

# TITLE

Does the Presence of Obesity and/or Metabolic Syndrome Affect the Course of Acute Pancreatitis? Prospective study \*Samer Al Sawalhi (MD,MRCS-Ireland)

\*Assistant Professor –Surgical consultant Department of surgery Isra'a Hospital-Amman-Jordan (skyscraper555@yahoo.com)

# OBJECTIVES

The incidence of acute pancreatitis (AP) is rising with increased prevalence of obesity, which exacerbates pancreatic injury.

Metabolic syndrome (MS) is defined as a cluster condition of cardiovascular risk factors, including hyperglycemia, dyslipidemia, hypertension, and central obesity.

\* We analyze if the presence of obesity and/or MS affects the course of pancreatitis.

In fact, a new severity scoring system (acute physiology and chronic health evaluation-obesity)[1] was proposed to consider obesity as an independent predictor for the outcome of AP.

Data were collected from 140 patients with AP between January 2010 and February 2013. Anthropometric data, including body mass index and waist circumference, were measured. Biochemical tests were used including fasting glucose, triglyceride, low- and high-density lipoprotein cholesterol levels, and total cholesterol level. Atlanta criteria, acute Physiology and Chronic Health Evaluation II, and Ranson scoring system were used to define severe AP. We graded the severity of pancreatitis into 5 distinct groups from A to E according to the Balthazar-Ranson grading scale[2]. The etiology, local and systemic complications of AP were also identified. Atlanta criteria were adopted to define mild AP (normal enhancement of pancreatic parenchyma on CT or if the Ranson score was less than 3), whereas severe AP was defined as presence of cardiovascular, pulmonary, renal dysfunction, and/or local complications such as necrosis, abscess, or pseudocyst.

Patients were classified as having MS based on the International Diabetic Federation criteria.

#### **Exclusion Criteria**



#### METHODS

Obesity is associated with an increased risk of AP development; therefore, larger abdominal adiposity and higher waist circumference (WC) often accompany severe pancreatitis.

The relationship between MS criteria and pancreatic diseases remains vague. In our study, we explored the relation between MS criteria based on the International Diabetic Federation (IDF) definition and pancreatitis and determined if obesity and body mass index (BMI) can predict pancreatitis severity Patients were excluded from the study if they fell into any of the following categories: presented with recurrent pancreatitis, diabetes mellitus, hyperlipidemia or dyslipidemia, hypertension, pregnancy, presence of morbidities possibly affecting the patient's weight, such as hypothyroidism, pregnancy, alcohol consumption, history of episodes of idiopathic and chronic pancreatitis, drug-induced and pancreatic divisum, endoscopic retrograde cholangiopancreatography pancreatitis, hyperlipidemiaor hypercalcemia-induced pancreatitis, and patients with symptoms for more than 2 days

#### **Definition of MS**

The National Heart, Lung, and Blood Institute/American Heart Association has an established IDF definition for MS that includes central obesity exceeding the standard WC (Q94 cm for men and Q80 cm for women) as an essential component, together

with at least 2 of the following 4 criteria[3] :

administering 150 mg/dL triglyceride or more or receiving drug treatment;
 HDL cholesterol level of less than 40 mg/dL in men or less than 50 mg/dL in women or receiving drug treatment;
 systolic blood pressure of 130 mm Hg and above and/or diastolic blood pressure of 85 mm Hg and above;
 fasting blood glucose of 100 mg/dL and above.

The IDF criteria have suggested a redefinition of the MS using WC adapted for different ethnic groups[3] and recommend the use of European cutoff values for WC measurement in people in the Middle East populations.



