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ABSTRACT

As it is known, in chronic hepatitis and cirrhosis of the liver, due to metabolic disorders, in particular fat-lipoid metabolism, the phospholipid membrane of hepatocytes is damaged, fat infiltration occurs, and due to a decrease in the elasticity of the liver vessels, microcirculation is disrupted. In order to fill in the gaps in the studies of the chemical composition of grain sorghum in relation to the fatty acid composition and their significance for justification in the use in therapeutic (dietary) and preventive nutrition, we conducted studies of the fatty acid composition of grain sorghum grown in the territory of the Khorezm region. The object of the study was grain sorghum (Sorghum) of the type "Katta-Bash" grown on the territory of the Khorezm region.

Key words: chronic hepatitis, cirrhosis, sorghum, fatty acid composition, dietary.

INTRODUCTION

Lipids in the human body are involved in complex metabolic processes and are responsible for their normal development. The biological properties of fats are determined by their fatty acid composition, the structure of triacylglycerols, as well as the presence of biologically active compounds: phospholipids, sterols, hydrocarbons, tocopherols, carotenoids, etc.) [3,5,10].

The main initial criterion for the quality of dietary fats is fatty acids. The fatty acids of natural oils and fats differ significantly in the length of the carbon chain,

the number and position of double bonds in it, and the spatial configuration. This determines the physical, chemical and biological properties that determine the specific characteristics of triacylglycerols involved in metabolic processes in the body (structural lipids) and forming adipose tissue (spare lipids).

In recent years, there has been a noticeable increase in interest in the search for natural antioxidants inherent in the body itself, because when these substances are used to compensate for the insufficiency of the physiological antioxidant system, the risk of side effects inherent in xenobiotics is minimal. Such natural substances include vegetable oils. In order to fill in the gaps in the studies of the chemical composition of grain sorghum in relation to the fatty acid composition and their significance for justification in the use in therapeutic (dietary) and preventive nutrition, we conducted studies of the fatty acid composition of grain sorghum grown in the territory of the Khorezm region.

Objects and methods of research.

The object of the study was grain sorghum (Sorghum) of the type "Katta-Bash" grown on the territory of the Khorezm region. Studies of the fatty acid composition were conducted at the Institute of Plant Chemistry named after Academician S. Yu. Yunusov of the Academy of Sciences of the Republic of Uzbekistan.The oil content of the seeds was determined by the standard method. [2]

The seed sample was ground in a coffee grinder and taken on an analytical scale with a weight of 8-10g. The weight of the crushed seeds was placed in a weighted extraction cartridge, a small layer of cotton wool was placed on top of the cartridge, then the edges of the cartridge were wrapped and placed in the Soxlet extractor. The oil was extracted with extraction gasoline (fraction 75-800C) for 20-22 hours. After complete extraction of the oil, the receiving flask with the oil extract was disconnected, and the gasoline was distilled on a rotary evaporator. Gasoline residues were removed by drying the oil in a drying cabinet at a temperature of 100-1050C to a constant weight. From the pre-crushed grains, oil or free lipids (FL) were extracted with extraction gasoline with a 72-80^{0}C in a Soxlet apparatus. In the extraction results, 3.26% of free lipids were obtained at the actual humidity.

The composition of the free lipid classes was determined by analytical TLC on silica gel. To identify free lipids, the solvent systems hexane - diethyl ether were used 4:1; 7:3; 3:2. Free lipids consisted mainly of triacylglycyrides(TAG), free FA, sterols, triterpenols, and hydrocarbons. Lipids were identified based on model compounds. NL spots were revealed in J_2 vapors by spraying the plates with a 50% aqueous solution of H_2SO_4 followed by heating.

The results of the study and their discussion. The content of unsaponifiable substances (US) in the FL of the test object was determined after alkaline

hydrolysis of the latter, and it was 1.21% of the mass of lipids (Table 1). The identification of US was carried out on the basis of qualitative reactions and their chromatographic mobility in a thin layer of silica gel in a system of solvents hexane - diethyl ether 4:1; 7:3 in comparison with model samples isolated from other natural sources [7].

