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**RESEARCH ARTICLE**

Davorin Branislav Ćeranić, et al.: Interleukins in acute pancreatitis

**Interleukins and inflammatory markers are useful in predicting the severity of acute pancreatitis**

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ABSTRACT

Acute pancreatitis (AP) is a disease with significant morbidity and mortality. The aim of this study was to evaluate the prognostic role of inflammatory markers, particularly interleukins (ILs), in the course of AP and to determine the frequency of etiologic factors of AP. We included patients with AP who were treated at our institution from May 1, 2012 to January 31, 2015. Different laboratory parameters, including ILs, and the severity scoring systems Ranson’s criteria and Bedside Index of Severity in Acute Pancreatitis (BISAP) were analyzed. AP was classified into mild and severe, and independent parameters were compared between these groups. The predictive performance of each parameter was evaluated using receiver operating characteristic (ROC) curves and the area under the ROC curve (AUC). A binomial logistic regression was performed to evaluate Ranson’s criteria and IL6, IL8, and IL10 (at admission and after 48 hours) in the course of AP. Overall, 96 patients were treated, 59 (61.5%) males and 37 (38.5%) females, average age 62.5 ± 16.8 years (range 22–91 years). The best predictor for the severity of AP was IL6, measured 48 hours after admission (AUC = 0.84). Other useful predictors of the severity of AP were lactate dehydrogenase ($p < 0.001$), serum glucose ($p < 0.006$), and difference in the platelet count ($p < 0.001$) between admission and after 48 hours ($p < 0.001$), hemoglobin ($p < 0.027$) and erythrocytes ($p < 0.029$). The major causes of AP were gallstones and alcohol consumption. According to our results, IL6 and Ranson score are important predictors of the severity of AP.

KEYWORDS: Acute pancreatitis; etiology; inflammatory markers; interleukins; scoring systems; Ranson’s criteria; IL6
INTRODUCTION

Acute pancreatitis (AP) is an acute common disease of the gland associated with various local and distant complications and significant morbidity and mortality (Error! Reference source not found.-Error! Reference source not found.). The revised Atlanta classification divides AP according to morphological changes (interstitial/edematous AP, acute peripancreatic fluid collection, pancreatic pseudocyst, acute necrotic collection, walled-off necrosis, necrotizing AP) and severity of the disease (mild, moderately severe and severe) (Error! Reference source not found..Error! Reference source not found.). Mild AP has a very low mortality rate (<1%), whereas the death rate for severe AP can be 10-30% (Error! Reference source not found.-Error! Reference source not found.). Patients who develop respiratory, cardiovascular and/or renal failure within the first days are at increased risk, with a mortality of 30-50% (Error! Reference source not found..Error! Reference source not found.-Error! Reference source not found.). Organ failure is usually defined according to the modified Marshall scoring system, (Error! Reference source not found.). The overall success in treating AP has improved in the past decades (Error! Reference source not found..Error! Reference source not found..Error! Reference source not found.). The course of the disease can be assessed by clinical and laboratory indicators, and, additionally, completed by scoring systems to predict risks, complications, and treatment outcomes (Error! Reference source not found..Error! Reference source not found..Error! Reference source not found.). Pro-Inflammatory Markers (PIM) and Anti-Inflammatory Markers (AIM) have also been used as markers of inflammation (Error! Reference source not found.-Error! Reference source not found.-Error! Reference source not found.). PIM include TNF-alpha, interleukins (IL)-1β, IL-2, IL-6 and IL-18, chemokines (Interleukin-8 IL-8), monocyte chemoattractant protein-1, macrophage inflammatory protein-1, growth-regulated oncogene-α, adhesive molecules, platelet-activating factor, various reactive oxygen and nitrogen compounds (Error! Reference source not found..Error!)
Currently, the Ranson criteria, Acute Physiology and Chronic Health Examination II (APACHE II) system and Multiple Organ Dysfunction Score (MODS) are the most widely used in clinical practice for predicting the course of AP. In 2008, the Bedside Index of Severity in Acute Pancreatitis (BISAP) score has been proposed to identify patients at high risk for severe disease early during the course of AP. Due to technological advances, the prognostic importance of imaging evaluation has improved greatly, especially with Computed Tomography (CT) and Balthazar criteria, as well as prognosis of these patients, due to multidisciplinary treatment approach following current guidelines.

