Section: Internal Medicine

Original Research Article

PREVALENCE OF NON-ALCOHOLIC FATTY LIVER DISEASE AMONG PATIENTS WITH PLAQUE PSORIASIS: A CASE-CONTROL STUDY

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Received *: 14/06/2026*
Received in revised form *: 14/07/2026*
Accepted *: 28/07/2026*

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DOI: 10.70034/ijmedph.2026.3.735

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2026; 16 (3); 4755-4763

ABSTRACT

Background: Psoriasis is a chronic immune-mediated inflammatory dermatosis increasingly recognized to have systemic metabolic associations. Non-alcoholic fatty liver disease (NAFLD) is closely linked with obesity, insulin resistance, dyslipidaemia, and metabolic syndrome, which are also frequently observed in patients with psoriasis. **Aim:** To assess the prevalence of NAFLD among patients with plaque psoriasis and evaluate its association with psoriasis severity, metabolic parameters, and FibroScan-based liver steatosis and fibrosis findings.

Materials and Methods: This case-control study was conducted at the Department of Dermatology, Siddhartha Medical College, over a period of two years. A total of 240 participants were included, comprising 120 patients with plaque psoriasis and 120 age-, sex-, and BMI-matched healthy controls. Clinical details, anthropometric measurements, blood pressure, Psoriasis Area and Severity Index (PASI), fasting blood sugar, liver enzymes, and lipid profile were recorded. NAFLD was assessed using transient elastography. Data were analysed using appropriate statistical tests, and a p-value <0.05 was considered statistically significant.

Results: NAFLD was significantly more frequent among psoriasis patients than controls: 79/120 (65.8%) versus 51/120 (42.5%), with an odds ratio of 2.61 (95% CI: 1.55–4.40; p<0.001). Psoriasis patients had significantly higher mean steatosis score (265.9 ± 52.8 vs 233.8 ± 21.2 dB/m; p<0.001) and fibrosis score (4.91 ± 1.62 vs 3.89 ± 0.81 kPa; p<0.001). Among psoriasis patients, those with NAFLD had significantly higher BMI, waist circumference, PASI score, fasting blood sugar, ALT, total cholesterol, triglycerides, LDL cholesterol, and metabolic syndrome prevalence. Logistic regression showed that metabolic syndrome, BMI, PASI score, fasting blood sugar, LDL cholesterol, and triglycerides were significant predictors of NAFLD.

Conclusion: NAFLD was significantly more prevalent among patients with plaque psoriasis compared with matched controls. Higher psoriasis severity and metabolic abnormalities were associated with NAFLD, suggesting the need for metabolic evaluation and non-invasive liver screening in high-risk psoriasis patients.

Keywords: Psoriasis; Non-alcoholic fatty liver disease; NAFLD; FibroScan; PASI; Metabolic syndrome; Steatosis; Fibrosis.

INTRODUCTION

Psoriasis is a chronic, immune-mediated, inflammatory and proliferative skin disease characterized by abnormal keratinocyte proliferation, epidermal hyperplasia, and sustained activation of innate and adaptive immune pathways.[1] Although traditionally considered a dermatological disorder, psoriasis is now increasingly recognized as a systemic inflammatory disease with multisystem associations. The global prevalence of psoriasis varies considerably across geographical regions, with adult prevalence reported to range from less than 1% in some populations to more than 8% in others.[2] In India, the reported prevalence of psoriasis varies from approximately 0.44% to 2.8%, with differences attributed to ethnicity, climate, study design, health-seeking behaviour, and regional population characteristics.[3]

The onset of psoriasis may occur at any age, but it commonly follows a bimodal pattern, with one peak in early adulthood and another in later adult life.[3] Chronic plaque psoriasis is the most common clinical form and may vary from limited localized plaques to extensive disease with significant physical, psychological, and metabolic burden. Beyond cutaneous involvement, psoriasis is associated with several systemic comorbidities. Psoriatic arthritis may occur in up to one-third of patients with psoriasis and contributes substantially to long-term functional impairment if not recognized early.[4] In addition, patients with psoriasis, particularly those with moderate-to-severe disease, have an increased burden of cardiovascular and metabolic comorbidities, partly mediated through shared inflammatory pathways such as tumour necrosis factor-alpha, interleukin-17, interleukin-23, insulin resistance, endothelial dysfunction, and oxidative stress.[5] Obesity is one of the most consistently reported metabolic comorbidities in psoriasis. Several observational studies and meta-analyses have shown that patients with psoriasis are more likely to be overweight or obese compared with individuals without psoriasis.[6] Metabolic syndrome is also more frequently observed in psoriasis and represents a clinically important cluster of abdominal obesity, dyslipidaemia, hypertension, and impaired glucose metabolism.[7] These metabolic abnormalities are relevant not only because they increase cardiovascular risk, but also because they may influence the severity of psoriasis, treatment response, and long-term disease outcomes.

