determine the likelihood that they would develop type 2 diabetes.

Conclusion:-

Study results showed prevalence of T2DM consisting with current literature. There was strong association between T2DM and psychological distress especially among female participants.

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