Estimating of pro- and anti-inflammatory cytokine response during AP showed good predictive results in some studies. Tumour Necrosis Factor (TNF), IL-1, IL-6, IL-8, IL-1β, platelet activator factor, leukotrienes, lipolytic and proteolytic enzymes, are important among the pro-inflammatory cytokines. On the other hand, anti-inflammatory cytokines are responsible for decreasing the activity of proinflammatory cytokines and for reducing the inflammation. IL-4, IL-10, IL-11, IL-13, and Interleukin-1 receptor antagonist (IL-1ra) are most important among anti-inflammatory cytokines.

The incidence rate of AP varies in different countries, it depends on age, gender of patients, their dietary habits and is ranging from 10/100,000 inhabitants in England, to 70/100,000 in
Finland and 80/100,000 in USA (24-30). Unfortunately, the etiology of AP remains unexplained in 10% of patients. (31).

The aims of this study were to determine the usefulness of inflammatory markers, in particular interleukins, in prediction of severity of acute pancreatitis.

**MATERIALS AND METHODS**

In the study were included 121 patients, who were treated at the Department of Gastroenterology (Division of Internal Medicine) in the period from May 1st, 2012 to January 31st, 2015. The study was approved by the National Medical Ethics Committee, No. 36/11/09. All patients signed informed consent. Diagnosis of AP was confirmed by fulfilling at least 2 of 3 criteria of the revised Atlanta classification (abdominal pain, at least a three-fold increase in activity of amylase and lipase, imaging findings). Patients with known malignant disease, and patients who underwent abdominal surgery 30 days prior to admittance were not included in the study.

**Laboratory tests**

On admittance and during the treatment, patients underwent the following laboratory tests: White Blood Cells (WBC), Red Blood Cells (RBC), Haematocrit (Ht), Haemoglobin (Hb), potassium, sodium, chloride, calcium, C-Reactive Protein (CRP), liver function tests, amylase, lipase, serum glucose, cholesterol, triglycerides, Blood Urea Nitrogen (BUN), creatinine, Lactate Dehydrogenase (LDH), iron, ferritin, proteinogram, blood coagulation factors, IL-1, IL-6, IL-8, IL-10. The determination of IL was carried out in an international approved laboratory of the Department of Laboratory Diagnostics of the University Clinical Center Maribor with the commercial tests, the chemiluminescence method, with analyser Immulite/Immuli 1000 IL-1β (Siemens Healthcare Diagnostics Inc., Newark, NJ, USA) according to the manufacturer's instructions. Biochemistry tests were analysed with spectrophotometric method on the analyser Dimension Vista System 1500 (Siemens Healthcare Diagnostics Inc., Newark, NJ, USA).
**Imaging methods in AP**

Imaging tests (abdominal X-ray at admission to exclude perforation or ileus and abdominal ultrasound) were performed within the first 24 h after admission. Abdominal Contrast Enhanced Computed Tomography (CECT), EUS and Magnetic Resonance CholangioPancreatography (MRCP) were performed when diagnosis was unsure, or if complication was assumed. ERCP with papillotomy was performed in patients with choledocholithiasis. CECT was repeated in patients with complications such as pseudocysts and pancreatic necrosis.

A multidisciplinary approach for was used all patients (Radiologist, Gastroenterologist, Abdominal Surgeon, Anaesthesiologist).

**Treatment of AP**

Patients received infusion treatment according to cardiac and kidney function, electrolytes` replacement with potassium chloride or Calcium gluconate, analgesics, Tramadol or Metamizole, piritramide (spasmolytic trospium chloride proton pump inhibitor pantoprazole nitrate patch, if there was suspicion of Oddi sphincter spasms, and intravenous broadspectrum antibiotics ceftriaxon, or ciprofloxacin and metronidazole or imipenem/cilastatin in cases of infections and elevated serum inflammation markers (CRP>150 mmol/l, L>12.000/ml, procalcitonin >1.3 and positive blood, urine or sputum culture).

**Assessment of the severity of AP**

The severity of acute pancreatitis was assessed in accordance with the scoring systems (Ranson >3, BISAP >3, MODS >2) as a mild, severe AP or AP with complications, respectively. AP without complications was considered as mild AP. However, an AP accompanied by local and/or systemic complications was considered as severe AP. Local complications included acute peripancreatic fluid collection, pancreatic pseudocyst, pancreatic necrosis or abscess. Systemic complications included Systemic Inflammatory
Response Syndrome (SIRS) and/or single organ failure. SIRS was defined by the presence of at least two out of the four following criteria: Body temperature >38°C or <36°C, respiratory rate >20/min or pCO2 >32 mm Hg, heart rate > 90/min, white blood cell > 12,000/mm³ or < 4000/mm³, or immature neutrophils > 10%. Cultures of blood, urine, stool, sputum or wound smears were used in cases of extrapancreatic site infections. Mortality was defined as death during hospital treatment or within 30 days after discharge.