Non-alcoholic fatty liver disease is defined by excessive hepatic fat accumulation in the absence of significant alcohol intake or other secondary causes of hepatic steatosis, such as viral hepatitis, steatogenic drugs, inherited metabolic disorders, or other chronic liver diseases.[8] NAFLD has emerged as the most common chronic liver disease worldwide and is strongly associated with obesity, type 2 diabetes mellitus, dyslipidaemia, and metabolic syndrome.[9] The disease spectrum ranges from simple steatosis to steatohepatitis, progressive fibrosis, cirrhosis, and hepatocellular carcinoma. Since many patients remain asymptomatic in the early stages, non-invasive screening methods such as ultrasonography and transient elastography are useful for detecting hepatic steatosis and assessing liver stiffness in clinically relevant populations.

The relationship between psoriasis and NAFLD has received increasing attention because both conditions share common inflammatory and metabolic pathways. Systemic inflammation in psoriasis may contribute to insulin resistance and hepatic lipid accumulation, while NAFLD may further amplify inflammatory and cardiometabolic risk. A study from South India reported an increased prevalence of NAFLD among patients with psoriasis, supporting the need for liver-related metabolic assessment in this group.[10] Similarly, a systematic review and meta-analysis concluded that patients with psoriasis have a significantly higher risk of NAFLD compared with individuals without psoriasis.[11] These findings suggest that NAFLD should be considered an important extracutaneous comorbidity in patients with psoriasis, especially in those with higher body mass index, dyslipidaemia, metabolic syndrome, or severe cutaneous disease.

Despite increasing evidence linking psoriasis with NAFLD, regional data remain limited, and population-specific evaluation is important because metabolic risk patterns, lifestyle factors, disease severity, and access to diagnostic tools vary across clinical settings. Therefore, the present study was undertaken at Siddhartha Medical College to assess the prevalence of NAFLD among patients with plaque psoriasis and to evaluate its association with psoriasis severity, metabolic parameters, and FibroScan-based liver steatosis and fibrosis findings.

Aim

To assess the prevalence of non-alcoholic fatty liver disease among patients with plaque psoriasis and to evaluate its association with psoriasis severity, metabolic parameters, and FibroScan-based liver steatosis and fibrosis findings.

Objectives

1. To compare the prevalence of non-alcoholic fatty liver disease and FibroScan-measured steatosis and fibrosis scores between patients with plaque psoriasis and age-, sex-, and BMI-matched healthy controls.
2. To evaluate the association of non-alcoholic fatty liver disease with psoriasis severity, body mass index, waist circumference, fasting blood sugar, lipid profile, liver enzymes, and metabolic syndrome among patients with plaque psoriasis.

MATERIALS AND METHODS

Study Design and Setting

This case-control study was conducted at the Department of Dermatology, **Siddhartha Medical College**, & Apollo Hospital over a period of two years.

Study place: Department of Dermatology, Siddhartha Medical College

Study period: January 2024 to December 2025.

Duration: 2 years

A total of 240 participants were included in the study. The study group consisted of 120 patients with plaque psoriasis, and the control group consisted of 120 age-, sex-, and BMI-matched apparently healthy individuals. Controls were selected from individuals without clinical evidence of psoriasis or known chronic inflammatory skin disease.

Study Population

Patients aged 18 years and above with clinically diagnosed plaque psoriasis were enrolled as cases. Apparently healthy individuals matched for age, sex, and BMI were included as controls. All participants were enrolled after obtaining informed consent.

Inclusion Criteria

Patients were included in the study if they fulfilled the following criteria:

1. Age 18 years and above.
2. Clinically diagnosed cases of plaque psoriasis.
3. Willingness to participate in the study.
4. Provision of written informed consent.

