ASSOCIATION OF BROILER CHICKEN INTAKE WITH POLYCYSTIC OVARIAN DISEASE IN WOMEN OF REPRODUCTIVE AGE

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ABSTRACT

Objective: *To determine the association between broiler chicken intake and polycystic ovarian syndrome.*

Materials and Methods: *This analytical case control study was conducted in Gynaecology Department of Watim General Hospital Rawalpindi over a period of two years (15 January 2018 to 15 January 2020), on a sample of one hundred females. Age matched fifty cases and fifty controls, with and without polycystic ovarian disease (PCOD) respectively, were selected using Rotterdam Criteria.*

Results: *Broiler chicken intake was more in women with polycystic ovarian disease (62%) than females who were not having polycystic ovarian disease (28%). The result was statistically significant (p=0.01).*

Conclusion: *A significant association was found between polycystic ovarian disease and broiler chicken intake.*

Keywords: *Polycystic ovarian disease, broiler chicken, reproductive age.*

INTRODUCTION

Polycystic ovarian disease (PCOD) is the most common endocrine disorder effecting 5 to 10% of the women of reproductive age.[1, 2] It is a multifactorial disease with complex pathophysiology.[3]

Various diagnostic criteria have been suggested for PCOD.[4] In 1990, National institute of health proposed the presence of clinical and/or biochemical hyperandrogenism and oligomenorrhea or amenorrhea as the criteria for diagnosis of PCOS.[5] In 2003, European Society of Human Reproduction and Embryology/American Society for Reproductive Medicine (ESHRE/ASRM) developed consensus on Rotterdam criteria.6 They proposed the presence of two out of three features for diagnosis of PCOS. These include presence of oligo and/or anovulation, clinical and/or biochemical hyperandrogenism and polycystic ovarian morphology (PCOM) on ultrasonography. PCOM is defined by researchers as either the presence of 12 or more follicles (2 mm to 10 mm in size) or ovarian volume of ≥ 10 ml without a dominant follicle in one or both ovaries.[3]

In 2006, Androgen Excess Society (AES) combined features of NIHS and Rotterdam criteria. According to AES, PCOD primarily involves androgen excess combined with any one of the phenotypic

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feature of hirsutism, oligo/anovulation or presence of polycystic ovaries on ultrasound scan.[7]

PCOD appear during early pubertal years.[8] Some patients may be asymptomatic. However, a majority of patients can present with a variety of clinical findings, depending upon the levels of androgen, gonadotropins and insulin resistance.[9] There are additional ethnic, religious and cultural factors contributing to diversity of PCOS.[10] PCOD is associated with a number of metabolic disturbances in the body. These include obesity, early diabetes, hypertension, and dyslipidemias and sleep apnea.[3] There is also an increased risk of cardiac diseases, subfertility and endometrial carcinomas.[11]

The occurrence of PCOD is high in south Asian women including Pakistan (52%) as compared to western women (20-25% prevalence in United Kingdom).[12] The high prevalence is found to be due to genetic and environmental factors. A significant association has been found between PCOD and genetic factors in our population.[13]

The consumption of broiler chicken per capita has increased in Pakistani population over the past decades. It is the most affordable and accessible source of animal proteins in developing countries including Pakistan.[14] In order to fulfill the increasing demand, broiler chickens have been found to feed on diet containing synthetic steroids, antibiotics, minerals and arsenic have to their promote growth.[15] It has also been found in literature that in order to reduce growth time, chickens are injected with Bovine growth hormone which increases insulin like growth factor 1 in humans if these chickens are eaten by humans.[16] Ovaries respond to insulin excess by producing excess of androgen which is involved in pathophysiology of PCOS.[17] Endocrine disruptors are hazardous for health even in small quantities. There is a concern not only in general population but also in health care providers about the effect of broiler chicken on reproductive life of humans.[18] Broiler chicken intake was found to be associated with increase in serum testosterone and out of proportion weight gain in experimental rats as compared to domestic chicken intake.15 It has been to be associated with hirsutism in women of reproductive age.[19] However studies establishing association between broiler chicken intake and polycystic ovarian disease could not be identified in literature. The purpose of current study was to determine association between broiler chicken intake and PCOS in women of Pakistani population.

