

HISTOPATHOLOGICAL STUDY OF NITRATE ION EFFECT ON PANCREAS EXPERIMENTALLY IN LABORATORY MICE.

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(Received 4 May 2016 ,Accepted 25July 2016)

Key words :- Nitrate , Histopathological change,Diabetes

ABSTRACT

This study was designed to explore the effect of nitrate ion on induction of diabetes experimentally in laboratory mice. Fifteen white mice, 7-8 week olds were randomly divided into three equal groups. First group was administrated orally 0.3 ml of nitrate ion (concentration was 0.25gm/10ml D.W) daily for one month. Second group was administrated orally 0.3 ml of potassium nitrate (concentration was 0.5gm/10ml D.W) daily for one month. Third group was administrated orally with 0.3 ml of distilled water (D.W) daily for one month. After 30 post administration the concentration of blood glucose of infected animals treated with nitrate ion increase in both first and second groups when compared with control group.

The histopathological change study showed pathological lesions in pancreas of first group treated with nitrate ion showed the exocrine region and islets of Langerhans with damaged due to necrosis, while the second group was infected with nitrate ion showed the exocrine region and islets of Langerhans with necrosis and congestion of blood vessel.

INTRODUCTION

Diabetes mellitus is one of the most common endocrine diseases, associated with a group of metabolic disorder characterized by chronic hyperglycemia with disturbances of carbohydrate, lipids, and protein metabolism resulting from defects in insulin secretion, insulin action, or both (1). Type 1 diabetes is thought to be inherited in genetically susceptible individuals by environmental factors such as viral, toxic or chemical agents that lead to autoimmune destruction of B-cells, resulting in the formation of altered protein components. This material is a foreign antigen to the immuno system,

establishing the basis for an autoimmune reaction against the cell of origin the (B-cell) (2),(3). Nitrate ion Occurrence in food, food supplements and medicines Potassium nitrate and nitrite are used as food preservatives, mainly for curing meats. (4) investigated the toxicity of potassium nitrite (KNO₂) and concluded that the sub-chronic toxicity.

Nitrate ion content is an important quality characteristic of vegetables. Vegetable nitrate content is of interest to governments and regulators owing to the possible implications for health and to check that controls on the content are effective. Nitrate itself is relatively non-toxic but its metabolites may produce a number of health effects. Nitrate was perceived as a purely harmful dietary component which causes infantile methaemoglobinaemia, carcinogenesis and possibly even teratogenesis (5). Other complications children who are exposed to large amounts of nitrate or nitrite might be at an increased risk of developing childhood diabetes, experience recurrent diarrhea or contract upper respiratory infections. Nitrates are also dangerous for unborn children. Mothers with diets rich in nitrite and nitrate are more likely to have babies with slow intrauterine growth, heart defects and Sudden Infant Deaths Syndrome (SIDS) (6).

MATERIALS AND METHODS

1- Nitrate ion preparation:

-Nitrate ion dissolved in distilled water (D.W) to prepare doses one of them 0.25 gram/10 ml. of D.W and the other dose 0.5 g/10 ml.10 cc of D.W .

- Experimental Design:

Fifteen white mice both sexes, 7-8 week olds were randomly divided into three groups equally and treated as follows:

- 1- First group was administrated orally 0.3 ml of nitrate ion (concentration was 0.25gm/10ml) daily for one month.
- 2- Second group was administrated orally 0.3 ml of nitrate ion (concentration was 0.5gm/10ml) daily for one month.
- 3- Third group was administrated orally with 0.3 ml of distilled water (D.W) daily for one month.

At day 30 post administratation all animals were sacrificed and collection of blood from each animal 0.5-1 milliliter of blood to get serum that using in blood sugar measuring , and pieces from pancreas were taken for fixed in 10% neutral buffer saline 72 hours for histopathological changes examination according to(7).

RESULTS

1-Measurements of blood sugar treated animals:

The concentrations of blood serum sugar treated animals with potassium nitrate 0.25 g/10 ml and 0.5 g/10 ml with control group as showed in table (1) increase in the concentrations of blood sugar for both first and second groups when compared with control group.

No.	Infected with 0.25 g/10 ml of potassium nitrate	Infected with 0.5 g/10 ml of potassium nitrate	control
1	127	141	118
2	124	138	116
3	154	149	105
4	173	153	112
5	195	171	115
Total	154.6	150.4	113.2

Table 1: show the titer of serum blood glucos infected animals with potassium nitrate 0.25 g/10 ml and 0.5 g/10 ml with control group

2- Histopathological change study:

- **Pancreas**-Showed that exocrine region and islets of Langerhans with damaged β cells due to necrosis of the first group (fig: 1), and the second group appeared the exocrine region and islets of Langerhans with damaged β cells due to necrosis and a decreased number of β cells and congestion of blood vessel (fig: 2).

