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Research Paper

Impact of mindfulness and coping strategies on eating behavior of patients with diabetes

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ABSTRACT

Background: Diabetes is a multifactorial chronic disorder constituting greater challenge in public health. Diabetes poses a major life stress that requires considerable physical, emotional, and psychological accommodation and coping. Eating behavior is considered to be one of the unhealthy coping strategy and mindfulness being a variable which has found to have several positive effect on individuals' wellbeing. ***Objective:*** The present study aims to understand the relationship among mindfulness, eating behavior, coping strategies of patients with diabetics. ***Methods:*** Total of 112 outpatients encompassing 38.3 % (n= 43) of female and 61.6% (n= 69) were male with diabetes. The questionnaire includes socio-demographic detail sheet, Mindfulness attention awareness scale (MAAS), Three factor eating questionnaire revised scale–18 (TFEQ-R-18) and coping strategies questionnaire. ***Results:*** Analysis reveals that mindfulness is negatively correlated with dimensions of unhealthy eating behavior which includes cognitive restrain, emotional eating and uncontrolled eating, and the dimensions of coping strategies-catastrophizing and cognitive coping and positively correlated with other dimensions of coping strategies which includes diversion and reinterpreting. ***Conclusion:*** these findings need to be replicated by prospective studies to establish causality and to evaluate potential implication. Effective treatments can be administered to individuals with diabetics based upon the existing relationship between variables and the range of psychological symptoms shown by individuals upon the treatment.

Keywords: *Diabetic, Mindfulness, Eating behavior, coping strategies.*

Diabetes is a multifactorial chronic disorder constituting greater challenge in public health and it is considered as a cluster of metabolic diseases characterized as hyperglycemia resulting from defects in insulin secretion, insulin action or both. Several studies have proven that diabetes is associated with mental disorders such as anxiety disorder and presence of such mental health issues may lead to other complications in medications (Kruse

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et.al, 2003). Another study had revealed that diabetics is closely associated with psychiatric disorders such as delirium, substance abuse, mood disorders, anxiety disorders, schizophrenia and other psychotic disorders. For ex, people with diabetics have two to four times greater risk of developing schizophrenia and 50-100% higher risk of developing depression than compared to general population. (Balhara et.al., 2011). Few epidemiological researchers have found that prevalence of depression and anxiety is higher among People with Diabetes compared with general population (Anderson et.al., 2000; Ciechanowski et.al, 2000; Lustman et.al, 1988). The study has also revealed that poor diabetic control has direct effects on brain functioning and indirect effects of decreased quality of life (Kruse et.al, 2003).

Types of diabetes: In Type 1 in diabetes the immune system destroys the cells that produce insulin, which is a hormone that regulates blood glucose level. There is also a genetic susceptibility to the disease and usually occurs at a younger age. Type 2 diabetes develops when the body is not able to use the insulin properly produced. This occurs due to insulin resistance or insensitivity of tissues to insulin and relative insulin deficiency (and may later lead to insulin deficiency). Gestational diabetes is a form of high blood sugar affecting pregnant women, which usually disappears after child birth. (Thomas et.al, 2018)

In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) and United States (17.7million) in second and third. ICMR (Indian Council of Medical Research) revealed that lower population of northern states are affected by diabetic mellitus when compared to southern states (Mohan et al., 2008). Studies reveal that the prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 and in India may increase up to 79.4 million in 2030. The etiology of diabetes in India is multifactorial and includes genetic factors coupled with environmental influences such as obesity associated with rising living standards, steady urban migration, and lifestyle changes. (Kaveeshwar, 2014). Prevalence of diabetics is increasing in migrant Indians as a result of environmental and lifestyle changes resulting from industrialization and migration to urban environment from rural setting. Apart from that obesity is a major contributing factor.(Mohan V et.al, 2004) Also the study reveals that prevalence of diabetics in rural population is one –quarter that of urban population and this difference is exceptionally seen between north and south population in India as south population have a greater count of diabetes than north. A suggested explanation for this difference is that the north Indians are migrant Asian population and south Indians are host population (Arora et.al, 2010).

