The incidence of recurrent acute pancreatitis and chronic pancreatitis after acute pancreatitis:

A systematic review and meta-analysis

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Background: The incidence of acute pancreatitis (AP) ranges from 13 to 45 per 100,000 person-years while the incidence of chronic pancreatitis (CP) is slightly lower, it ranges from 5 to 12 per 100,000 person-years. The AP's continued recurrence can lead to CP, which is currently an incurable disease. However, how frequent can patients develop **RAP and CP after AP** is still unknown.

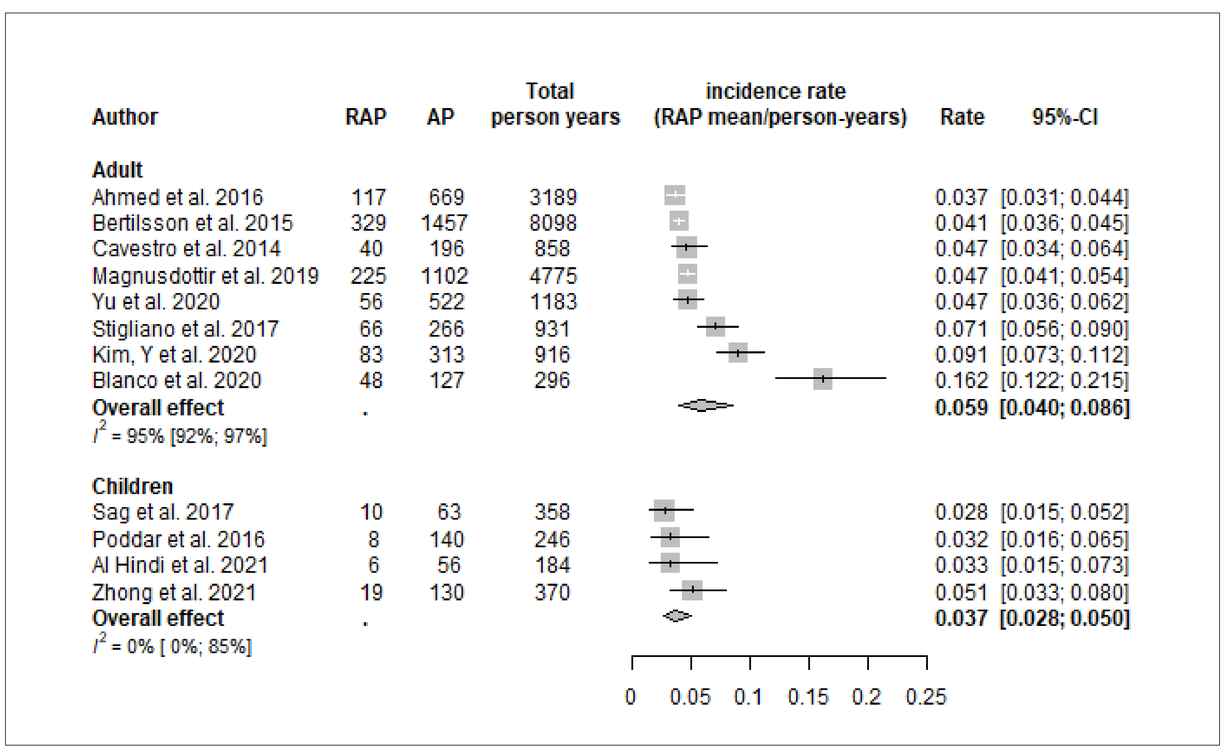
Aim: Our systematic review and meta-analysis aimed to assess the incidence of RAP after the first AP and the incidence of CP after the first and recurrent episodes of AP in the adult and children population.

Methods: Our protocol was prospectively registered on **PROSPERO (CRD42021283252).**

The systematic search was conducted in three major databases (MEDLINE, CENTRAL, EMBASE) on the 18th of October, 2021. **Inclusion criteria:** all articles that reported on the follow-up of patients diagnosed with acute pancreatitis (defined by the **Revised Atlanta Classification**) were eligible. **Our outcomes**, the incidence of RAP and CP was assessed overally and based on the etiology and severity after the first episode of AP, while CP was evaluated after one RAP episode as well. **Statistical methods:** a random-effect model was used to calculate the **pooled incidence rates (IR)** with 95% confidence intervals (CI). Heterogeneity was analyzed with the I^2 and the Cochrane Q tests. **The risk of bias assessment** was carried out with the **Joanna Briggs Institute Critical Appraisal Tool.**