Exclusion Criteria

Participants were excluded from the study if they had any of the following:

1. Positive serological evidence of hepatitis B or hepatitis C infection.
2. History of chronic liver disease due to known causes other than NAFLD.
3. History of significant alcohol intake.
4. Presence of other inflammatory or autoimmune diseases.
5. Pregnancy or lactation.
6. History of malignancy or chemotherapy.
7. Current systemic therapy for psoriasis.
8. Use of methotrexate, acitretin, cyclosporine, biologics, or systemic corticosteroids within at least six weeks before enrolment.
9. Use of drugs known to significantly affect body weight or metabolic profile, such as beta-blockers, sulphonylureas, or injectable progestins.
10. Current smoking habit or other relevant lifestyle factors likely to influence BMI or metabolic status.

Ethical Considerations

The study was conducted after obtaining approval from the Institutional Ethics Committee of Siddhartha Medical College.Written informed consent was obtained from all participants before enrolment. Confidentiality of participant information was maintained throughout the study. The study was conducted in accordance with accepted ethical principles for biomedical research involving human participants.

Clinical Data Collection

A structured proforma was used to record demographic details, clinical history, duration of psoriasis, treatment history, and relevant comorbidities such as diabetes mellitus and hypertension. Anthropometric measurements including height, weight, body mass index, and waist circumference were recorded for all participants.

Body mass index was calculated using the formula:

BMI = weight in kilograms / height in metres^2

Blood pressure was measured using a standard sphygmomanometer after adequate rest. Systolic and diastolic blood pressure values were recorded in millimetres of mercury.

Assessment of Psoriasis Severity

The severity of psoriasis was assessed using the **Psoriasis Area and Severity Index (PASI)**. The PASI score ranges from 0 to 72 and evaluates the extent and severity of psoriatic lesions based on erythema, induration, scaling, and body surface area involvement.

Psoriasis severity was classified as follows

PASI score	Severity category
<7	Mild psoriasis
7–12	Moderate psoriasis
>12	Severe psoriasis

Laboratory Investigations

After an overnight fast, venous blood samples were collected from all participants in the morning under aseptic precautions. The following biochemical parameters were analysed:

1. Fasting blood sugar
2. Alanine aminotransferase
3. Aspartate aminotransferase
4. Total cholesterol
5. Triglycerides
6. Low-density lipoprotein cholesterol
7. High-density lipoprotein cholesterol

The following cut-off values were used for interpretation

Parameter	Reference/cut-off value
Fasting blood sugar	<100 mg/dL
ALT	4–36 U/L

AST	8–33 U/L
Total cholesterol	<200 mg/dL
Triglycerides	<150 mg/dL
LDL cholesterol	<100 mg/dL
HDL cholesterol in males	≥40 mg/dL
HDL cholesterol in females	≥50 mg/dL

Definition of Metabolic Syndrome

Metabolic syndrome was defined according to the updated National Cholesterol Education Program Adult Treatment Panel III criteria. Participants were considered to have metabolic syndrome if any three of the following five criteria were present:

Criterion	Cut-off value
Elevated waist circumference	≥102 cm in men or ≥88 cm in women
Elevated triglycerides	≥150 mg/dL or on treatment for elevated triglycerides
Reduced HDL cholesterol	<40 mg/dL in men or <50 mg/dL in women, or on treatment for reduced HDL cholesterol
Elevated blood pressure	Systolic BP ≥130 mmHg or diastolic BP ≥85 mmHg, or on antihypertensive medication
Elevated fasting blood sugar	≥100 mg/dL or on treatment for elevated glucose

Assessment of NAFLD

Non-alcoholic fatty liver disease was assessed using transient elastography. Liver steatosis and fibrosis were evaluated using FibroScan. The examination was performed by a trained operator according to standard procedure.

The controlled attenuation parameter was used for steatosis assessment and liver stiffness measurement was used for fibrosis assessment.