Mindfulness can be defined as “moment-by–moment awareness” (Germer et.al, 2005) or as “a state of psychological freedom that occurs when attention remains quite and limber, without attachment to any particular point of view” (Martin et.al, 1997). Mindful living helps an individual to identify and manage the hidden emotions that are causing problems in personal or professional relationships. Such as lowering stress level, reducing ruminating and protecting against depression and anxiety. Diagnosing a patient with diabetes has considerable distress in patient life which may include uncertainty, fear of unexplained physical symptoms, social isolation and repeated thoughts about health problems (Jena et.al, 2018). Being mindful helps people to cope up better with rejection and social isolation. Meditation and Mindfulness-Based Therapy is particularly useful for diabetic patients with serious threat to health affected by anxiety, worry and thought suppression and it also has a positive message to be included in general weight management (Warren et.al, 2017). Therapies such as Mindfulness-Based Cognitive Therapy (MBCT), Mindfulness-Based

Stress Reduction (MBSR), Mindful Self-Compassion (MSC), Mindful Eating-Conscious Living (ME-CL) and similar mindfulness based programs are widely used as intervention programs to help diabetic patients to reduce emotional distress and to improve health related quality of life and glycemic control. These intervention programs for diabetic patients are self-regulating one's attention focusing on direct experiences, especially one's psychological processes, such as thoughts and feelings.

Eating behavior is a broad term that encompasses food choice and motives, feeding practices, dieting, and eating related problems such as obesity, eating disorders, and feeding disorders (Lacaille L, 2013). In the context of behavioral medicine, eating behavior research focuses on the etiology, prevention, and treatment of obesity and eating disorders, as well as the promotion of healthy eating patterns that help manage and prevent medical conditions such as diabetes, hypertension, and certain types of cancers. Various types of eating behavior have been identified and these include uncontrolled eating, emotional eating and restrictive eating/cognitive restrain, each has its own etiology. Cognitive restrain refers to the conscious restriction of food intake to control body weight or to promote weight loss, uncontrolled eating refers to the tendency to eat more than usual because of a loss of control over intake and emotional eating refers to over eating during dysphoric mood states. Eating behavior is considered to be one of the unhealthy coping strategy and mindfulness being a variable which has found to have several positive effects on individuals' wellbeing. Mindfulness acts a potential moderator between psychological distress and emotional eating and psychological distress is positively associated with engagement in emotional eating and mindfulness is inversely related with it (Pidgeon A et.al, 2012). A research identifies that mindful eating effectively decreases binge eating and emotional eating in populations engaging in eating behavior. (Katterman et.al, 2014).

Coping strategies refers to the specific efforts, both behavioral and psychological, that people employ to master, tolerate, reduce or minimize stressful events. (Taylor et.al, 1998). The term coping generally refers to adaptive (constructive) coping strategies i.e. strategies which reduce stress. Researches has suggested the importance of knowing positive and negative coping on the wellbeing of individual which suggest that physicians with exhaustive knowledge can manage the patients better. (Karl et.al, 2009). The effectiveness of coping depends upon the type of stress, the individual, and the circumstances. Coping responses are partly influenced by personality, social environment, and particularly the nature of the stressful environment. Coping strategies plays a major role in handling the stress which is acquired due to chronic disease like diabetes. In diabetes the stressor is usually assumed to be the chronic with which one must cope, and the coping leads to certain metabolic and psychosocial outcomes. Psychological, emotional and social distress has significant impact on chronic illness such as diabetes. Psychological factors play a major role in managing and achieving metabolic control (Kent et.al, 2010). Coping also may affect psychosocial outcomes, such as psychological adjustment, depression, and quality of life. (Grey et.al, 2000).

The constantly changing cognitive, behavioral and emotional efforts to manage particular external or internal demands, coping strategies are separated into emotion focused and problem focused. A problem focused coping is aimed at resolving stressful situation or event or altering the source of stress and emotion focused coping is a mechanism used to reduce distress by minimizing or preventing the emotional component of a stressor such as distracting oneself, meditating, using systematic relaxation procedure and seeking social

support. Emotion focused and problem focused coping strategies may be used simultaneously or alternative. (Tuncay et.al, 2008).