Results: **RAP:** Out of the 9382 articles, 20 were eligible for the quantitative synthesis. Our results showed, that the **incidence rate of RAP** in **adult** patients after the first episode of AP was **0.059 person-years (CI: 0.040 to 0.086; I^2=95%),** while in **children** it was **0.037 person-years** (CI: 0.028 to 0.050; I^2=0%) (**Figure 1.**). The highest incidence rate of RAP by etiology was in **hypertriglyceridemia** induced acute pancreatitis patients (IR: 0.081 person-years; CI: 0.057 to 0.116; I^2=36%) (**Figure 2.**). Patients with **moderate** acute pancreatitis had the highest incidence rate of RAP in terms of severity (IR: 0.076 person-years; CI: 0.046 to 0.123; I^2=88%). (**Figure 3.**)

CP: Regarding CP, our findigs showed that the **incidence rate of CP after the first episode of AP** was **0.013 person-years** (CI: 0.009 to 0.02; I^2=80%) while **after the first RAP** was 0.039 person-years (CI: 0.024 to 0.064, I^2=83%) (**Figure 4**.). The highest CP incidence rate (IR: 0.025 person-years; CI: 0.016 to 0.04; I^2=57%) was observed in patients with acute pancreatitis of alcoholic etiology. (**Figure 5**.). The risk of bias was low in the majority of the included studies.



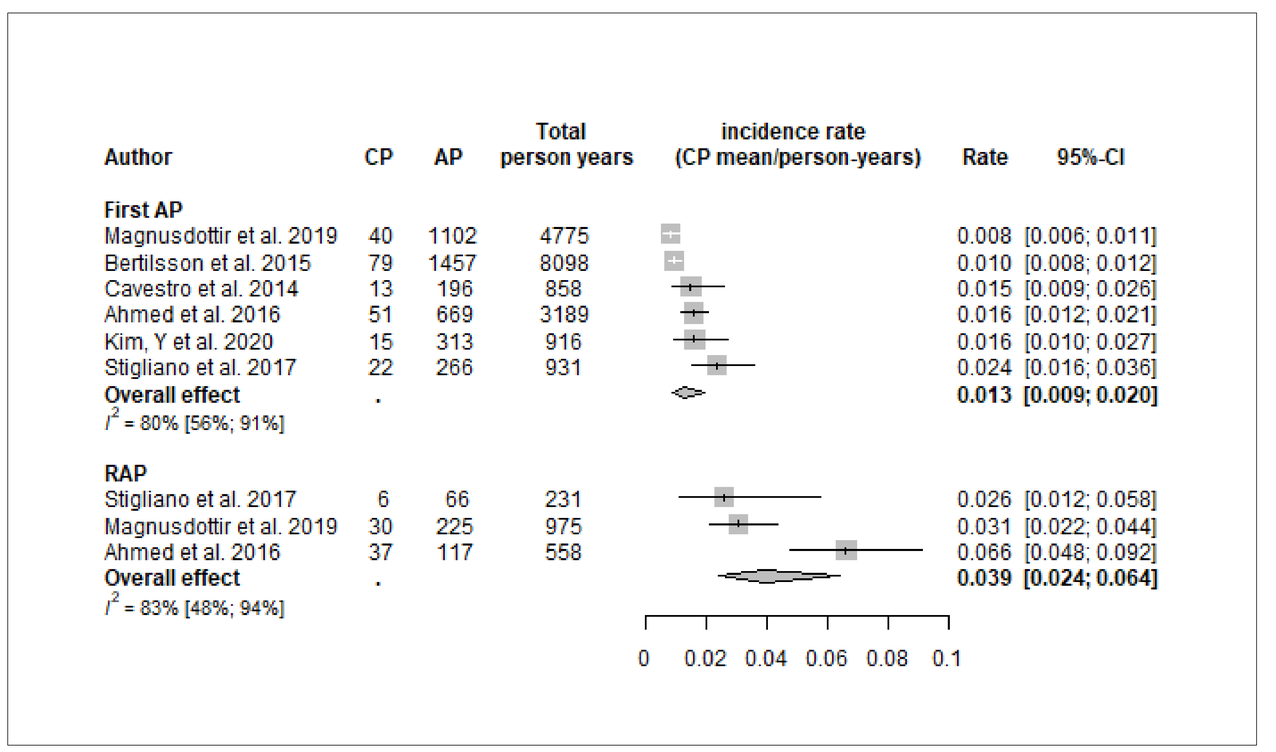


Figure 1. Two forest plots showing the pooled incidence rates of RAP in adults and children after a first episode of AP

