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RESEARCH ARTICLE

INCIDENCE OF NEW ONSET DIABETES MELLITUS SECONDARY TO ACUTE PANCREATITIS: A SYSTEMATIC REVIEW

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Abstract

Background and Aims: Patients who have an episode of acute pancreatitis (AP) frequently develop diabetes mellitus (DM) overtime. There ported incidence of DM after AP varies depending on the severity, etiology and the extent of pancreatic necrosis during AP. We performed a systematic review to determine the incidence of new-onset DM after a Pepisode(s) and compared the rate of DM in AP patients based upon different disease characteristics.(1)

Method: A total of 50 patients were enrolled from government general hospital Kadapa India suffered from acute pancreatitis during January 2018 to July 2019.

Results: The random-effects pooled incidence was 22.0% for DM.The DM incidence was higher in the populations that had a severe AP (SAP) episode than in those with mild acute pancreatitis (MAP) Patients that displayed pancreatic necrosis during the AP attack(s) had a higher frequency of DM than those without necrosis in addition, the pooled incidence of DM was higher after alcoholic compared to biliary AP. The incidence of insulin use after SAP and alcoholic AP was 21 and 18%, respectively, with very low heterogeneities.

Conclusion: Patients with AP developed DM after discharge from hospital with a frequency of about 22%. SAP, alcoholic AP and acute necrotizing pancreatitis (ANP) were associated with increased incidence of DM. Assessments of severity, etiology, and pancreatic necrosis are critical for predicting DM development after AP.

Introduction:-

The exocrine and endocrine components comprise about 90 and 2–5%, respectively, of the pancreatic mass. Disorders of the exocrine pancreas including pancreatitis and pancreatic cancer can lead to endocrine dysfunction and abnormal glucose metabolism. The American Diabetes Association and the World Health Organization classified pancreatogenic, pancreoprivic, or apancreatic diabetes mellitus (DM) as type 3c DM.Type 3c diabetes is not a single

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entity as it results from several different exocrine pancreatic diseases including acute, relapsing, and chronic pancreatitis of any etiology, hemochromatosis, cystic fibrosis,fibro calculous pancreatopathy, pancreatic trauma, pancreatectomy, pancreatic agenesis, and pancreatic cancer .

Acute pancreatitis (AP) has been reported to cause DM. However, the data on the incidence of diabetes after AP is controversial, ranging from rare cases to more than half of all patients developing DM. Few studies reported progressiveimprovements or even complete recovery of abnormal glucose metabolism after one episodeofAP,whilemoststudiesshowedsustainedimpairments ofpancreaticendocrinefunctionafterattacksofAP(2).Thereasons for such huge variations between studies are attributable to inclusion of heterogenous groups of patients (severe and mild AP, AP with and without pancreatic necrosis) as well as various follow-up periods and the inclusion of patients with and without pancreatic surgery. The severity of AP appears to correlate with the magnitude of the resulting endocrine pancreatic dysfunction.. The criteria to define AP severity include the presence and extent of pancreatic necrosis which reflects the pancreas localsituation,andaspectsofsystemorgandysfunctionreported that AP patients with pancreatic necrosis had much higher incidence of DM later on compared to those who had no pancreatic necrosis. Moreover, in the group of patients with pancreatic necrosis, the rate of DM positively correlated with the area of necrosis(3). This study also demonstrated that the occurrenceofDMcontinuedtoincreaseforalongtimeafterAP, thus the risk became much greater in those patients with more than 5 years'follow-up.

Pancreatic procedures including pancreas resection and necrosectomy in SAP patients, have an obvious effect on the incidence of DM.A very high incidence of DM in 92% of SAP patients after pancreaticnecrosectomy(4).Similarly patients undergoing necrosectomy had higher incidence of pancreatic endocrine deficiency in long-term followup.

Methods:-

Search Strategy and Selection Criteria:

Since the 2010 an electronic medical record system has been used in Government medical college Kadapa India, which has facilitated several studies on AP.To track changes consistently throughout the course of AP and facilitate the evaluation and study of AP, a dedicated database from government medical college kadapa India was established in 2010 to collect clinical data of AP patients who were admitted to this Hospital. Data from January 2018 to july2019 were prospectively collected and entered in the electronic medical record system. Data were prospectively collected since January 2018. The following information was documented in detail: demographic data (age, sex, birthplace, etc), course of diseases and medication history, smoking and alcohol history, family history, experimental and imaging results, and treatment(5).

