

Short Communication

Impact of Physical Activity on Ovarian Reserve Markers in Normal, Overweight and Obese Reproductive Age Women

Surekha T¹, Himabindu Y^{1*}, Sriharibabu M², Anil Kumar Pandey³

Departments of ¹Obstetrics and Gynaecology and ²Medicine,
GSL Medical College, Rajahmundry, Andhra Pradesh – 533296

Department of ³Physiology,
BPS Govt. Medical College for women,
Khanpur Kalan, Sonapat, Haryana – 131305

Abstract

Physical inactivity is a leading risk factor for overweight and obesity in the society. Prevalence of overweight and obesity in the reproductive age group women not only affects maternal health but also the health of the off spring. Infertility is a common problem in India affecting 13-19million people at any given time. Even though it is not life threatening, infertility causes intense mental agony and trauma that can only be best described by infertile couples themselves. Infertility is more common in overweight and obese individuals compared to normal weight individuals. Decreasing ovarian reserve is an important factor for infertility in women. This study examined the impact of physical activity on ovarian reserve markers in normal, overweight and obese reproductive age women. The observations made in this study reveal that physical activity improves ovarian reserve markers in all reproductive age women but this improvement is more distinct and statistically significant in overweight and obese women compared to normal weight women.

Introduction

Demographic transition in India in the last three decades has resulted in increased consumption of food and fuel and decreased physical activity. As a result, there is gradual increase in the prevalence of overweight and obesity in general population as well as in women of reproductive age. The restriction of outdoor physical activity in girls and women is also

partly responsible for this increasing trend in obesity in reproductive age women. The early onset of NCD risk factors in reproductive age women not only affects maternal health but also the health of off spring. The importance of physical activity cannot be over emphasized in the present era of sedentary life styles as WHO estimated that physical inactivity is the world's fourth leading risk factor for death. Physical activity has been recognized as an important measure for modifying NCD risk factor burden in the society even though it is not yet picked up in practice (1, 2).

Fertility rates started declining in India in the last few decades (3). About 10-15% of the Indian couples are seeking treatment for infertility at any given time. According to WHO estimates 13-19 million couples

*Corresponding author :

Dr. Y. Himabindu, Professor, Department of Obstetrics and Gynaecology, G. S. L. Medical College, Rajahmundry, Andhra Pradesh – 533296; Email : manne.himabindu@gmail.com

(Received on July 30, 2013)

are infertile in this country (4). This was in part attributed to Improved Socioeconomic status, female literacy and employment resulting in increased age at marriage. As a result more and more number of couples are seeking the help of reproductive physicians to overcome the problem of infertility. It is well established that decreasing ovarian reserve is an important factor for infertility. Ovarian reserve markers are being increasingly used to assess the fertility status of women at a given age (5). It is not known whether physical activity influences ovarian reserve markers in reproductive age women. The objective of this study was to examine the impact of physical activity on ovarian reserve markers in normal, over weight and obese reproductive age women.

Materials and Methods

This observational cross sectional study included 214 married women in reproductive age group who satisfied the inclusion criteria. Healthy women with normal menstrual cycles (25-35days) were included in the study. Subjects using hormonal contraceptives, smokers, pregnant and lactating mothers and those who underwent hysterectomy or oophorectomy were excluded. Subjects with polycystic ovarian syndrome, diabetes mellitus and thyroid disorders were also excluded from the study. Written informed consent was obtained from all the participants and institutional ethics review committee approval was obtained before commencing the study. Study subjects were divided into four groups. Group 1 constituted 113 normal weight women who were

physically active. Group 2 constituted 47 normal weight women who were physically inactive. Group 3 constituted 23 overweight and obese women who were physically active and group 4 constituted 34 overweight and obese women who were physically inactive. Physical activity was assessed using International Physical Activity Questionnaire (IPAQ) and measured in Met Minutes/week.

FSH and AMH were estimated on days 3-6 of the menstrual cycle. Serum FSH was measured using a specific immumetric assay kit (Immulite; Diagnostic products corporation, Los Angeles CA, USA). Measurement of serum AMH levels was performed using AMH/MIS Elisa kit (Diagnostic systems Lab, Webster Texas, USA). On the same day transvaginal ultrasound examination was carried out to count the number of antral follicles (AFC) between 2-6mm in both the ovaries. FSH, AMH levels and antral follicle counts were compared in all the four groups. Statistical analyses were performed using SPSS software version-16. Analysis of variance (ANOVA) was used for comparing the groups. For all statistical analyses $p < 0.05$ was considered significant.

