



## Original Article

## Association between Poly Cystic Ovaries and Non-Alcoholic Fatty Liver Disease in Young Females on Ultrasonography

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## ABSTRACT

PCOS and nonalcoholic fatty liver disease are both associated with the metabolic syndrome, which is characterized by central adiposity, hypertension, diabetes, and dyslipidemia. **Objective:** To determine the association between poly cystic ovaries and non-alcoholic fatty liver disease in young females. **Methods:** In this cross-sectional study at Chughtai Medical Center in Lahore, 272 patients with polycystic ovaries and fatty liver disease were selected. Utilizing a convex abdominal instrument with a frequency range of 3-5 MHz, the Toshiba Nemio 17 was utilized. **Results:** In this study, 74 out of 272 female patients diagnosed with PCOS also had fatty liver, highlighting a significant association ( $p$ -value = 0.025). Notably, within the 17-25 age group, 45 to 46 patients exhibited fatty liver, suggesting a link between PCOS and fatty liver in younger individuals experiencing hormonal issues. **Conclusions:** This study demonstrates association between polycystic ovary syndrome in adolescent females and with nonalcoholic fatty liver disease. The findings support the notion that PCOS is more prevalent in individuals with NAFLD.

## INTRODUCTION

Polycystic ovaries and non-alcoholic fatty liver disease are both associated with metabolic syndrome, which is characterized by central adiposity, hypertension, type II diabetes, and dyslipidemia. Insulin resistance appears to be the underlying pathophysiological mechanism for both diseases [1]. Because polycystic ovarian disease and non-alcoholic fatty liver disease co-exist, insulin resistance is a common characteristic of both conditions [2]. Brown et al. published the first study linking polycystic ovaries and nonalcoholic fatty liver disease in 2005. NASH was

identified in a young female with polycystic ovaries who underwent a liver biopsy [3]. It is characterized by hyperandrogenism, ovulatory dysfunction, and polycystic ovary morphology and affects 8-18% of women throughout their reproductive years. Polycystic ovary syndrome is a prevalent, debilitating ailment among women of childbearing age [4-6]. Among the clinical manifestations of polycystic ovary syndrome are menstrual irregularities (oligomenorrhea or amenorrhea), hirsutism, chronic acne, androgen-dependent alopecia, abdominal obesity,

hypertension, and infertility [7]. The initial diagnosis of polycystic ovarian syndrome was made in 1935 by two gynecologists, Drs. Stein and Leventhal. Compared to White people (20-25%) in the UK, South Asian women, particularly Pakistani women, have a substantially greater frequency of polycystic ovarian syndrome (52%) than do White people [8-10]. Polycystic ovarian syndrome and non-alcoholic fatty liver disease are also linked to metabolic syndrome, which includes symptoms such central obesity, hypertension, type II diabetes, and dyslipidemia [11]. The normal pathophysiological system present in the two circumstances has all the earmarks of being basic insulin resistance [12]. Polycystic ovary disorder and non-alcoholic greasy liver illness coexist. 10th the first relationship between non-alcoholic greasy liver illness and polycystic ovary condition was accounted for in 2005, by Brown et al [13]. They recorded NASH on liver biopsy in a youthful patient with polycystic ovary syndrome [14, 15]. Increased gamble of non-alcoholic greasy liver sickness in patients with polycystic ovary condition is because of their equivalent etiology [16]. It appears to be that these distinctions relate to hereditary, identity and uncommonly way of life, for example, food propensities and exercise [17-19]. This study's goal is to determine the association of NAFLD with PCOS patients compared to the general population and to alert scientists to the fact that it is becoming a sign of metabolic syndrome. The results of the study will aid in the accurate and prompt diagnosis and management of NAFLD and PCOS.

**METHODS**

In this cross-sectional study conducted at Chughtai Medical Center in Lahore, we enrolled a total of 272 female patients who were diagnosed with both polycystic ovaries and fatty liver disease. The sample size was calculated using means from relevant previous published studies. The data was collected using purposive sampling technique for the period of four months from December 2022 to March 2023. The study specifically focused and included individuals who had polycystic ovaries to check their association with fatty liver. To diagnose we utilized ultrasound equipment Toshiba Nemoo 17 equipped with a convex abdominal probe featuring a frequency range of 3-5 MHz. We diagnosed patients who had polycystic ovary syndrome and checked their liver echotexture. Patients with other pelvic pathologies were excluded from the study. Prior to any data collection, we ensured that informed consent was obtained from all study participants. After obtaining written permission, we utilized data collection sheets to gather relevant information. For data analysis, SPSS version 21.0 was employed. Descriptive statistics d to report the data, including the mean and

standard deviation for quantitative variables such as age. Qualitative variables like echo texture of liver were checked by cross tabulation and applying chi-square test to check the presence of fatty liver in patients having PCOS. The echo texture was further checked by applying cross tabulation in three age groups to confirm Nonalcoholic fatty liver disease. Then cross tabulation was also applied to find the relationship to age with the presence of PCOS.

**RESULTS**

The mean of age of the female patients who had PCOS and diagnosed for fatty liver was 22.1507±3.88431.

