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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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A THOROUGH STUDY AND META-ANALYSIS OF THE PROGNOSTIC RELEVANCE OF THE C-REACTIVE-ALBUMIN RATIO IN ACUTE PANCREATITIS

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Abstract.

Background: Although most cases of acute pancreatitis (AP) are minor, severe cases are associated with a substantial risk of death. Acute pancreatitis (AP) is a common illness. Therefore, it is critical to assess AP severity as soon as possible. This review aimed to ascertain the predictive significance of the CRP to albumin ratio in individuals with AP.

Methods: We searched PubMed, Science Direct, and Cochrane Library electronic databases Until January 2023. Studies that reported the CRP/alb ratio at admission and its relationship to the severity or death of patients with AP were included. Using a random-effects model, we computed the pooled mean difference (MD) and 95% confidence interval (CI). The quality of the included studies was evaluated using the Newcastle-Ottawa scale.

Results: This meta-analysis combined data from six trials with a total of 2244 patients. Upon admission, the CRP/alb ratio was higher in patients with severe AP than in those with mild to moderate AP (pooled MD:3.59; 95% CI:2.51-4.68; $p<0.00001$). Additionally, non-survivor AP patients had a substantially higher CRP/alb ratio than survivor AP patients (pooled MD:2.12; 95% CI:0.43-3.8; $p < 0.01$).

Conclusion: Individuals with AP may benefit from a high CRP/ALB ratio as a preliminary indicator of poor prognosis.

Key words. CRP albumin ratio, Severity of pancreatitis, systemic review, risk of death.

Introduction.

Gallstones are the most common cause of acute pancreatitis in Southern Europe and alcohol consumption in Eastern Europe, with documented incidences ranging from 4.6 to 100 per 100,000 population in 17 European nations [1]. A better understanding of this illness can lead to higher mortality and morbidity, even with recent advancements in medicine [2]. Over the years, several grading systems have been employed to help physicians accurately estimate the mortality rates and determine their severity. A few popular scoring systems that are utilized are the Glasgow, Atlanta classification, Ranson, acute physiological assessment and chronic health evaluation (APACHE), and bedside index for severity in acute pancreatitis (BISAP) [3,4].

Sudden and severe abdominal discomfort, together with high pancreatic enzyme levels, is a symptom of acute pancreatitis (AP), a pancreatic inflammation [5]. The two leading causes of this illness. Regarding severe AP, the mortality risk is elevated, even though the majority of instances are moderate. In 2019, the global incidence of AP, a common gastrointestinal ailment, was reported to be 34.8 per 100,000 people [6]. While AP generally has a mortality rate of 3–10%, in cases of severe AP, the mortality rate can reach 36–50% [7,8]. Therefore, it is crucial to assess disease severity early in order to select the best treatment course. The severity and prognosis of acute pancreatitis (AP) are often assessed using several scoring systems, including the Atlanta classification, bedside index for severity in acute (BISAP), sensitive physiological assessment and chronic health evaluation (APACHE II), and Ranson scores. [9,10]. Most of these scoring systems require further blood tests 48 h after admission to improve their accuracy in predicting AP severity. They also considered numerous blood tests and clinical indicators. Instruments that can predict the prognosis of AP during the first hour of admission are required. C-reactive protein (CRP), an inflammatory measure, is frequently used in clinical practice to assess the severity of several inflammatory and infectious disorders. The acute-phase reactant generated by the liver is enhanced by inflammation and infection. Conversely, albumin is a negative acute-phase reactant produced by the liver, which decreases with inflammation. Additionally, albumin levels, illness severity, and death were related. Although the expected levels of the CRP/albumin ratio are still under debate, a new predictive score linked to mortality and the degree of inflammation was recently identified as the CRP-to-albumin (CRP/albumin) ratio. Most of the earlier studies that attempted to link the CRP/alb ratio to AP severity and mortality produced encouraging findings. Nevertheless, to the best of our knowledge, no meta-analysis has compiled the results of these investigations. This study examined the predictive significance of the CRP/ALB ratio in AP through a systematic review and meta-analysis.