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TABLE 1. Overall Patient Characteristics (N –140)				TABLE 2. Relationship Between Severity of Pancreatitis and Risk Factors (N = 140)					Relationship between BMI and (mild/severe) pancreatitis 95% CI for the Mean				
Patient Characterist	ics	Result		Patient Chara	cteristics	Mild Pancreatitis (n = 124)	Severe Pancreatitis (n = 16)	$\chi^2$	25.				
Age, y Median, mean (SD		48.4 (17.7), 68 [17	.0 85.0]	Age, y Mean		48.7	49.2	0.831	35			_	
[minimum-maxii Sex (male/female)	-	(60 [42.9%]/80 [5%	7.1%])	Median SD		45.0 17.9	51.5 16.1		34 -				
BMI, kg/m <sup>2</sup> Mean (SD), range		30.1 (6.99), 34.2 [	14.9 49.1]	- × `	mum-maximum)	68 (17 85)	59 (51-110)	0.021	33 -				
[minimum-maxi Underweight	muni	2 (1.4 %)		Sex (male/fema Basha mujaki 1	/	53 (42.7%)/71 (57.2%)	7 (43.7%)/9 (56.2%)	0.932 0.009	32 -				
Normal		36 (25.7%)		Body weight, h	ч <del>у</del>	73.8	70.0	0.009				Ψ	
Overweight		32 (22.9%)		Mean		/3.8	78.0		<b>Σ</b> 31 -				
Obese		58 (41.4%)		Median		76.0	75.0		ā				
Morbid obesity		12 (8.6 %)		SD •		16.3	21.3		30 -				
Central obesity				× `.	mum-maximum)	78 (40-118)	54 (56 110)						
WC, cm				BMI, kg/m <sup>2</sup>				0.553	20	ę			
Mean (SD), rang [minimum-ma		5.55 (16), 98-92 [	35.0 127.0]	Mean Median		30.0 29.4	31.0 31.8		29 -				
Etiology				SD		7.1	5.9		28 -				
Biliary		106 (75.5%)		Range (mini	mum-maximum)	34.2 (14.9-49.1)	15.6 (23.6 39.2)						
Unknown (idiop	athic)	34 (24.3%)		WC, cm	r	, ,	, r	0.756	27				
Death (mortality)		4 (2.9%)		Mean		95.2	98.2			mild		sever	
Severity of Pancrea	atitis			Median		98.0	98.5				creatitis severiy		
Mild		124 (88.6%)				17.4	13.3			rum	a course screen		
N ARRAY A				90		11.9							
Severe		16 (11.4%)		SD Range (mini	mum-maximum)	92.0 (35, 12.3)			FIGURE 1 Dates	jonshin betwe	en RMI and (n	hild/severe)	
Complications				Range (mini	mum-maximum) Ves (88)	92.0 (35 123) 79 (69 5%)	47.0 (76.0 123.0)	0.561	FIGURE 1. Relat	ionship betwe	en BMI and (n	nild/severe)	
		16 (11.4%) 13 (9.2%) 16 (11.4%)			mum-maximum) Yes (88) No (52)	92.0 (35 123) 79 (69.5%) 45 (86.5%)		0.561	FIGURE 1. Relati pancreatitis.	ionship betwe	en BMI and (n	hild/severe)	
Complications Local Systemic	15 in Patients With I	13 (9.2%) 16 (11.4%)		Range (mini	Yes (88)	79 (69.5%)	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%)		pancreatitis.		<b>,</b>	nild/severe)	
Complications Local Systemic	15 in Patients With I	13 (9.2%) 16 (11.4%)		Range (mini MS	Yes (88) No (52)	79 (69.5%) 45 (86.5%)	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Anal		pancreatitis. s of MS Criteria in Patients '	With AP (N - 140)	MS (Negative)	MS (Positive)	2