Table 1. Indicators of grain sorghum seeds and free lipids

Indicator	Content
Moisture and volatile substances, % of the seed weight	8,8
Oil content at the actual humidity, % of the seed weight	3,26
Oil content per abs. dry matter, % by weight of seeds	3,57
Oil refractive index, n_d^{20}	1,4737
Acid number of the oil, mg KOH	8,62
Iodine number, mg/100 g	115,62
Content of unsaponifiable substances, % by weight of oil	1,21

Biologically active components such as sterols, triterpenols, and hydrocarbons were found in the US medium.

The isolated FA in the form of methyl esters (ME) was analyzed by GC. GC analysis was performed on an Agilent Technologies 6890 N instrument with a flame ionization detector, using a 30 m long capillary column with a nonpolar HP-5 phase applied at a temperature of 60 to 250 0C. Carrier gas-helium 30 ml /min.
The main characteristics of seeds and free lipids of grain sorghum of the "Katta-Bash" selection are presented in Table 2..

Table 2. Fatty acid composition of grain sorghum of the type "Katta-Bash", GLC,% by weight

Fatty acid	Content,
Palmitic16:0	14,00±0,20
Palmitoleic acid,16:1	0,41±0,01
Margarine, 17:0	0,23±0,01
Stearic acid,18:0	1,52±0,11
Oleic acid+Linolenic acid,18:1+18:3	38,14±0,21
Linoleic 18:2 ω6	44,69±0,23
Arachinic 20:0	0,34±0,02
Eicosenic 20:1	0,39±0,01
Behenic 22:0	0,15±0,02
Lignoceric 24:0	0,13±0,02
$\sum_{\text{saturated FA}}$	16,37±0,24
$\sum_{\text{unsaturated FA}}$	83,63±0,28

From the data in Table 2, it can be seen that the set of fatty acid composition (FA), consisting of 10 components, is more diverse. Free lipids are enriched with unsaturated FA(83.63%) mainly due to the acids 18:2ω6 (linolenic) and 18:1+18:3 (oleic+linolenic), the content of which was (44.69±0.23 and 38.14±0.21%, respectively).

As you know, the composition of fats and oils contains essential, vital essential components, including lipotropic, anti-sclerotic action.

Highly unsaturated fatty acids are essential ingredients in food. These include linoleic acid, linolenic acid, and arachidonic acid. PFA is required for the growth and development of humans and animals, for the normal state of many organs and systems. Attention to these components of food increased even more when it was found that polyenic acids play a major role in cholesterol metabolism and in the prevention of atherosclerosis. Polyenic fatty acids (PFA) are part of cell membranes and intercellular substances, are components of phosphatides. The latter are involved in many vital processes of the body, in particular, in homeostasis, control blood pressure, muscle function, and enzymes.

PFA are necessary for the absorption of saturated fat, and their lack leads to a lack of energy, to weight loss, to polyphagia. With a deficiency of PFA in the body, violations of the structure and function of organs and systems are detected [6]. Among other symptoms, there is a violation of hematopoiesis, there is a change in the time of platelet aggregation, depending on the content of linoleic acid in food; in particular, it increases when the content of food is more than 4% of this fatty acid (in calories). When linoleic acid is included in food, these changes on the part of platelets are detected earlier than significant changes in the concentration of lipids in blood plasma [12].The relatively high concentration of linolenic acid in the volume of 44.69±0.23 in grain sorghum, allows its use in diet therapy of various diseases. The absence or reduced level of its metabolite (docosahexaenoic acid) in the lipids of the brain and retina of the eyes leads to irreversible disorders of mental abilities and perception in children, deterioration of visual acuity in older people [12].