Materials and Methods.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed for this systematic review and meta-analysis. We conducted a thorough literature search using PubMed, Science Direct, and the Cochrane Library to identify relevant papers published through January 31, 2023. PANCREATIS AND ("CRP albumin ratio" OR "C-reactive protein/albumin" OR "C-reactive protein albumin" OR "CRP/albumin" OR "CRP alb ratio" OR "CRP/alb") were the keywords we used. We also looked at the references of relevant publications. Duplicate results were removed after the first search.

Study choice.

The study selection was carried out separately by two authors (HAS, and MIF). A review process was used to weigh unrelated research by reviewing paper titles and abstracts. Studies that passed the first screening were subjected to inclusion and exclusion criteria for this evaluation. Studies that satisfied each of the following requirements were included: (1) observational studies describing acute pancreatitis patients, (2) admission CRP/alb ratio, (3) adult patients, (4) documenting the severity

of AP and patient death, and (5) papers written in Indonesian or English. Studies that satisfied any of the following criteria were also disqualified: (1) no full text available, (2) case reports, (3) conference papers, (4) review articles, (5) non-research letters, (6) commentaries, and (7) did not supply the information required to perform a meta-analysis.

Extraction of data.

The name of the first author, year of publication, nation, type of study, number of patients, age, mean or median value of the CRP/ALB ratio, and outcomes (severity or mortality) are among the data taken from the included studies. AP severity of AP is the primary outcome examined in this systematic review and meta-analysis. The secondary result was the death rate of patients with secondary result. The authors used an electronic data collection form with gather the required data from each article and analysed in Zagazig University Egypt.

Bias risk.

The Newcastle-Ottawa scale (NOS) was used to evaluate the risk of bias in each included study. This procedure was performed separately by three authors (IKM, CPS, and DAS). Three categories were used to categorize the assessment results: low risk (7-9), moderate risk (4-6), and high risk (0–3).

Statistical analysis.

The statistical analysis program used was Stata 17 together with Review Manager 5.4. Using the mean difference (MD) and standard deviation (SD) from each trial, we calculated the pooled mean difference (MD) with 95% confidence intervals (CI). In cases where the data were given as medians with Q1 and Q3 or ranges, we used a calculator developed by Luo et al. and Wan et al. to calculate the mean. 8, 9 The I2 statistic was used to evaluate heterogeneity; values > 60% indicated significant heterogeneity. This shows the proportion of variation in observed impacts across research linked to the variation in genuine effects. P values were all two-tailed, with a less than 0.05 considered statistically significant. A forest plot was created to visually represent the estimated effects and the degree of study heterogeneity. Sensitivity analysis used the leave-one-out strategy, which involves redoing the analysis after removing one study at a time.

Results.

Examining choices and attributes. A total of 21 publications were identified using a keyword search. After removing duplicates, 18 journals were extracted. Eleven potential papers remained after we eliminated seven based on our analysis of the abstracts and titles. Subsequently, the entire texts of all possible studies were acquired and examined to determine whether they could be included in the meta-analysis. Publications that did not meet all inclusion criteria and those that did not provide all the data required for this meta-analysis were excluded. Consequently, six studies were included in the current investigation. Figure 1 shows exclusion and inclusion criteria. PRISMA flow schematic, Figure 1.

All six included studies comprised 2244 patients and were retrospective cohorts. Each study will be conducted between 2017 and 2022. Owing to the location of the study, two were