Diabetes poses a major life stress that requires considerable physical, emotional, and psychological accommodation and coping. A study has revealed that there is an existing negative relationship between mindfulness and eating behavior and practice of mindful eating has an effective improvement in dysregulated eating and dietary patterns which in turn helps diabetic self-care management. (Kearney et.al, 2012). Another study has revealed that practice of positive coping reduces eating behavior which in turn improves the health in diabetic patients. (Park et.al, 2018) The purpose of the investigation is to identify the relationship between the variables mindfulness, eating behavior and coping strategy among diabetic patients and to identify whether the results of previous studies are recurring. Effective treatments can be developed and administered to individuals with diabetics based upon the existing relationship between variables and the range of psychological symptoms shown by individuals upon the treatment.

METHODOLOGY

Aim: To examine the relationship among mindfulness, coping strategies and eating behavior of patients with diabetes.

Objectives

1. To understand the relationship between mindfulness and eating behavior among diabetic patients.
2. To understand the relationship between coping strategies and eating behavior among diabetic patients.

Hypothesis

H_oa- There is no relationship among mindfulness, eating behavior, coping strategies of patients with diabetics

H_ob- There is no significant relationship between mindfulness and eating behavior among diabetic patients

H_oc- There is no significant relationship between coping strategies and eating behavior among diabetic patients.

Sampling

Purposive and snowball sampling methods was used to collect data. Based upon the necessity and convenience, the diabetic outpatients were selected from easily accessible locations near-by and a few data were been collected from the references of previously suggested diabetic patients. Some data were collected using Google forms. The data was collected from various sectors such as college students, company employees, hospital outpatients and vicinity with person having diabetes.

Participants

The sample constitutes of 112 diabetic outpatients between ages ranging from 18-70 years. Participants were provided with informed consent form before collecting the data. The study exclusively included diabetic patients and those who are not diabetic were excluded. The responses were collected by directly administering questionnaire and online Google forms to diabetic outpatients.

Instruments Used

Socio demographic details: This socio demographic data is intended to gather information regarding the name of the participant, age, gender, socioeconomic status (upper or middle or lower), place of residence (urban or rural), height, weight, duration of diabetes.

Mindfulness Attention Awareness Scale (MAAS): Developed by Brown.K.W and Ryan.R.M (2003). The scale has 15 items (1-6 likert scale) which assess dispositional mindfulness. The scoring is done by calculating the mean score where the sum of the answer is divided by total number of questions. Higher score reflects higher levels of dispositional mindfulness. The MAAS has the good internal consistency realibility ($\alpha \geq .82$).

Three Factor Eating Questionnaire (TFEQ-R18v2): Developed by Cappelleri.J.C, Bushmakin. A. G, Gerber. R. A, et.al, 2009. The instrument is a shortened and revised version of original 51 items TFEQ. The questionnaire consists of 18 items that measures the domains of eating behavior: restrained eating, uncontrolled eating based upon the food intake. The TFEQ –R18 consist of 18 items on a 4-point response scale (definitely true, mostly true/mostly false/definitely false). Higher scorers in the respective scales are indicative of greater cognitive restrain, uncontrolled or emotional eating. The internal consistency reliability coefficient (cronbach's α) for the scale is above 0.70 and below the 0.90 indicating high internal consistency.

Coping Strategy Questionnaire (CSQ-R): Developed by Rosenstiel.A.K and Keefe.E.J (1983), the questionnaire is a shortened and revised version of 44 items CSQ. The questionnaire consists of 23 items designed to assess four coping strategies: catastrophizing, diversion, reinterpreting, and cognitive coping. Each item is scored on a 5 point likert scale with responses ranging from always, often, sometimes, rarely and never. Items from 1-5 with dimension catastrophizing have positive scoring and 6-23 with dimensions diversion, reinterpreting, and cognitive coping have negative scoring. Higher score indicates negative coping.

