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Original Article

Impulsivity, Set Shifting and Attributional Style in Obese and Non-Obese Females: A Comparative Study

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ABSTRACT

Introduction: Obesity has adverse effects on health, as excess fat accumulates in the body. It leads to reduced life expectancy and increases other health issues. Executive functions and personality factors play important role as they are determinants of eating behaviour of a person, thus affecting the risk of obesity.

Objectives: The aim of the present study was to find out how obese adult females differ from their non-obese counterparts in terms of impulsivity, set shifting ability and attributional style.

Material and Methods: The present study aimed to find out how obese adult females differ from their non-obese counterparts in terms of impulsivity, set shifting ability, and attributional style. A cross-sectional, comparative pilot study employing the purposive sampling method was conducted. The study samples were collected from a hospital setup. Thirty individuals participated, with 15 in each group, divided on the basis of body mass index (BMI). The obese group had been characterised by BMI ≥25kg/m^2. They were assessed by the Stroop Colour Word Test, the Wisconsin Card Sorting Test, and the Attributional Style Questionnaire.

Results: Obese and non-obese females differed significantly in terms of impulsivity and set shifting ability. Moreover, there was a significant difference between the two groups in the global/specific attribution domain of the good outcome achievement goal score.

Conclusion: Obese females appeared more impulsive, had a deficit in cognitive flexibility, and feedback utilization. This might have played an important role in the difficulty in response inhibition, narrowing down their thinking process, and affecting their reception of environmental feedback. This, in turn, makes it difficult for them to maintain a healthy lifestyle and leads to a relapse of obesity.

Keywords: Attributional style questionnaire, Impulsivity, Obesity, Stroop colour word test, Wisconsin card

INTRODUCTION

Obesity is a global issue of epidemic proportions. Obesity is defined as abnormal or excessive fat accumulation that presents a health risk.[1] Obesity is considered to be dangerous as it is associated with increased risk of physiological issues like hypertension, dyslipidemia, type 2 diabetes, etc.,[1,2] and also has psychological effects like impaired body image, low self-esteem, eating disorders, stress, substance abuse, and poor quality of life.[3] Globally, people are considered obese when their body mass index (BMI) is greater than or equal to 30 kg/m^2.[4] However, in the present study, the cut-off was taken according to the Asian Indian standards, i.e., obesity is when BMI is greater

than 25 kg/ m^2.[5] The present study dealt with exogenous obesity, i.e.,when the person's intake of food is more than the body can utilize. This is associated with improper diet, lack of physical activity, sleep deprivation, and psychological factors such as stress, personality factors, and loneliness.[6]

Studies have found that there is a positive relation between impulsivity and obesity.[7] Impulsivity seems to be a hindrance in the treatment of obesity, as it leads to a lack of control overeating behaviour and makes it difficult to resist food.[8] Obesity has also been associated with executive dysfunction, with a focus on three distinct neurocognitive constructs: decision making, response inhibition, and cognitive flexibility.[9,10] Individuals who lack confidence in controlling their eating behavior have often been found to have an internal, global, and uncontrollable attributional style. These individuals with low levels of eating self-efficacy were also found to have issues related to binge eating.[11]

The aim of the present study was to find out how obese adult females differ from their non-obese counterparts in terms of impulsivity, set shifting ability, and attributional style, as these factors have been found to associate with eating behavior.[7-9,12]

MATERIAL AND METHODS

The aim of the present study was to find out how obese adult females differ from their non-obese counterparts in terms of impulsivity, set shifting ability, and attributional style.

Hypothesis

It was hypothesized that there would not be any significant difference between obese and non-obese female in terms of impulsivity, set shifting ability and attributional style.

Inclusion and exclusion criteria: The study group consisted of 15 females having obesity (BMI >/ 25 kg/m^2), age ranging from 20 to 40 years, and a minimum of 8years of education. 15 non-obese (BMI <25 kg/m^2) females, whose age, education, and socioeconomic status were matched with the experimental group, were included in the control group. Participants in the experimental group were included only if they had primary obesity. Adults suffering from any organic disease, endocrinological disorder (thyroidism and Cushing's syndrome), neurological disorder, terminal illness, mental retardation, and psychiatric disorders were excluded.

Description of the tools

The socio-demographic sheet was used to collect the background information about the participants, such as the name, address, age, sex, educational qualification, marital status, occupation, family type, family income, current height and weight, health status, medical history, and family history of endocrinological disorder.

The Stroop Colour Word Test was used to assess impulsivity. This test was designed by J. R. Stroop in 1935.The Wisconsin Card Sorting Test (WCST), a neuropsychological test of "set-shifting", i.e., the ability to display flexibility in the face of changing schedules of reinforcement. The WCST was written by David A. Grant and Esta A. Berg (1948). The Professional Manual for the WCST was written by Robert K. Heaton, Gordon J. Chelune, Jack L. Talley, Gary G. Kay, and Glenn Curtiss (1981). The Attributional Style Questionnaire (ASQ) was prepared by Christopher Peterson and colleagues in 1982, and measures individual differences in the use of the attributional dimensions of internality, stability, and globality.[13]

Procedure

The study was carried out for a duration of 8 months, and samples were collected from a hospital setup in Kolkata. It was a cross-sectional, comparative pilot study and used a purposive sampling method. A total sample of 30 females was included in the study.

