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Obesity and Infertility a Correlation Study on Anthropometric Indices and Infertility among Women Attending Selected Infertility Clinic

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Abstract
Background*:With the rising prevalence of infertility among women and men in kerala, the problem needs recognition as a public health issue. Even though the causes of infertility are numerous, recent studies have shown that obesity is largely linked to infertility. A study was conducted to assess correlation on anthropometric indices and infertility among women attending selected infertility clinic at Kottayam*
Aims: *1) Estimate the anthropometric indices such as Body Mass Index[BMI], Waist to Hip Ratio[WHR] and Waist Circumference[WC] and infertility in women. 2) Identify the relationship between obesity and infertility in women. 3)Find out the association between anthropometric indices and infertility with selected demographic variables.*
Methods: *research approach used was quantitative; design was descriptive. The sample consisted of conveniently selected 150 women (fertile women-50, infertile women -100). The tool administered were 1) A semi structured questionnaire which includes subject's socio-demographic data 2) Anthropometric measurements were taken according to standardized methods and techniques using standardized equipments like scale, weighing machine, measuring tape and standiometer.*
Results*: The average value of BMI of infertility group is 26.94 and the fertile group is 23.55 and the p value is <0.001.So there is a significant relationship between obesity and infertility. The average value of anthropometric indices between family history of infertility (group 1,0.937±0.057, group 2,0.873±0.047) and type of marriage (group 1, 0.936±0.057, group 2, 0.873±0.047) shows that WHR have significant difference between groups (p=0.005).*
Conclusion*: Women with excess body weight are more likely to have fertility problems and therefore weight reducing therapies such as exercises and dietary interventions must be incorporated into the treatment of infertility.*

Key words: *correlation, anthropometric indices, infertility, body mass index [BMI], waist to hip ratio[WHR]*

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I. Introduction

Infertility is a disease resulting in the inability to achieve pregnancy after 12 month of unprotected sexual intercourse or 6 months for women over 35 years old. With a rising prevalence of infertility among women and men, the problem needs recognition as a public health issue. Even though the causes of infertility are numerous, recent studies have shown that obesity is largely linked to infertility. A large proportion of infertile women have polycystic ovarian syndrome (PCOS) which is also linked with increased risk of obesity and other metabolic anomalies. Thus, in sub fertile/infertile women with PCOS, overweight or obesity usually is more prevalent [1].The rates were higher in females than in males. There is prevalence of obesity in women to be nearly twelve times that in males. The study will investigate the impact of anthropometric indices such as Body Mass Index (BMI), Waist to Hip Ratio (WHR) and Waist Circumference (WC) on female fertility.

In developing countries very few studies have conducted to know the impact of anthropometric indices on female infertility. Obesity is rapidly increasing worldwide [2]. Obesity results from a chronic imbalance between energy intake and energy expenditure. Global obesity rate almost nearly doubled among women to 15% from 6.4% in 1975. The WHO estimate the overall prevalence of primary infertility in India between 3.9 and 16.8 percentage. Estimate of infertility vary widely among Indian states. The prevalence of infertility in Kerala is 2.6 percentages. WHO reported that 60 percentages of women are overweight [3].
There are many research studies done worldwide supporting the present study.

Paul C Adamson, karl Krupp, Alexandra H Freeman, Jeffrey D Klausner, Arthur L Reingold and PurnimaMadhivanam had done a prospective study on prevalence and correlate of primary infertility among young women in Mysore with 897 sexually active women's aged 15 to 30 years. The result shows that the mean age of the women was 25.9 years(range 16 to 30 years) and the prevalence of infertility was 12.6% [4].

HichemAbdessalem MAI and Abbassia Demmouche had done a case control study of body mass index and infertility in Algerion women with 256 infertile cases with 326 fertile control subjects. The BMI of infertile women was compared with fertile group. An association between BMI and infertility was observed for the overweight (25 -29.9 kgm^2, p=0.0021 [5].