Results

The mean age of the normal weight women who were physically active was 24.69 ± 3.8 and that of physically inactive women was 24.79 ± 3.3 . The mean age of the overweight and obese women who were physically active was 24.96 ± 3.6 and that of physically inactive women was 25.17 ± 3.1 . The mean BMI of normal

TABLE I: Age, BMI and ovarian reserve profile of different study group subjects.

Parameters	Normal weight (n=160)		Over weight and obese (54)	
	Physically active (n=113)	Physically inactive (n=47)	Physically active (n=23)	Physically inactive (n=31)
AGE (yrs)	24.69±3.8	24.79±3.3	24.96±3.6	25.17±3.1
BMI Kg/m ²	21.86±3.3	22.38±2.7	26.72±2.1**	27.65±1.9**
AMH (ng/ml)	3.2686±2.2	2.8084±1.8	2.2105±0.5##	1.6246±1.1##
FSH IU/L	8.4652±5.4	9.1215±6.0	5.5104±3.6**	9.1945±7.5**
AFC	8.53±2.2	8.09±2.2	7.65±1.6##	5.48±2.4##

Data presented are MEAN±SD. Analysis of data was done by one-way ANOVA and post-hoc by LSD test. **Depicts comparison between physically active and inactive over weight and obese reproductive age women. ##. Also depicts comparison between physically active and inactive over weight and obese reproductive age women. **P<0.05; ## P<0.001. BMI: Body mass index AMH: Antimullerian hormone FSH: Follicular stimulating hormone AFC: Antral follicle count.

weight women who were physically active was 21.86 ± 3.3 Kg/m² and of those who were physically inactive was 22.38 ± 2.7 Kg/m². Similarly the BMI of overweight and obese women who were physically active was 26.72 ± 2.1 Kg/m² and that of physically inactive women was 27.65 ± 1.9 Kg/m². Statistically significant differences were not seen in the ages of the studied groups ($p=0.452$) but there was significant difference in the BMI of these study groups ($p=0.043$). Significant differences were also seen in the levels of AMH ($p=0.000$), FSH ($p=0.071$) and AFC ($p=0.000$) among the study groups (Table I).

Discussion

Few studies have examined the role of physical activity on ovarian reserve markers. This study examined the impact of physical activity on ovarian reserve markers in normal, over weight and obese reproductive age women. In this study there were variations in the levels of ovarian reserve markers between normal, overweight and obese women though both the groups were identical in age. Higher BMI was perhaps responsible for these minor variations in the measures of ovarian reserve. Various recent studies show that ovarian reserve markers like AMH, and AFC are negatively influenced by increasing BMI (6, 7, 8). Some studies indicate that obesity is associated with reduced number of retrieved oocytes but not the success of treatment cycle in ART programs (9). A recent study claims no association between ovarian reserve markers and obesity (10).

The observations made in this study reveal that

physical activity has positive impact on ovarian reserve markers in both normal, overweight and obese reproductive age women, though this is more pronounced and statistically significant only in case of overweight and obese women (Table I). Many recent studies also confirm this positive impact of physical activity on ovarian reserve markers and fertility outcomes in reproductive age women (11, 12, 13). In Some studies vigorous physical activity was associated with negative impact on fertility outcomes but again this was attributed to negative energy balance in these women rather than physical activity (14). The limitations of this study were only small number of subjects were included in each sub group. The study results were compared with studies conducted outside India as there is limited number of studies available in India for comparison. More over the study population in various other studies was not identical in all respects with the present study subjects. More number of studies involving larger sample sizes is required to establish the impact of physical activity on ovarian reserve and overall fertility outcomes. In conclusion there is a need for educating infertile couples about modifiable life style factors which will help them make positive changes that have an impact on fertility outcomes while reducing high costs associated with ART programs.

Acknowledgments

The authors are thankful to the management and administration GSL Medical College and General Hospital for their encouragement to conduct this study.

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