Complications Local	15 in Patients With I Criteria	13 (9.2%) 16 (11.4%)		Range (mini MS <b>nknown</b> )	Yes (88)	79 (69.5%) 45 (86.5%) <b>ry</b> )	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Anal Factor		pancreatitis. s of MS Criteria in Patients ' Criteria	With AP (N - 140) Total (N = 140)	MS (Negative) (n = 52), n (%)	MS (Positive) (n = 88), n (%)	
Complications Local Systemic TABLE 3. Prevalence of M Factor	Criteria	13 (9.2%) 16 (11.4%) Pancreatitis (N – 140) Total (N = 140)	Pancreatitis (U (n = 34), n	Range (mini MS <b>nknown</b> )	Yes (88) No (52) Pancreatitis (Bilia (n = 106), n (%	79 (69.5%) 45 (86.5%) <b>Γy</b> ) <u>χ<sup>2</sup></u>	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Anal		pancreatitis. s of MS Criteria in Patients <sup>s</sup> Criteria Male, ≥94	With AP (N - 140) Total (N = 140) 40	MS (Negative) (n = 52), n (%) 8 (15.3)	MS (Positive) (n = 88), n (%) 32 (36.3)	<u>χ</u> <sup>2</sup> 0.000
Complications Local Systemic TABLE 3. Prevalence of M Factor	Criteria Yes	13 (9.2%) 16 (11.4%) Pancreatitis (N – 140) Total (N = 140) 88 (62.8%)	Pancreatitis (Ur $(n = 34), n$ $0 (0)$	Range (mini MS <b>nkn own</b> ) (%)	¥es (88) No (52) Pancreatitis (Bilia (n = 106), n (% 88 (83)	79 (69.5%) 45 (86.5%) <b>ry</b> )	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Anal Factor		pancreatitis. s of MS Criteria in Patients <sup>v</sup> Criteria Male, ≥94 Male, <94	With AP (N - 140) Total (N = 140) 40 20	MS (Negative) (n = 52), n (%) 8 (15.3) 18 (34.6)	MS (Positive) (n = 88), n (%) 32 (36.3) 2 (2.2)	
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Complications Local Systemic TABLE 3. Prevalence of M Factor MS Central obesity, WC, cm	Criteria Yes No Male, ≥94 Male, <94 Female, ≥80 Female, <80	13 (9.2%) 16 (11.4%) Pancreatitis (N – 140) Total (N = 140) 88 (62.8%) 52 (37.1%) 40 20 70 10	Pancreatitis (Un (n = 34), n 0 (0) 34 (100) 8 (23.5 6 (17.6 14 (41.1 6 (17.6	Range (mini MS nkn own) (%) )) )) ))	$\frac{\text{Yes}(\$\$)}{\text{No}(52)}$ <b>Pancreatitis (Bilia</b> ( $n = 106$ ), $n$ (% 88 (83) 18 (16.9) 32 (30.1) 14 (13.2) 56 (52.8) 4 (3.7)	$\frac{79(69.5\%)}{45(86.5\%)}$	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Analy Factor Central obesity, WC, cm Raised triglycerides, mg/dL Reduced HDL cholesterol	rsis Result TG	pancreatitis. s of MS Criteria in Patients <sup>1</sup> <u>Criteria</u> Male, ≥94 Male, <94 Female, ≥80 Female, <80 S ≥150 mg/dL (1.7 mmol/L) S <150 mg/dL (1.7 mmol/L) Male, <40 Male, <40 Male, <50	With AP (N - 140) <b>Total (N = 140)</b> 40 20 70 10 14 126 44 16 62	MS (Negative) (n = 52), n (%) 8 (15.3) 18 (34.6) 16 (30.7) 10 (19.2) 4 (7.6) 48 (92.3) 20 (38.4) 6 (11.5) 22 (42.3)	MS (Positive) (n = 88), n (%) 32 (36.3) 2 (2.2) 54 (61.3) 0 (0) 10 (11.3) 78 (88.6) 24 (27.2) 10 (11.3) 40 (45.4)	0.000