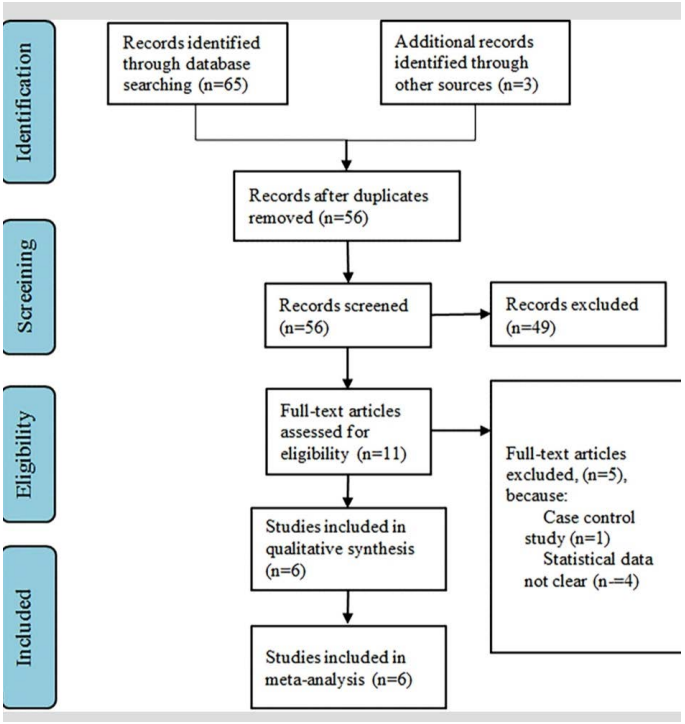

Figure 1. *Flowchart of study patients.*

in China and four were in Turkey. The association between AP severity and CRP/ALB was examined in five studies. Two investigations reviewed the connection between AP mortality and the CRP/alb ratio. The features of the included studies are shown in Table 1.

Quality evaluation.

Five studies were deemed to be at low risk, and one study was considered to be at moderate risk when the NOS was used to assess the risk of bias. The assessment of the bias risk is presented in Table 2.

AP severity and the CRP/alb ratio A total of 1960 participants from five studies were used to examine the connection between AP severity and the CRP/alb ratio. Patients with severe AP had a higher CRP/alb ratio than those with mild-to-moderate AP (pooled MD, 3.59; 95% CI:2.51-4.68; $p < 0.00001$ (figure 2.) Sensitivity analysis using the leave-one-out technique was also conducted because of the extreme heterogeneity (I2 = 89%). After removing one study at a time, the leave-one-out analysis revealed no discernible changes in the results (Figure 3).

Only two studies that assessed the CRP/ALB ratio and AP mortality met the inclusion criteria. Because the heterogeneity of these studies was regarded as low (I2 = 0%), fixed-effects models were used in this analysis. These analyses showed that the CRP/ALB ratio was higher in non-survivors than in survivors (pooled MD,2.12; 95% CI:0.43-3.8; $p < 0.01$) (Figure 4)).

Discussion.

Localized inflammation can have systemic implications in patients with AP. The development of systemic organ malfunction, and ultimately organ failure, predisposes patients to systemic inflammation. Sixteen organ failures and the existence of systemic consequences were used to classify the

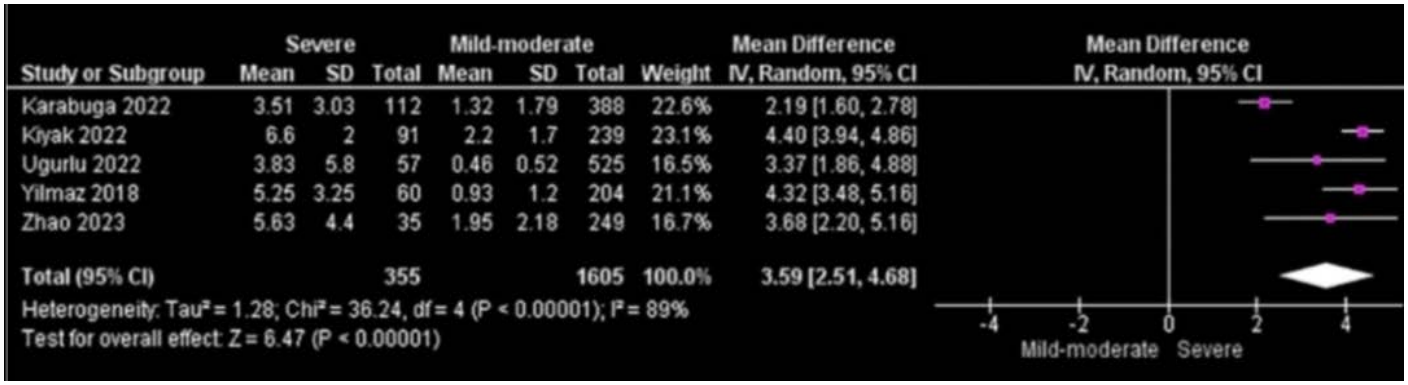

Figure 2. *A forest plot of research contrasting the CRP/alb ratio in patients with severe AP with mild-to-moderate AP.*

