

Cardiovascular Disease Risks in Patients with Celiac Disease: Retrospective Study Using the National Inpatient Sample

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Study Aim

This study is a retrospective cohort study that uses the National Inpatient Sample (NIS) database to investigate the relationship between celiac disease (CD) and adverse cardiovascular events (CVDs), mortality, and cost of hospitalization.

Methods

- This study utilizes the NIS database from 2016 to 2019 to identify CD patients > 18 years old. International Classification of Disease, Ninth Revision (ICD-10) codes were used for data extraction.
- CD patients were compared to a randomly matched sample of non-CD patients and subdivided using specific ICD-10 codes.
- Binary logistic regression was used to assess outcomes while adjusting for various confounders.

Results

- 59,130 patients were analyzed with 29,644 having CD and 29,486 without CD.
- After adjusting all the comorbidities and variables, patients with CD were found to have a higher likelihood of adverse cardiovascular events (odds ratio [OR] 1.071, $p < 0.01$), mortality (OR 1.048, $p < 0.0001$), and increased hospitalization costs (\$2,432.45, $p < 0.0001$) as seen on Table 1.
- Despite a lower prevalence of traditional CVD risk factors, such as hyperlipidemia and obesity, CD patients demonstrated elevated CVD risk.
- Additional analysis was performed to determine if there was a higher risk of CVD in patients with CD and Iron deficiency anemia (IDA).
- 2,810 patients had IDA from the celiac cohort.
- There was no statistical significance between having IDA and developing CVD ($t=-1.25$, $p=0.213$) and increased mortality rates ($t=-0.73$, $p=0.466$) when controlling for other variables.

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Results

Table 1.

Variable	Celiac Disease							
	Analysis of Maximum Likelihood Estimates							
	Estimate	Standard Error	t Value	Pr> t	Odds Ratio	95% Confidence Interval		p-value
CV events	0.0684	0.0254	2.69	0.0071	1.071	1.019	1.125	0.01
Mortality	-0.4801	0.0782	-6.14	<0.0001	1.048	1.043	1.053	<0.0001
Estimated Regression Coefficients								
Cost of hospitalization	2432.4483	242.760281	10.02	<0.001		1956.6139	2908.2827	<0.0001

Conclusion and Clinical Impact

- In conclusion, the results of our retrospective cohort study suggest that individuals with celiac disease have a higher risk of adverse cardiovascular events, in-hospital mortality, and a higher cost of hospitalization despite having a lower prevalence of cardiovascular disease risk factors.
- This may be due to CD-induced inflammation and atherosclerosis and lower levels of high-density lipoprotein-C as seen in Figure 1.
- Biopsies have revealed higher levels of interleukin (IL)-1 β and IL-6 in enterocytes with elevated levels of C-reactive protein.
- Patients with underlying IDA in the setting of CD, did not have higher mortality rates and CVD suggesting that the proinflammatory state of CD may be the culprit of increased CV mortality.
- Further long-term randomized controlled trials are required to establish the relationship between CD and adverse CVD, the mechanism by which it raises the risk of adverse cardiovascular events, and to address the question of whether it should be included in the atherosclerotic cardiovascular disease risk score.
- Also, more studies are needed to investigate the effectiveness of anti-inflammatory drugs in decreasing CVD risk in CD patients.

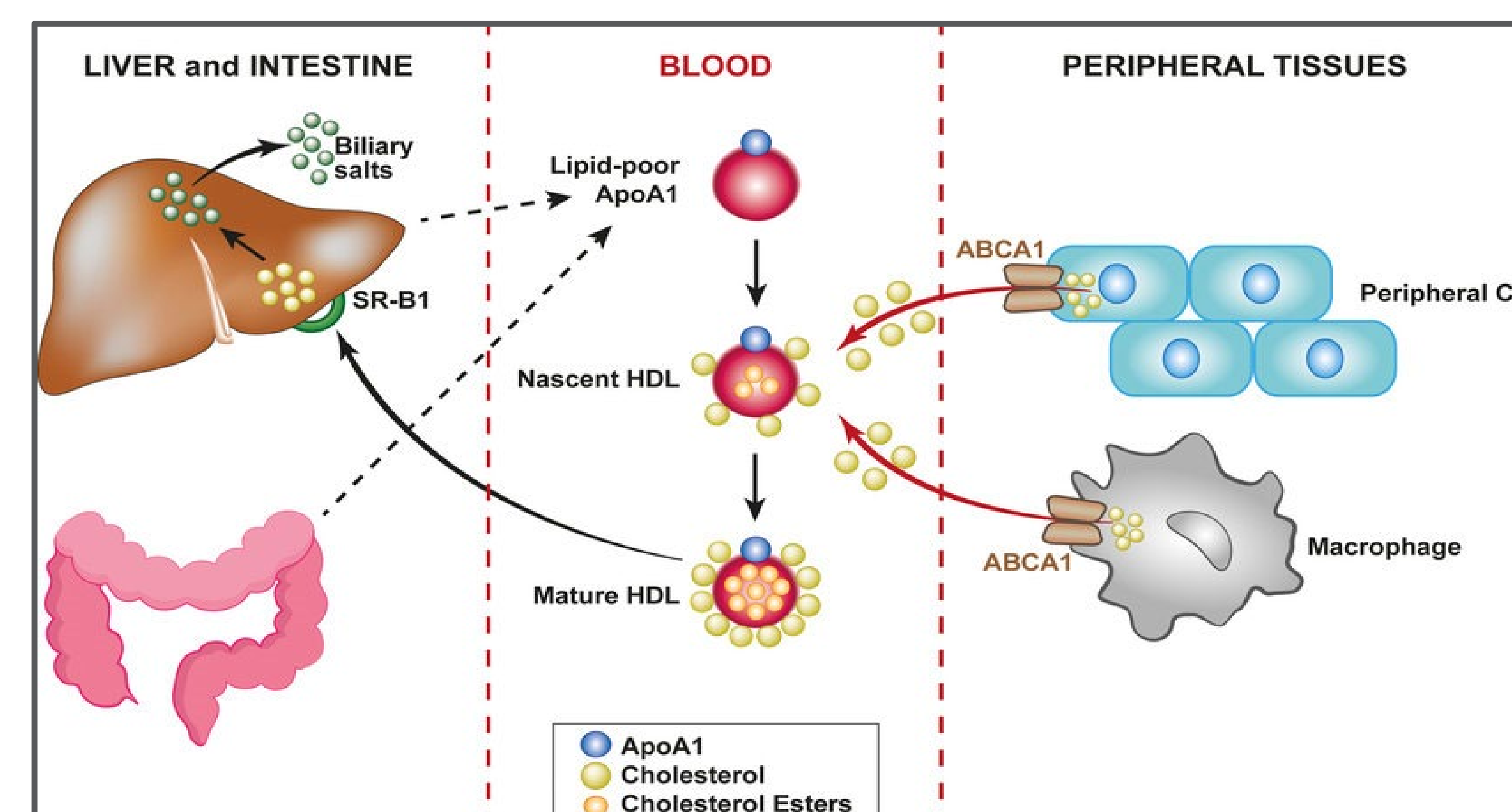


Figure 1: CD patients have lower ApoA1 levels resulting in decreased HDL synthesis.

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