CENTRAL OBESITY: AN IMPORTANT INDICATOR OF REPRODUCTIVE HEALTH IN YOUNG URBAN WOMEN OF KOLKATA.

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Various studies have indicated that abdominal obesity in females may contribute to the onset of menstrual problems and other associative symptoms of Poly Cystic Ovarian Syndrome (PCOS), which create an alarming reproductive health concern in urban females. The current study was designed to assess whether there is a relation between obesity and menstrual irregularities and reproductive health risk factors among young urban females. Random samples of 75 young female college students from urban background were selected on the basis of their menstrual health status. Students with irregular menstruation along with markers of PCOS formed the study group and were compared with students having no reproductive health problems as control groups. Body mass index (BMI), Waist circumference, Hip circumference, Waist Hip Ratio (WHR), and Visceral Fat were measured following standardized protocols. The result showed a significant number of subjects from study group having high WHR and visceral fat content than normal subjects. On the contrary maximum number of subjects from control group showed normal WHR and visceral fat values. These data indicated that high abdominal fat accumulation and increased values of waist and hip circumference in females might be prominent markers of abnormal reproductive health issues like menstrual irregularities and PCOS. All these parameters may increase the risk for lifestyle diseases like Diabetes, CVD, even reproductive problems in later life if the conditions remain unscreened and untreated.

Obesity as a multifactorial health disorder is gaining prevalence worldwide. Excess body weight is strongly associated with grave conditions like Cardiovascular Disease, Type 2 Diabetes, Metabolic Syndrome, Arthritis, Cancer etc (WHO, 2000).

previously, it was designated as an adulthood disease but now it is becoming an emerging health problem in young adults, adolescents and even in children (Manojan *et al*, 2014). Obesity-associated metabolic risks are greater in Asian people than in European descent populations (NIN, 2008).Both male and females are affected by this situation but it is significantly higher in women due to presence of more adipose cells compared to men. Women are easily affected by the co-morbidities of obesity but along with those, increased body weight easily affects the reproductive profile of women. These may range from irregular menstruation to more serious conditions like PCOS (Poly Cystic Ovarian Syndrome) and even infertility (Christopher *et al*,2 010).

Many studies have proved that body fat distribution especially central obesity is a key

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CENTRAL OBESITY:

parameter in manifesting various reproductive problems (Zaadstra et al, 1993).

Among all the types, central obesity which is characterized by increased waist circumference, increased waiship ratio (WHR) and high visceral fat accumulation, is mostly correlated with abnormal reproductive patterns in women. A study showed that a mere 0.1 unit increase in WHR of a female leads to 30% drop in her reproductive functions (Mitchell et al, 1953) which hinted at a direct relationship between WHR and fertility.

The most important part in the reproductive life of a female is undoubtedly the normal flow of menstrual cycle. Abnormal reproductive health in young women indicates various potential health hazards in their later life. So an early diagnosis and proper treatment of reproductive disorders help in counteracting many alarming health conditions in future.

The objective of the study was to assess the bio markers of central obesity (Waist Hip Ratio and Visceral Fat) and to determine its association with reproductive problems like menstrual irregularities, oligomenorrhea, dysmenorrhea and probability of PCOS among the young women of selected colleges in Kolkata, West Bengal.

MATERIALS AND METHODS

SELECTION OF SUBJECTS: This study was conducted on female students (aged 18-20 years) of Hiralal Mazumdar Memorial College Dakhineswar, West Bengal, who were approached for participating in this evaluation process. The consent of the participants was obtained prior to the study in written format.

EVALUATION OF MENSTRUAL STATUS AND OTHER RELATED FEATURES:

About 120 students were approached (of middle income background and led sedentary life style) to fill up a pre-tested self-structured questionnaire (prepared according to WHO guidelines,2012) containing questions
- Regarding their menstrual status e.g. length of their menstrual cycle, onset of menstruation each month, duration of menstruation cycle
- Presence of oligomenorrhea, dysmenorrhea,
- Outbreak of acne prior to their cycle,
- Presence of excessive facial and body hair, swelling of breasts
- Other associated psychological symptoms like depressions, tension, anxiety prior and etc. other questions like their demographic profile and lifestyle levels were assessed by set questions.

After obtaining information from the questionnaire, the college students were divided into 2 groups. One with symptoms of irregular menstruations (defined as CASE group) containing 40 no. of students and another group with no manifestation of irregular menstruation or other associative symptoms of adverse reproductive system (defined as control group) having 75 no. of students.

Other students were excluded from the study keeping in mind the exclusion criteria of hypothyroidism.

Finally, 35 students(out of 40 students) were randomly selected from the CASE group and 40 students (out of 75 students) were selected from the control group for further

anthropometric measurements to assess level of central obesity.