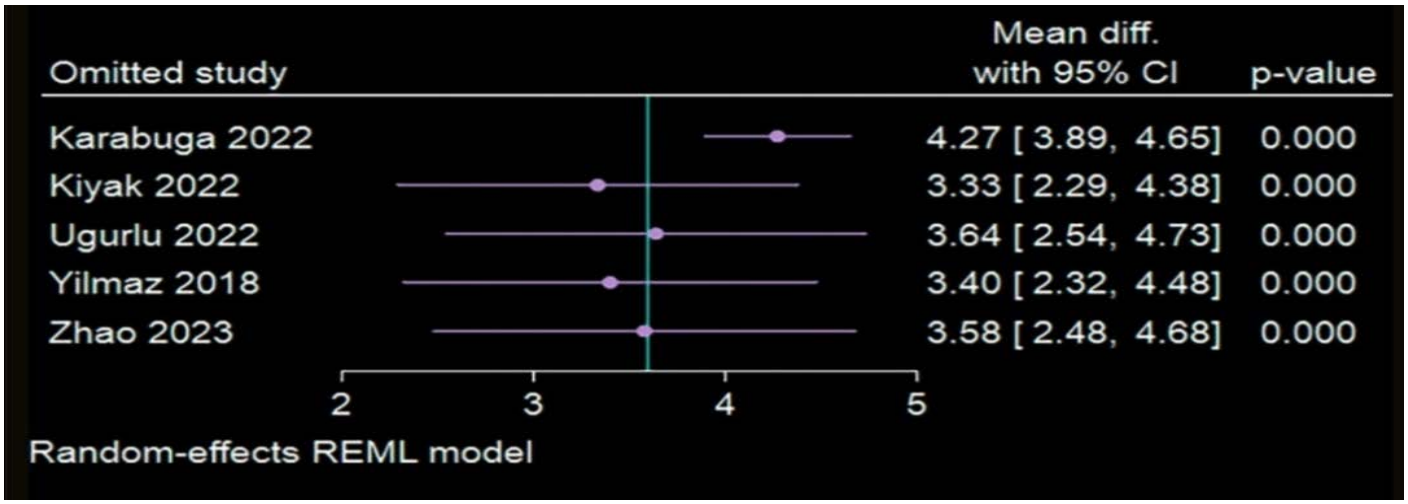

Figure 3. *Compares the CRP/alb ratios of patients with severe and mild-to-moderate AP using a leave-one-out approach.*

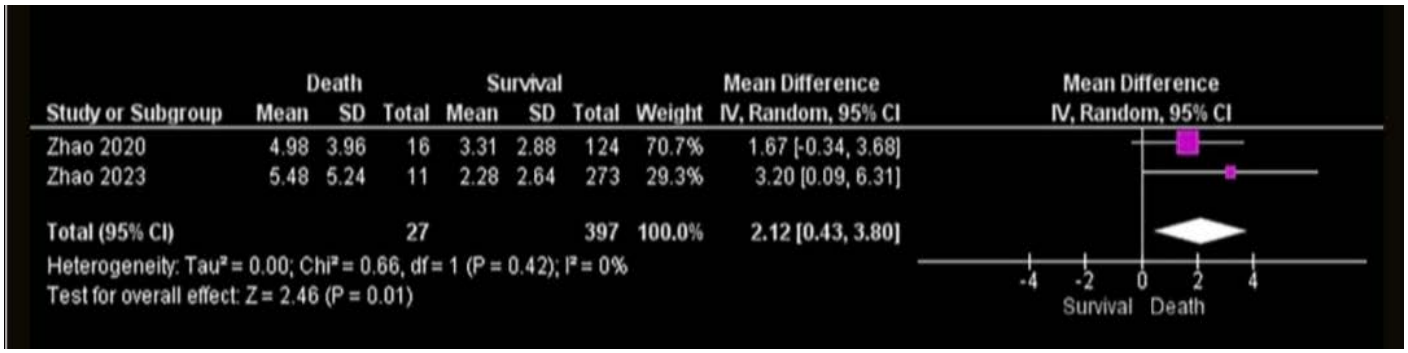

Figure 4. *A forest plot of research comparing the CRP/alb ratio in AP patients who survived against those who did not.*