Dr Suzan Omer Rasool had done a study on anthropometric measurements in PCOS and Non PCO infertile patients. The included 130 PCOS patients and 173 Non PCO patients.Result shows that the mean BMI of PCO patient was (31.4) and non PCO patient was (28.5). The mean WHR of PCO patient was (0.8) and non PCO patient was (0.81). The shows that BMI is significantly higher in the infertile PCO groups [6].

II. Material and Methods

Study design and setting

The study used quantitative approach with descriptive survey design in Abraham infertility clinic and research center, Kottayam, Kerala, India.

Materials involved

Standardized equipment was modified for adaptation in the present setting to measure the weight, height, body mass index [BMI], waist circumference [WC], hip circumference [HC],and waist to hip ratio[WHR].

Standardized Semi structured questionnaire was used to collect the demographic profile among 150 women. This includes subject's age, education, occupation, income, type of family, duration of marriage, type of marriage, location of house, duration of infertility, family history of infertility, type of infertility and diagnosis of infertility.

Procedure methodology

Type of participants and method of data collection

In this study, two groups with 150 women are taken [100 infertile sample and 50 fertile samples]. Samples were collected conveniently and requested them to fill the questionnaire and check the anthropometric indices [weight, height, waist circumference, hip circumference, BMI and WHR] of the subjects by using standardized calibrated weighing machine, scale, and measuring tape.

TOOL 2:

Apparatus

All measurements were taken according to standardized methods and techniques using standardized equipment.

1. Scale

A platform electronic scale was used to measure the subjects‟ weight to the nearest 0.1kg. The scale was calibrated before the study.

2. Measuring tape

The measuring tape used was non-extendible, flexible and with a stub of 4cm before the zero line.

3. Standiometer

Height was measured using a standiometer to the nearest 0.1cm. A standiometer is a measuring stick attached to a vertical metal board with a movable horizontal headboard. The standiometer can measure up to two meters.

Ethics

The study obtained clearance from the Institutional Ethics Committee of the Amrita Institute of Medical Science and Research center, Kochi.

Analysis And Interpretation Of Data

The total number of sample size selected for the study was 100 infertile samples and 50 fertile samples.

Section 1- Sample Characteristics

55% of the subjects were belongs to the age group of 31-40 years. 35% were educated up to degree level and 66% are home makers. 43% of the family monthly income between Rs. 5001-10000 and 67% belongs to nuclear family. 89% of subjects have duration of marriage< 15 years. 98% was non consanguineous marriage. 89% of the subjects were not having any family history of infertility and more than 75% of the subjects were

from rural areas. 95% of subjects have duration of infertility <15 years. 63% of subjects are diagnosed as uterine factors.