**Table 1:** Descriptive Statistics of Age

Descriptive Statistics of Age	N	Minimum	Maximum	Mean ± SD
	272	17.00	30.00	22.150±3.884

The patients with PCOS were diagnosed on ultrasound and found that 74 people had fatty liver out of 272 which shows the association of fatty liver with PCOS. The Chi square tests show the p-value 0.025 which is significant.

**Table 2:** Echotexture of liver with PCOS Cross tabulation

Echotexture * PCOS Cross tabulation				
Count		PCOS		Total
		No	Yes	
Echotexture	Normal	75	87	162
	Fatty	36	74	110
Total		111	161	272

Both age groups of young age from 17-25 shows that 45 to 46 patients had fatty liver, which indicates that the presence of PCOS at the young age group females with hormonal issues can cause fatty liver.

**Table 3:** Cross tabulation of age group with fatty liver

Age Group * Echotexture Crosstabulation				
Count		Echotexture		Total
		Normal	Fatty	
Age Group	17-20	51	45	96
	20-25	78	46	124
	25-30	33	19	52
Total		162	110	272

Both age groups of young age from 17-25 shows that 45 to 46 patients had fatty liver, which indicates that the presence of PCOS at the young age group females with hormonal issues can cause fatty liver. The age groups 20-25 had highest incidence of PCOS showing 73 patients.

**Table 4:** Cross tabulation of age group with PCOS

Age Group * PCOS Crosstabulation				
Count		PCOS		Total
		No	Yes	
Age Group	17-20	41	55	96
	20-25	51	73	124
	25-30	19	33	52
Total		111	161	272

## DISCUSSION

The objective of the assessment was to explore the association between liver fat and in vivo insulin affectability, body mass index, stomach adiposity, and lipid processing in enormous adolescent young women with polycystic ovary syndrome (PCOS). All individuals were overweight/obese young women in pre-adulthood with a wide extent of body mass index, midsection adiposity, and adiposity. Through and through liver fat was inside a normal range for all subjects (29.5-75.3 HU). Fatty liver was accessible in 6.7% individuals (6.7%) [20]. Brzowska *et al.*, inspected Productive Therapy of Polycystic Ovarian Condition, Nonalcoholic Fatty Liver Disorder and Pointlessness with Chinese Local Drug. This case report nuances a long-term older individual with hyperlipidemia, Nonalcoholic Fatty Liver Disease (NAFLD), Polycystic Ovarian Condition (PCOS) and unproductiveness. Her debilitated liver limit has thwarted the usage of medication drugs (statins and metformin) [21]. The patient in this manner went through two periods of Chinese local medicine treatment: the essential condition to upgrade hyperlipidemia and amenorrhea; and the resulting recipe to further develop ovarian brokenness similarly as glucose and lipid processing. Of course, a blend of remedies to treat PCOS and NAFLD simultaneously can struggle. The outcome of this case report showed that CHM may be strong for complex metabolic and conceptive issues with infertility [16]. Faisal *et al.*, induced that PCOS is a tangled contamination related with various organs, which furthermore shows association with the inescapability of NAFLD. In this manner it's crucial to separate metabolic issues PCOS patients [22]. To investigate the clinical signs, endocrinological and metabolic properties of polycystic ovary syndrome (PCOS) in women of childbearing age (or in pubescence) and its association with nonalcoholic fatty liver disease (NAFLD), especially center around separate differentiations in metabolic characters when PCOS was joined by alcoholic fatty liver or not. Clinical indications, endocrinological and metabolic characteristics of 50 PCOS patients and 50 non PCOS patients that visited the Endocrinological Part of the At first Jointed forces Clinical center of Nanjing Clinical School from 2008 to 2009 were examined [23]. Center anthropometric elements including inescapability of NAFLD, insulin opposition (IR), ALT levels were checked between the two get-togethers out. Among the 50 patients of PCOS patients, 34 were of childbearing age and 14 were in pubescence. Their supervisor whimpers are oligomenorrhea, arm ovulation, barrenness and clinical signs associated with hyper androgen including hirsutism, skin break out, alopecia. The metabolic issues integrate fat or overweight, diabetes or incapacitated glucose

resilience, hypertension, nonalcoholic fatty liver and lipid disturbance [24, 25].

## CONCLUSIONS

This study shows a strong relationship between young girls with polycystic ovaries and non-alcoholic fatty liver disease. The research's findings are consistent with the idea that PCOS is more common in people with NAFLD and vice versa. The similarities between both diseases and the metabolic syndrome underscore the significance of taking PCOS and NAFLD's relationships into consideration. The study highlights the need for routine NAFLD screens for PCOS, diabetes mellitus, and metabolic risk factors in addition to NAFLD screenings for women with PCOS. The findings have therapeutic significance for PCOS and NAFLD management in young girls, including early detection, targeted therapies, and better management.

## Authors Contribution

Conceptualization: TM

Methodology: MAN

Formal analysis: AA, MAN

Writing-review and editing: TM, AJ

All authors have read and agreed to the published version of the manuscript.

## Conflicts of Interest

The authors declare no conflict of interest.

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