severity of AP. Sustained organ failure was defined as severe AP. Organ failure or systemic consequences were absent in patients with moderate AP [10,17]. Inflammation markers are hypothesized to predict the prognosis of AP, because the degree of inflammation determines the severity of AP. One of the most widely used biomarkers, CRP, has been demonstrated to be strongly correlated with AP severity. The issue was that, when measured 48 hours after admission, the connection was only significant, and CRP levels alone upon admission had a low predictive value. Globally, the threshold for predicting severe acute pneumonia (AP) was established as CRP > 150 mg/L within 48 h. Numerous investigations have shown that albumin and CRP levels can help determine the prognosis of different diseases. It is anticipated that combining these two markers will result in a better prediction value than utilizing either marker alone, which is a potentially useful prognostic score for predicting the severity and death of patients with AP, according to our meta-analysis. Six studies met the inclusion criteria and were included. Two studies were from China and four were from Turkey. Several studies employed different CRP and albumin measurement units, whereas others did not state the measurement units used. As none of the corresponding authors of relevant studies responded when we attempted to contact them to address this issue, we estimated the measurement units based on other pertinent information from each study. All the data were converted into the same measurement units. Some of

Table 1. *Features of the research that were part of the meta-analysis.*

Study	Country	Study design	Assessment of severity	Sample	Mean/median age	Non-severe/ severe	Survivors/non-survivors	Cut-off severe	Cut-off mortality
Karabuga 2022	Turkey	retrospective observational study	BISAP score	female 253 (50.6%) male 247 (49.4%)	55.68 ± 18.30	mild 388 severe 112	survivor 473 death 23	>0.0015	
Kiyak 2022	Turkey	retrospective observational study	Balthazar and Ranson score	female 173 (52.6%) male 156 (47.5%)	male 50.3 ± 15.7 female 54.3 ± 17.4	mild 238 severe 91		>5.34	Mortality (-) 3.3 ± 2.6 (+) 6.5 ± 1.2
Ugurlu 2022	Turkey	retrospective observational study	contrast-enhanced abdominal computed tomography (CECT) and Revised Atlanta Classification	582 female 344 (59.1%) male 238 (40.8%)	male 58.06 ± 17.34 female 57.9 ± 21.05	AEP 525 ANP 57	survivor 541 death 41	> 0.878	
Yilmaz 2018	Turkey	retrospective observational study	Ranson score	264 female 159 (60.2%) male 105 (39.8%)	59.97 ± 17.47	moderate 204 severe 60	no mortality	>8.51	
Zhao 2020	China	retrospective observational study		140 female 42 (30%) male 98 (70%)	49.88 ± 13.94		survivor 124 death 16		>7.69
Zhao 2023	China	retrospective observational study	severe AP defined as persistent single or multiple organ failure (>48 h)	284	59.50 (IQR 39.00–70.00)	non severe 249 severe 35	survivor 273 death 11	>5.03	>5.33

Table 2. *The NOS of research was part of the meta-analysis.*

Study	Selection				Comparability	Outcome				
	Representative-ness of the exposed cohort	Selection of the nonexposed cohort	Ascertainment of exposure	Demonstration that outcome of interest was not present at start of study	Comparability of Cohorts	Assessment of outcome	Was follow-up long enough for outcomes to occur	Adequacy of follow up of cohorts	SCORE	Evidence quality
Karabuga 2022	*	*	*		*	*	*	*	7	Low risk of bias
Kiyak 2022	*	*	*			*	*	*	6	Low risk of bias
Ugurlu 2022	*	*	*	*	*	*	*	*	8	Low risk of bias
Yilmaz 2018		*		*		*	*	*	5	Moderate risk of bias
Zhao 2020	*	*	*	*		*	*	*	7	Low risk of bias
Zhao 2023	*	*	*		*	*	*	*	7	Low risk of bias