Procedure

The data was collected using two methods. One, through direct administration of questionnaire and secondly by using Google forms. The participants of people with diabetes were selected from various sectors such as outpatients from multispecialty hospitals, company employees, daily wage workers and vicinity. The data was collected after informing the sample about the study and there were no deceptive practices throughout the study. The informed consent was acquired from the participants. The subjects were asked to provide information on some socio demographic details and the participants were given the Mindfulness Attention Awareness Scale (MAAS), Three factor eating questionnaire (TFEQ-R18V2) and Coping strategy questionnaire (CSQ-R) to respond. The instructions for the questionnaire were given in understandable language. Informed consent was acquired from each participant and confidentiality of the personal data of the participants were assured and maintained.

Data analysis

The data was coded in Microsoft excel and the analysis was carried out with the help of SPSS 20. Frequency, percentage, mean and standard deviation were used for descriptive statistics. The Pearson product moment correlation was used to understand the relationship among the variables. The independent sample t-test was used to examine the difference among the variable with respect to socio-demographic variables.

RESULTS

Table 1: Frequency and percentage of the socio demographic variables of the respondents. (N = 112)

Variable	Frequency	Percentage%
Gender		
Male	43	38.4
Female	69	61.6
Age		
10-29	2	1.8
30 -49	45	40.2
50-69	58	51.8
70 and above	7	6.3
Socioeconomic status		
Lower	11	9.8
Middle	58	51.8
Upper	43	38.4
Domicile		
Rural	43	38.4
Urban	69	61.6
Type of diabetes		
Gestational diabetes	12	10.7
Type I	29	25.9
Type II	71	63.4

Table 1 shows the frequency and percentage of socio-demographic variables. The age of the participants ranges from 10 to 70 years and most of the samples are in the age range of 50-69 (51.8%). Among 112 samples there are 43 (38.3 %) female and 69 (61.6%) male with diabetes were included in this study. Among the sample population of 112, the 69 (61.6 %) are from urban and 43 (38.4%) rural background.

Table 2: Correlation among the study variables

Variable	M	SD	1	2	3	4	5	6	7	8
1. Mindfulness			1	-.20*	-.20*	-.29**	-.51**	.27**	.36**	-.09
2. Cognitive restrain				1	.13	-.07	.34**	-.02	-.10	-.03
3. Uncontrolled eating					1	.42**	.37**	-.00	.03	.29**
4. Emotional Eating						1	.36**	-.21*	-.35**	-.03
5. Catastrophizing							1	-.15	-.48**	.33**
6. Diversion								1	.32**	.27**
7. Reinterpreting									1	.25**
8. Cognitive Coping										1

***. Correlation is significant at the 0.01 level (2-tailed).*
**. Correlation is significant at the 0.05 level (2-tailed).*

Table 2 shows the Pearson correlation analysis among the variables mindfulness, eating behavior and coping strategy. Mindfulness was significantly correlated with the dimensions

of eating behavior such as cognitive restrain (r= -.20*), Uncontrolled eating (r= -.20*) and Emotional eating (r= -.29**). Mindfulness was positively significantly correlated with diversion (r= .27**) and reinterpreting (r= .36**) of coping strategies and also has significantly negative correlation with catastrophizing (r= -.51**). Even though the relationship between mindfulness and cognitive coping (r= -.09) is negative, the relationship was not significant.

The dimension of eating behavior, cognitive restrain was significantly correlated with the dimension of coping strategy catastrophizing (r= .34**). Cognitive restrain is negatively correlated with other dimensions of coping strategy such as diversion (r=-.02), reinterpreting (r=-.10) and cognitive coping (r=-.03), and the relationship was not significant. The dimension of eating behavior, uncontrolled eating was positively significantly correlated with catastrophizing (r= .37**) and cognitive coping (r=.29**). Even though uncontrolled eating is negatively correlated with diversion (r=-.00) and positively correlated with reinterpreting (r=.03), the relationship was not significant. The dimensions of eating behavior, emotional eating is negatively significantly correlated with the dimensions diversion (r=-.21*) and reinterpreting(r=-.35**) and positively correlated with catastrophizing (r=.36**). Even though the relationship between emotional eating and cognitive coping (r= -.03) is negative, the relationship was not significant.