Ethics

The study was approved by the National Medical Ethics Committee of the Republic of Slovenia, No. 36/11/09. Written informed consent was obtained from patients who participated in this study.

Statistical methods

Data were analysed using SPSS software (Statistical Package for Social Sciences), version 23.0. Results were expressed as means and 95% trust interval since the results were not distributed equally. The Wilcoxon test for dependent samples was used to compare parameter values received at admission and after 48 hours. The non-parametric Mann-Whitney U-test was used to compare independent parameters on patients with mild and severe courses of the disease. The predictive performance of each parameter was evaluated using Receiver-Operator Characteristic (ROC) curves, and the Area Under the ROC Curve (AUC). Sensitivity, specificity, Positive Predictive Value (PPV), Negative Predictive Value (NPV), and accuracy were calculated. Values p<0.05 were considered as statistically significant. Binomial logistic regression was performed to ascertain the effects of interleukins on the severity of the disease.

RESULTS

One hundred and twenty-one patients were included in the prospective study. Twenty-five patients were lost from the study due to inadequate compliance in patients with alcoholic
pancreatitis. We analysed data of 96 patients. There were 59 (61.5%) male and 37 (38.5%) female, mean age 62.5±16.8 years, range 22-91 years.

Demographic characteristics of patients with AP are presented in Figure 1. Gallstones were the cause of AP in 54 (56%) patients, and excessive alcohol consumption in 26 (27%) patients. Complications secondary to ERCP with endoscopic papillotomy occurred in 5 (5.2%) patients. Drug-induced AP was diagnosed in 2 (2%) patients, both in patients using azathioprine. The etiology of AP remained unexplained in 9 out of 96 patients (9%). Recurrent AP was diagnosed in 13 (13.5%) patients: 7 (54%) patients with alcoholic and 6 (46%) patients with biliary etiology. Due to the elevated inflammatory markers within 48 hours after the admission, 77% of patients received broad-spectrum antibiotic therapy, most commonly a combination of cephalosporin or quinolone and metronidazole.

The average duration of hospital stay for all patients was 12.0±8.2 days, range 3-75. Three male patients (3/93; 3.1%) died due to associated diseases (one patient due to diabetes with complications and two patients due to heart failure). After discharge, 33% of patients (32/96) with gallstones were referred (with priority) to cholecystectomy (two patients refused surgical treatment).

**Risk stratification of AP**

All patients who were included in the study were stratified according to the Ranson´s criteria with an average score 2.3±1.53, range 1-7. There were 83% of patients (80/96) with mild and 17% of patients (16/96) with severe AP (SAP). Severity staging, according to the BISAP score, was 0.95/5±0.74 points, range from 0 to 3. Important parameters for disease course prediction regarding the mild and severe form of the disease were performed (IL-6, IL-8, IL-10, C-reactive protein, serum amylase values on admission and 48 hours after admission; LDH and serum glucose at admission). Values for single parameters are presented in Table 1.
Results confirmed that IL-6 has the greatest predictive value in prediction of SAP at admission (Figure 2) and also has the best predictive value in the follow-up. IL-8 (AUC=0.70) also demonstrated the greatest predictive value in the follow-up and IL-10 has the greatest predictive value at admission (Figure 3). In the follow-up, IL-10 (AUC=0.70) also demonstrated the greatest predictive value.

In comparison between the values at admission and after 48 hours, CRP has been shown to have the greatest predictive value at follow up (Figure 4). LDH (p<0.001), serum glucose (p<0.006), the difference in value of platelets (p<0.001), haemoglobin (p<0.027), and RBC between admission and after 48 hours (p<0.029) proved to be statistically significant for predicting the disease course. Haematocrit (p<0.06), lipase (p<0.18 for the first day and p<0.32 for the third day) and serum amylase (p<0.27 for the first day and p<0.99 for the third day) proved not to be statistically significant for the course of AP.

Compared to the BISAP scoring system (AUC=0.78), the Ranson scoring (AUC=0.8) has only an insignificantly larger predictive value of the treatment course (Figure 5). WBC (AUC=0.70) appeared to have the greatest predictive value amongst WBC, haemoglobin, RBC, haematocrit and platelet number values. At a WBC value of 11.6 the sensitivity was 0.63 and specificity was 0.71. Among BUN, creatinine, serum calcium and prothrombin time at follow up, BUN has been shown to have the greatest predictive value (AUC=0.70). At a threshold BUN value of 3.75 the sensitivity was 0.73 and specificity is 0.57.