Measurement of Physical Status :

- Their weight and heights were measured by using the weighing machine (OMRON, India) and Stadiometer (Hindusthan minerals private limited)
- BMI was measured using the standardized formula and then compared with WHO values of BMI **(WHO,2006)**
- **Measurement of Waist Hip Ratio :** Waist and hip circumferences were measured to the nearest 0.1 cm using a flexible metric measuring tape with the subject in a standing position. Waist circumference was measured around the abdomen at the level of the umbilicus. Hip circumference was measured at the level of the maximum extension.

  Waist Hip Ratio data were obtained by dividing waist circumference with hip circumference and then were compared with WHO values of WHR **(WHO, 2008).**
- **Measurement of Visceral Fat:** Visceral fat, which is another important marker of abdominal obesity, was measured with the help of Karada scan OMRON Body Fat Analyzer depending on the principle of Bio electrical Impedance Analysis (BIA) (Kyle, Ursula, 2012). The measurements were taken for 3 times and then the average value was taken as the final one.
- Statistical Analysis: After collecting all the data statistical analysis were carried out with the help of SPSS version (16.0) to maintain accuracy and avoiding any error.

RESULT

Out of the final 75 numbers of total subjects studied, 35 numbers of subjects belonged to the Case group (who responded positively for menstrual irregularities) while the rest i.e. 40 numbers of subjects (having no menstrual and other reproductive irregularities) were treated as the control group.

Prevalence of Menstrual Irregularities :

After obtaining information from the questionnaire from both the groups, it was found that the CASE group had higher incidences of Oligomenorrhea , Dysmenorrhea and other

TABLE 1 : Informations obtained from Case and Control group regarding menstrual status and other related matters through Questionnaire

Parameters	Frequency of subjects	
	Case (n=35)	Control (n=40)
Duration of Menstrual cycle >5days	27%	31%
=3-5 days	19%	48%
<2-3 days	54%	21%
Oligomenorrhea	49%	23%
dysmenorrhea	58%	39%
Outbreak of acne	14%	9%
Swelling of breast	28%	14%
Feeling of depression	26%	14%
Anxiety & tension	33%	15%

associated features of reproductive dysfunction , where as in case of the CONTROL group the rate of such prevalence were relatively lower. **(TABLE-1).**

Measurement of Waist Hip Ratio and Visceral Fat :

Anthropometric parameters were measured with standardized protocol and special emphasis were given on BMI , Waist Circumference ,Hip circumference , WHR ,Visceral Fat estimation, percentage of body fat. In this study waist hip ratio (WHR) and visceral fat values were taken as indicators of central adiposity. The mean value of waist hip ratio (0.83±0.062) was found to be near the reference value but the visceral fat value range (13.16± 4.29) was found to be higher than the reference value (TABLE -2) .

TABLE 2: Waist Hip Ratio and visceral fat (VF) values of the CASE group (having the symptoms of irregular menstruation and other associative symptoms of reproductive disoredr)

Parameter studied	No. of samples	Reference value	Range of value	Mean ±SD	Standard Error
Waist Hip Ratio (WHR)	35	<0.85	O.75-0.9	0.83±0.062	0.1054
Visceral Fat Value (VF)	35	<12	5-16	13.16±4.29	0.725

While studying the data of control group it was seen that both the mean waist hip ratio value (0.75±0.0606) and visceral fat values (7.7±3.16) were found to be lower than the reference value of such parameters **(TABLE-3).**

TABLE 3: The following findings were made in context of the CONTROL group (not having the symptoms of typical irregular menstruationand other associative symptoms of reproductive disoredr)

Parameter studied	No. of samples	Reference value	Range of value	Mean ±SD	Standard Error
W.H.R	40	<0.85	0.65	0.75±0.0606	0.0095
V.F	40	<12	03-09	7.7±3.16	0.0606

The values of WHR and VF (visceral fat) values of both the groups were compared with each other and it was found in both situations CASE group tend to have higher WHR and VF values (0.83±0.062 & 13.16±4.29 respectively) and the CONTROL group had lower values(0.75±0.0606 & 7.7±3.16 respectively) in comparison with the CASE group. (Figure 1a and Figure 1b)