Complications Local Systemic TABLE 3. Prevalence of M Factor MS Central obesity, WC, cm	Criteria Yes No Male, ≥94 Male, <94 Female, ≥80 Female, <80 Underweight	13 (9.2%) $16 (11.4%)$ Pancreatitis (N - 140) $16 (88 (62.8%))$ $52 (37.1%)$ $40$ $20$ $70$ $10$ $2$	Pancreatitis (U: (n = 34), n 0 (0) 34 (100) 8 (23.5 6 (17.6 14 (41.1 6 (17.6 2 (5.8)	Range (mini MS nkn own) (%) )) )) )) ))	$\frac{\text{Yes}(88)}{\text{No}(52)}$ Pancreatitis (Bilia (n = 106), n (% 88 (83) 18 (16.9) 32 (30.1) 14 (13.2) 56 (52.8) 4 (3.7) 0 (0)	79 (69.5%) 45 (86.5%) <b>ry</b> ) <u>x<sup>2</sup></u> 0.000	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Analy Factor Central obesity, WC, cm Raised triglycerides, mg/dL Reduced HDL cholesterol level, mg/dL	rsis Result TG TG	pancreatitis. s of MS Criteria in Patients <sup>1</sup> <u>Criteria</u> Male, ≥94 Male, <94 Female, ≥80 Female, <80 Female, <80 S ≥150 mg/dL (1.7 mmol/L) S <150 mg/dL (1.7 mmol/L) Male, <40 Male, <40 Male, <50 Female, <50 Female, >50	With AP (N - 140) Total (N = 140) 40 20 70 10 14 126 44 16 62 18	MS (Negative) (n = 52), n (%) 8 (15.3) 18 (34.6) 16 (30.7) 10 (19.2) 4 (7.6) 48 (92.3) 20 (38.4) 6 (11.5) 22 (42.3) 4 (7.6)	MS (Positive) (n = 88), n (%) 32 (36.3) 2 (2.2) 54 (61.3) 0 (0) 10 (11.3) 78 (88.6) 24 (27.2) 10 (11.3) 40 (45.4) 14 (15.9)	0.000 0.349 0.378
Complications Local Systemic TABLE 3. Prevalence of M Factor MS Central obesity, WC, cm	Criteria Yes No Male, ≥94 Male, <94 Female, ≤80 Female, <80 Underweight Normal weight	13 (9.2%) 16 (11.4%) Pancreatitis (N – 140) Total (N = 140) 88 (62.8%) 52 (37.1%) 40 20 70 10 2 36	Pancreatitis (Ur (n = 34), n 0 (0) 34 (100) 8 (23.5 6 (17.6 14 (41.1 6 (17.6 2 (5.8) 12 (35.2	Range (mini MS nkn own) (%) )) )) )) ))	$\frac{Y_{85}(88)}{N_0(52)}$ Pancreatitis (Bilia (n = 106), n (% 88 (83) 18 (16.9) 32 (30.1) 14 (13.2) 56 (52.8) 4 (3.7) 0 (0) 24 (22.6)	$\frac{79(69.5\%)}{45(86.5\%)}$	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Analy Factor Central obesity, WC, cm Raised triglycerides, mg/dL Reduced HDL cholesterol	rsis Result TG TG	pancreatitis. s of MS Criteria in Patients <sup>1</sup> <u>Criteria</u> Male, ≥94 Male, <94 Female, ≥80 Female, ≥80 Female, <80 s ≥150 mg/dL (1.7 mmol/L) s <150 mg/dL (1.7 mmol/L) Male, <40 Male, <40 Male, >40 Female, <50 Female, >50 Systolic, ≥130	With AP (N - 140) <b>Total (N = 140)</b> 40 20 70 10 14 126 44 16 62	MS (Negative) (n = 52), n (%) 8 (15.3) 18 (34.6) 16 (30.7) 10 (19.2) 4 (7.6) 48 (92.3) 20 (38.4) 6 (11.5) 22 (42.3)	MS (Positive) (n = 88), n (%) 32 (36.3) 2 (2.2) 54 (61.3) 0 (0) 10 (11.3) 78 (88.6) 24 (27.2) 10 (11.3) 40 (45.4)	0.00 0.34 0.37