Steatosis staging was classified as follows

Steatosis stage	FibroScan value
S0	<238 dB/m
S1	238–260 dB/m
S2	261–290 dB/m
S3	>290 dB/m

Fibrosis staging was classified as follows

Fibrosis stage	FibroScan value
F0	<5.8 kPa
F1	5.8–6.8 kPa
F2	6.9–7.8 kPa
F3	7.9–11.8 kPa
F4	>11.8 kPa

Statistical Analysis

Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics software. Categorical variables were expressed as frequency and percentage. Continuous variables were expressed as mean ± standard deviation. The independent t-test was used to compare continuous variables between two groups. The chi-square test was used to assess associations between categorical variables. Fisher's exact test was applied when expected cell counts were small. For sparse multi-category staging tables, Fisher-Freeman-Halton exact test or Monte Carlo exact test was used where applicable. The association between psoriasis and NAFLD was expressed using odds ratio with 95% confidence interval. Logistic regression analysis was performed to identify factors independently associated with NAFLD among psoriasis patients. Correlation between psoriasis severity and steatosis/fibrosis parameters was assessed where applicable. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic characteristics of the study population

Variable	Psoriasis patients (n=120)	Controls (n=120)	Statistical test	p-value
Age range, years	18–74	18–70	—	—
Age, years, mean ± SD	39.1 ± 12.8	37.2 ± 11.4	Independent t-test	0.226
Male, n (%)	78 (65.0%)	71 (59.2%)	Chi-square test	0.352
Female, n (%)	42 (35.0%)	49 (40.8%)	Chi-square test	0.352
BMI, kg/m², mean ± SD	28.4 ± 4.6	27.7 ± 4.1	Independent t-test	0.215
Waist circumference, cm, mean ± SD	93.5 ± 11.2	90.9 ± 13.5	Independent t-test	0.106

The psoriasis and control groups were comparable with respect to age, sex distribution, BMI, and waist circumference. No statistically significant difference was observed between the two groups for baseline demographic variables.

Table 2: Laboratory parameters among psoriasis patients

Parameter	Mean ± SD	Elevated/abnormal level, n (%)
Fasting blood sugar, mg/dL	101.3 ± 23.6	28 (23.3%)
ALT, U/L	27.9 ± 14.8	27 (22.5%)
AST, U/L	26.2 ± 9.7	25 (20.8%)
Triglycerides, mg/dL	158.0 ± 85.0	56 (46.7%)
Total cholesterol, mg/dL	204.7 ± 44.5	61 (50.8%)
LDL cholesterol, mg/dL	108.2 ± 27.3	67 (55.8%)
HDL cholesterol, mg/dL	45.2 ± 17.6	57 (47.5%)

Dyslipidaemia was commonly observed among psoriasis patients. Raised LDL cholesterol, elevated total cholesterol, hypertriglyceridaemia, and reduced HDL cholesterol were the most frequent biochemical abnormalities. A proportion of patients also showed elevated fasting blood sugar and liver enzyme levels.

Table 3: Prevalence of NAFLD and FibroScan measurements in psoriasis patients and controls

Variable	Psoriasis patients (n=120)	Controls (n=120)	Statistical test	p-value	OR (95% CI)
NAFLD, n (%)	79 (65.8%)	51 (42.5%)	Chi-square test	<0.001	2.61 (1.55–4.40)
No NAFLD, n (%)	41 (34.2%)	69 (57.5%)	Chi-square test	<0.001	—
Steatosis score, dB/m, mean ± SD	265.9 ± 52.8	233.8 ± 21.2	Independent t-test	<0.001	—
Fibrosis score, kPa, mean ± SD	4.91 ± 1.62	3.89 ± 0.81	Independent t-test	<0.001	—

NAFLD was significantly more frequent among psoriasis patients than among controls. Psoriasis patients also had significantly higher mean steatosis and fibrosis scores, indicating a greater burden of hepatic steatosis and liver stiffness in the psoriasis group.

Table 4: Steatosis and fibrosis staging in psoriasis patients and controls

Stage	Psoriasis patients (n=120), n (%)	Controls (n=120), n (%)	Statistical test	p-value
Steatosis stage			Chi-square test	<0.001
S0	41 (34.2%)	69 (57.5%)		
S1	16 (13.3%)	42 (35.0%)		
S2	18 (15.0%)	9 (7.5%)		
S3	45 (37.5%)	0 (0.0%)		
Fibrosis stage			Fisher-Freeman-Halton exact test / Monte Carlo exact test	<0.001
F0	86 (71.7%)	117 (97.5%)		
F1	22 (18.3%)	2 (1.7%)		
F2	6 (5.0%)	1 (0.8%)		
F3	6 (5.0%)	0 (0.0%)		
F4	0 (0.0%)	0 (0.0%)		

Psoriasis patients had significantly more advanced steatosis and fibrosis staging than controls. Severe steatosis was observed only in the psoriasis group, while most controls were classified as S0 or S1. Advanced fibrosis was uncommon, but F3 fibrosis was observed only among psoriasis patients.