The study was approved by the Institute of Post Graduate Medical Education and Research (IPGME and R), and R Research Oversight Committee, Institutional Ethics Committee of the Institute of Post Graduate Medical Education and Research, Kolkata.

Data was taken across sessions. Participants of the experimental group were selected from the hospital out patient department (OPD) of the Department of Endocrinology and Metabolism. Initially, 30 individuals were approached for data collection; however, there were 5 dropouts in follow-up sessions, and 10 data could not be included as the participants had secondary obesity associated with endocrinological issues. So finally, 15 data points could be included based on the inclusion criteria. Participants of the control group were selected from the non-obese, healthy individuals, the non-relative accompanying person with the patient, from the OPD.

After the introduction with the participants, rapport was established, and brief details about the purpose of the study were given to the individual. Consent of the individual was taken, and confidentiality was assured and maintained. The socio-demographic details were taken, followed by administration of the Stroop Colour Word test and Wisconsin Card Sorting Test, and Attribution Style Questionnaire. The data obtained were scored and subjected to a t-test using statistical package for social sciences version 16 (SPSS 16).

RESULTS

The mean age of the obese group was 26.07 years, and for the non-obese group, 25.93 years. The t value of 0.17 ($p>0.05$) indicated no significant difference between obese and non-obese groups in terms of age. In the obese group,

mean height was 1.63m as compared to 1.65m in the non-obese group, with a t-value of 1.02 (p>0.05) indicating no significant difference. The mean weight of the obese group was 74.37 kg, in contrast to 56.90 kg in the non-obese group. The t-value of 7.71 (p< 0.01) indicated that the two groups differed significantly from each other with respect to weight and consequently differed significantly in terms of BMI [t-value of 12.03(p< 0.01)]. However, the normality of the data was not assessed before other statistical measurements.

The Stroop Colour Word Test, used to measure impulsivity, indicated more impulsivity in the obese female group. It was found that the obese females took more time to name the inkcolours used to write the colour names, especially when they were incongruent. The test suggests that a greater time taken is indicative of difficulty in inhibiting cognitive interference and subsequently more impulsivity [Table 1].

Table 1: Data of stroop colour word test

Test	Female						
Domain	Obese		Non-obese		t	df	p
	Mean	SD	Mean	SD			
Stroop test	14.47	6.91	7.60	3.10	3.33	28	0.00*

(*) significant at the 0.05 level, SD: Standard deviation, df: Degrees of freedom

When obese and non-obese female groups were compared in the Wisconsin Card Sorting Test, which was used to measure the set shifting ability, it was found that obese female group took significantly more number of trials to complete the test, had more number of errors, perseverative responses, perseverative errors and failure to maintain set, thus results are indicative of difficulty in set shifting [Table 2].

Regarding the Attributional Style Questionnaire, it was found that obese female had a greater score for attribution of global cause positive/good outcome events when achievement was the goal area, as their mean score differed significantly from the score of the non-obese group. However, for global cause positive/good outcome events when affiliation was the goal,the data were found to be insignificant. In case of global cause negative/bad outcome events, the mean difference was not significant enough in both cases of achievement and affiliation-oriented goals [Table 3].

DISCUSSION

The current study attempted to compare obese and non-obese females in terms of their behavioural impulsivity, leading to difficulty in response inhibition, the ability to change mental set, and their style of attribution regarding various events in life.

The results have shown a significant difference in the Stroop Colour Word Test, indicating cognitive interference and decreased inhibitory control in the obese female group. These difficulties were observed in previous studies where a lack of control in eating was associated with decreased inhibition.[14,15] It was further found that even if the obese individuals have a desire to lose weight, they find it difficult to control their eating behavior.[16] The impulsive and disinhibited behavior might affect their eating behavior, as impulsivity leads to a lack of consequence consideration. Both self-report measures and behavioural measures have reported that impulsivity is high in obese individuals in comparison to their normal counterparts.[8,17] This lack of inhibition can lead to binge eating behavior as a coping method, especially in times of

Table 2: Data of wisconsin card sorting test

Test	Female						
Domain	Obese		Non-obese		t	df	p
	Mean	SD	Mean	SD			
WCST total trial	102.73	19.04	79.47	11.34	4.07	28	0.00*
WCST correct	75.67	7.84	66.40	3.99	4.08	28	0.00*
WCST error	27.07	13.16	13.07	7.71	3.56	28	0.00*
WCST perseverative response	14.07	7.15	7.73	5.64	2.70	28	0.01*
WCST perseverative error	12.87	5.94	7.27	5.02	2.78	28	0.00*
WCST non-persevertive error	14.20	8.79	5.80	3.36	3.46	28	0.01*
WCST conceptual level response	68.53	7.03	64.40	3.23	2.07	28	0.05*
WCST failure to maintain set	.60	.74	.13	.36	2.21	28	0.04*

