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Sonographic Correlation of Polycystic Ovaries (PCO) with the Fatty Liver

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Abstract

Objective*:** To assess the Sonographic Correlation of polycystic ovaries (PCO) for the fatty liver. ***Method*:** This is a study carried out at the Dhaka National Medical Institute Hospital, Johnson Road, Dhaka from June 2022 to November 2022 for a period of 6 months. A total number of 60 female patients with an age range of 18 years to 45 years, who had Sonographic features of polycystic ovaries, were included. Postmenopausal women and patients with a history of HbsAg+ were excluded from this study. Proper history was taken from all patients. Then every patient underwent USG of the Radiology & Imaging department of DNMC. Curvilinear probe 3-5 MHz Samsung HS40 machine was utilized patients with polycystic ovaries and NAFLD (Non-Alcoholic Fatty Livers Disease) are remembered for this examination and patients with some other pelvic pathology are avoided in this investigation. ***Results*:** During the study, 40% belonged to 27-35years age group and all patients had bilateral PCOS. Plus, 83.33% had fatty liver. 40% had grade-II fatty liver. Followed by 32% had grade-III fatty liver and only 28% had grade-I fatty liver. Among the 18-26 years group grade-I fatty liver was higher, 70% followed by in 27-35 years group grade-II fatty liver was higher, 52.38%, and the 36-45years years group grade-III fatty liver was higher, 42.85%. Prevalence of Hepatomegaly is typically seen higher in the 36-45years age group, 25%. ***Conclusion: Based on our study we can conclude that there was a significant correlation between fatty liver and PCOS.

Keywords*:* Polycystic ovaries, Fatty liver disease, Ultrasound, NAFLD.

INTRODUCTION

The coexistence of multiple medical conditions within an individual has been a subject of substantial interest in the field of medical imaging. One such intriguing association lies between polycystic ovaries (PCO) and fatty liver disease. Polycystic ovaries, characterized by the presence of multiple small cysts on the ovaries and hormonal imbalances, and fatty liver disease, marked by the accumulation of excess fat within liver cells, are both prevalent disorders with considerable implications for women's health. The correlation between these two conditions has drawn the attention of researchers and clinicians alike, sparking investigations into the underlying mechanisms and potential shared factors that contribute to their co-occurrence [1-6].

Sonography, as a non-invasive and widely accessible imaging modality, plays a pivotal role in the detection and assessment of both poly cystic ovaries and fatty liver. Through the use of high-frequency sound waves, sonography provides detailed visualization of

internal structures and allows for the identification of cystic changes in the ovaries as well as the quantification of hepatic fat deposition. The ability to non-invasively capture these distinct aspects of PCO and fatty liver disease using a single imaging technique offers a unique opportunity for comprehensive assessment and potential insights into their interconnectedness [7-9].

This study aims to explore the sonographic correlation between poly cystic ovaries and fatty liver disease, delving into the diagnostic criteria, pathophysiological links, and clinical implications of this intriguing association. By synthesizing the existing literature, we hope to contribute to a deeper understanding of the relationship between these two conditions, shedding light on shared underlying mechanisms and potential management strategies. Furthermore, the exploration of this correlation by sonography in simultaneously evaluating seemingly unrelated conditions, offering a holistic approach to patient care.

Objective: To assess the Sonographic Correlation of polycystic ovaries (PCO) with the fatty liver.

METHOD

This was cross sectional a study carried out as the Dhaka National Medical Institute Hospital,Johnson Road, Dhaka from June, 2022 to November 2022 for a period of 6months. A total number of 60 female patients with age range of 18 years to45 years, who had Sonographic feature of polycystic ovaries, were included.

Postmenopausal women and patients with a history of HbsAg+ were excluded from this study. Proper history was taken from all patients. Then every patient underwent USG in the Radiology & Imaging department of DNMC. Curvilinear probe 3-5 MHz Samsung HS40 machine was utilized for USG of a patient with polycystic ovaries (PCO) & NAFLD and NAFLD (Non-Alcoholic Fatty livers Disease) are remembered for this examination and patients with some other pelvic pathology are avoided in this investigation.