Complications Local Systemic TABLE 3. Prevalence of M Factor MS Central obesity, WC, om	Criteria Yes No Male, ≥94 Male, <94 Female, ≥80 Female, <80 Underweight	13 (9.2%) $16 (11.4%)$ Pancreatitis (N - 140) $16 (88 (62.8%))$ $52 (37.1%)$ $40$ $20$ $70$ $10$ $2$	Pancreatitis (U: (n = 34), n 0 (0) 34 (100) 8 (23.5 6 (17.6 14 (41.1 6 (17.6 2 (5.8)	Range (mini MS nkn own) (%) )) )) )) ))	$\frac{\text{Yes}(88)}{\text{No}(52)}$ Pancreatitis (Bilia (n = 106), n (% 88 (83) 18 (16.9) 32 (30.1) 14 (13.2) 56 (52.8) 4 (3.7) 0 (0)	$\frac{79(69.5\%)}{45(86.5\%)}$	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Analy Factor Central obesity, WC, cm Raised triglycerides, mg/dL Reduced HDL cholesterol level, mg/dL	rsis Result TG TG	pancreatitis. s of MS Criteria in Patients N Criteria Male, ≥94 Male, <94 Female, ≥80 Female, ≥80 Female, <80 s ≥150 mg/dL (1.7 mmol/L) s <150 mg/dL (1.7 mmol/L) Male, <40 Male, <40 Male, >40 Female, <50 Female, >50 Systolic, ≥130 Diastolic, 85	With AP $(N - 140)$ Total $(N = 140)$ 40 20 70 10 14 126 44 16 62 18 98	MS (Negative) (n = 52), n (%) 8 (15.3) 18 (34.6) 16 (30.7) 10 (19.2) 4 (7.6) 48 (92.3) 20 (38.4) 6 (11.5) 22 (42.3) 4 (7.6) 30 (57.6)	MS (Positive) (n = 88), n (%) 32 (36.3) 2 (2.2) 54 (61.3) 0 (0) 10 (11.3) 78 (88.6) 24 (27.2) 10 (11.3) 40 (45.4) 14 (15.9) 68 (77.2)	0.004 0.34 0.37
Complications Local Systemic TABLE 3. Prevalence of N Factor MS Central obesity, WC, cm	Criteria Yes No Male, ≥94 Male, <94 Female, ≥80 Female, <80 Underweight Normal weight Overweight	13 (9.2%) $16 (11.4%)$ Pancreatitis (N - 140) $16 (88 (62.8%))$ $52 (37.1%)$ $40$ $20$ $70$ $10$ $2$ $36$ $32$	Pancreatitis (U (n = 34), n 0 (0) 34 (100) 8 (23.5) 6 (17.6) 14 (41.1) 6 (17.6) 14 (41.1) 6 (17.6) 12 (35.2) 5 (14.7)	Range (mini MS nkn own) (%) )) )) )) )) ))	$\frac{\text{Yes}(\text{SS})}{\text{No}(52)}$ <b>Pancreatitis (Bilia</b> (n = 106), n (% SS) (n = 106), n	$\frac{79(69.5\%)}{45(86.5\%)}$	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Analy Factor Central obesity, WC, cm Raised triglycerides, mg/dL Reduced HDL cholesterol level, mg/dL	rsis Result TG TG	pancreatitis. s of MS Criteria in Patients $^{\circ}$ Criteria Male, $\geq 94$ Male, $\geq 94$ Remale, $\geq 80$ Female, $\geq 80$ Female, $\geq 80$ Female, $\leq 80$ Semale, $\leq 80$ Female, $\leq 80$ Female, $\leq 80$ Male, $\leq 40$ Male, $\leq 40$ Male, $\leq 40$ Male, $\geq 40$ Female, $\leq 50$ Female, $\leq 50$ Female, $\geq 50$ Systolic, $\geq 130$ Diastolic, $\otimes 5$ Systolic, $\leq 130$	With AP (N - 140) Total (N = 140) 40 20 70 10 14 126 44 16 62 18	MS (Negative) (n = 52), n (%) 8 (15.3) 18 (34.6) 16 (30.7) 10 (19.2) 4 (7.6) 48 (92.3) 20 (38.4) 6 (11.5) 22 (42.3) 4 (7.6)	MS (Positive) (n = 88), n (%) 32 (36.3) 2 (2.2) 54 (61.3) 0 (0) 10 (11.3) 78 (88.6) 24 (27.2) 10 (11.3) 40 (45.4) 14 (15.9)	0.00 0.34 0.37
