

Perceived Stress among Diabetic and Non-diabetic Adults Safeya Makhmur* and Sangeeta Rath**

Abstract

Psychologists and medical professionals have realized that psychological factors affect all aspects of physical well-being. Diabetes, in particular type-2 diabetes, is one of the most prevalent diseases worldwide, and the management of this disease is important because it affects the lives of 200 million people. The primary purpose of the present study was to examine the impact of diabetes and gender on the status of perceived stress. The study involves quantitative analysis. In the present study, 120 participants were selected purposively from Odisha, India. The study adopts a 2(diabetics versus non-diabetics) × 2 (adult males versus adult females) factorial design. The participants of these four quasi-experimental groups were compared to the dependent measure (perceived stress). 60 diabetics (30 males and 30 females) and 60 non-diabetics (30 males and 30 females) were given the perceived stress measures and the scores were interpreted accordingly. Then the results were analysed and interpreted by using Analysis of Variance (ANOVA). Diabetic participants reported as much magnitude of perceived stress as do non-diabetic participants. Further, the influence of gender was also found to be significant.

Key Words: Diabetes, Gender, ANOVA, Perceived Stress

Stress is the inability to cope with a perceived or real (or imagined) threat to one's mental, physical, and spiritual well-being, which results in a series of physiological responses and adaptations. Selye (1950) has defined stress as "the nonspecific response of the body to any demand." According to Baum (1990), Stress is a negative emotional experience accompanied by predictable biochemical, physiological, cognitive, and behavioral changes that are directed towards either altering the stressful event or accommodating its effects.

Perceived stress is the feeling or thought that an individual has, and about how much stress an individual experiences at a given point of time or over a given period. Perceived stress incorporates feelings about the uncontrollability and unpredictability of one's life, how often one has to deal with irritating hassles, how much change is occurring in one's life and confidence in one's ability to deal with problems or difficulties. It is not measuring the types or frequencies of stressful events, which have happened to people, rather measures how an individual feels and evaluates the stressfulness and their ability to handle them (Phillips, 2103).

A variety of factors can activate the stress response psychologically, biologically, and physically. The hypothalamus in the brain produces a corticotrophin-releasing factor that stimulates the anterior pituitary to secrete corticotrophin or Adrenal-Corticotrophin Hormone (ACTH). ACTH in turn stimulates the adrenal cortex to secrete stress hormones. Stress causes both and modulates a diversity of physiological effects that can enhance resistance to disease or cause damage and thereby promote disease. Stress-related hormones such as cortisol and epinephrine have protective and adaptive functions as well as damaging effects. The primary and secondary effects of the stress response constitute the biological pathways along with a person's experiences, living and working conditions, interpersonal relations,

lifestyle, diet, and personality traits that can affect the body. There is an interaction between the nervous system, the immune system, and behavior (Ader and Cohen, 1975). Stressful conditions can affect immune system function such as lowering of B-cells, T-cells, and natural killer cells (McKinnon and Weisse et al., 1989). The Diathesis-stress model suggested that people's vulnerability to a physical or psychological disorder depends on the interplay of their predisposition to the disorder and the amount of stress they experience (Steptoe and Ayers, 2004). Stress can affect behavior, which in turn, can lead to illness or worsen an existing condition. Studies have suggested that the continued presence of stressors may deplete the body's resources and make it vulnerable to illness, and especially chronic stress leads to physical disorders such as ulcers, high blood pressure, heart disease, diabetes, and asthma. Goldston et al., (1995) found that stressful negative events predicted poorer metabolic control.

An emerging body of literature suggests that stress has a role in the aetiology of Type-2 Diabetes Mellitus (T2DM) both as a predictor of new-onset of T2DM and as a prognostic factor in people with existing T2DM. In case of severe stress, the body secretes stress hormones like adrenaline. They cause a narrowing of the blood vessels and an increase in blood pressure. At the same time, these hormones release the sugar from the cells, and the blood sugar increases so that the body can have more energy at its disposal. Under the influence of stress, the brain and muscles burn more sugar than normal. If it is moderate, then the process is completely harmless to health. However, if the balance in the body is disrupted by stress, this can trigger the onset of diabetes.