Platelet values at admission and after 48 hours had the strongest impact on distinguishing between a mild AP and an SAP (AUC=0.76; CI=0.60-0.91). At a cut-off T-value of 27.5 the sensitivity was 75% and specificity was 70%.

**Binomial logistic regression**
A binomial logistic regression was performed to ascertain the effects of seven variables on the likelihood that participants will have severe course of the disease: Ranson score and intraleukins IL6, IL8 and IL10 measured at admission and after 48 hours. Linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell procedure. A Bonferroni correction was applied using all fifteen terms in the model resulting in statistical significance being accepted when \( p < 0.00333 \). The logistic regression model was statistically significant, \( \chi^2(7) = 43.430, p < 0.0001 \). The model explained 64.2% (Nagelkerke R\(^2\)) of the variance in severity of the course of the disease and correctly classified 93.4% of cases. Sensitivity was 98.7%, specificity was 66.7%, PPV was 90.9% and NPV was 93.8%. Of the seven predictor variables only two were statistically significant: Ranson score and IL6 after 48 hours (as shown in Table 2). Increasing Ranson score was associated with an increase in the likelihood of exhibiting severe course of disease. Similarly, increasing IL6 value after 48 hours was associated with an increase in the likelihood of exhibiting severe course of disease.

**DISCUSSION**

We confirmed an important role of inflammatory markers, in particular interleukins, in the prediction of severity and in follow up of the patients with AP. AP is still a disease with significant morbidity and mortality. The incidence of the disease is very different in different countries, and is associated with nutritional and other habits. By a prospective study in a tertiary institution, we wanted to determine the etiology of AP and whether modern imaging methods and laboratory findings, including interleukins, can predict the course of the disease accurately and delineate between mild and severe forms of the disease. Gallstones and alcohol remain the most common causes for AP, which is in accordance with previous reports (Error! Reference source not found., Error! Reference source not found., Error! Reference source not found., Error! Reference source not found.)
In recent years, the number of younger patients with AP increased in our, as well as in other, environments, which may be correlated with the increased alcohol consumption among the younger population. The average length of stay (12 days) and mortality rate (3%) in Slovenia are comparable with other developed countries, as well as the share and type of complications (pancreatic necrosis, pseudocyst). LDH, serum glucose, the difference in value of platelets, haemoglobin, and RBC between admission and 48 hours proved to be statistically significant for predicting the disease course. Several laboratory findings and prediction models have been used to estimate the disease course. Interleukins – an unstructured group of proteins secreted by numerous cells in the body like monocytes, macrophages, endothelium, and fibroblasts, are produced as a response to proinflammatory stimulus, and are useful in predicting the course of AP. IL-6 enable cell growth, differentiation, circulation, and take part in the inflammatory process and immune response. They also enable healing processes and recovery. We confirm the positive role of IL-6 in prediction of SAP at admission, as well as in follow-up 48 hours after admission.
Pancreatic enzymes are useful only for diagnosis, and not for prognosis. In two studies it was confirmed that levels of IL-6 are higher in patients with severe AP, as well as IL-8 and IL-10 (Error! Reference source not found. Error! Reference source not found.). On the other hand, due to the fast decrease in serum, IL-6 is not a good marker for longer monitoring of the disease.