Complications Local Systemic TABLE 3. Prevalence of M	Criteria Yes No Male, ≥94 Male, ≤94 Female, ≤80 Female, ≤80 Underweight Normal weight Overweight Obese class 1	13 (9.2%) 16 (11.4%) Pancreatitis (N – 140) Total (N = 140) 88 (62.8%) 52 (37.1%) 40 20 70 10 2 36	Pancreatitis (Ur (n = 34), n 0 (0) 34 (100) 8 (23.5 6 (17.6 14 (41.1 6 (17.6 2 (5.8) 12 (35.2	Range (mini MS nkn own) (%) )) )) )) )) ))	$\frac{Y_{85}(88)}{N_0(52)}$ Pancreatitis (Bilia (n = 106), n (% 88 (83) 18 (16.9) 32 (30.1) 14 (13.2) 56 (52.8) 4 (3.7) 0 (0) 24 (22.6)	$\frac{79(69.5\%)}{45(86.5\%)}$	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Analy Factor Central obesity, WC, cm Raised triglycerides, mg/dL Reduced HDL cholesterol level, mg/dL Raised blood pressure, mm	rsis Result TG TG	pancreatitis. s of MS Criteria in Patients $^{\circ}$ Criteria Male, $\geq 94$ Male, $\leq 94$ Female, $\geq 80$ Female, $\geq 80$ Female, $\leq 80$ $i \geq 150 \text{ mg/dL} (1.7 \text{ mmol/L})$ i < 150  mg/dL (1.7  mmol/L) Male, <40 Male, $<40$ Male, $<40$ Male, $<40$ Male, $<40$ Female, $<50$ Female, $<50$ Female, $<50$ Systolic, $\geq 130$ Diastolic, $85$ Systolic, $<130$ Diastolic, $85$	With AP (N - 140) Total (N = 140) 40 20 70 10 14 126 44 16 62 18 98 42	MS (Negative) (n = 52), n (%) 8 (15.3) 18 (34.6) 16 (30.7) 10 (19.2) 4 (7.6) 48 (92.3) 20 (38.4) 6 (11.5) 22 (42.3) 4 (7.6) 30 (57.6) 22 (42.3)	MS (Positive) (n = 88), n (%) 32 (36.3) 2 (2.2) 54 (61.3) 0 (0) 10 (11.3) 78 (88.6) 24 (27.2) 10 (11.3) 40 (45.4) 14 (15.9) 68 (77.2) 20 (22.7)	0.000 0.349 0.378 0.013
Complications Local Systemic TABLE 3. Prevalence of N Factor MS Central obesity, WC, cm	Criteria Yes No Male, ≥94 Male, <94 Female, ≥80 Female, <80 Underweight Normal weight Overweight	13 (9.2%) $16 (11.4%)$ Pancreatitis (N - 140) $16 (88 (62.8%))$ $52 (37.1%)$ $40$ $20$ $70$ $10$ $2$ $36$ $32$	Pancreatitis (U (n = 34), n 0 (0) 34 (100) 8 (23.5) 6 (17.6) 14 (41.1) 6 (17.6) 14 (41.1) 6 (17.6) 12 (35.2) 5 (14.7)	Range (mini MS nkn own) (%) )) )) )) )) ))	$\frac{\text{Yes}(\text{SS})}{\text{No}(52)}$ <b>Pancreatitis (Bilia</b> (n = 106), n (% SS) (n = 106), n	$\frac{79(69.5\%)}{45(86.5\%)}$	47.0 (76.0 123.0) 9 (10.2%) 7 (13.4%) TABLE 4. Univariate Analy Factor Central obesity, WC, cm Raised triglycerides, mg/dL Reduced HDL cholesterol level, mg/dL	rsis Result TG TG	pancreatitis. s of MS Criteria in Patients $^{\circ}$ Criteria Male, $\geq 94$ Male, $\geq 94$ Remale, $\geq 80$ Female, $\leq 80$ Male, $\leq 40$ Male, $\geq 40$ Male, $\geq 40$ Female, $\leq 50$ Female, $\geq 50$ Systolic, $\geq 130$ Diastolic, $\approx 5$ Systolic, $\leq 130$	With AP $(N - 140)$ Total $(N = 140)$ 40 20 70 10 14 126 44 16 62 18 98	MS (Negative) (n = 52), n (%) 8 (15.3) 18 (34.6) 16 (30.7) 10 (19.2) 4 (7.6) 48 (92.3) 20 (38.4) 6 (11.5) 22 (42.3) 4 (7.6) 30 (57.6)	MS (Positive) (n = 88), n (%) 32 (36.3) 2 (2.2) 54 (61.3) 0 (0) 10 (11.3) 78 (88.6) 24 (27.2) 10 (11.3) 40 (45.4) 14 (15.9) 68 (77.2)	0.000 0.349 0.378

