



HUNGARIAN  
PANCREATIC  
STUDY GROUP

# Metabolic syndrome and hypertension individually worsen the outcome of acute pancreatitis: a systematic review and meta-analysis

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## INTRODUCTION

With the obesity epidemic, the number of related health conditions have also markedly increased. As a result, the prevalence of metabolic syndrome (MS) reached 25% in western countries. In the severe form of acute pancreatitis (AP), mortality rate may be as high as 50%. Earlier studies associated the elements of MS with more complications, increased severity and mortality in AP.

## AIM

The aim of our meta-analysis was to identify the most important risk factors by investigating the individual and synergistic effect of MS factors on AP outcome.

## METHODS

Our systematic search was performed in three databases (MEDLINE, Embase and CENTRAL) from inception to 1 November 2023. Articles were selected according to predefined eligibility criteria. We investigated the effect of four MS factors: obesity, hypertension, diabetes mellitus and hypertriglyceridemia on AP outcome. We calculated pooled odds ratios (OR) with 95% confidence intervals (CIs). Risk of bias assessment was carried out with the Quality in Prognostic Studies (QUIPS) tool. The protocol was registered in PROSPERO under number CRD42023471092.

## RESULTS

We identified 15,904 unique records, and after the selection process, 103 studies were included in our analysis. Based on the results of four articles with a total sample size of 137,000, patients with MS are more likely to have moderately severe and severe, rather than mild AP (OR=1.687, CI:0.593-4.803). The odds of developing severe AP is almost 40% increased in the MS patient group (OR=1.398, CI:0.918-2.129). The risk of mortality is also increased in the group with MS (OR=1.307, CI:0.240-7.102). When analyzed individually, hypertension was a statistically significant predictor of both mortality (OR=2.564, CI:1.392-4.723) and disease severity (OR=1.792, CI:1.399-2.296) in AP.

### The odds of developing severe pancreatitis with vs. without metabolic syndrome

Study	MS			No MS			Risk Difference	OR of mild AP	OR	95%-CI	Weight
	Sample Size	Event	Risk	Sample Size	Event	Risk					
S. Sawalhi (2014)	88	9	0.102	52	7	0.135	-0.032		0.732	[0.255; 2.100]	7.0%
A.M. Blaszcak (2020)	136712	20864	0.153	137575	17789	0.129	0.023		1.213	[1.187; 1.239]	55.9%
A. Szentesi (2019)	167	13	0.078	739	34	0.046	0.032		1.750	[0.902; 3.395]	14.8%
I. Mikolasevic (2016)	110	25	0.227	499	64	0.128	0.099		1.999	[1.192; 3.354]	20.8%
R. Niknam (2020)	34	3	0.088	42	1	0.024	0.064		3.968	[0.394; 40.003]	1.6%
<b>Random effect</b>	<b>137111</b>	<b>20914</b>		<b>138907</b>	<b>17895</b>				<b>1.398</b>	<b>[0.918; 2.129]</b>	<b>100.0%</b>

$I^2 = 40%$  [0%; 78%],  $\tau = 0.20$

### The odds of developing severe pancreatitis with vs. without hypertension

Study	Hypertension			No Hypertension			Risk Difference	OR of mild AP	OR	95%-CI	Weight
	Sample Size	Event	Risk	Sample Size	Event	Risk					
S.K. Cho (2020)	124	10	0.081	199	14	0.070	0.010		1.159	[0.498; 2.697]	5.8%
V. Jain (2023)	18	8	0.444	231	73	0.316	0.128		1.732	[0.656; 4.568]	4.4%
D. Mole (2016)	595	152	0.255	1458	238	0.163	0.092		1.759	[1.396; 2.215]	77.8%
A. Szentesi (2019)	676	48	0.071	451	14	0.031	0.040		2.386	[1.299; 4.381]	11.2%
R. Niknam (2020)	27	3	0.111	49	1	0.020	0.091		6.000	[0.592; 60.786]	0.8%
<b>Random effect</b>	<b>1440</b>	<b>221</b>		<b>2388</b>	<b>340</b>				<b>1.792</b>	<b>[1.399; 2.296]</b>	<b>100.0%</b>

$I^2 = 0%$  [0%; 79%],  $\tau = 0$

## CONCLUSION

MS and hypertension individually worsen the outcome of AP and may serve as a clinical predictor of severity and mortality. Closer monitoring along with lifestyle counselling and education of obese AP patients is crucially important.