The point of this investigation is to assess the relationship between NAFLD and PCO estimated by the non-obtrusive sonographic procedure. Most notably we present the most up-to-date and significant correlation between fatty liver and PCO in women of Bangladesh. We have followed the following grading criteria for fatty leaver:

Grade 1: diffusely increased hepatic echogenicity but periportal and diaphragmatic echogenicity is still appreciable

Grade 2: diffusely increased hepatic echogenicity obscuring periportal echogenicity but diaphragmatic echogenicity is still appreciable

Grade 3: diffusely increased hepatic echogenicity obscuring periportal as well as diaphragmatic echogenicity

RESULTS

Table 1 shows the demographic status of the patients, where the majority, 40% belong to the 27-35-year-old age group, and all patients had bilateral PCOS. Among them, 83.33% had fatty liver.

Table 1: Demographic status of the patients

Age group	**Frequency**	**Percent**
18-26 years	16	26.67
27-35years	24	40
36-45years	20	33.33
PCOS	**Frequency**	**Percent**
Bilateral Polycystic Ovaries	60	100
Fatty liver Status	**Frequency**	**Percent**
Yes	50	83.33
No	10	16.67

Figure 1 shows the grade of fatty liver of the patients where 40% had grade-II fatty liver. Followed by 32% had grade-III fatty liver and only 28% had grade-I fatty liver.

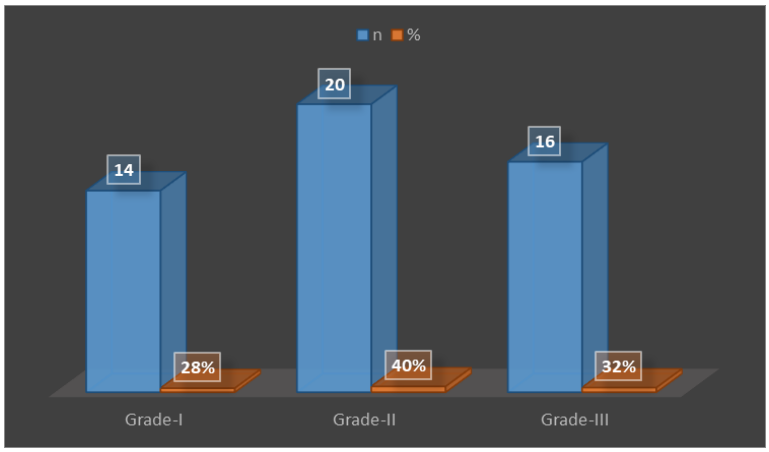

Figure-1: Grade of Fatty liverof the patients, N=50

Figure-2 shows presence of Hepatomegaly in the patients where 16% had Hepatomegaly.

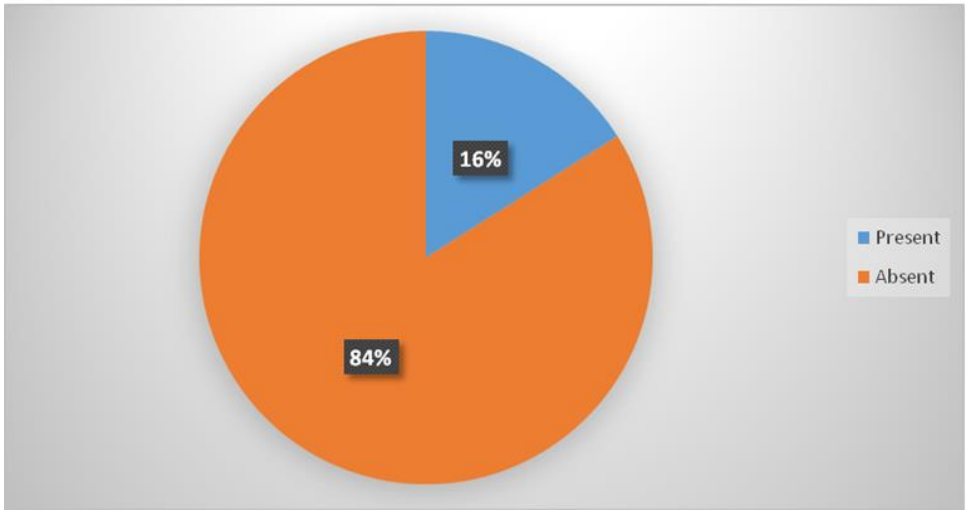

Figure 2: Presence of Hepatomegaly

Table-2 shows correlation between age group and fatty liver grade where among 18-26 years group grade-I fatty liver was higher, 70% followed by in 27-35 years group grade-II fatty liver was higher, 52.38% and 36-45years group grade-III fatty liver was higher, 42.85%.