Table 5: Comparison of psoriasis patients with and without NAFLD

Variable	Psoriasis with NAFLD (n=79)	Psoriasis without NAFLD (n=41)	Statistical test	p-value
Age, years, mean ± SD	41.2 ± 12.0	35.1 ± 13.8	Independent t-test	0.019
Duration of psoriasis, years, mean ± SD	9.3 ± 7.3	7.4 ± 6.4	Independent t-test	0.145
BMI, kg/m², mean ± SD	29.7 ± 4.5	25.4 ± 3.2	Independent t-test	<0.001
Waist circumference, cm, mean ± SD	96.4 ± 9.7	87.9 ± 12.1	Independent t-test	<0.001
Systolic BP, mmHg, mean ± SD	123.8 ± 8.7	120.9 ± 8.3	Independent t-test	0.078
Diastolic BP, mmHg, mean ± SD	80.2 ± 6.7	77.6 ± 9.5	Independent t-test	0.123
Diabetes mellitus, n (%)	15 (19.0%)	1 (2.4%)	Fisher's exact test	0.011
Hypertension, n (%)	9 (11.4%)	3 (7.3%)	Fisher's exact test	0.749
PASI score, mean ± SD	16.4 ± 10.3	10.1 ± 8.6	Independent t-test	<0.001
Fasting blood sugar, mg/dL, mean ± SD	105.9 ± 27.6	92.5 ± 7.4	Independent t-test	<0.001
ALT, U/L, mean ± SD	30.3 ± 16.1	23.4 ± 10.8	Independent t-test	0.006
AST, U/L, mean ± SD	27.2 ± 9.9	24.4 ± 9.1	Independent t-test	0.125
Total cholesterol, mg/dL, mean ± SD	213.8 ± 43.9	187.1 ± 40.8	Independent t-test	0.001
Triglycerides, mg/dL, mean ± SD	179.6 ± 88.4	116.4 ± 59.7	Independent t-test	<0.001
LDL cholesterol, mg/dL, mean ± SD	115.4 ± 28.1	94.2 ± 19.5	Independent t-test	<0.001

HDL cholesterol, mg/dL, mean ± SD	43.7 ± 17.9	48.1 ± 16.8	Independent t-test	0.187
Metabolic syndrome, n (%)	44 (55.7%)	7 (17.1%)	Chi-square test	<0.001

Psoriasis patients with NAFLD were significantly older and had higher BMI, waist circumference, PASI score, fasting blood sugar, ALT, total cholesterol, triglycerides, and LDL cholesterol compared with psoriasis patients without NAFLD. Diabetes mellitus and metabolic syndrome were also significantly more frequent among psoriasis patients with NAFLD. No significant difference was observed for duration of psoriasis, blood pressure, hypertension, AST, or HDL cholesterol.

Table 6: Logistic regression analysis showing factors associated with NAFLD among psoriasis patients

Variable	Adjusted OR	95% CI	p-value
Age	1.04	1.001–1.08	0.047
Sex	2.62	0.70–9.82	0.142
BMI	2.91	1.34–6.34	0.007
Waist circumference	1.04	0.98–1.10	0.176
Diabetes mellitus	2.41	0.40–14.2	0.331
Hypertension	0.73	0.14–3.84	0.702
Duration of psoriasis	1.04	0.96–1.12	0.284
PASI score	2.15	1.26–3.68	0.005
Fasting blood sugar	1.06	1.008–1.13	0.023
Total cholesterol	1.005	0.99–1.02	0.426
LDL cholesterol	1.02	1.006–1.05	0.012
HDL cholesterol	1.00	0.97–1.02	0.984
Triglycerides	1.01	1.001–1.019	0.024
ALT	1.004	0.96–1.04	0.852
AST	0.98	0.92–1.04	0.631
Metabolic syndrome	5.21	2.04–13.2	0.001

On logistic regression analysis, BMI, PASI score, fasting blood sugar, LDL cholesterol, triglycerides, and metabolic syndrome were significantly associated with NAFLD among psoriasis patients. Metabolic syndrome showed the strongest association with NAFLD.