(*) significant at the 0.05 level. WCST: Wisconsin card sorting test, SD: Standard deviation, df: Degrees of freedom

Table 3: Data of the attributional style questionnaire

Questionnaire	Female						
Domain	Obese		Non-obese		t	df	p
	Mean	SD	Mean	SD			
ASQ good global/ specific achievement	17.20	2.48	15.20	2.57	2.17	28	0.04*
ASQ good global/ specific affiliation	14.73	3.37	14.27	2.12	.46	28	.65
ASQ good global/ specific total	31.93	4.67	29.47	2.92	1.74	28	.10
ASQ bad global/ specific achievement	11.93	3.22	13.13	3.11	1.04	28	0.31
ASQ bad global specific affiliation	10.27	3.31	11.40	3.36	.93	28	.36
ASQ bad global specific total	22.20	5.67	24.40	5.30	1.10	28	0.28

(*) significant at the 0.05 level. ASQ: Attributional style questionnaire, SD: Standard deviation, df: Degrees of freedom

emotional need. These behavioural patterns may lead to gaining of weight gain and can also be the reason for lapses in dieting, disrupting the recovery process.[8]

While measuring the ability to change mental set, using the Wisconsin Card Sorting Test, it was found that obese females took significantly more number of trials to complete the test, had more number of errors, and failed to maintain set. The results are indicative of difficulty in their ability to maintain a set and also difficulty in changing the mental set according to the demands of the situation. Also, there were significant differences between the two groups in terms of the total number of correct responses made, the number of non-perseverative errors, and conceptual level responses. These are indicative of a lack of cognitive flexibility in the individuals.[18-21] The focus was on particular aspects of the stimulus, and proper utilization of the environmental cues was not present; this is in accordance with the studies stating the presence of cognitive deficits and attentional biases in obese people, which play a role in the development and maintenance of obesity and eating disorders.[22] The obese female had at times perseverated to the mental set (perseverative errors), without using the negative feedback, and had at times shifted the set easily, ignoring the positive feedback (which is indicative of a failure to maintain set) from the examiner. Thus, this data indicates that they had difficulty in proper planning in reaching a goal and also found it difficult to shift cognitive strategies and inhibit their behaviour, and most importantly, modify them in accordance with the changing environment, i.e., poor feedback utilization. In real-life situations, this lack of planning and disinhibited behaviour may lead to disinhibited eating behavior and greater food cravings.[9,10,23,24] Thus, they might have difficulty in controlling diet or ignoring food cues from the environment, thus leading to lapse in treatment, especially treatment methods based on change in sedentary lifestyle.

When obese and non-obese female groups were compared in terms of the Attributional Style Questionnaire, it was found that obese females had a greater score for attribution of global cause positive/good outcome events when achievement was the goal area. However, for bad outcome events, though a mean difference was seen, it was not significant enough. The existing studies state that the chances of engaging in binge eating behaviour were greater if an individual had internal, global, and uncontrollable attributions.[11] Moreover, attributions of global causes for a particular lapse were found to predict a more serious relapse during the period of dietary restriction.[25] So the tendency to attribution of global cause might have played an important role in the case of the obese female, as it narrows down their thinking process and might affect their reception of environmental feedback, which is again behaviourally reflected in the findings of the Wisconsin Card Sorting Test. Attributional style, on the other hand, might affect the motivation of the obese individual and make her susceptible to other psychological issues like depression, as depression is associated with a global attribution style. Moreover, depression or anxiety issues again may lead to overeating as a coping strategy.[26, 27]

In India, obesity is emerging as an important health problem. It is seen that obesogenic environments, personality, and cognitive factors are critical determinants of eating behavior and the risk of obesity, so for the proper prevention and cure of obesity, addressing these personality factors becomes crucial. However, there is a need for research in this area, especially in the Indian population. This study can be a step forward towards that goal. The present study findings would be of immense value, as they would help to identify a few cognitive factors related to obesity, which need to be addressed for its treatment. A person with a genetic predisposition to obesity can be helped out with precautionary measures, and also help in the treatment and maintenance of treatment, preventing relapse of obesity.

However, if this study is carried out with a larger sample, it can provide a better picture and help in the conclusion. BMI is the only measure taken to determine obesity; however, body fact percentage could have been another crucial method of obesity index.

CONCLUSION

Thus, the present study concludes that obese females were found to have difficulty in inhibiting their responses even when it is necessary. They also have difficulty in planning and utilizing environmental feedback to change their behaviours accordingly. A tendency of global attributional style has also been found. All of these factors might affect their dietary decisions, planning, and decisions related to daily living. This, in turn, makes it difficult for them to maintain a healthy lifestyle and leads to a relapse of obesity.

Ethical approval: The research/study approved by the Institutional Review Board at IPGME & R Research Oversight Committee, Institutional Ethics Committee of Institute of Post Graduate Medical Education and Research, number Inst/IEC/290, dated 21March, 2013.
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