Table 3: Difference among the study variables based on the type of diabetics

Dimensions	Diabetes types	Mean	Std. Deviation	F	Sig.
Mindfulness Total	Type 1	43.42	8.22	.46	.62
	Type 2	45.17	9.43		
	Gestational diabetes	36.09	4.72		
Cognitive restrain	Type 1	15.14	1.82	.98	.37
	Type 2	15.59	2.63		
	Gestational diabetes	17.91	2.16		
Uncontrolled eating	Type 1	20.53	1.89	3.10	**.04**
	Type 2	21.24	3.98		
	Gestational diabetes	24.64	3.80		
Emotional Eating	Type 1	6.88	1.11	1.06	.35
	Type 2	6.62	1.40		
	Gestational diabetes	6.09	1.30		
Catastrophizing	Type 1	17.77	4.42	1.69	.18
	Type 2	16.26	3.98		
	Gestational diabetes	20.73	3.16		
Diversion	Type 1	16.02	2.71	.26	.76
	Type 2	14.98	4.02		
	Gestational diabetes	16.82	3.28		
Reinterpreting	Type 1	16.88	2.28	1.09	.34
	Type 2	17.81	3.92		
	Gestational diabetes	17.64	3.82		
Cognitive coping	Type 1	11.67	3.70	1.97	.14
	Type 2	10.47	4.36		
	Gestational diabetes	13.55	4.39		

Table 3 shows the ANOVA of the study variables. One way analysis of variables (ANOVA) was run on the variable dimension of mindfulness, eating behavior, coping strategy and type of diabetes. The study found that only uncontrolled eating has a significant difference of .049 with type of diabetes and the other variables are not significant.

DISCUSSION

The current study was designed to examine the relationship between the variables mindfulness, eating behavior and coping strategies among patients with diabetics. Effective management of diabetes requires self-care behavior such as mindfulness attention, proper food intake and effective coping strategies during stress. In order to reduce the difficulties undergone by diabetic patient during treatment and to facilitate upcoming researches in the field the present study takes a broader view of the relationship between the existing variables and the demographic data. The hypothesis was that there is a significant relationship among the variables mindfulness, eating behavior and coping strategies among diabetic patients and the results have revealed that there is an existing relationship between the variables.

The analysis of statistical data reveals that mindfulness is negatively correlated with dimensions of eating behavior. Mindfulness is negatively correlated with cognitive restrain, emotional eating and uncontrolled eating. A research study on mindfulness based stress reduction and eating behavior had discloses that mindfulness is negatively correlated with emotional and uncontrolled eating (Kearney et.al, 2012). Mindfulness is negatively correlated with coping strategies such as catastrophizing, cognitive coping and positively correlated with diversion and reinterpreting. A research study reveals that mindfulness is negatively correlated with non-adaptive coping strategy and positively correlated with adaptive coping strategies (Vinothkumar et.al, 2016). A research study by (Katterman et.al, 2015) brings out the importance of mindful eating for people with unhealthy eating habits. In the study mindfulness- based interventions was administered to people with obesity and unhealthy eating habits as a long term program. Results suggest that mindfulness meditation effectively decreased binge eating and emotional eating in populations engaging in this behavior. And the study also put forward that Mindfulness based stress reduction therapy can be given to binge eaters as an intervention program to reduce and avoid unhealthy eating habits during stressful days. Also, these intervention programs can also be given to patients who are suffering with stressful chronic illness such as diabetes, cancer, obesity etc. Intervention programs such as mindfulness based cognitive therapy, mindfulness based eating therapies can be administer to people with unhealthy coping and to avoid abnormal eating behaviors for the well-being of diabetic patients.