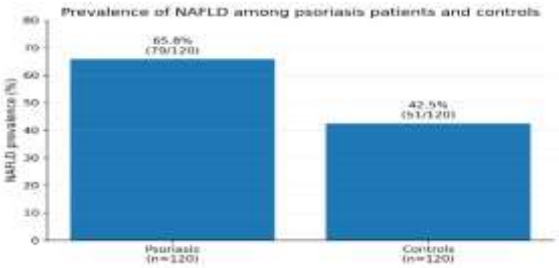

Figure 1: Prevalence of NAFLD among psoriasis patients and controls.

NAFLD was significantly more frequent among psoriasis patients than controls: 65.8% versus 42.5%; OR 2.61, 95% CI 1.55–4.40; p<0.001.

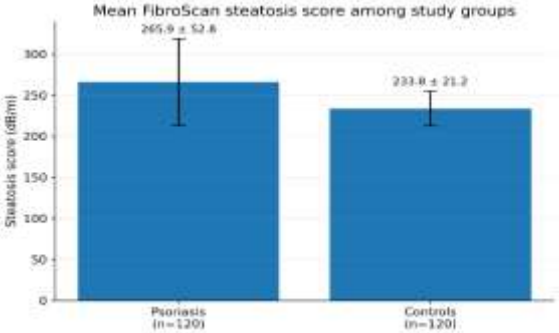

Figure 2: Mean FibroScan steatosis score among psoriasis patients and controls.

Psoriasis patients showed a significantly higher mean steatosis score than controls: 265.9 ± 52.8 dB/m versus 233.8 ± 21.2 dB/m; p<0.001.

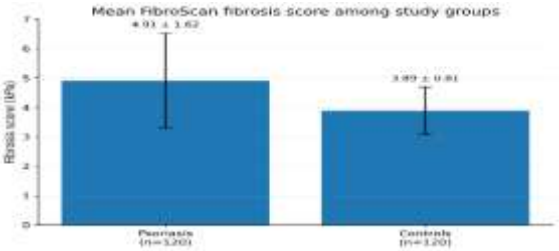

Figure 3: Mean Fibro Scan fibrosis score among psoriasis patients and controls.

Psoriasis patients showed a significantly higher mean fibrosis score than controls: 4.91 ± 1.62 kPa versus 3.89 ± 0.81 kPa; p<0.001.

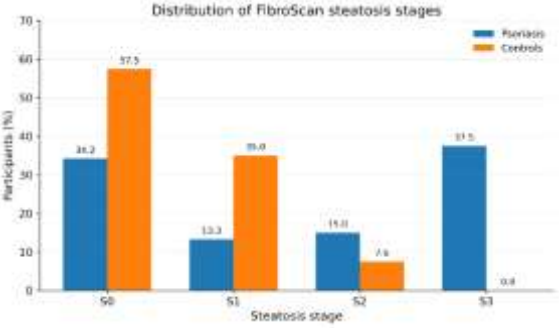

Figure 4: Distribution of FibroScan steatosis stages among psoriasis patients and controls.

Severe steatosis was observed in 37.5% of psoriasis patients, while none of the controls showed S3 steatosis.

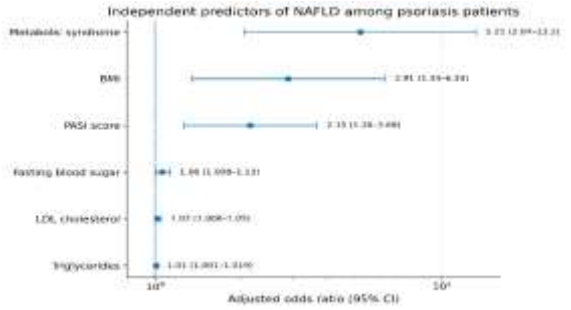

Figure 5: Independent predictors of NAFLD among psoriasis patients.

Metabolic syndrome, BMI, PASI score, fasting blood sugar, LDL cholesterol, and triglycerides were significant predictors of NAFLD in logistic regression analysis.

DISCUSSION

The present case-control study demonstrated a significantly higher prevalence of non-alcoholic fatty liver disease among patients with plaque psoriasis compared with matched controls. NAFLD was observed in 79 of 120 psoriasis patients (65.8%) and 51 of 120 controls (42.5%), indicating that psoriasis patients had approximately 2.6 times higher odds of NAFLD than controls. In addition, the psoriasis group had significantly higher mean steatosis and fibrosis scores on FibroScan. These findings support the concept that psoriasis is not restricted to cutaneous inflammation alone but is frequently associated with systemic metabolic and hepatic comorbidity.