Inclusion Criteria:

1. Ageequaltoorgreaterthan18years.
2. Measurements of glucose metabolism in AP patients were performedaftermorethanonemonthfrom hospital ldischarge following episode (s) ofAP.
3. Absence of a history of pre-existing pre-diabetes or diabetes before the APepisode.
4. The reports provided standard diagnosis methods forAP.
5. The reports included incidence rates or raw data to calculate therates.

Exclusion Criteria:

1. Reports that focused specifically on either AP patients with pancreatic surgery, hereditary pancreatitis or autoimmunepancreatitis.
2. Reportsin which thenumberofDMpatientswereunavailable.
3. Studies where less than 50% of the patients provided information during the follow-up or there was no report on the percentage of patients providing data duringfollow-up.

Participants' Key Characteristics and Definitions:

AP: AP was confirmed when 2 out of the 3 measures were fulfilled: (1) typical abdominal pain, (2) serum amylase and/or lipase >3 times the upper limit of normal, and/or (3) characteristic findings from abdominalimaging.
Acute necrotizing pancreatitis was determined based on contrast-enhanced CT scan, histology, surgery or medicalrecords.Pancreatic surgery was noted when the patient underwent pancreatic resection, necrosectomy with peritoneal lavage, retroperitoneal drainage and lavage. Surgeries not related to pancreas (e.g., cholecystectomy, cesarean section, and others) were not recorded as surgery for the purposes of this study.

Recurrent AP was recorded in patients with one or more episodes of confirmed AP since their first AP attack. Those patients with only one confirmed episode of AP were recorded as no recurrence or one single attack of AP.).

Results:-

Among the 50 patients studied 34 patients (68%) males and 16 patients(32%) females

Table 1:- Patient Distribution Based on Gender.

Gender	Male	Female
	34 (68%)	16 32%)

Discussion:-

Findings from this systematic review suggest that DM is an important problem for AP patients, although there is wide variation in the incidence of DM between populations from different subgroups. A previous study (Das et al., 2014) reported the pooled estimates of the incidence of endocrine dysfunction (both prediabetes and diabetes) in 40%after a first attack of AP. In this review, we increased the number of included studies and enlarged the population of AP, which could further strengthen the reliability of the result of DM rate after AP. Additionally, we restrictedly focused on the occurrence of diabetes only, finding a similar incidence of DM after AP to the resultofthepriormeta-analysisinabout22%.What'sparticularly differentfromthepriormeta-analysisisthatwecomparedtheDM rate among AP subjects with various severity and etiology, with and without the presence of pancreatic necrosis. Those subjects with SAP, alcoholic AP and ANP have a DM incidence after the AP attack of 39, 28, and 37% respectively compared with lower DM rates of 14, 12, and 11% in MAP, biliary AP and non-ANP, respectively. This finding indicates the severity, etiology, and necrosis are crucial factors in predicting new-onset DM afterAP(6).

DM secondary to pancreatic diseases is classified as pancreatogenic diabetes (American Diabetes, 2011). Acute pancreatitis, as the most common pancreatic disorder, is more often associated with the development of pancreatic endocrine dysfunction. However, there is little information relating pancreatic exocrine function to the development of diabetes after an episode of AP. During the recovery phase of AP, blood glucose levels would rapidly return to normal in most patients However, a subset of the patients will develop DM and need prolonged antidiabetic treatments including insulin.OnepossiblemechanismofDMsecondary to AP could be nutrient maldigestion induced by exocrine insufficiency that causes abnormal incretin secretion andimpairedinsulinreleasefromβ- Increased insulin resistance could be another explanation forabnormalcarbohydratemetabolismafterAPThese two possible mechanisms appear to be associated with classical type 2 diabetes, which illustrates that T3cDM might be a heterogeneous disorder strongly overlapping with type 2 diabetes. In addition, the loss of pancreatic β cells caused by necrosis is considered to be a main cause of DM after AP, especially in those subjects with necrosectomy.

Conclusion:-

The results of our analysis show that ∼1 in 5 patients with an AP episode develops DM afterwards, and the rate increases over time. In addition, the occurrence of DM after alcoholic AP, SAP, and ANP was 2 to 3 times higherthan thatsecondarytobiliaryAP, MAP,andAPwithoutnecrosis.

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