A similar study by Jordan et.al (2014) reveals that mindfulness is significantly negatively correlated with eating behaviors as mindfulness encourages healthier eating. Also, the study reveals that mindfulness is directly correlated with healthy coping and inversely with unhealthy coping. Mindfulness aid in stress reduction among patients with chronic pain such as diabetes. (Jordan.C.H, 2014). A study by (Sabri. A. A et.al, 2007) emphasizes the interrelation between demographic variables and awareness of diabetes mellitus among urban and rural population. The results indicate that the rural diabetics are far less knowledgeable about diabetes mellitus, its management and its complications. Similar results were been obtained in the current study, where there is a significant difference between urban and rural population.

However, the present result is inconsistent with those reported by David j. Keareny (2012) that there are no evidences to prove mindfulness brings beneficial change in eating through

reductions in disinhibited eating or significant changes in dietary intake. They found there is no significant relationship between mindfulness and eating behavior, inconsistency could be due to the way sampling was chosen.

The present study concludes that there is an existing relationship between the variables mindfulness, eating behavior and coping strategies. Mindfulness is negatively correlated with eating behavior and non-adaptive coping strategies. And mindfulness is positively correlated with adaptive coping strategies. This is due to, mindfulness is positive element and eating behavior and coping strategies are non-adaptive negative elements. Also the study reveals that significant differences existing between urban and rural population. This may be due to the lack of awareness among rural diabetics and crisis in proper healthy intakes due to financial problems for daily wage workers. Hence, there is a crucial need to improve the awareness level of diabetes mellitus in rural areas. Doing so will give rise to a healthier workforce and a lessened economic burden.

Both biological and psychological factors are responsible for sex and gender difference in diabetes risk and outcome (Kautzky et.al, 2016). But the present study disproves by concluding that there are no significant differences in gender and hence treatments can be administered in general.

CONCLUSION

1. There is a significant relationship among mindfulness and coping strategies on eating behavior of patients with diabetes.
2. There is a significant negative relationship between mindfulness and eating behavior among diabetic patients.
3. There is a significant positive relationship between eating behavior and coping strategies among diabetic patients.
4. There is no significant difference between male and female in the study variables.

Limitations

1. The study sample was heterogeneous and include patients with type 1, type 2 and gestational diabetes in different ratios which may account for some of the differences in results.
2. The study includes cross sectional analyses where the independent and dependent variables, and potential mediators were assessed at the same time point. Cross-sectional analyses limit casual inference compared to prospective studies. For instance, prospective studies would provide stronger evidence on whether there is a significant relationship among mindfulness, coping strategies and eating behavior of patients with diabetics.
3. Most of the diabetic outpatients hesitated to reveal it in public that they have diabetics and were highly impatient in filling out the questionnaire. Also felt irritable while filling as similar questions were given to check the accuracy of responses.
4. Since snowball and purposive sampling methods were been used in the study unknown proportion of the entire population is not covered. As the study also included collection of data through Google forms direct interaction with participants is lagging.
5. Some authors have argued that mindfulness cannot be captured by self-reported questionnaires (Grossman and van dam 2011). It is still uncertain how one might best capture the central quality of mindfulness by self-reported measures. Hence the

assessment of mindfulness is without a gold standard, and the accuracy of self-reported mindfulness measure would be mistaken.

Implications

The study can be elaborated in a broad perspective in terms of factors involved in mindfulness, eating behavior and coping strategy.

The study has found significant difference among urban and rural, considering cultural bounds in India we can focus on developing tools related to these variables that is more suitable for the Indian context to have a more clear and accurate finding.

The current study may be used to develop therapies and intervention programs for diabetics. Previous researches were conducted among diabetes patients with mindfulness based therapy and have suggested for future works to develop effective therapy to control glycemic levels. More work is needed to assess whether mindfulness based therapy may enhance diabetes self-management programs that mediate their effects through improved personal skills, self-efficacy, knowledge, and communication. Beyond these potential contributions, Mindfulness based therapy may also be useful to address stress and psychosocial issues typically associated with chronic conditions such as diabetes, obesity, cancer patients etc.

Further research is needed to determine the extent to which mindfulness plays a role in the etiology and/or maintenance of disinhibited eating and unhealthy coping in patients with diabetes**.**

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Conflict of Interest

The author declared no conflict of interest.

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