the studies met the inclusion criteria and completed the screening procedure [18,19]. However, they were ultimately disqualified owing to unclear statistical data, and compared to non-severe and survivor AP patients, we discovered that admission CRP/ALB ratios were greater in severe and non-survivor AP patients. These results are consistent with those of other recent studies that demonstrated the usefulness of the CRP/ALB ratio as a prognostic indicator in a range of illnesses. As inflammation and carcinogenesis are related, several systematic studies have demonstrated the usefulness of the CRP/alb ratio as a predictor of various cancer types [20,21]. Several studies focusing on sick individuals have attempted to ascertain this association. In their single-center retrospective analysis, Park et al. discovered a correlation between a greater CRP/Alb ratio and higher ICU patient mortality [21],Wang et al. found that patients with acute renal injury who were critically unwell and had higher CRP/Alb ratios also had higher 2-year all-cause mortality and in-hospital mortality [22], According to the findings of the present meta-analysis, the CRP/Alb ratio in AP patients may also be a valid prognostic indicator. When AP becomes severe, hospitalization to the critical care unit is common. This could account for the findings of this study, which is focused on critically sick patients, and another study that is comparable to this one. To our knowledge, this is the first meta-analysis assessing the CRP/alb ratio in AP patients as a predictive indicator. The predictive significance of the CRP/ALB ratio in patients with AP was evaluated in a systematic review by Tarar et al. However, that study only performed a qualitative analysis based on three retrospective cohort studies and did not perform a meta-analysis.

Other quality of studies was further evaluated using the MINORS (methodological index by other reviews for non-randomized studies) assessment tool (Table 3. Data were assessed using Microsoft Excel (Microsoft Corporation, Redmond, WA, the data were), and tables were created as needed to carry out pertinent statistical analyses [21]. The authors have not yet registered any protocol for this study. Fewer than five cases were disqualified.

Some items for meta-Analyses and Systematic Reviews had nine hundred fifty-six participants with acute pancreatitis who were recruited in studies that looked at the link between the CRP/albumin ratio and the severity of acute pancreatitis their found in our research across three studies (Table 4). Of these, 478 (478; 50%) were male and 478 (50%) were female. Of the patients, 201 (215) had severe pancreatitis and 750 (755; 79%) had nonsevere pancreatitis [20]. The performance of the CRP/albumin ratio was assessed using the established scoring systems in all three investigations. These scoring systems include the Ranson, Atlanta, and BISAP scoring systems. These investigations revealed a strong connection between the CRP/albumin ratio at admission and the subsequent development of severe acute pancreatitis (Tables 4) and (Table 5) present assessment of ratio as a tool CRP: C-reactive protein; NLR: neutrophil-to-lymphocyte ratio.

Since Pinilla et al. found a substantial link between CRP/PALB and severe organ failure in patients with sepsis in 1998, the inflammatory ratio, including CRP and albumin (PALB), has been used for predictive purposes [13]. In 2009, Fairclough et al. reported the first study to utilize CRP/albumin to predict patient outcomes. They compared the effectiveness of the marker with the modified early warning score (MEWS) [14]. They discovered that the MEWS performed better than the CRP/albumin ratio for patients admitted to the acute medical unit; however, if this ratio increased from <2 to >4, mortality increased from 5% to 25%. Additionally, Ranzani et al. discovered that in patients with sepsis, the CRP/albumin ratio was an independent risk factor for 90-day mortality (Table 5) [15].

Hepatocytes release CRP, a positive acute-phase reactant, in response to interleukin 6 (IL-6), a systemic inflammatory marker. Conversely, these signals cause albumin, a negative acute-phase reactant, to decrease. Hypoalbuminemia has been demonstrated to be a strong and dose-dependent independent predictor of unfavorable results [16]. Given the biology of acute pancreatitis, using this ratio to predict severity is promising. Particularly in its severe form, acute pancreatitis causes systemic and localized inflammatory reactions that would unavoidably impact these liver indicators.

The CRP/albumin ratio measures the outcomes in cancer patients owing to the role of inflammation in neoplastic diseases. When Kinoshita et al. initially investigated this relationship, they discovered that the ratio may predict tumor growth and a decline in liver functional reserve in patients (HCC) patients [17]. In HCC, a cut-off value of >0.037 was considered an early indicator of poor outcomes. Zhou et al. examined the relationship between CRP and albumin in patients with small-cell lung cancer patients and found that patients with a ratio greater than 0.441 had a 1.34 times higher risk of dying than those with a CRP level < 0.441. Therefore, this ratio was identified as an independent prognostic factor in patients with SCLC [18]. Additional research has further confirmed the function of the CRP/albumin ratio as a prognostic indicator in colorectal and esophageal squamous cell cancers (Table (Table 5) [19,20].