Table 2: Correlation between age group and fatty liver grade

Description			**Fatty Liver**			**P value**
			Grade I	Grade II	Grade III	.013
Age group	18-26 years	Count	7	2	1	
		% within age	70%	20%	10%	
	27-35 years	Count	4	11	6	
		% within age	19.04%	52.38%	28.57%	
	36-45 years	Count	3	7	9	
		% within age	15.7%	36.84%	42.85%	

P value <.05 is significant

Table 3 shows a correlation between age group and presence of Hepatomegaly. Where the prevalence of Hepatomegaly is typically seen higher in the 36-45years age group, 25%.

Table-III: Correlation between age group and presence of Hepatomegaly

Description			**Hepatomegaly**		**P value**
			Present	Absent	.044
Age group	18-26 years	Count	4	26	
		% within age	13.3%	86.7%	
	27-35years years	Count	3	13	
		% within age	18.8%	81.3%	
	36-45years	Count	1	3	
		% within age	25.0%	75.0%	

P value <.05 is significant

DISCUSSION

Heritability estimates for PCOS range from 50-70%, according to studies of families and twins. Defects in insulin action in skin fibroblasts from PCOS patients, as well as elevated testosterone release from theca cells, indicate that they are genetically determined [10, 11]. The pathophysiology of polycystic ovary syndrome (PCOS) is complicated and poorly understood, hence most previous genetic investigations on PCOS used a candidate gene strategy. Consequently, genes involved in PCOS pathogenesis have been investigated as candidates. These include genes that affect obesity and insulin resistance, -cell dysfunction, steroid synthesis and metabolism, androgen receptor and X-inactivation, and ovarian folliculogenesis. It is possible that some of the genetic susceptibility loci for PCOS are also involved in the etiology of NAFLD [12].

Common metabolic diseases including NAFLD and PCOS are insulin-resistant. A major pathophysiological factor in the etiology and progression of many diseases is insulin resistance. Researchers have shown that the connection between NAFLD and PCOS works both ways. Even after controlling for obesity and other potential confounders, the incidence of NAFLD remains considerably higher. Additionally, the median age of women with advanced liver fibrosis was 5 years earlier in those with PCOS compared to those without PCOS, indicating that NAFLD is more severe in PCOS [13]. Several variables, including hyperandrogenism and insulin resistance, obesity, persistent low-grade inflammation, and genetic predisposition, have been linked to its development. Hepatic steatosis, nonalcoholic steatohepatitis (NASH), liver fibrosis, and hepatocellular cancer are among the conditions that may develop from insulin resistance, a characteristic of polycystic ovary syndrome. However, owing to the effect of hepatic dysfunction and insulin resistance on sex hormone metabolism, women with NAFLD are also at higher risk of developing PCOS. Hyperandrogenism (HA) and irregular menstruation periods are hallmarks of polycystic ovary syndrome (PCOS), which may be caused by hepatic dysfunction associated with NAFLD. The hormonal abnormalities that lead to PCOS may be made worse by insulin resistance, which has been demonstrated to enhance androgen bioavailability [14].

However, we were unable to locate this in our research. Our research showed that all patients had bilateral PCO and that 83.33 percent of them also had fatty liver. This is corroborated by the finding that PCO on both sides causes fatty liver disease. All of the participants were reproductive women who were either overweight or heavy. The participants' body types, waist circumferences, and overall levels of fat were all all over the map. Moreover, the majority of patients in our research were between the ages of 27 and 35. In another study, out of 103 individuals with PCO, 8 had fatty liver of grade 1 severity, 14 had fatty liver of grade 2 severity, and 16 had fatty liver of grade 3 severity, as described in one research. In fact, the report echoed our findings, noting that the prevalence of fatty liver and PCO seems to increase with age: out of 113 patients, 2 had grade 1 fatty liver in the first age group, 7 had grade 3 fatty liver in the second age group, and 4 had grade 1 fatty liver in the third age group [15]. In our study correlation between age group and fatty liver grade where among 18-26 years group grade-I fatty liver was higher, 70% followed by in 27-35 years group grade-II fatty liver was higher, 52.38% and 36-45years group grade-III fatty liver was higher, 42.85%.

CONCLUSION

In the subsequent sections, we delve into the diagnostic criteria for polycystic ovaries and fatty liver disease, discuss the potential hormonal and metabolic connections between these conditions, and examine the implications for clinical management. By elucidating the sonographic correlation between polycystic ovaries and fatty liver, we aim to enhance the medical community's appreciation of the intricate interplay between diverse physiological systems and foster a more comprehensive approach to patient evaluation and care. Based on our study we can conclude that there was a significant correlation between the simultaneous presence of PCO & and fatty liver sonography cally.

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