The prevalence of NAFLD observed in the present study is closely comparable to the findings of Dhaher et al., who reported NAFLD in 66.2% of Iraqi patients with psoriasis compared with 42.3% of controls, with an odds ratio of 2.66.[12] The similarity between their findings and the present study may be related to the use of a comparable case-control design and FibroScan-based assessment of hepatic steatosis and fibrosis. Similarly, Abedini et al. reported a higher prevalence of NAFLD among Iranian patients with psoriasis, with NAFLD observed in 65.6% of psoriasis patients compared with 35% of controls.[13] These findings strongly support the present observation that NAFLD is more frequent among patients with psoriasis than among individuals without psoriasis.

The present findings are also consistent with the Pakistan-based case-control study by Ghafoor et al., who reported NAFLD in 52.4% of psoriasis patients compared with 28.7% of controls, with an odds ratio of 2.741.[14] Although the absolute prevalence was lower than in the present study, the direction of association was similar. Differences in prevalence may be explained by variation in ethnicity, metabolic risk profile, psoriasis severity, diagnostic modality, sample selection, and clinical setting.

Madanagobalane and Anandan, in a South Indian study, reported NAFLD in 17.4% of psoriasis patients and 7.9% of matched controls.[10] Although the prevalence was lower than in the present study, their findings also suggested an increased frequency of NAFLD in psoriasis. The lower prevalence may be related to differences in diagnostic criteria, as NAFLD assessment in that study included ultrasonographic evidence along with biochemical parameters. In contrast, the present study used FibroScan-based assessment, which may provide a more sensitive non-invasive estimate of liver steatosis and fibrosis.

Awosika et al. reported NAFLD in 21.2% of patients with moderate-to-severe psoriasis compared with 7.8% of controls in a United States dermatology clinic-based study.[15] However, after adjustment for age, sex, and body mass index, the association was not statistically significant. This partially supports the present findings by showing a higher crude prevalence of NAFLD in psoriasis, while also suggesting that obesity and metabolic factors may mediate part of the association. In the present study, NAFLD remained significantly higher among psoriasis patients, and metabolic syndrome, BMI, fasting blood sugar, LDL cholesterol, and triglycerides were important associated factors.

The present findings differ from the Indian pilot study by Mahajan et al., which included 61 psoriasis patients and 24 controls and reported NAFLD in 27.9% of patients by ultrasonography and 32.8% by FibroScan, compared with 20.8% among controls.[16] The difference between psoriasis patients and controls was not statistically significant in that study. This contrast may be due to the smaller sample size, pilot design, exclusion of patients with pre-existing comorbidities, and differences in disease severity distribution. Compared with that study, the present study included a larger sample and demonstrated a stronger association between psoriasis and NAFLD.

In the present study, psoriasis patients also had more advanced steatosis and fibrosis staging than controls. Severe steatosis was observed in 37.5% of psoriasis patients, whereas none of the controls had S3 steatosis. Similarly, F3 fibrosis was observed only among psoriasis patients. Dhaher et al. also reported significantly higher steatosis and fibrosis scores among psoriasis patients compared with controls.[12] This finding is clinically relevant because hepatic involvement may remain asymptomatic in the early stages and may be missed unless specifically evaluated. FibroScan-based assessment therefore has practical value in psoriasis patients, particularly before initiating long-term systemic or potentially hepatotoxic therapy.

Among psoriasis patients, those with NAFLD had significantly higher BMI, waist circumference, fasting blood sugar, ALT, total cholesterol, triglycerides, LDL cholesterol, and PASI score compared with those without NAFLD. Metabolic

syndrome was also significantly more frequent in the NAFLD subgroup. These findings indicate that NAFLD in psoriasis is closely linked with metabolic dysfunction. Similar observations have been reported in previous studies, where NAFLD in psoriasis was associated with obesity, hyperglycaemia, dyslipidaemia, and metabolic syndrome.[12,15]

Psoriasis severity was also associated with NAFLD in the present study. The mean PASI score was significantly higher among psoriasis patients with NAFLD compared with those without NAFLD. Logistic regression analysis also identified PASI score as one of the independent predictors of NAFLD. Gandha et al. reported that psoriasis extension correlated with NAFLD severity, although the correlation was stronger with body surface area involvement than with PASI score.[17] This partially supports the present finding and suggests that greater inflammatory burden or more extensive skin disease may be related to higher hepatic steatosis risk.