### RESULTS

We found that body weight can predict the clinical severity of pancreatitis with significant P value (P = 0.009; Table 2).

We found that 88 (62.8%) of patients with pancreatitis

fulfilled the criteria of MS by using the IDF criteria (Table 3).

There was a significant association between gallbladder stone induced pancreatitis and BMI value (Table 3;P = 0.024). Furthermore, we noticed that the prevalence of MS is more in patients with acute biliary pancreatitis (83%; P = 0.000; Table 3).

\*\*In our study, the risk of initial attack of acute biliary pancreatitis also increased with increment of WC ( $\geq$  94 cm in males and  $\geq$ 80 cm in females; Table 3; P = 0.039).

#### 0.0007.

#### <u>Discussion</u>

the incidence of AP is increasing, paralleled with an increase in the prevalence of obesity[4]. Obesity is a chronic low-grade inflammatory state characterized by high circulating levels of proinflammatory cytokines[5]. Alternatively, obesity may intensify the immune response, which is able to exacerbate pancreatic injury. Obesity is correlated with severity of AP, local complications, and mortality in patients with AP. These results were confirmed in our study and by meta-analysis[6].

obesity is also associated with higher levels of inflammatory markers[7]. Papachristou et al [1] proposed a new severity scoring system (APACH-O) that considers obesity as an independent predictor for the outcome of AP, and they concluded that obesity increases the severity of AP by amplifying the immune response to injury.

\*\*Patients with android fat distribution and higher WC measurements are at greater risk for developing severe AP[8].

Recently, it has been shown that children with MS harbor a high risk of pancreatitis[9], suggesting that the relationship between the risk of pancreatitis and MS is interchangeable.

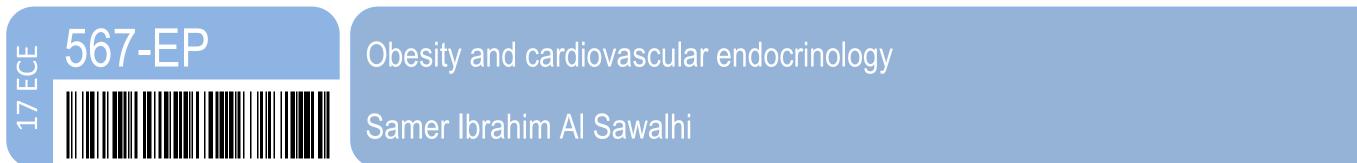
-The high prevalence of MS in patients with pancreatitis with its considerable burden on the middle-aged population mandates the implementation for its prevention by addressing issues of obesity early in the disease progression. Accumulation of visceral fat in patients with obesity increases the risk of severe AP although the action of adipocytokines [9] among these, serum adiponectin concentrations have been shown to be lower in patient with obesity. In addition, evaluating hypoadiponectemia may be useful for accurate assessment of MS in patients with AP.

## CONCLUSIONS

# References

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The presence of MS in patients with pancreatitis is noticeable, but it does not affect the course of disease severity, whereas obesity correlates with pancreatitis severity. Further research is warranted to expand the details of this relationship









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