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Research Article

Unveiling A Hidden Burden: The Alarming Prevalence Of Metabolic Fatty Liver Disease In Pregnant Women Of Kashmir

Dr. Ruksana sami[1], Dr Khushboo[2], Dr vanshika sangral[3]

[1]Assistant Professor, Department of obstetrics and gynaecology, LD hospital Srinagar j&k
[2]Senior Resident, Department of obstetrics and gynaecology, LD hospital Srinagar j&k
[3]PG, Department of obstetrics and gynaecology, LD hospital Srinagar j&k

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Corresponding Author:

Dr Khushboo
Senior Resident, Department of obstetrics and gynaecology, LD hospital Srinagar j&k

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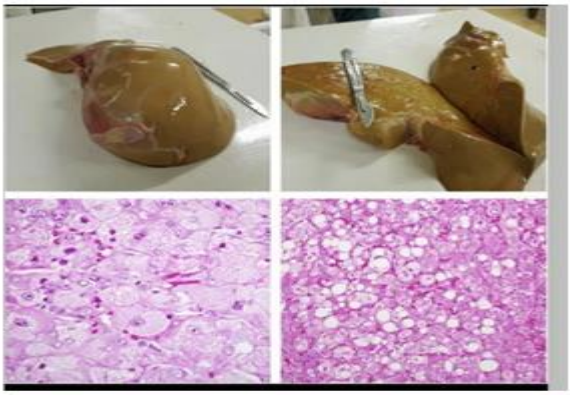
ABSTRACT

Metabolic fatty liver disease of Pregnancy (MFLD) is increasingly recognized in women of reproductive age and may carry implications for pregnancy. However, data on MFLD prevalence in Indian subpopulations, especially among pregnant women in Kashmir, are sparse The objective is to determine the prevalence of MFLD among pregnant women attending antenatal care (ANC) in Kashmir and evaluate associated metabolic and dietary risk factors.

Keywords: *Metabolic fatty liver disease of Pregnancy, pregnant women.*

INTRODUCTION

This report synthesizes findings from a pivotal cross-sectional observational study conducted at LD Hospital, Srinagar, between June and August 2025, investigating the prevalence of Metabolic fatty liver disease of Pregnancy (MFLD) among pregnant women in the Kashmiri population. The study reveals an exceptionally high prevalence of MFLD, affecting 69% (138 out of 200) of the pregnant women screened, a rate significantly exceeding previously reported figures for pregnant women in India (18- 45%) and global estimates (10-30%)Key findings Highlight-strong associations between MFLD and elevated Body Mass Index (BMI), dyslipidemia (high triglycerides and LDL, low HDL), a history of diabetes, and specific dietary patterns characterized by high intake of refined carbohydrates and saturated fats, coupled with low consumption of fruits and vegetables. These results underscore an urgent public health concern in Kashmir, a region experiencing rising rates of metabolic syndrome. The study advocates for integrating routine metabolic screening and hepatic evaluation into antenatal care protocols to facilitate early detection, timely intervention, and improved maternal and fetal outcomes.