MATERIALS AND METHODS

This analytical case control study was conducted in Watim General Hospital Rawalpindi after approval from ethical committees of the respective hospitals. Females aged 12- 40 years, registered in outpatient department of Gynecology clinics of the hospitals were included in the study. Age and BMI matched cases and controls, with and without polycystic ovarian disease (PCOD) were selected using Rotterdam Criteria. Cases with polycystic ovaries on ultrasound or hormonal imbalance not fulfilling Rotterdam criteria were excluded. Sample size of 100 participants was selected with age matched, 50 participants in cases having polycystic ovarian disease and 50 in control group having no PCOD. Non probability convenience sampling was used. This study focused on broiler chicken as a cause which might result in polycystic ovarian disease in females of reproductive age. An informed consent was obtained from all participants. A semi structured questionnaire including frequency of broiler chicken intake was filled for each study participant. Each participant was asked for usual frequency of broiler chicken intake during last five years. Polycystic ovarian disease was diagnosed and confirmed using Rotterdam criteria. Participants having PCOD were included in the study. Patients having polycystic ovaries on ultrasound but not fulfilling Rotterdam criteria were excluded from the cases of study.

Dietary intake of broiler chicken was considered as regular when it was consumed as either daily or on alternative days, once or twice a week. It was defined as irregular when broiler chicken was consumed once in two weeks or once a month or never.

Data was analyzed using Statistical tests for Social Sciences (SPSS) version 21. Descriptive statistics of socio-demographic variables were computed. Dietary intake for broiler chicken in cases and controls were expressed by using frequencies and percentages. Comparison of broiler chicken intake pattern between cases and controls was performed using chi square test. Value of $p \leq 0.05$ was considered significant.

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RESULTS

The study was conducted on 100 participants (50 cases having PCOD and 50 controls who were Non PCOD). The mean age of participants with PCOD was 26 years SD±5.40 with mean parity of 1 SD±0.98 and mean BMI of 25 SD±5.17 (Table I). The mean age of participants who were non PCOD was 26 years SD±6.21 with mean parity of 2 SD±1.5 and mean BMI of 23 SD±4.22 (Table 2). The highest variability was found in age and lowest in parity in both groups (Table I&II).

Among a total of 100 participants, 45(45%) had regular chicken intake. Among these 31(62%) were PCOD and 14 (28%) were non PCOD. While 55 (55%) had irregular chicken intake. Among these 19 (38%) had PCOD and 36 (72%) were Non PCOD (Table III).

Among 50 participants with PCOD, 31(62%) had regular broiler chicken intake and 19 (38%) had irregular chicken intake. In Non PCOD group, 14 (28%) used broiler chicken regularly and 36 (72%) used irregular chicken (Table IV). Statistically significant association (p=0.01) was found between PCOD and broiler chicken intake (Odd ratio=4.1) (Table V).

DISCUSSION

Mean ages of participants with PCOD and non PCOD are the same because participants of the same ages were included in the study (cases and controls respectively) (Table I &II). Mean parity of patients with PCOD is lower than non PCOD in our study (Table I&II). This may be due to lower rate of fertility in patients with PCOD then controls. Research shows that PCOD is the most common cause of anovulatory infertility. According to Royal College of Obstetricians and Gynaecologists guidelines 2015, PCOD is associated with reduced fertility in female.[20] Our findings are contrary to a study conducted in Sweden where there was no difference in mean parity of patients with PCOD as compared to controls.[21] This information is important for young women that they have similar reproductive capacity. Lower parity in

Table: 1 Descriptive statistics (Cases with PCOD)

Variables	Mean	Range	SD	Coefficient of variation
Age (years)	26	15-38	5.40	29.235
Parity	1	0-3	.918	0.842
BMI	25	17-38	5.176	26.787