Kaplan et al. first evaluated the relationship between this ratio and pancreatitis severity in 2015 [9]. The researchers discovered a positive correlation ($p<0.001$) between the CRP/albumin ratio and length of hospital stay, Atlanta classification of disease severity, and Ranson score. Balance was an independent risk factor for mortality in this study. A CRP/albumin ratio of >16.28, with 92.1% sensitivity and 58% specificity, was linked to death. They found that a percentage larger than 16.28 was associated with a mortality rate 19.271 times higher than a ratio lower than 16.28. Moreover, the median survival was 55 months, as indicated by the area under the curve (AUC), with a ratio of >16.28 (Table 5).

Yilmaz et al. [10] also examined the association between severe acute pancreatitis and CRP/albumin ratio. Using Ranson scoring, they discovered that if the balance was > 8.51, severity could be predicted with 66% sensitivity and 90% specificity. Additionally, they found that this ratio indicated longer stay in the ICU and hospitals. When Karabuga et al. used the BISAP score to evaluate the association of severity, they arrived at similar conclusions [11]. They discovered that the ratio was 71.43% sensitive and 70.88% specific for predicting severe acute pancreatitis at a cut-off of 0.0015.

Table 3. *The MINORS evaluation instrument.*
Using the MINOR methodological index for non-randomized research, the included articles were rated. The scores for the items are either 2 (reported and adequate), 1 (registered but inadequate), or 0 (not reported). In non-comparative investigations, a score of 16 is considered excellent. However, none of these studies were comparable.

Articles included	**Kaplan et al. [9]**	**Karabuga et al. [10]**	**Yılmaz et al. [11]**	**Zhao et al. [12]**
Aim clearly stated	2	2	2	2
Inclusion of consecutive patients	2	2	2	2
Prospective collection of data	0	0	0	0
Endpoints appropriate to the aim of the study	2	2	2	2
Unbiased assessment of the study endpoint	0	0	0	0
Follow-up period appropriate to the aim of the study	2	0	0	0
Loss to follow up less than 5%	2	0	0	0
Prospective calculation of the study size	0	0	0	0
Total score (out of 16)	8	6	6	6

Table 4. *Research Population.*

Study Name	**Year Published**	**Retro/Prospective**	**Study type (Case series, cohort, RCT)**	**Age, mean (range)/SD**	**Sex, M:F**	**Severity of cases by number**
Kaplan et al. [9]	2017	Retrospective	Cohort	61.9 ± 18.0	72:120	Ranson “0”: 29(15.1%); “1”: 36 (18.8%); “2”: 44 (22.9%); “3”: 31 (16.1%); “4”: 17 (8.9%); “5”: 25 (13%); Atlanta “mild”: 127 (66.1) “moderately severe”: 36 (18.8)); “severe”: 29 (15.1%)
Karabuga et al. [10]	2022	Retrospective	Cohort study	50.19 ± 16.01	247:253	BISAP <3, mild AP: 388 (77.6%); BISAP≥ 3, severe AP: 112 (22.4%)
Yılmaz et al. [11]	2018	Retrospective	Cohort study	59.97 (21-95) ±17.47	105:159	Defined as the Ranson score >3, N=60 (22.8%)
Zhao et al. [12]	2020	Retrospective	Cohort study	49.88 ± 13.94	98:42:00	Defined using the Atlanta score 46 (32.86%)

Table 5. *Assessment of ratio as a tool CRP: C-reactive protein; NLR: neutrophil-to-lymphocyte ratio.*