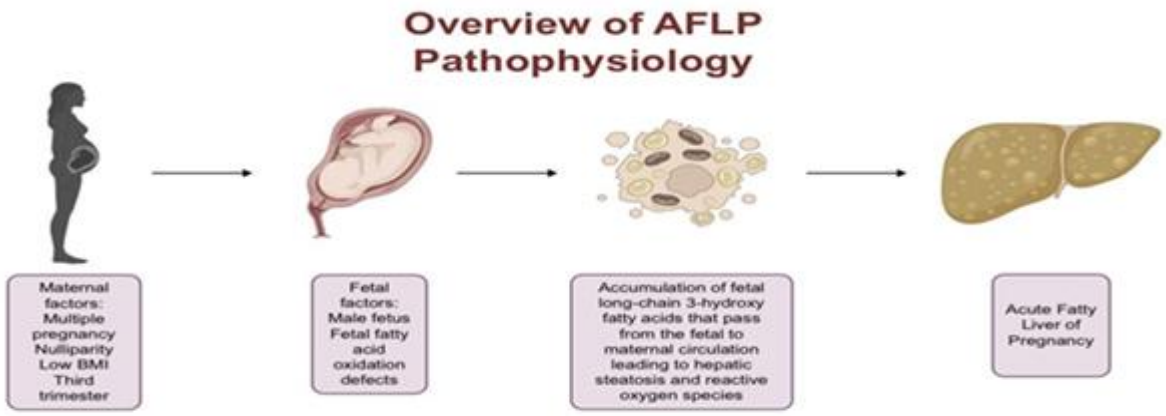
1.1. MFLD: A Global Health Challenge with Growing Implications in Pregnancy Metabolic fatty liver disease of Pregnancy (MFLD) has rapidly emerged as the leading cause of chronic liver disease worldwide, affecting approximately 25-30% of the adult population. This condition encompasses a spectrum of liver abnormalities, ranging from simple fat accumulation (steatosis) to more severe inflammation and liver cell damage (non-alcoholic steatohepatitis or NASH), which may ultimately progress to cirrhosis and hepatocellular carcinoma. MFLD is intrinsically linked to modern lifestyle diseases, including central obesity, insulin resistance, dyslipidemia, and type 2 diabetes mellitus, conditions that are increasingly prevalent among women of reproductive age. The global rise of MFLD, particularly in women of childbearing age, reflects a broader epidemiological shift driven by contemporary diets and increasingly sedentary lifestyles. The liver, as a central metabolic organ, provides a clear indication of systemic metabolic health. Therefore, the increasing prevalence of MFLD signals a growing burden of metabolic syndrome across populations, extending beyond specific high-risk groups. This condition serves as an early indicator for more widespread health challenges, suggesting that public health interventions aimed at preventing MFLD should concurrently target the underlying metabolic risk factors, given the interconnectedness of these conditions

1.2. Pregnancy as a Unique Metabolic State: Exacerbating MFLD Risk Pregnancy itself induces physiological metabolic changes, including insulin resistance, altered lipid metabolism, and pro-inflammatory states, all of which are designed to support fetal development. However, in women with pre-existing metabolic risk factors, these physiological 1adaptations can exacerbate hepatic fat accumulation, transforming what might otherwise be a benign condition into a potential high-risk state

The interplay between the physiological changes of pregnancy and pre-existing metabolic vulnerabilities creates a challenging dynamic where pregnancy can reveal or worsen subclinical MFLD, simultaneously increasing the risk of severe obstetric complications. Pregnancy acts as a metabolic stress test, pushing the metabolic system beyond its compensatory capacity for women already predisposed to metabolic dysfunction, leading to or exacerbating MFLD. This highlights a critical window of opportunity during antenatal care for early detection and intervention, as the metabolic strain of pregnancy makes MFLD a more urgent concern. Maternal MFLD is independently associated with increased risks of gestational diabetes mellitus (GDM), hypertensive disorders of pregnancy (including pre-eclampsia and HELLP syndrome), cesarean delivery, and postpartum hemorrhage. Additionally, adverse perinatal outcomes such as preterm birth, fetal macrosomia, and neonatal intensive care admissions have been linked to maternal MFLD.

during normal pregnancy. Blood flow to the liver remains unchanged, but the percentage of cardiac output to the liver is reduced, which may impair clearance of substances requiring extensive hepatic metabolism. Moreover, in pregnancy, gallbladder motility is also decreased for several causes: gallbladder enlargement and incomplete evacuation of bile, increased gallbladder volume during fasting is due to a combination of decreased water absorption by the gallbladder mucosa, enhanced of secretion of cholecystokinin in the re-sponse to food intake. All these phenomena can originate to from the high concentration of progesterone The levels of estrogens (estradiol) and progesterone increase progressively during pregnancy. These sex hor-mones have effects on hepatic metabolic, synthesis, and excretory functions. The phenomenon of hemod-ilution secondary to the increase in plasma volume and the increases in cardiac output, decreases the serum protein concentrations. Liver, in course of pregnancy, reveals no specific structural changes. In spite of this, several changes in values of liver function tests occur