Several studies have shown that stress and psychological distress play important roles in the development, intensification, and chronicity of diabetes (Moran and et al., 2014). Stress plays a dual

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role (cause and effect) in its relationship with diabetes. In other words, stress can be considered as a cause and yet a consequence of diabetes (Branon and et al., 2013). On one hand, stress increases glucose and glycosylated haemoglobin (HbA1C) and, on the other hand, diabetes and its consequences can increase stress levels among individuals with type-2 diabetes as well as cause other physical, behavioral, and mental disorders (Eren and et al., 2013). The results of Eren's research showed that people with diabetes experience higher levels of stress compared to healthy people. Stressful events in life cause problems in the effective management and control of diabetes (Bradley, 1998). Moreover, stress has been reported to elevate blood glucose levels.

Surwit and et al., (1992) stated that stress is a potential contributor to chronic hyperglycemia in diabetes. Stress has long been shown to have major effects on metabolic activity. Furthermore, regulation of these stress hormones may be abnormal in diabetes. According to Hackett and Steptoe (2017), psychological stress mobilizes biological responses implicated in type-2 diabetes mellitus, including the release of glucose and lipids into the circulation, inflammatory cytokine expression, and increased blood pressure.

Hellhammer (2009) suggested that type-2 diabetes patients have the highest perceived chronic stress, and the perceived performance of blood glucose measurement and insulin treatment are associated, these results may have high importance for diabetes patients under acute stressful situations. Bo, Pouwer and et al., (2019) found 46% of diabetics in his study are reported high-perceived stress (Perceived Stress Scale ≥ 18). Zhao, and et al., (2013) reported T2MD group had significantly higher total occupational stress scores, as well as scores on such factors as workload, interpersonal relationship, and home/work balance than the non-diabetic group.

Vasanth, and et al., (2017) stated that stress is an important factor in not only causing diabetes onset or exacerbation but also hampering proper treatment by interfering with the treatment adherence of patients. The study found that increased levels of stress decreased adherence ($P < 0.001$). The glycaemic index (HbA1C level) was found to be linked to both treatment adherence and stress. Tripathy and et al., (2017) revealed that the prevalence of high/very high stress was 35% among diabetic patients. Age 30–40 years, working in professional jobs, and lack of physical activity were factors significantly associated with stress. The perceived major stress inducers were related to family, work, financial issues, and the disease itself. The study showed high levels of stress in more than one-third of diabetic patients.

The concept of gender is often discussed in the realm of health and disease. Taylor et al., (2002) stated that men's and women's nervous system responses to stress are virtually identical and women exhibit neuroendocrine responses to stress that differ from

men's reactions, and these differences lay the biological foundation for gender differences in behavioral responses to stress. It was found that the stress response in women is better characterized as "tend-and-befriend" than "fight-or-flight."

Researchers have found that there may be a single gene responsible for how men and women respond to stress. The SRY gene that men have on their Y chromosome contributes to the release of norepinephrine into the bloodstream, leading to an increase in blood pressure that encourages the "fight or flight" response. Women, on the other hand, do not have the SRY gene, and instead secrete endorphins that motivate them to behave in a friendly manner towards children and social partners, facilitate the trend, and befriend response (Lee & Harley, 1998).

The magnitude of the stress response and the ability to recover effectively is believed to be determined by multiple factors including genetics, personal perception of the specific stressor, and coping resources (Cacioppo et al., 2016).

Gentry and et al., (2007) suggested that women reported higher overall perceived stress levels, whereas men perceived more stress from personal factors. Hamaideh (2010) found statistical differences between males and females regarding their perception and reactions to stressors. Female students reported a higher perception of stressors in frustrations, conflict, pressures, and changes, as well as emotional reactions to stressors. Male participants reported higher behavioral and cognitive reactions to stressors than female students did. Hamaideh (2010) Helping women to achieve a greater sense of control over their stressors and to engage in cognitive reactions rather than emotional ones when dealing with stressors, as well as encouraging both men and women to engage in stress-reduction and stress management workshops, would be useful. Literature on gender differences in perceived stress was found to be inconsistent; therefore, the present study intends to examine the impact of gender differences in perceived stress among participants.

Objectives

The objectives of the present study are to empirically examine the sense of perceived stress of diabetic and non-diabetic as well as male and female participants.

Method

An Overview of Design

The study involves quantitative analysis. In the current study, 120 participants were selected. The study has adopted 2(diabetics versus non-diabetics) \times 2 (adult males versus adult females) factorial design. The participants of these four quasi-experimental groups were compared to the dependent measure (perceived stress). 60 diabetics (30 males and 30 females) and 60 non-diabetics (30 males and 30 females) were given perceived stress measures and the scores are interpreted.