The lack of PFA leads to a deterioration in the elastic properties of blood vessels due to damage to the main intercellular substances and disruption of the structure of cell membranes.[8] The richest source of PFA is vegetable oils. There is evidence of a contributing role of fat deficiency in the formation of alimentary dystrophy and other diseases of food insufficiency. For a long time, the view of fats as a powerful energy substance and a factor of pronounced protein conservation has been determined.[1]

A comparative assessment of the fatty acid composition of grain sorghum oil of the "Katta Bash" type with other vegetable oils indicates a significant advantage of sorghum oil in terms of the content of valuable fatty acids (Table 3).

Table 3. Content of fatty acids in common vegetable oils

Product Name acid name	Sunflower	Sesame	Corn	Sorghum	Safflower	Soybean	Cottonseed oil
Myristic acid	-	0,1 -2,0	0,1 -2,0	-	0,1 -2,0	0,1-2,0	0,1 -2,0
Palmitic acid	3,5-11,7	7,0-11,7	5,0-8,0	14,00±0,20*	2,1-8,4	7,0-12,1	12,8-28,0
Stearic acid	-	3,6-7,1	up to 6,2	1,52±0,11	1 , 5 - 1 1 , 2	2,0-5,0	0,9-3,3
Oleic+linolenic acid	25,0-35,0	35,0-49,4	23,0-49,0	38,14±0,218	7,0- 12,2	20,0-30,0	13,9-35,0
Linoleic acid	55,0-72,0	37,0-48,4	48,0-56,0	44,69±0,23*	57,0-85,0	44,0-60,0	34,0-57,2
Arachnoid	-	0,1 -2,0	0,1-2,0	0,34±0,02*	0,1-2,0	0,1-2,0	0,1-2,0
Other acids	0,6-0,8	0,5	up to 3,0	0,8-1,6	4,0-6,0	up to 2,0	1,0-3,0

- * P<0,01

As is known, in chronic hepatitis and cirrhosis of the liver, due to metabolic disorders, in particular fat-lipoid metabolism, the phospholipid membrane of hepatocytes is damaged, fat infiltration occurs, and due to a decrease in the elasticity of the liver vessels, microcirculation is disrupted.[4]

In viral chronic hepatitis, PFA decreases as linoleic and arachidonic fatty acids, as well as beta-lipoproteins, which requires their intake from outside in the form of a therapeutic diet containing sorghum dishes enriched with PFA. In the synthesis of lipoproteins, the liver plays an important role, which contributes to the normalization of cholestasis, and in this regard, the lipid spectrum of sorghum in the diet therapy of chronic cholestatic hepatitis is of great importance.[11]

In 90% of cholesterol is synthesized in the liver, it is promoted by polyenic fatty acids (PFA).Since the synthesis of cholesterol is disrupted in chronic liver diseases, sorghum dishes can be recommended for its correction.[11]

Thus, the lipid spectrum of sorghum is a stimulator of metabolic disorders in chronic liver diseases, and also restores the phospholipid membrane of hepatocytes.[4]

Conclusions:

1. The results of the study of the fatty acid composition of grain sorghum of the "Katta-Bash" type revealed a high content of unsaturated UFA (83.63%) mainly due to the acids 18:2ω6 (linolenic) and 18:1+18:3 (oleic+linolenic), the content of which was (44.69 and 38.14%, respectively).

2. The relatively high content of linolenic acid in the grain sorghum of the "Katta-Bash" type in the volume of 44.69±0.23% by weight allows it to be recommended for diseases characterized by a violation and lack of PFA.

3. The high content of polyunsaturated fatty acids in the volume of 38.14±0.21% by weight allows us to recommend the use of sorghum grain "Katta-Bash" in the diet therapy of chronic liver diseases.

4. The lipid spectrum and fatty acids in sorghum stabilizes the phospholipid membrane of hepatocytes and improves metabolism, as well as microcirculation in the liver allows us to recommend it in the diet therapy of chronic hepatitis and cirrhosis of the liver.

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