Study Name	**Year conducted**	**Number of patients**	**CRP/albumin ratio values, mean mg/L (range)**	**Mortality**	**Complications**	**Follow-up, median**	**Study’s recommendation**
Kaplan et al. [9]	Jan 2002 - June 2015	192	The ratio of 16.28 had a 19.3x change in death	38 (19.8%)	Acute renal failure: 17 (8.9%); Abscess: 8 (4.2%); Sepsis: 10 (5.2%); Pseudocyst: 9 (4.7%); Ascites: 3 (1.6%); Haematoma: 5 (2.6%); Cholangitis: 6 (3.1%); Oedematous: 153 (79.7%); Necrotizing pancreatitis: 38 (19.8%)	63 months (1-126)	CRP/albumin ratio could be used to predict prognosis in patients with acute pancreatitis.
Karabuga et al. [10]	Feb 2019 – March 2020	500	0.0181 ± 0.00232; Median: 0.00083	Mild AP: 2 out of 388 (0.52%); Severe AP: 21 out of 112 (18.75%); Total: 23 out of 500 (4.6%)	N/A	N/A	NLR and CRP/albumin values were found most reliable in determining the severity of acute pancreatitis. Recommends usability of these inexpensive parameters.
Yılmaz et al. [11]	Jan 2014 – Nov 2017	264	19.16 (0.05-114.94) ± 26.09	0	22 (8.3%)	N/A	Highlight the CRP/ albumin ratio promising a potential marker for use in determining prognosis in acute pancreatitis cases
Zhao et al. [12]	Jan 2008 – Nov 2019	140	Single operation: 2.90±3.02; Re-operation: 4.63±2.8; Survival: 3.32 ±2.88	16 (11.43%)	90 (64.29%)	N/A	The creatinine/albumin showed better performance than CRP/albumin

It has been proposed that the various scoring systems and threshold values of hepatic parameters cause disparities in the cut-offs between these two investigations. Zhao et al. investigated the predictive value of the CRP/albumin ratio in patients requiring surgical debridement for acute pancreatitis [20]. They discovered that this ratio was substantially linked to longer ICU stays ($p = 0.003$) and an increased likelihood of reoperation following initial debridement ($p<0.05$).

The CRP/albumin ratio has become a powerful prognostic marker in several medical fields in the past 20 years. Our assessment of the literature on this ratio revealed a generally positive link between the development of severe acute pancreatitis and CRP/albumin ratio upon admission. The primary usefulness of this ratio stems from the ease with which these characteristics can be regularly measured and computed. Because it is straightforward and uncomplicated, it is a priceless tool for healthcare evaluation. In acute pancreatitis, early patient categorization based on possible severity is critical; therefore, additional research is required to evaluate the usefulness of the CRP/albumin ratio as a predictive tool.

This study found a positive overall correlation between the admission CRP/ALB ratio and the incidence of severe AP along with an extended hospital stay [21]. These results are in line with the results of our study. However, our research has some limitations. First, only two nations, China, and Turkey, were included in the six studies included in this meta-analysis. Although the lack of diversity in the study area is beyond our ability to explain, we can state that this poses a challenge to the current investigation. Second, there is a chance that the comparisons drawn in this study will not be correct because of variations in the units of measurement utilized in each study. Finally, to distinguish between severe and non-severe AP, nearly all the studies employed distinct methodologies and criteria. These variations were anticipated given that the studies were conducted in various nations and locations. Usually, one center uses the acute pancreatitis severity criterion more frequently than the other. Nonetheless, we believe that this distinction had no appreciable impact on the outcomes [20,21], because all standards were well-accepted standards that had previously been examined in a small number of investigations and revealed no appreciable variations in predictive value.

Conclusion.

The CRP/Alb ratios were associated with severe AP and patient mortality. Therefore, in individuals with AP, the CRP/ALB ratio can be used as an early predictor of a poor prognosis. However, large-scale trials including patients of different ethnicities are required to corroborate the results we obtained because of the study's limitations. According to our systematic review,

The CRP/albumin ratio upon admission was positively correlated with the development of severe acute pancreatitis, extended hospital stays, and a higher mortality rate in these studies. We believe that it is simple to compute the CRP/albumin ratio and use it to determine disease severity.

Acknowledgment.

Not application

Data availability.

The datasets used and/or analyzed during the current study are available from the corresponding author's request.

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None

Ethics declarations.

Ethics approval and consent to participate:

This study was conducted in accordance with the Declaration of Helsinki and approval was obtained from the Institutional Review Board of Zagazig University Hospital on December 6, 2021 (No. #-12-06/2021). The requirement for informed consent was waived by the Zagazig University Institutional Committee of Medicine.

Consent for publication.

Not applicable.

Competing interests.

The authors declare that this research was conducted in the absence of any commercial or financial relationships that could be construed as potential conflict of interest.

Author contributions.

HAS, ME: contributed to the conception and design.

ME,AKE organised the database and performed the statistical analysis.

HAS,KS,MR: wrote sections of the manuscript and prepared tables.

MIF : contributed to the manuscript revision.

HAS,MIF,ASA : selection processing

All authors approved and equally shared the submitted version.

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