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Association of chronic pancreatitis with risk of diabetes mellitus development

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Abstract

Introduction: Pancreatogenic diabetes mellitus affects the life quality and it is an independent risk factor for mortality at chronic pancreatitis. In practice, pancreatogenic diabetes mellitus is rarely diagnosed, and patients are incorrectly diagnosed with diabetes mellitus type 1 or type 2.

Objective: To determine the association of chronic pancreatitis with risk of diabetes mellitus developing.

Material and methods: Case-control study design, retrospective studies. The study was conducted on the base of the Municipal hospital №1 of Karaganda. Case histories of 23 patients, their outpatient records and discharges from hospital were studied. The patients were divided into 2 groups during the study: group 1 – the patients with chronic pancreatitis; group 2 – the patients with chronic pancreatitis and diabetes mellitus type 2.

Results and discussion: The study found that the number of patients under 60 years of age with chronic pancreatitis and diabetes mellitus are 4 times higher than the number of patients over 60 years of age. An increase in blood sugar among patients with chronic pancreatitis was associated with an exacerbation of the underlying disease. Predictors of diabetes mellitus in patients with chronic pancreatitis were female gender (OR=1,179) and high glucose level (OR=0,667). High body mass index did not affect an increase in glucose levels in patients with chronic pancreatitis.

Key words: diabetes mellitus, chronic pancreatitis, glucose

СОЗЫЛМАЛЫ ПАНКРЕАТИТТІҢ ҚАНТ ДИАБЕТІ ҚАУІПІМЕН БАЙЛАНЫСЫ

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ТҰЖЫРЫМДАМА

Кіріспе: Панкреатогенді қант диабеті өмір сүру сапасына әсер етеді және созылмалы панкреатит кезіндегі өлім-жітімнің тәуелсіз факторы болып табылады. Іс жүзінде, панкреатогенді қант диабеті диагнозы сирек қойылады, ал науқастарға дұрыс емес диагноз - 1 немесе 2 типті қант диабеті қойылады.

Мақсаты: Созылмалы панкреатиттің қант диабетін дамыту қаупімен байланысын анықтау.

Материалдар мен тәсілдер: Зерттеу тәсілі - жағдай-бақылау, ретроспективті. Зерттеу Қарағанды қаласының «№1 қалалық ауруханасы» негізінде жүргізілді. 23 науқастың ауру тарихтары, амбулаториялық карталар және ауруханадан шығарылу қортындылары зерттелді. Зерттеу барысында пациенттер 2 топқа бөлінді: 1-топ - созылмалы панкреатитпен ауыратын науқастар; 2-топ - созылмалы панкреатит және 2 типті қант диабеті бар науқастар.

Нәтижелер мен пікірталас: Зерттеу барысында созылмалы панкреатит пен қант диабетімен ауыратын 60 жасқа дейінгі науқастар 60 жастан асқан адамдарға қарағанда 4 есе көп екендігі анықталды. Созылмалы панкреатитпен ауыратын науқастарда қандағы қанттың жоғарылауы негізгі аурудың өршуіне байланысты болды. Созылмалы панкреатитпен ауыратын науқастардағы қант диабетінің болжамдары әйелдер жынысы (OR=1,179) және глюкозаның жоғары деңгейі (OR=0,667) болды. Сонымен қатар, дене массасының индексі жоғарылауы созылмалы панкреатитпен ауыратын науқастарда глюкоза деңгейінің жоғарылауына әсер етпеді.

Негізгі сөздер: қант диабеті, созылмалы панкреатит, глюкоза

СВЯЗЬ ХРОНИЧЕСКОГО ПАНКРЕАТИТА С РИСКОМ РАЗВИТИЯ САХАРНОГО ДИАБЕТА

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РЕЗЮМЕ

Введение: Панкреатогенный сахарный диабет ухудшает качество жизни и является самостоятельным фактором риска смертности при хроническом панкреатите. На практике панкреатогенный сахарный диабет диагностируют редко, а пациентам ставят неправильный диагноз - сахарный диабет первого или второго типа. Целью исследования является определение связи хронического панкреатита с риском развития сахарного диабета.

Материалы и методы: Дизайн исследования случай-контроль, ретроспективные исследования. Исследование проводилось на базе «Городской больницы №1» г. Караганды. Были изучены истории болезни, амбулаторные карты и выписки из стационаров 23 больных. В ходе исследования, больные были разделены на 2 группы: 1 группа - больные хроническим панкреатитом; 2 группа - больные хроническим панкреатитом и сахарным диабетом 2 типа.