The quantitative analysis of perceived stress scores assessed by using IBM SPSS Statistics for Windows

version 20.0, giving General Linear Models-Univariate command as the design requires a two-way ANOVA procedure that designates a single dependent variable and utilizes two independent variables to gain an understanding of how the independent variables influence the dependent variable. The scores on the perceived stress serve as the dependent variables. The independent variables are the status i.e. diabetics versus non-diabetics and gender i.e. male versus female. Here is an attempt to discover if gender, or diabetes, or gender by diabetes interaction has an impact on the perceived stress.

Participants

In the present study, 120 diabetics and non-diabetics were selected based on non-random sampling i.e., purposive sampling technique. Sixty diabetics were selected from two different private diabetes clinics and sixty non-diabetic participants were selected from different colonies of Cuttack city and Bhubaneswar city of Odisha, India. All the participants were equated in terms of their demographic characteristics such as; age (40-60), gender (60 males-60 females), educational level (graduate level), socioeconomic status (middle), and marital status (all married), etc. Patients attending Alok Knungo's clinic, Cuttack between July 2018 and February 2019, who had already been diagnosed by a physician of having type-2 diabetes mellitus (T2DM) for more than 5 years according to their personal medical record, were eligible to be included in the study. The consultation time is limited in the clinic and every interview took 30 – 40 minutes. Patients who were ailing, and had emergency medical conditions were not taken into consideration. The detailed purpose of the research was made clear to all the participants and written consent was received from them before the administration of the tool.

Measure of Stress

Perceived Stress Scale (PSS, Cohen, Kamarach, Mermelstein, 1983) is one of the more popular tools for measuring psychological stress. It is a self-reported questionnaire that was designed to measure "the degree in which individuals appraise situations in their lives is stressful" (Cohen et al, 2007). The PSS items evaluate the degree to which individuals believe their life has been unpredictable, uncontrollable, and overloaded during the previous month. PSS has good internal consistency, with an alpha of 0.78; and has established good construct validity (See Appendix A).

PSS is a 10 item scale measuring the perception of stress on a 5 point scale from never to quiet (from 0-4) of ten. The PPS total scores range from 0 to 40. The score equal between 0 and 13 corresponds with the low level of stress, but a score greater than 20 corresponds with high perceived stress. Questions are directed on feelings and thoughts during the last month. It is not a diagnostic instrument but intended to make comparisons of subjects' perceived stress related to current, objective events. The higher the

degree and longer duration of self-perceived stress, indicated by a higher score, is considered a risk factor for clinical psychiatric disorders (Cohen, 1983).

Procedure

According to the American Psychological Association's ethical code of conduct, the ethical issues are discussed with all the participants, and informed consent regarding their right to deny participating in the study and to withdraw from the intervention once participation has begun was taken. In the first phase, all the four groups of participants are compared quantitatively to the perceived stress measure. The analysis has been done with the SPSS package, giving general linear models uni-variate command, as the design requires a two-way ANOVA procedure.

The total data collection procedure took approximately 6 months. Initially, private diabetic clinics of Cuttack and Bhubaneswar city have been identified and respective doctors of those clinics were contacted. Persons with type-2 diabetes were randomly sampled at diabetes clinics after obtaining permission from hospital administrators and the individual client attending the outpatient clinics. The researcher using structured standardized questionnaires interviewed an equal number of persons with diabetes in the following age (aged 40-60 years). The patient included in the sample was able to comprehend and respond to Odia and Hindi languages.

Results

Analysis of Perceived Stress

The perceived stress scores have been taken from the responses of participants through a 10-item scale, that measures the degree to which individuals believe their life has been unpredictable, uncontrollable, and overloaded during the previous month. The scale is believed to be uni-dimensional. All items are answered using a 5- point Likert scale format ranging from never to very often.

The Analysis of Variance (ANOVA) is performed on perceived stress scores indicates significant main effect for diabetes, $F(1,116) = 7.34, P < 0.1$ (see Table 1). As shown from Table 2, diabetic participants reported as much magnitude of perceived stress as do non-diabetic participants ($M = 21.90$ & $M = 19.71$ respectively). Results also reveals significant effect for gender, $F(1, 116) = 4.19, P < .05$. As predicted, females show significantly higher perceived stress as compared to males ($M = 21.63$ & $M = 19.98$ respectively). Further analysis reveal non-significant diabetes \times gender interaction, $F(1, 116) = 0.78$. That shows the level of diabetes and gender combinedly have no effect on the perceived stress scores of participants.