Figure 4. Two forest plots showing the pooled incidence rates of CP in adult patients after a first episode of AP and after one RAP

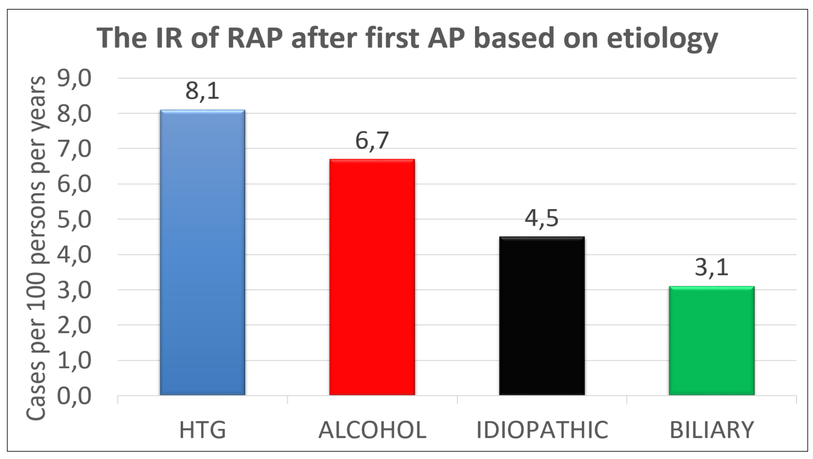


Figure 2. RAP etiology

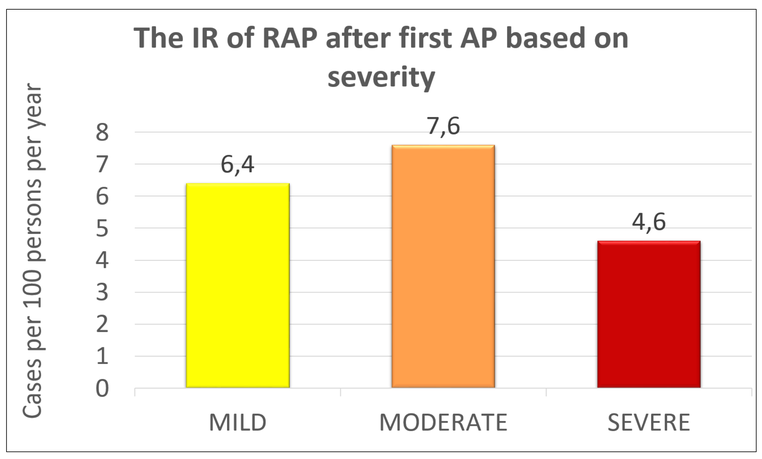


Figure 3. RAP severity

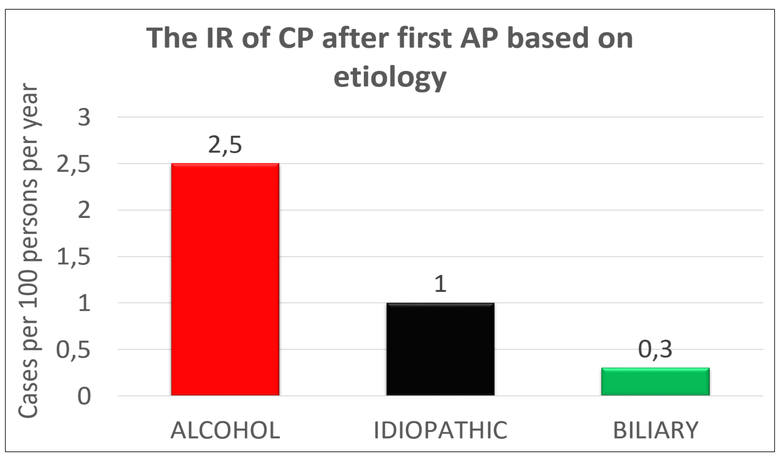


Figure 5. CP etiology

Conclusions: Our results showed that recurrent acute pancreatitis affects a large proportion of adult and pediatric patients. Compared to patients with the first episode of AP, RAP lead threefold higher incidence rate for developing CP