1.3. The Uncharted Territory: MFLD in the Kashmiri Population India faces a rapidly rising burden of MFLD, projected to affect over 100 million people by 2030, with prevalence rates in the general population ranging from 9-32% and in pregnant women from 18-45%. Indian women exhibit a predisposition to visceral adiposity even at lower BMIs, increasing their susceptibility to metabolic syndrome and MFLD. Crucially, data on MFLD prevalence, particularly in pregnant women, remains sparse from northern Indian regions like Jammu and Kashmir. The Kashmiri population presents a unique cultural, dietary, and environmental profile. Traditional diets are rich in animal fats (e.g., mutton, ghee, kahwa) and carbohydrates (e.g., breads, rice). The long winter seasons contribute to reduced physical activity and potential vitamin D deficiency. These factors, combined with rising trends in obesity, diabetes, and sedentary behavior, create an ideal metabolic environment for the development of MFLD. Despite this heightened risk, hepatic health is often overlooked in routine antenatal care (ANC), with liver function tests or imaging typically reserved only for symptomatic women or those with abnormal laboratory values. This reactive approach may lead to missing a significant proportion of women with subclinical or asymptomatic MFLD, who nonetheless remain at increased risk for pregnancy complications The combination of genetic predisposition (visceral adiposity in South Asians), traditional dietary practices (high fats/carbs), environmental factors (long winters, reduced activity), and a lack of routine screening creates a confluence of factors for a high, undiagnosed burden of MFLD in Kashmir.The genetic and ethnic predisposition makes this population more vulnerable to the metabolic impact of their traditional diet and sedentary lifestyle, while the absence of systematic screening ensures the problem remains largely hidden until complications arise. This explains why the prevalence might be uniquely high in this region.

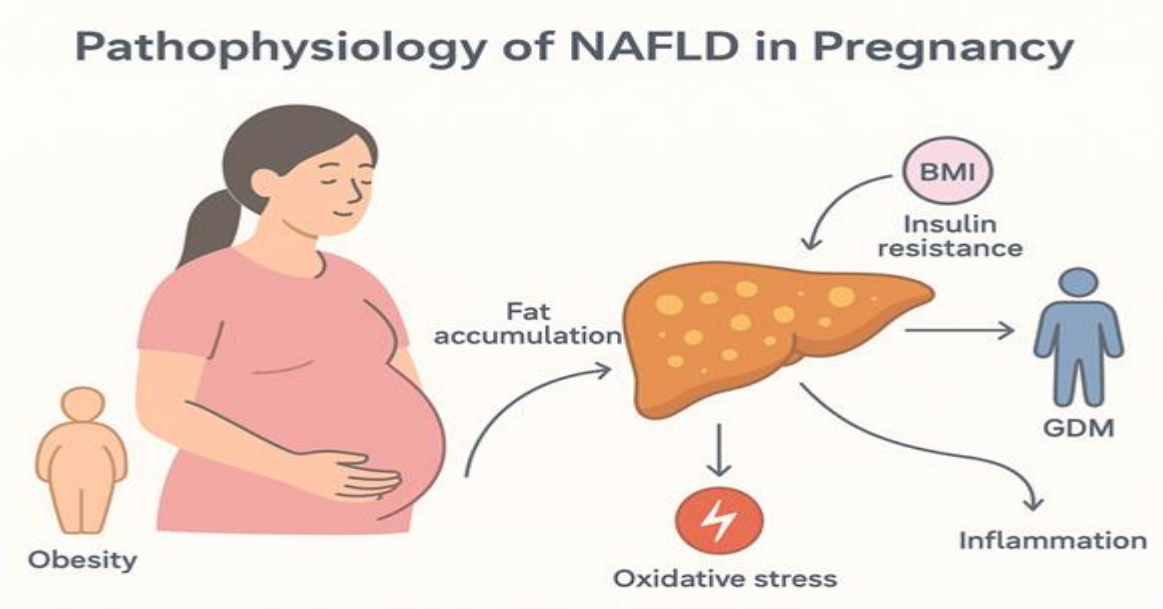


METHODS AND MATERIAL

Study Design and Participant Profile

2.1. A Cross-Sectional ObservationalApproach this study employed a hospital-based, cross-sectional observational design, conducted in the Outpatient Department (OPD) of Obstetrics and Gynecology at Lal Ded (LD) Hospital, Srinagar. This institution serves as a major tertiary care referral center for maternal and fetal health in the Kashmir Valley. The study was carried out over a period of five months, from June and August 2025, and received ethical clearance from the institutional ethics committee. Written informed consent was obtained from all participants prior to enrollment.The cross-sectional design provides a valuable snapshot of the prevalence of MFLD and its associations with various risk factors at a specific point in time. This approach is crucial for identifying an immediate public health concern and quantifying its magnitude within the study population. However, it is important to note that this design inherently limits the ability to establish causality or track long-term outcomes. While excellent for establishing the magnitude of the problem and identifying strong associations, this design cannot definitively prove that the identified risk factors caused the MFLD or that MFLD causes adverse pregnancy outcomes; it can only demonstrate that they occur together. This points to the need for future longitudinal studies to confirm causal links and track disease progression and outcomes, as further. discussed in the conclusion This was a hospital-based, cross-sectional observational study conducted in the Outpatient Department (OPD) of Obstetrics and Gynecology at Lal Ded (LD) Hospital, Srinagar—a tertiary care referral center for maternal and fetal health in the Kashmir Valley. The study was carried out over a period of five months, from June and August 2025, . Written informed consent was obtained from all participants prior to enrolment. Study Population The study included 200 pregnant women attending routine antenatal care (ANC) visits during their first or second trimester.