Table 1: Sample Characteristics

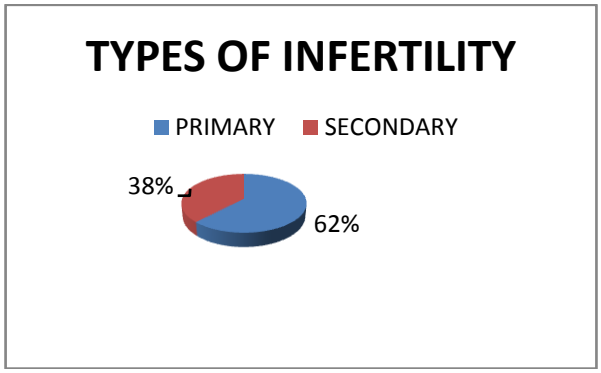
n=100

Sl No	Demographic Variable	Frequency [F]	Percentage [%]
1	**Age [In Years]**		
	• 21-30	45	45
	• 31-40	55	55
2	**Education**		
	• Illitracy	1	1
	• Primary	27	27
	• Secondary	16	16
	• Higher	1	1
	• Diploma	9	9
	• Degree	35	35
	• PG	11	11
3	**Occupation**		
	• Employe	34	34
	• Unemploye	66	66
4	**Monthly Income**		
	• 5001-10000	43	43
	• 10001-20000	31	31
	• 20001-30000	21	21
	• >30000	5	5
5	**Type Of Family**		
	• Joint Family	33	33
	• Nuclear Family	67	67
6	**Duration Of Marriage**		
	• <15 Years	89	89
	• >15 Years	11	11
7	**Type Of Marriage**		
	• Consanguineous	2	2
	• Non Consanguineous	98	98
8	**Family History Of Infertility**		
	• Yes	11	11
	• No	89	89
9	**Place Of Residence**		
	• Urban	16	16
	• Semiurban	9	9
	• Rural	75	75
10	**Duration Of Infertility**		
	• <15 Years	95	95
	• >15 Years	5	5
11	**Diagnosis**		
	• Uterine Factors	63	63
	• Extra Uterine Factors	37	37

In the types of infertility among 100 subjects most of them (62%) had primary infertility and (38%) had secondary infertility**.**

Figure 1: Types of Infertility.

n=100



Section 2 : Compare The Average Value Of Bmi With Fertile And Infertile Groups.

Among this the average value of BMI in infertile group was 26.94 and the fertile group was 23.55 and the p value is <0.0001.So there is a significant relationship between obesity and infertility**.**

Table 2: Comparison Of The Average Value Of BMI With Fertile And Infertile Groups.

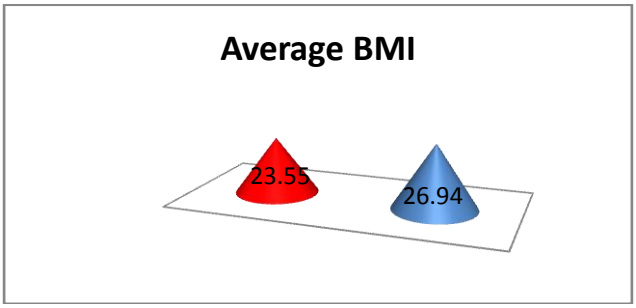
n=100

Group	Number	Mean±SD	P Value
Fertile	50	23.55	
Infertile	50	26.94	<0.0001

While comparing the average value of BMI of infertile women group was 26.94 and the fertile women group was 23.55 and the p value is <0.0001.So there is a significant relationship between obesity and infertility**.**

Figure 2: The diagram shows that the comparison of the average value of BMI with fertile and infertile groups.

n=100



Section 3: Compare The Average Value Of Anthropometric Indices Between Demographic Variables Of Infertile Group

When comparing the average value of anthropometric indices between types of marriage only one variable (WHR) showing significant difference between groups (p=0.005).

Table 3: Comparison of the average value of anthropometric indices between types of marriage

n=100

Anthropometric Indices	Consanguinous Mean±SD	Non Consaguinous Mean±SD	p- Value
Weight	60.33±8.358	66.50±12.212	0.238
Height	151.66±3.881	156.61±7.301	0.112
BMI	26.50±5.128	27.00±4.286	0.794
Waist circumference	94.83±9.368	91.38±10.248	0.439
Hip circumference	101.00±8.264	104.02±9.825	0.476
WHR	0.936±0.057	0.873±0.047	0.005

When comparing the average value of anthropometric indices between family history of infertility only one variable (WHR) showing significant difference between groups (p=0.005).

Table 4: Comparison Of The Average Value Of Anthropometric Indices Between Family History Of Infertility

n=100

Anthropometric Indices	Present Mean±SD	Absent Mean±SD	p-Value
Weight	60.33±8.358	66.50±12.212	0.238
Height	151.66±3.881	156.61±7.301	0.112
BMI	26.50±5.128	27.00±4.286	0.794
Waist Circumference	94.83±9.368	91.38±10.248	0.439
Hip Circumference	101.00±8.246	104.02±9.825	0.476
WHR	0.937±0.057	0.873±0.047	0.005

When comparing the average value of anthropometric indices between type of diagnosis WHR showing significant difference between groups (p=0.005).