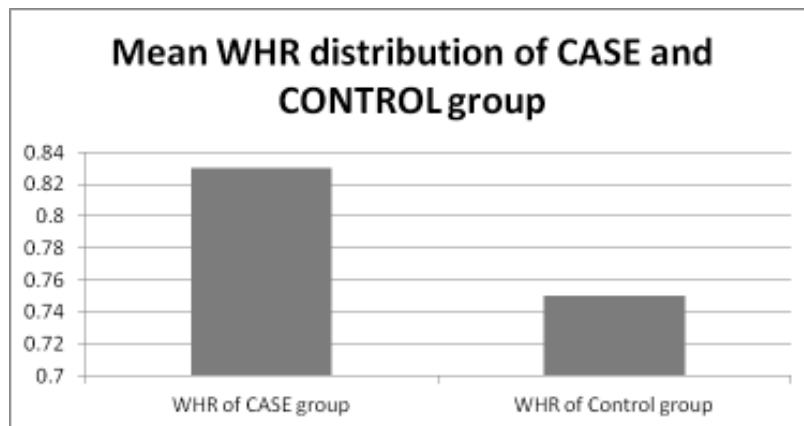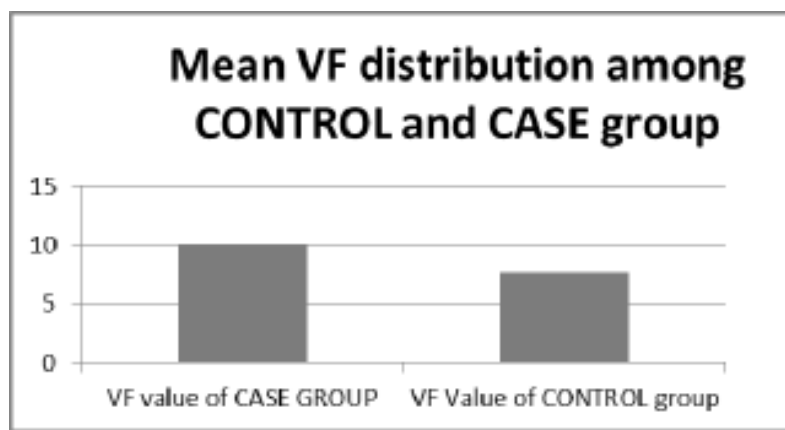**Fig. 1a: Bar chart representation of the mean WHR values of both the groups.**

Figure 1b: Bar chart representation of the mean VF (visceral fat) values of both the groups

The data were statistically analyzed with IBM SPSS (version 16) and student's t test was performed. The results showed the data were significant (p <0.05) i.e. significant differences were observed within the WHR values and VF values of both the CASE and CONTROL group (TABLE-4).

Parameters	CASE group (n=35)	CONTROL group (n=40)	Significance level
WHR	0.83±0.062	0.75±0.0606	p < 0.05 significant
VF	13.16±4.29	7.7±3.16	p < 0.05 significant

TABLE 4: Comparative Analysis between the parameters of CASE and CONTROL group.

DISCUSSION

The observation of our study strongly indicates that the presence of menstrual irregularities and other associated symptoms are predominant in case group (who have high values of visceral fat and waist hip ratio: common indicator of central obesity) and are relatively less in control group (who have normal visceral fat values and waist hip ratio). Symptoms like menstrual disturbances, psychological problems are more prevalent among the case group who have higher tendency for central obesity.

A huge body of studies already highlighted a close relationship between abdominal fat distribution and metabolic disorders. Mainly, the accumulation of central obesity has been shown to be an important factor for the onset of various degenerative diseases including impaired glucose tolerance, insulin resistance, dyslipidemia, type 2 diabetes, hypertension and other severe diseases especially in Asian population (Li et al, 2012).

Obesity is very closely related to every aspect of menstrual cycle in female. The onset of menarche may occur at younger age in obese girls than in normal weight girls. According to a study (Frisch *et al*, 1971) menstruation usually, starts when body weight reaches a 'critical mass'. With increase in growth, the percentage of fat rises and initiates the pubertal process and menstruation begins when the body weight reaches 48 kg or contains (22% body fat). Due to obesity, often girls reach this weight at a very early stage and undergo early menarche. When fat loss occurs and drops below this critical range, menstruation frequently disappears.

According to the studies by Rittmaster, 1993; Buyalos *et al*, 1995; Dos Ries et al, 1995, it is seen that elevated amount of fat tissue in obese women points out at the coupling of reproduction to nutritional factors. Central obesity which can be easily determined by a high Visceral Fat value (>12) may often lead to the onset of Poly Cystic Ovarian Syndrome (PCOS). This in turn causes increased levels of circulating LH which is thought to be responsible for the increased ovarian production of steroids and impaired follicular development. The LH surge is also related to the presence of Hirsutism, Oligomenorrhea, Dysmenorrhea and Psychological changes in women during menstruation.

Obesity in pre-pubertal girls may also be associated with hyperandrogenemia and that lead to high risk of adolescent polycystic ovary syndrome (Donato J *et al*, 2011). Important indicator of central obesity i.e. high waist hip ratio (>0.85) may cause reproductive disorders and polycystic ovarian syndrome (PCOS) even infertility in women (Guzick, 1998).

CONCLUSION

It can be concluded that obesity not only causes various life style diseases but is also correlated with reproductive disorders. Our study showed that those adolescent girls (college students) who have higher central obesity indicators like waist hip ratio and visceral fat values had abnormal menstrual profile in comparison with those adolescent girls who did not have central obesity and no complaints of menstrual or other disturbances. Proper measures should be taken to counteract obesity to prevent any grave health conditions in future life.

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