Результаты и обсуждение: В ходе проведенного исследовния было выявлено, что больных до 60 лет, страдающих хроническим панкреатитом и сахарным диабетом в 4 раза больше, чем среди лиц старше 60 лет. Повышение уровня сахара крови среди больных хроническим панкреатитом было связано с обострением основного заболевания. Предикторами развития сахарного диабета у больных хроническим панкреатитом явились: женский пол (OR=1,179) и высокий уровень глюкозы (OR=0,667). При этом, увеличение индекса массы тела не влияло на повышение уровня глюкозы у пациентов с хроническим панкреатитом.

Ключевые слова: сахарный диабет, хронический панкреатит, глюкоза

Introduction

In the world, one person dies due to diabetes mellitus every 6 seconds. There are nearly 300 000 people with diabetes mellitus in Kazakhstan. According to different authors, the development of diabetes mellitus at chronic pancreatitis varies from 10 to 90%. Chronic pancreatitis accounts for 76% among pancreatic diseases, accompanied by diabetes development [1]. Pancreatogenic diabetes mellitus affects the life quality and it is an independent risk factor for mortality at chronic pancreatitis. In practice, pancreatogenic diabetes mellitus is rarely diagnosed, and patients are incorrectly diagnosed with diabetes mellitus type 1 or type 2 [2].

Syndrome of endocrine disorders at chronic pancreatitis manifests in 2 opposite versions: hyperinsulinism and diabetes mellitus. Hyperinsulinism occurs more often in the early stages of chronic pancreatitis and it is manifested by attacks of hypoglycemic conditions, while the level of insulin is normal or moderately elevated, the level of glucagon is within normal limits. Hypoinsulinemia and hypoglucagonemia develop with the progression of the disease, which is associated with a decrease of islet cells mass [3]. In these cases, the blood glucose level usually normalizes at the exacerbation of pancreatitis subsides. Identifying of diabetes mellitus symptoms can be difficult. In some cases, it is associated with a decrease in the need for endogenous insulin due to a reduction in the volume and calorie content of food in case of pain or strict dietary, as well as a violation of nutrient absorption against the background of exocrine pancreatic insufficiency. The degree of impaired carbohydrate metabolism in patients with chronic pancreatitis varies widely: from impaired glucose tolerance to insulin-dependent diabetes mellitus. Diabetes mellitus can also form at the beginning of clinical manifestation of chronic pancreatitis, but more often a persistent violation of carbohydrate metabolism occurs several years after the onset of the disease [3].

The objective was to determine the association of chronic pancreatitis with risk of diabetes mellitus developing.

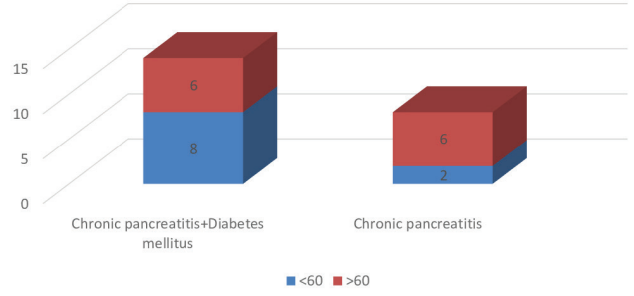
Material and methods

Case-control study design, retrospective studies. The study was conducted on the base of the Municipal hospital №1 of Karaganda. Case histories of 23 patients, their outpatient records and discharges from hospital were studied. The patients were divided into 2 groups during the study: group 1 – the patients with chronic pancreatitis; group 2 – the patients with chronic pancreatitis and diabetes mellitus type 2. Inclusion criteria: the patients with chronic pancreatitis at the age from 38 to 80 years. Exclusion criteria: comorbid patients, patients under the age of 38 and over 80 years old, the patients with only diabetes mellitus type 1 and type 2. The material was processed using the statistical analysis software package Statistica 8.

Results

The average age of the patients was 61.3 years (Figure 1). The gender composition included 6 (26.1%) men and 17 (73.9%) women.