Gunjaca et al. (Error! Reference source not found.) studied the pro-inflammatory and anti-inflammatory process in AP. Pro-inflammatory cytokines were significant for pathogenesis of severe AP and IL-6 was recognised as a key mediator for acute phase protein synthesis. With logistic regression analysis they presented better independent prognostic value for IL-10 (even better than for IL-6) (Error! Reference source not found.). In the presenting study, CRP has been shown as a good prognostic factor after 48 to 72 hours. It is well-known that IL-6 increases earlier than IL-8 during the inflammatory process, and induces synthesis of CRP (and other acute-phase proteins). CRP has shown the best predictive value, AUC is 0.82. At value of CRP=152, is sensitivity 0.81, specificity 0.69, PPV 0.34, NPV 0.95, p<0.001. Another group, Digalakis et al (Error! Reference source not found.) studied CRP, IL-8 and tumour necrosis factor-α as predictors of the severity of AP. CRP originates in the liver and is induced by the releasing of IL-1 and IL-6. They revealed higher serum levels of IL-8 in patients with severe AP in comparison to patients with mild or moderate AP, and established the highest sensitivity and diagnostic accuracy on the second day (Error! Reference source not found.). Basak et al. (Error! Reference source not found.) had used Ranson score and CRP in predicting the severity of AP in patients. He demonstrated that concomitant use of CRP and Ranson score could distinguish the severe AP from mild AP, that the sensitivity, specificity, and accuracy of CRP were 82.9%, 80.9%, and 81.1%, respectively (Error! Reference source not found.). Vasseur et al. (Error! Reference source not found.) analysed the role of IL-22, and presented a strong elevation during the early phase of AP.
In two groups, Gunjaca et al. (Error! Reference source not found.) and Fisic et al. (Error! Reference source not found.) it is believed that IL-6 and IL-10 are useful markers of the severity AP course; however, their use in routine clinical practice is limited because of their high costs. Analysis of IL is not possible in all laboratories. The other good predictors in our analysis are available in all laboratories and are easy to evaluate, like LDH, serum glucose, BUN, platelets difference between the first and the third day, haemoglobin values and RBC (Error! Reference source not found.). However, their role and accuracy should be confirmed in bigger randomised studies.

Lack of data on most difficult patients treated in Intensive Care Unit is the limitation of this study, since only 17% of patients had severe AP, indicating less severe disease of this group than in comparative studies.

It is necessary to provide critical evaluation of treatment results, as well as material and non-material factors affecting the treatment. In addition, restrictions applied in certain environments must also be taken into consideration. When treating patients who are most at risk, it is necessary to provide a multidisciplinary approach in making optimal clinical decisions (Error! Reference source not found..Error! Reference source not found..Error! Reference source not found..Error! Reference source not found..Error! Reference source not found.). This is the only approach that enables a modern and successful treatment of patients suffering from AP. The authors also share the opinion, that the outcome of treatment of mild or severe AP undoubtedly influences the implementation of modern recommendations for the management of this disease (Error! Reference source not found.). IL-6 is a useful marker for the AP course; however, its use in clinical practice is limited because of its high costs.

C-reactive protein, LDH, serum glucose, BUN, platelets difference between admission and after 48 hours, haemoglobin values and RBC have also been shown as good predictive factors; however, their role and accuracy should be confirmed in bigger randomised studies.
Despite new inflammatory markers and numerous studies with determination of laboratory values and models in predicting severity in patients with AP, it seems that Ranson criteria are still useful in validation of AP in everyday clinical practice that strongly support their use. Gallstones and alcohol remain the leading causes of AP in our population. Inflammatory markers, in particular interleukins, are important tools in the prediction of severity and in follow up of patients with AP. Unfortunately, low availability and high costs are limiting their use in everyday clinical practice. However Ranson score, CRP, WBC, platelets and BUN are simple and available markers for routine clinical work. The multidisciplinary approach and implementation of modern recommendations in clinical practice enable successful treatment and lower mortality in patients with AP.