Discussion and Conclusion

The purpose of the study was to examine the role of diabetes and gender on the level of perceived stress among participants of Cuttack and Bhubaneswar city of Odisha. Results showed a significant effect for

diabetes, as diabetics showed higher perceived stress than their non-diabetic counterparts did, which is

planning. Mukrim et al., (2019) have recommended including the psychological aspects during the

Perceived Stress Comparisons

Table 1: Analysis of Variance Performed on Perceived Stress Scores of Participants.

Sources	df	MS	F
Status	1	143.00	7.34**
Gender	1	81.67	4.19*
Status × Gender	1	1.40	0.78
Error	116	19.47	

Note: * $P < .05$, ** $P < .01$

Table 2: Mean Ratings on Perceived Stress Scores of Participants

Groups	Male		Female		Combined
	M	SD	M	SD	M
Diabetic	20.96	4.56	22.83	4.57	21.90
Non-diabetic	19.00	3.57	20.43	4.83	19.71
Combined	19.98		21.63		

consistent with previous researches. Aktar and Satu (2017) have found significant differences between participants with diabetes and participants without diabetes in perceived stress and psychological well-being. The study conducted by Shin, and et al., (2012) suggested that adults with diabetes are more likely to experience serious psychological distress (SPD) than adults without diabetes do. Bhandary, Rao and et al., (2013) found that stress was found to be high among diabetics (22.17%) as compared to that in non-diabetics (16.92%). Krishna (2018) found that there were significantly higher scores of stress in the diabetics when compared to healthy controls. Jyotsana (2011) showed significant differences in the stress levels of the subjects of diabetic Mellitus patients and control group non-diabetic subjects. Jain, and et al., (2018) found that perceived stress was high in people with diabetes compared to the control group of healthy participants. Family functioning was unhealthy in people with diabetes compared to the controls. Behavior control was observed to more likely affect patients with type 2 diabetes. The study also found a positive correlation between perceived stress and HbA1C level ($r=0.463$, $P<0.001$).

Based on this study, intervention programs and specific coping strategies related to diabetes management can be developed to help diabetic's better cope with stress. Interventions for diabetics may focus on enhancing the use of adaptive strategies such as spiritual activities, spending time with friends and family, thanksgiving practices, physical exercises, and proper medical adherence, etc. Braun et al. (2008) argue that all patients with diabetes should participate in structured training and follow-up programs to improve their metabolic control and quality of life. The positive effects of blood glucose control have been proven in promoting the health of individuals with type-2 diabetes; therefore, some interventions should be designed to achieve this goal. Various theories and models have been proposed in the area of behavior change and health promotion

evaluation of diabetic patients, more health education programs must be employed about the psychological and mental health of diabetic patients and enhancing the awareness among healthcare providers about the psychological complications of diabetic patients.

Recent studies in gender's influence on perceived stress have consistently revealed that women report higher levels of chronic and daily stressors than men (Hogan, Carlson, & Dua, 2002; Ptacek, Smith, & Zanas, 1992; Tamres, Janicki & Helgeson, 2002). The present study was also designed to examine gender differences in stress levels among participants and reported significant differences in the level of stress attributed to gender. Female participants showed higher perceived stress than their men counterparts. The argument stated by Hoeksema (1990) that women face several burdens in everyday life as a result of social status and roles relative to men and these strains contribute to higher stress perhaps could explain the finding of this study. In the current study, females reported higher feelings of helplessness, self-blaming, sadness, and fear as consequences of stressors; whereas males reported more anger, critical thinking, and oriented towards problem-solving.

Implications

There is a need for health administration to increase counseling services to address the perceived stress faced by diabetic adults. Appropriate coping skills and stress management techniques should be implemented on a broad scale. Additionally, this study supplements the existing literature. Generally, life events researches reveal a pessimistic view about stress, but the positive effects of stress need attention. It is important to recognize theories that some stress can be helpful and adaptive. Jang and William (2002) highlighted that life events research has evolved from early models that regarded life changes as essentially stressful and having similar impacts on most people to more complex models that accentuate individual differences and variability in both response style and

vulnerability. Individual characteristics and context can act to mitigate negative psychological stress factors such as lack of control and limited outlets for frustration (Sapolsky, 1994). According to Jang and William (2002), positive events change individuals' perspectives of other events and provide motivation and resources to overcome negative stress. Helping women to achieve a greater sense of control over their stressors and to engage in cognitive reactions rather than emotional ones when dealing with stressors, as well as encouraging both men and women to engage in stress-reduction and stress management workshops, would be useful.

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