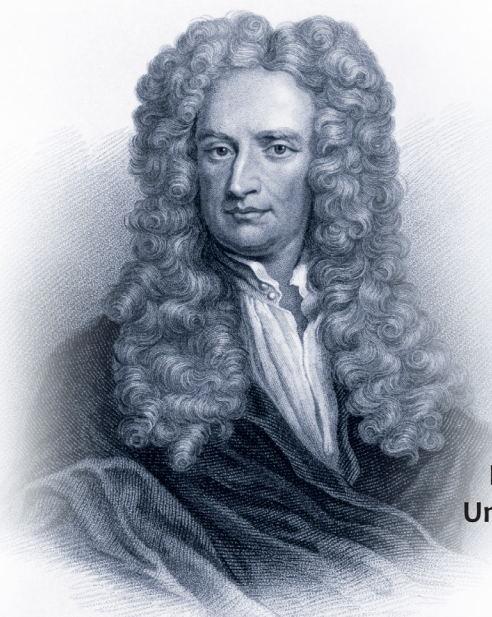




INTERNATIONAL CONFERENCE

**PROCESS  
MANAGEMENT AND  
SCIENTIFIC  
DEVELOPMENTS**



Birmingham  
United Kingdom



# **International Conference “Process Management and Scientific Developments”**

Birmingham, United Kingdom  
(Novotel Birmingham Centre, May 2, 2020)



Materials of the International Conference  
**"Process Management and Scientific Developments"**  
(Birmingham, United Kingdom, May 2, 2020)

M67

ISBN 978-5-905695-36-0

These Conference Proceedings combine materials of the conference – research papers and thesis reports of scientific workers. They examines technical and sociological issues of research issues. Some articles deal with theoretical and methodological approaches and principles of research questions of personality professionalization.

Authors are responsible for the accuracy of cited publications, facts, figures, quotations, statistics, proper names and other information.

UDC 330

**ISBN 978-5-905695-36-0**

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## THE IMPACT OF THE MEAL SEQUENCE ON THE COMPENSATION OF TYPE 2 DIABETES

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**Annotation.** The article presents the results of the study of the impact of meal sequence on the improvement of the parameters of carbohydrate exchange in Uzbek patients with type 2 diabetes.

**Key words:** type 2 diabetes, meal sequence, compensation

Diabetes mellitus is a serious disease leading to severe complications. In 2019 the number of patients with diabetes mellitus in the world reached 463 million people (1), mostly with diabetes mellitus type 2. It is known, that treatment of diabetes mellitus type 2 is based on a correct style of life, in other words, rational nutrition and physical activity (2). Unfortunately, not all the patients can follow dietary recommendations due to some reason. Dietary recommendations for patients with diabetes mellitus type 2 suffering overweight, as a rule, are aiming decrease of nutrition calories.

Yabe D et al. Reported that, consumption of dietary fibers prior to proteins, carbohydrates, and lipids by Japanese patients promoted improvement of glycemic profile, even if hypoglycemic therapy was not intensified (3). Studies of Japanese researchers served the basis for the design of dietary recommendations based on the role of sequence of food consumption in the control of diabetes mellitus type 2 in Japanese people (4).

The origin of that study was established by the observations made by Kun-Ho Yoon et al. published in 2006, which showed that in Asia, different from USA, the prevalence of obesity was not correlated with the prevalence of diabetes mellitus type 2, and that confirmed the dominance of beta-cells dysfunction over insulin-resistance in Asian countries (5).

As it is known, Central Asia is a territory located between Europe and Asia, which was conquered both by Alexander Macedonian, and Chingiz khan, and it causes interest in the character of physiopathological alterations in the development of diabetes mellitus type 2 in people living in that area for the application of the obtained data in the design of the regulation of that state.

On the basis of the aforesaid, **the objective** of this work was to reveal the impact of the food consumption sequence on the compensation of carbohydrate exchange in the patients with diabetes mellitus type 2 among Uzbek population.

**Research methods and data.** The study enrolled 40 patients with diabetes mellitus type 2. The patients of the basic group were recommended to consume dietary fibers such as salads made of fresh vegetables before protein, lipid, and carbohydrate food. The control group patients (n=20) were those, who followed only the principles of nutrition based on the decrease of food calories. The study lasted for 3 months.

Patients were asked and their status was clinically assessed. The measurements included the measurements of height and weight for the calculation of BMI. Besides that, waist circumference was measured. In order to assess the condition of carbohydrate exchange the level of fasting glycemia and glycemia after meal was measured together with the level of glycosylated hemoglobin (HbA1c).

For statistical processing of the data Microsoft Excell 2010 software was used with Student's criterion. The data were expressed in statistical mean  $M \pm m$ .

**Results and discussion.** Table 1 represents clinical characteristics of patients with diabetes mellitus type 2 enrolled in the study.

The average age of the patients in the basic group was 52 years old, and in the control group it was 54. Duration of diabetes was compatible in both groups, being 5.6 and 5 years respectively. The groups were also matched by other criteria.

**Table 1.**  
**Clinical characteristics of the patients with diabetes mellitus enrolled in the study**

	Basic group (n=20)	Control group (n=20)
Gender (M\F)	9/11	8/12
Age (years)	52±5.7	54±6.4
Duration of diabetes (years)	5.6±2.3	5.0±3.1
BMI, kg/m <sup>2</sup>	30.1±1.7	31.2±1.9
Waist circumference (cm)	92.4±4.5	91.0±5.4

As it is seen from the Table the groups were compatible.

In the basic group 66.7 and 42.5% of the patients, and in the control group 61.2 and 47.6% had diabetic neuropathia and retinopathia, respectively. Patients in both group administered oral glucose decreasing therapeutic agents, mostly consisting of a combination of metforminum, sulfonylurea agents, and DPP-4 inhibitors. Glucose decreasing agents were not administered during the study.

Table 2 present the values assessed in the study.

**Table 2.**  
**Values of the patients enrolled in the study**

	Basic group (n=20)		Control group (n=20)	
	Before	After	Before	After
Fasting glycemia, mmol/l	8.5± 0.4	7.9±0.3	9.1± 0.9	8.9±0.9
Postprandial glycemia, mmol/l	12.4±0.9	8.7±0.5*	12.1±1.3	10.9±0.9
HbA1c, %	11.6±0.8	9.5±0.7*	12.6±1.8	11.5±1.7
BMI	30.1±1.7	29.9±1.3	31.2±1.9	31.5±2.1
Waist circumference, cm	92.4±4.5	92.1±4.4	91.0±5.4	92.0±6.1

According to the obtained data only some parameters of the basic group underwent certain changes. There was a reliable decrease in postprandial glycemia and glycosylated hemoglobin levels ( $p < 0.05$ ).

Decrease in postprandial glycemia, which is considered to be an important risk factor of cardiovascular complications of diabetes mellitus, demonstrates the impact of food consumption sequence. As it is known, glycosylated hemoglobin is the criterion of carbohydrate exchange compensation and the control of diabetes mellitus was based on its individual level for each patient. Decrease of that value by 2.1% by means of alteration of just dietary recommendations is considered to be a perfect result, and together with the intensification of glucose decreasing therapy it will allow the achievement of therapeutic target levels.

Thus, the obtained results demonstrate that in case of diabetes mellitus type 2 in Uzbek patients it is necessary to apply the method of consequent food consumption, in other words, to consume dietary fibers before proteins, lipids, and carbohydrates, as traditionally in Central Asia consumption of these food components is simultaneous, but this does not lead to the improvement of diabetes mellitus type 2 compensation.

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