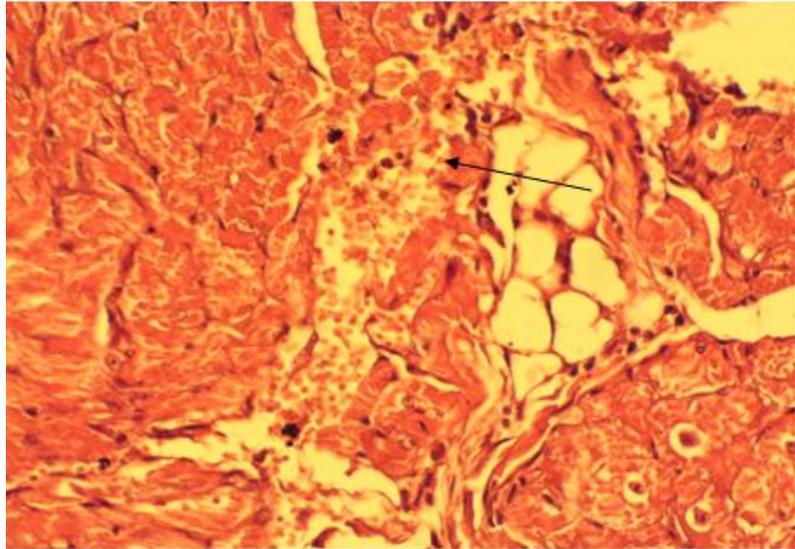


Fig1:Histopathological section in pancreases of one animal infected with potassium nitrate 0.25 g/10 ml showed the exocrine region and islets of Langerhans with damaged β cells due to necrosis and a decreased number of β cells (\rightarrow) (H&EX400).

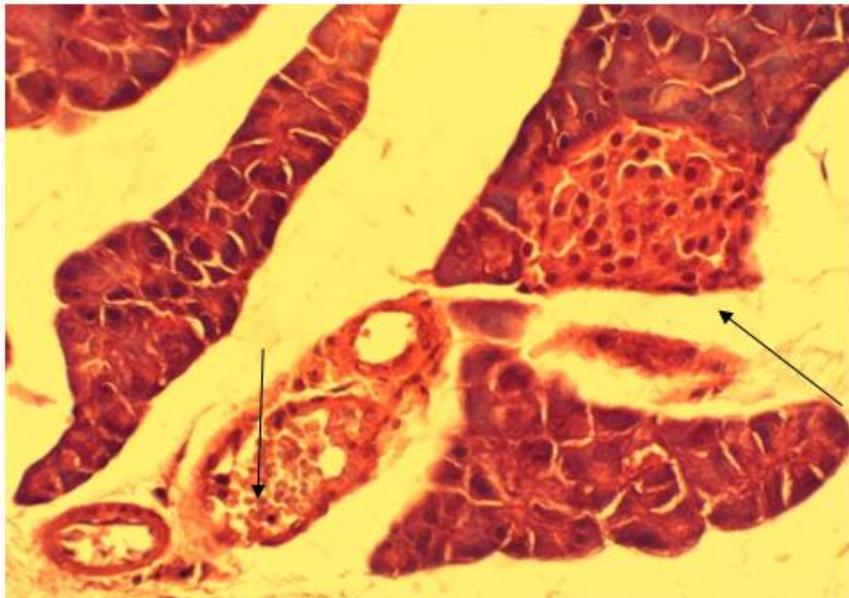


Fig2:Histopathological section in pancreases of one animal infected with potassium nitrate 0.5 g/10 ml showed the exocrine region and islets of Langerhans with damaged β cells due to necrosis and a decreased number of β cells and congestion of blood vessel (\rightarrow) (H&EX400).

DISCUSSION

From our data, we concluded, the increased blood sugar is good indicators for the diagnostic of tissue injury of pancreas by the toxicity of potassium nitrates .The sub-chronic toxicity of potassium nitrite has been investigated by (4) study, 6 week old Wistar rats were treated with potassium nitrite (concentrations not specified) in their drinking water for 90 days. There were no deaths but hypertrophy of the was found in all treated groups (increased incidence and severity with increasing levels of nitrite in the water (8). A number of studies evaluated possible associations between developmental end points and exposure to nitrate. The results provide some evidence of nitrate-related developmental effects possible confounding by other potential toxicants was not evaluated, and most studies did not account for dietary nitrate or nitrite intake, which is typically the major source of ingested nitrate and nitrite. Some studies reported significant associations between selected developmental end points and nitrate in drinking water sources. Other studies found no evidence of associations between nitrate and risk of developmental effects. Finally there are no studies about induction of nitrate ion to diabetes. There is deficiency in references about this study.

دراسة إمرضيه نسجية لتأثير ايون النترات على عضو البنكرياس تجريبيا في الفئران المختبرية

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الخلاصة

صممت هذه الدراسة للتحري عن تأثير ايون النترات في احداث مرض السكري تجريبيا في الفئران المختبرية، استخدم في الدراسة خمسة عشر فارا ابيض من كلا الجنسين وبعمر 7-8 اسابيع عشوائيا الى ثلاثة مجاميع متساوية. اعطيت المجموعة الاولى 0.3 مللتر من نترات البوتاسيوم عن طريق الفم (وبتركيز 0.25 ملغرام/ 10 مللتر من الماء المقطر). اما المجموعة الثانية فقد اعطيت 0.3 مللتر من نترات البوتاسيوم عن طريق الفم (وبتركيز 0.5 ملغرام/ 10 مللتر من الماء المقطر)، والمجموعة الثالثة فقد اعطيت 0.3 مللتر من الماء المقطر عن طريق الفم يوميا ولمدة شهر. وبعد ثلاثون يوما لوحظ ارتفاع ارتفعت معدلات سكر الدم للحيوانات المعاملة بايون النترات للمجموعتين الاولى والثانية مقارنة بمجموعة السيطرة.

اظهرت الدراسة المرضية النسجية وجود افات مرضية في البنكرياس، واطهرتالمجموعة الاولى تحطم المنطقةخارجية الافرازنتيجة التنخروتناقص اعداد خلايا بيتا ، بينما اظهرت المجموعة الثانية تحطم المنطقة خارجية الافرازوجزيرات لانكرهانز مع التنخرواحتقان الاوعية الدموية.

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