Table 5: Comparison Of The Average Value Of Anthropometric Indices Between Types Of Diagnosis

n=100

Anthropometric Indices	Uterine Mean±Sd	Extra Uterine Mean±Sd	p-Value
Weight	63.52±9.657	67.66±13.442	0.224
Height	156.08±7.476	155.96±6.980	0.952
BMI	25.95±3.417	27.77±4.901	0.141
Waist Circumference	91.17±10.088	92.33±10.306	0.691
Hip Circumference	100.91±8.234	106.00±10.239	0.062
WHR	0.898±0.055	0.865±0.046	0.029

III. Discussion

Section 1: Sample characteristics.

In this study half of the subjects in infertile groups were belongs to 31-40 age group category.it shows most of the women are taking infertility treatment on time at kerala. One more data confirming this is 90%of subjects were under <15yrs of duration of marriage and <15 years duration of infertility.majority patients 62% have secondary infertility and remaining 38%were secondary infertility.

This findings are in par with the findings of cross sectional descriptive study conducted by Valliani, RahilaRamzan, Jehan, Musharaf, Praveen and Sajitha on prevalence of body mass index among infertile women in infertility clinic Nazimabad with 218 infertile women aged between 20 to 40 years. The result shows that 61.9% were 20 to 30 years and 39.17% were 30 to 40 years. The majority of patient have primary infertility by 77.88% and remaining 22.58% were secondary infertility. The BMI calculation shows that 33.48% women were overweight and 25.67% were obese [7].

Section 2: Comparison of obesity between fertile and infertile women.

In this study the average BMI value of infertile group was 26.94 and which is coming under overweight category and average BMI of fertile group was 23.55 and which is coming under normal category. This clearly states that there a definite correlation between infertility and anthropometric indices. These findings are in congruent with a cross sectional descriptive study by Mallikarjuna M, Rajeshwari B V on selected risk factors of infertility in women in tertiary care center Karnataka with 50 cases and 50 control groups. The result shows that BMI >25 kg/m^2 (overweight) is a significant risk factor contributing to infertility(p=0.004) [8].

Bhavna Seth, SarikaArora ,Ritusingh had done a cross sectional study on association of obesity with hormonal imbalance in infertility in North Indian women. This study was carried out in 113 women(57 with primary infertility and 56 with secondary infertility). Results shows that the ratio of LH/FSH was significantly higher in women with primary infertility as compared with secondary infertility($p=<0.05^8$). These findings gives a clear evidence that obesity leads to hormonal imbalances which is a main contributing factor for infertility [9].

There is many risk factors due to obesity in infertile people. One among in that is prevalence of metabolic syndrome. Its more seen in PCOS women, which is a main cause for infertility. One similar study conducted in this area by Pillai BP, Prasanna Kumar H, Jayakumar RV, Alur V C, Sheejamol V S on the prevalence of Polycystic ovarian syndrome in a south Indian population and the use of neck circumference in defining metabolic syndrome in 121 subjects. In this study the relationship between neck circumference and waist circumference in PCOS group was done. The mean age, BMI, weight, blood pressure, neck circumference and waist circumference were significantly elevated in the group with metabolic syndrome compared to the group without metabolic syndrome [10].

These finding are always giving a recommendation to do further studies in female anthropometric indices to other serious disease conditions including infertility problems.

IV. Conclusion

The present study concludes that obesity is closely associated with infertility among women. In overweight women with infertility, weight loss should be considered as a first line treatment. So before starting any therapy for infertility, obesity factor should be targeted first. A holistic approach to weight regulation and reproductive health needs to be adopted to increase chances of conception in overweight women. This will ensure a positive impact on their general health.

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