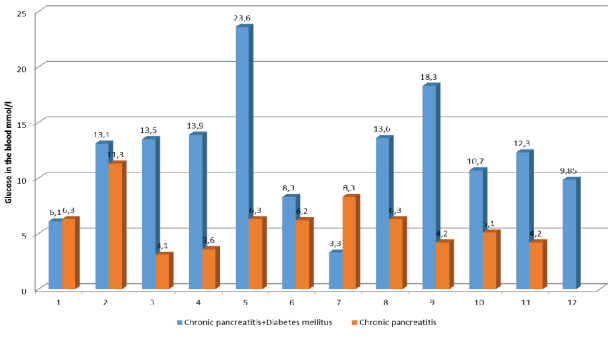
Figure 1 - The age of the patients



The diagnosis of chronic pancreatitis and diabetes mellitus was established according to clinical data, biochemical parameters, and results of endoscopic ultrasound scanning. Fluctuations in glucose levels were assessed according to the patient's diaries, according to records in outpatient medical records within 30 days after discharge and written-out epicrisis from hospitals of subsequent hospitalizations. The body mass index was determined in accordance with the following formula: BMI = weight (kg) / height2 (m).

The study revealed that the number of patients under 60 years of age with chronic pancreatitis and diabetes mellitus was 4 times higher than the number of patients over 60 years of age.

Figure 2 - Fluctuations in blood sugar



The results of blood sugar examination in patients with chronic pancreatitis and diabetes mellitus (Figure 2) showed the fluctuations in glucose levels ranged from 3.3 mmol/L to 23.6 mmol/L. At the same time, these fluctuations ranged from 3.1 mmol/L to 11.3 mmol/L in patients with chronic pancreatitis. An increase in blood sugar in patients with chronic pancreatitis was associated with an exacerbation of the underlying disease. Perhaps, the extension of the inflammatory process to the endocrine cells of the pancreas could cause the development of diabetes mellitus in the future.

Table 1 presents the data on the impact of the clinical data of patients with chronic pancreatitis on the risk of diabetes development.

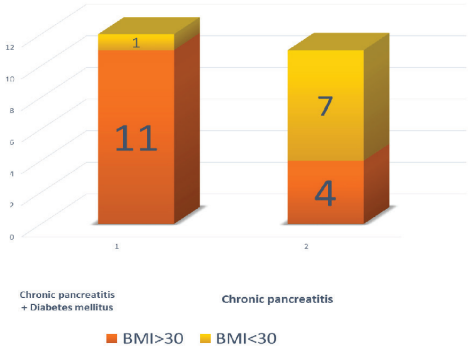
Table 1 Assessment of the impact of clinical data in patients with chronic pancreatitis on the risk of diabetes development

Risk factor	Odds ratio (OR)	Confidence interval (95%)
Male gender	0,643	[0.106-3.913]
Female gender	1,179	[0.321-4.326]
Age	0,589	[0.183-1.900]
Glucose level	0,667	[0.128-3.470]

According to the analysis of anamnestic data, it was revealed that the predictors of diabetes development in patients with chronic pancreatitis were female gender (OR=1.179) and high glucose level (OR=0.667).

The body mass index (Figure 3) in patients showed that high BMI did not affect an increase in glucose level in patients with chronic pancreatitis. Accordingly, the metabolic syndrome at chronic pancreatitis is not the cause of a decrease in glucose tolerance in this case.

Figure 3 - The body mass index in patients



Discussion

The study found that the number of patients under 60 years of age with chronic pancreatitis and diabetes mellitus are 4 times higher than the number of patients over 60 years of age. An increase in blood sugar among patients with chronic pancreatitis was associated with an exacerbation of the underlying disease. Predictors of diabetes mellitus in patients with chronic pancreatitis were female gender (OR=1,179) and high glucose level (OR=0,667). High BMI did not affect an increase in glucose levels in patients with chronic pancreatitis.

Taking into account the results of this study, it can be assumed that the inflammatory syndrome developing during exacerbation of chronic pancreatitis affects not only exocrine, but also endocrine pancreatic function. It can also be assumed that the metabolic syndrome accompanying a high body mass index and the cause of insulin resistance in diabetes mellitus type 2 is not the cause of an increase in blood sugar in chronic pancreatitis. The greater susceptibility of women to the development of chronic pancreatitis is possibly associated with pregnancy, compression of the bile ducts of the pregnant uterus.

Thus, it is necessary to more carefully approach the diagnosis and treatment of patients with chronic pancreatitis. It is necessary to study the levels of insulin and glucagon along with the study of exocrine pancreatic function. In addition, gender and age must be considered when referring to research.

Disclosures: There is no conflict of interest for all authors.

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