Table: 2 descriptive statistics (Controls without PCOD)

Variables	Mean	Range	SD	Coefficient of variation
Age (years)	26	15-40	6.218	38.660
Parity	2.12	0-6	1.547	2.393
BMI	23.04	16-32	4.228	17.876

Table: 3 Frequency of broiler chicken intake by females with and without polycystic ovarian disease

Broiler chicken intake	Frequency	PCOD (n=50)	Non PCOD (n=50)	Total
Regular	Daily	2 (4%)	0	45(45%)
	Alternative day	6 (12%)	3(6%)	
	Twice a week	11 (22%)	2 (4%)	
	Once a week	12 (24%)	9 (18%)	
Irregular	Twice a month	4 (8%)	5 (10%)	55 (55%)
	Once a month	7 (14%)	13 (26%)	
	More than once a month	5 (10%)	11 (22%)	
	Not eating	3 (6%)	7 (14%)	

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Table: 4 Frequencies of PCOD/ Non PCOD and Broiler chicken intake

			Regularity of chicken intake		Total
			Regular chicken intake	Irregular chicken intake	
PCOD	PCOD	Count	31	19	50
		Expected Count	22.5	27.5	50.0
		% within PCOD	62.0%	38.0%	100.0%
	Non PCOD	Count	14	36	50
		Expected Count	22.5	27.5	50.0
		% within PCOD	28.0%	72.0%	100.0%

(PCOD= polycystic ovarian disease)

Table: 5 Inferential statistics for association between PCOD and Broiler chicken intake

Statistical test/measure	Value	Result
Chi-Square (Critical value =3.84)	11.677	Significant
p-value	0.01	Significant
Odd ratio	4.1	
95% Confidence Interval	1.8-9.7	Significant

our study may be due to less access of the women in our country to seek medical advice regarding assisted reproductive techniques.

Our findings suggest mean body mass index in patients with PCOD is greater than non PCOD. Research shows association of obesity and polycystic ovarian disease. In a study conducted in Pakistan by Fouzia Hanif et al, significant association was found between obesity and PCOD and presentation of clinical symptoms were higher in PCOD patients as compared to normal weight patients.[22]

Polycystic ovarian disease is a common endocrine disorder and is a concern for females of reproductive age. There is an increase in prevalence in Pakistan.[23] Research shows that commercially fed inorganic chicken leads to hormonal imbalance of female rats. A significant increase was found in body weight and serum estrogen level in rats fed on broiler chicken. So it was suggested that polycystic ovarian disease in human may be due to intake of commercially fed broiler chicken.[2] Our finding suggested a statistically significant association (p=0.01) between Polycystic ovarian disease and broiler chicken intake. Proportion of broiler chicken intake in patients with polycystic ovarian disease was higher than the proportion of broiler chicken intake in non PCOD controls (Table-IV) and this difference was found to be statistically significant (Table-V). In other words, we can say that the difference observed in this study is real and not by chance. We find a positive association between broiler chicken intake and polycystic ovarian disease. Similar results were found elsewhere. A study conducted in Lahore found a statistically significant association between broiler chicken intake and hirsuitism while intake of milk and vegetables was more in healthy controls.[19]

Limitations and future recommendations

Our study was conducted within a single city and small sample size was used. It is therefore recommended to conduct similar studies with large sample size in multiple institutions and also in other provinces, countries and cultures, so as to generalize the findings of the study. Future research is needed to measure the sex steroid hormonal levels in relation to broiler chicken intake in females with and without polycystic ovarian disease.

CONCLUSION

A significant association was found between polycystic ovarian disease and broiler chicken intake. Based on the findings of our study we propose that broiler chicken meat consumption could be the potential cause of hormonal imbalance and polycystic ovarian disease in females of reproductive age. In order to reduce health hazards associated with commercially available broiler chickens, they need

to be fed on vegetarian feed free of any hormonal components.

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