The strongest independent predictor of NAFLD in the present study was metabolic syndrome, followed by BMI, PASI score, fasting blood sugar, LDL cholesterol, and triglycerides. This is biologically plausible because psoriasis, NAFLD, and metabolic syndrome share overlapping inflammatory and metabolic pathways. Chronic low-grade inflammation, insulin resistance, adipokine imbalance, oxidative stress, and pro-inflammatory cytokines such as tumour necrosis factor-alpha, interleukin-6, and interleukin-17 may contribute to both psoriatic inflammation and hepatic fat accumulation.[18] The proposed hepato-dermal axis suggests a bidirectional inflammatory relationship in which skin-derived inflammatory mediators may influence hepatic insulin resistance and steatosis, while liver-derived inflammatory signals may amplify systemic inflammation and worsen psoriasis activity.[18]

The findings of the present study are further supported by higher-level evidence. Candia et al., in a systematic review and meta-analysis of case-control studies, reported that patients with psoriasis had a significantly increased risk of NAFLD compared with non-psoriatic controls, with a pooled odds ratio of 2.15.[11] Ruan et al., in a population-based study of outpatient adults in the United States, also reported an association between psoriasis and NAFLD.[19,20] These findings support the need to consider NAFLD as an important extracutaneous comorbidity of psoriasis.

Overall, the present study shows that NAFLD is significantly more frequent among patients with plaque psoriasis and is associated with higher psoriasis severity, obesity-related measures, dyslipidaemia, impaired fasting glucose, and metabolic syndrome. These findings support routine metabolic risk assessment and consideration of non-invasive liver screening in psoriasis patients, especially in those with severe disease or metabolic abnormalities. However, because this was a case-control study, the findings indicate association and not causation. Larger prospective studies are required to clarify the temporal and mechanistic relationship between psoriasis and NAFLD.

CONCLUSION

The present case-control study demonstrated that non-alcoholic fatty liver disease was significantly more prevalent among patients with plaque psoriasis compared with matched healthy controls. Psoriasis patients also showed significantly higher FibroScan-based steatosis and fibrosis scores, indicating greater hepatic involvement in this group. Among psoriasis patients, NAFLD was significantly associated with higher BMI, increased waist circumference, higher PASI score, elevated fasting blood sugar, dyslipidaemia, raised ALT, and metabolic syndrome. Logistic regression analysis further identified metabolic syndrome, BMI, PASI score, fasting blood sugar, LDL cholesterol, and triglycerides as significant predictors of NAFLD.

These findings suggest that NAFLD is an important extracutaneous comorbidity in patients with plaque psoriasis. Screening for metabolic risk factors and non-invasive liver assessment may be particularly useful in psoriasis patients with severe disease, obesity, dyslipidaemia, impaired fasting glucose, or metabolic syndrome, especially before initiating long-term systemic or potentially hepatotoxic therapy.

Limitations

1. The study was conducted at a single centre; therefore, the findings may not be fully generalizable to the wider population.
2. The case-control design shows association but cannot establish causality between psoriasis and NAFLD.
3. Liver biopsy was not performed; therefore, histological confirmation of steatosis or fibrosis was not available.
4. Lifestyle factors such as diet, physical activity, and detailed alcohol intake were not assessed in depth.
5. Inflammatory markers, insulin resistance indices, adipokines, and cytokine profiles were not included, limiting mechanistic interpretation.
6. Long-term follow-up was not performed to assess progression of NAFLD or the effect of psoriasis treatment on liver status.

Future Directions

1. Larger multicentric studies are needed to validate the association between psoriasis and NAFLD in different populations.
2. Prospective longitudinal studies should be conducted to assess whether psoriasis severity predicts development or progression of NAFLD.

3. Future studies should evaluate the effect of systemic antipsoriatic therapies, including methotrexate and biologics, on hepatic steatosis and fibrosis.
4. Incorporation of inflammatory markers, insulin resistance parameters, adipokines, and cytokine profiling may help clarify the pathophysiological link between psoriasis and NAFLD.
5. FibroScan-based screening protocols should be validated for routine risk stratification in psoriasis patients.
6. Interventional studies focusing on weight reduction, metabolic control, and lifestyle modification may help determine whether improvement in metabolic health reduces NAFLD burden in psoriasis.

Conflict of Interest: None
Funding Support: Nil

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