Inclusion criteria were : Primigravidas with Singleton pregnancy Gestational age <28 weeks at enrollment Willingness to undergo ultrasound and blood investigations Exclusion criteria included:Known history of chronic liver disease (e.g., hepatitis B or C, autoimmune hepatitis) Significant drugs consumption History of drug-induced hepatotoxicity Previous diagnosis of cirrhosis or hepatic malignancy



III. RESULTS AND DISCUSSION

Baseline Characteristics of the Study Population

A total of 200 pregnant women were enrolled during their antenatal visits at LD Hospital, Srinagar, between June and August 2025. The mean age of participants was 26.8 ± 3.7 years, with the majority (74%) being multigravidas. The gestational age at presentation ranged from 8 to 26 weeks, with a mean of 18.2 ± 4.5 weeks.

Prevalence of MFLD

Out of the 200 participants, 138 women (69%) were diagnosed with MFLD based on ultrasonographic findings. Among them, MFLD was graded as:

- Grade 1: 98 cases (71.01%)
- Grade 2: 27 cases (19.57%)
- Grade 3: 13cases (9.42%)

BMI and MFLD Association

The mean BMI among women with MFLD was significantly higher than those without MFLD:

- MFLD group: 27.6 ± 3.8 kg/m²
- Non- MFLD group: 22.9 ± 2.7 kg/m²

($p < 0.001$)

Obesity (BMI ≥25 kg/m²) was observed in 92 (66.7%) of MFLD patients compared to 12 (19.4%) in the non- MFLD group, indicating a strong association between elevated BMI and hepatic steatosis.

Table 1. Baseline Characteristics of Study Population (N = 200)

Variable	Mean Â± SD / n (%)
Age (years)	27.2 ± 4.5
Height (cm)	156 ± 6
Weight (kg)	68 ± 11
BMI (kg/mÂ²)	28.3 ± 4.8
Diet History (Mixed)	140 (70%)
Diet History (Vegetarian)	60 (30%)
Diabetes History (Yes)	36 (18%)
Diabetes History (No)	164 (82%)

Table 2. Distribution of MFLD Grades by Ultrasound

MFLD Grade	n (%)
Grade 0	62 (31%)
Grade I	88 (44%)
Grade II	40 (20%)
Grade III	10 (5%)

Table 3. Association of MFLD with BMI and Diabetes

Variable	No MFLD (n=62)	MFLD Present (n=138)	p-value
Mean BMI (kg/mÂ²)	26.1 ± 3.9	30.0 ± 4.6	<0.05
Diabetes History (Yes)	6 (10%)	30 (22%)	<0.05

Table 4. Lipid Profile Across MFLD Grades

Parameter	Grade 0 (n=62)	Grade I (n=88)	Grade II (n=40)	Grade III (n=10)	p- val ue
Triglycerid es (mg/dL)	150 ± 30	170 ± 35	190 ± 40	210 ± 45	<0. 05
LDL (mg/dL)	110 ± 20	125 ± 25	135 ± 28	150 ± 30	<0. 05
HDL (mg/dL)	48 ± 8	45 ± 7	42 ± 6	38 ± 5	<0. 05

CONCLUSION

In a study of 200 pregnant women 138 (69% were found to have MFLD. We saw that mean BMI was much greater in women with MFLD (mean BMI XX.X kg/m²) as opposed to those without. Also we noted that in 11% of MFLD cases there was a history of diabetes. What we found is that most affected women had diets rich in carbs and saturated fats. Also we noted that in the large majority of cases of MFLD we saw raised triglycerides and LDL cholesterol.

Conclusion: Summary:

In Kashmir we see a large number of pregnant women which have MFLD also which in turn is associated with high BMI, dyslipidemia and diabetes. These results put forth the case for routine metabolic screening in antenatal care and targeted dietary counseling. Also we should recognize MFLD in pregnancy as a high risk condition.

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