Investigation and Analysis of Diabetes

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Abstract: Objective: To investigate the prevalence of diabetes mellitus in Qingdao, analyze the correlation between diabetes and smoking, and explore the advantages of application of fasting blood glucose (FPG) combined with glycosylated hemoglobin (HbA1c) in the detection of diabetes mellitus. Methods**:** 6011 citizens who were examined in Health management center of Qilu Hospital of Shandong University (Qingdao) in 2017 were selected as subjects for blood glucose examination. Results: The prevalence of diabetes in smokers was 13.3%, which was higher than non-smokers (8.8%). Screening of FPG combined with HbA1c increased the detection rate by 5.27% of diabetes compared with simple FPG screening. Conclusion**:** The incidence of diabetes is related to smoking. The screening of FPG combined with HbA1c prominently increased the detection rate compared with simply FPG for diabetes.

Keywords: Diabetes; Fasting Blood Glucose; Glycosylated Hemoglobin

Introduction

Diabetes, which is characterized by hyperglycemia, is a complex chronic disease caused by interaction of genetic factors and the environment. Long-term hyperglycemia in patients with diabetes caused by metabolic problems, could cause serious kidney failure, uremia, blindness, cerebrovascular disease, gangrene, heart disease and so on [1].As early symptoms of diabetes are not obvious, many patients with diabetes miss the best opportunity for treatment. The early screening for diabetes is the key for prevention and treatment of diabetes. This study analyzed the screening of diabetes in some urban residents in 2017 in Qingdao, analyzed risk factors of diabetes and provided the basis of the prevention and treatment for diabetes.

1. Objects and methods
1.1 objects

Screening objects were 6011 residents in Qingdao, excluding known diabetics, whose age distributed in 18-89 years old. We adopted a combination of home screening and centralized screening in the hospital (collected from residents of Health management center of Qilu Hospital of Shandong University(Qingdao)) in 2017.

1.2 Detection methods

Fasting blood glucose was measured in all 6011 residents. Residents whose FPG≥7.0 mmol/L were diagnosed as diabetes. Fasting was defined as 8h-12h without calorie intake. FPG was measured by Beckman 5800 biochemical analyzer. HbA1c was tested in 739 patients simultaneously. Residents whose glycosylated hemoglobin (HbA1c)≥6.5% was diagnosed as diabetes. We used high performance liquid chromatography (PRIM USultra2) to detect HbA1c.

1.3 Statistical methods

SPSS 13.0 software was used for statistical analysis. The comparison between groups was executed with Chi-squared Test. $P < 0.05$ was considered as significant difference between these groups.

2. Results

Among the screening population, 1659 residents were smokers, 220 (13.3%) residents were diagnosed with diabetes. 4352 residents were non-smokers, and 529 (8.8%) residents were detected with diabetes. The prevalence in smokers was higher compared with non-smokers. The detection rates were significantly different between these groups ($P < 0.01$, Chi-square test).

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Table 1   Positive detection rates with different detection methods of diabetes

Standard	Positive number	Positive rate
FPG ≥7.0	41	5.50%
HbA1c≥6.5% and FPG≥7.0	32	4.30%
HbA1c≥6.5% and FPG＜7.0	39	5.27%

As result shown in Table 1, there were 739 people who tested FPG and HbA1c simultaneously in 6011 residents. In the population, 41 people only had FPG≥7.0 mmol/L. the detection rate was 5.50% (41/739). 32 patients had HbA1c≥6.5% and FPG≥7.0 mmol/L. the detection rate was 4.30% (32/739). 39 patients had HbA1c≥6.5% and FPG <7.0 mmol/L. the detection rate was 5.27% (39/739). Therefore, in screening for diabetes, FPG combined with HbA1c prominently increased the detection rates by 5.27% compared with simply FPG.

3. Discussion

Prevention and management of diabetes required continuous multiple risk factors control [2]in addition to controlling blood glucose. This study found that smokers were more susceptible to diabetes than non-smokers. This finding was consistent with other studies [3]. Early diagnosis for diabetes could help patients self-management of diet and smoking, which could reduce the incidence of complication. The measurement for fasting blood glucose is the main basis for the diagnosis of diabetes, but blood glucose measurement is instantaneous obtained information, which is vulnerable to exercise and other factors, that may result in misdiagnosis. Simple fasting blood glucose screening maybe miss the crowd with normal fasting blood glucose, but 2-hour postprandial blood glucose exceeded. However, HbA1c reflectes the average blood glucose level in recent 2-3 months, which could make up for the shortage of fasting blood glucose test. HbA1c≥6.5% had been used as one of the criteria for the diagnosis of diabetes in the latest guidelines of the American Diabetes Association[4]. Fasting blood glucose combined with glycosylated hemoglobin screening could increase the detection rate of diabetic patients.

Reference

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