**DECLARATION OF INTERESTS**

The authors declare no conflict of interests.
REFERENCES


### TABLE 1. Mann Whitney U test: comparison of independent samples (mild and severe course) by chosen parameters. Values p<0.05 were considered as statistically significant.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>AUC (95% CI)</th>
<th>P value</th>
<th>Cut-off</th>
<th>Sensitivity (%)</th>
<th>Specificity (%)</th>
<th>PPV (%)</th>
<th>NPV (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL-6 at admission</td>
<td>0.782 (0.644-0.920)</td>
<td>&lt;0.00 1</td>
<td>70.05</td>
<td>80.0</td>
<td>70.1</td>
<td>34.3</td>
<td>94.7</td>
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<tr>
<td>IL-6 after 48h</td>
<td>0.835 (0.719-0.950)</td>
<td>&lt;0.00 1</td>
<td>35.1</td>
<td>86.7</td>
<td>75.0</td>
<td>40.6</td>
<td>96.6</td>
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<tr>
<td>IL-8 at admission</td>
<td>0.672 (0.522-0.822)</td>
<td>0.035 0.07</td>
<td>21.7</td>
<td>80.0</td>
<td>61.0</td>
<td>28.6</td>
<td>94.0</td>
</tr>
<tr>
<td>IL-8 after 48h</td>
<td>0.696 (0.558-0.834)</td>
<td>0.016 0.16</td>
<td>16.5</td>
<td>73.3</td>
<td>69.7</td>
<td>32.4</td>
<td>93.0</td>
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<tr>
<td>IL-10 at admission</td>
<td>0.742 (0.580-0.903)</td>
<td>0.002 0.2</td>
<td>5.35</td>
<td>73.3</td>
<td>59.7</td>
<td>26.2</td>
<td>92.0</td>
</tr>
<tr>
<td>IL-10 after 48h</td>
<td>0.705 (0.543-0.868)</td>
<td>0.002 0.2</td>
<td>5.45</td>
<td>60.0</td>
<td>84.2</td>
<td>42.9</td>
<td>91.4</td>
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<tr>
<td>Ranson score</td>
<td>0.798 (0.683-0.913)</td>
<td>&lt;0.00 1</td>
<td>2.5</td>
<td>81.3</td>
<td>68.7</td>
<td>34.2</td>
<td>94.8</td>
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<td>CRP after 48h</td>
<td>0.819 (0.712-0.926)</td>
<td>&lt;0.00 1</td>
<td>152.0</td>
<td>81.3</td>
<td>68.8</td>
<td>34.2</td>
<td>94.8</td>
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<td>LDH</td>
<td>0.796 (0.678-0.914)</td>
<td>&lt;0.00 1</td>
<td>4.555</td>
<td>75.0</td>
<td>68.5</td>
<td>34.3</td>
<td>92.6</td>
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<td>Glucose</td>
<td>0.716 (0.564-0.868)</td>
<td>0.006 0.65</td>
<td>6.55</td>
<td>62.5</td>
<td>61.5</td>
<td>25.0</td>
<td>88.9</td>
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<td>T difference</td>
<td>0.755(0.595-0.914)</td>
<td>0.001 2.75</td>
<td>75.0</td>
<td>70.0</td>
<td>33.3</td>
<td>93.3</td>
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<tr>
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<td>.792</td>
<td>.341</td>
<td>5.388</td>
<td>.020</td>
<td>2.207</td>
<td>1.131</td>
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<td>IL-6 admission</td>
<td>.002</td>
<td>.003</td>
<td>.514</td>
<td>.474</td>
<td>1.002</td>
<td>.996</td>
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<td>.712</td>
<td>.987</td>
<td>.922</td>
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<td>IL-10 admission</td>
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<td>.082</td>
<td>1.514</td>
<td>.219</td>
<td>1.106</td>
<td>.942</td>
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<td>IL-6 after 48h</td>
<td>.018</td>
<td>.009</td>
<td>3.882</td>
<td>.049</td>
<td>1.018</td>
<td>1.000</td>
<td>1.037</td>
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<tr>
<td>IL-8 after 48h</td>
<td>-.080</td>
<td>.055</td>
<td>2.110</td>
<td>.146</td>
<td>.923</td>
<td>.829</td>
<td>1.028</td>
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<tr>
<td>IL-10 after 48h</td>
<td>.024</td>
<td>.121</td>
<td>.039</td>
<td>.844</td>
<td>1.024</td>
<td>.807</td>
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<tr>
<td>Constant</td>
<td>-5.090</td>
<td>1.584</td>
<td>10.330</td>
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FIGURE 1. Demographic characteristics of patients with acute pancreatitis, age and gender distribution. Image shows that prevalent male patients and patients middle- and older age period.
FIGURE 2. Comparison between predictive value of Interleukin-6 (IL-6) at admission, Interleukin-8 (IL-8) at admission and Interleukin-10 (IL-10) at admission in prediction. The values of IL-6 at admission has the highest predictive value (AUC=0.782). At value IL-6 =70.05 pg/ml, has sensitivity 0.80 and specificity 0.701, PPV 0.40, NPV 0.96, p<0.001.
FIGURE 3. Comparison between predictive value of all Interleukins 48 hours after admission (Interleukin-6 (IL-6), Interleukin-8 (IL-8) and Interleukin-10 (IL-10)) in prediction, IL-6 has at control highest predictive value (AUC=0.835). At value IL-6 =36.1pg/ml, has sensitivity 0.867 and specificity 0.75.
FIGURE 4. C Reactive protein (CRP) has been shown to have the greater predictive value at follow up (AUC=0.82). At cut-off value of CRP at 3rd day=152 the sensitivity was 0.81 and specificity 0.69.
FIGURE 5. Ranson score has a little better predictive value of disease course in comparison with the Bedside Index of Severity in Acute Pancreatitis – BISAP score. At the cut off value Ranson score =2.5 is sensitivity 0.813 and specificity 0.687. At BISAPsc= 1.5 sensitivity is 0.563 and specificity 0.912.