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Biological Activity of Fresh Squeezed Grapefruit Juice.

Olga I. Ustinova*, and Yuri V. Ustinov.

Medical University "REAVIZ" 227, Chapaevskaya str., Samara, 443001, Russian Federation.

ABSTRACT

The subject of alimentary correction of health by natural foods of plant origin, which are metabolically connatural to the body and exhibit immunoprotective properties, is essential for maintaining human health. Fresh squeezed grapefruit juice an hour after intake dramatically increases the biological activity of all body systems, especially, cardiovascular system, stomach – pancreas – spleen, kidneys – bladder, and liver – gall bladder systems. Thus, in case of the functional weakness of these human systems, it is advisable to use grapefruit juice.

Key words: Alimentary correction of health, grapefruit juice, biological activity of organs, biological activity of grapefruit juice.

**Corresponding author*

INTRODUCTION

According to the research conducted by the World Health Organization, the longevity and quality of human life depends by 50% on life pattern [1] that provides healthy (health bearing) nutrition. Health is largely determined by the intake of nutrients and minor components of food. The natural foodstuffs are the most metabolically connatural to the human body. Therefore, the subject of alimentary correction of health by natural foods of plant origin is most important for maintaining human health [2, 3, 4].

Grapefruit juice is one of the most important natural plant food used not only to improve the taste of food, but also to correct the human health condition. Grapefruit contains citric acid, pectin and coloring matter, sugar, essential oil, potassium, calcium and some mineral nutrients; it is also rich in dietary fibre [5, 6]. The fruit pulp also contains ascorbic acid (40-50 mg per 100 g), vitamins B1, B2, D and P, carotene (provitamin A); the glycoside naringin, which gives the fruit a bitter taste. Grapefruit (100 g) contains dietary fiber (1.8 g), organic acids (1.5 g), water (88.8 g), mono- and disaccharides (6.5 g), and ash (0.5 g).

The content of vitamins, mineral nutrients and macronutrient elements in grapefruit, as well as the daily intake are presented in Table 1 [5, 7].

Table 1: The average content of vitamins, mineral nutrients and macronutrient elements per 100 g of grapefruit juice

Vitamins									
Vitamin	Vitamin A	Vitamin B1	Vitamin B2	Vitamin B5	Vitamin B6	Vitamin B9	Vitamin C	Vitamin E	Vitamin PP
Content in grapefruit, mg	0.003	0.050	0.030	0.030	0.040	0.003	45	300	300
Daily intake, mg	1.5	1.5	1.7	20	2	0.2	60	1.33	10
Mineral nutrients and macronutrient elements									
Mineral nutrients	Potassium	Calcium	Phosphorus	Sodium	Manganese	Iron			
Content in grapefruit, mg	184	23	18	13	10	0.5			
Daily intake, mg	1000-2000	1000	1000	4000-5000	400	10-20			

Pink and red colors of fruit pulp are due to the presence of carotenoid lycopene and anthocyanins. They provide increased antioxidant and radioprotective activity of the organism when eating the grapefruit. Moreover, the higher mass fraction of lycopene, the more intense the color of the fruit pulp. Grapefruits and grapefruit juice contribute to the restoration of normal muscle tone after physical exercise [8]. Especially important is eating grapefruit for the correction of content of ascorbic acid (vitamin C), because a great need in this vitamin and the body's inability to synthesize it led to the necessity of using ascorbic acid in therapeutic and prophylactic purposes [9].

In ancient medicine of the East, the use of grapefruit had been started primarily in India and China [6]. Folk medicine uses grapefruit as a means improving digestion, since it improves appetite, stimulates digestion, alleviates heartburn symptoms, and partially reduces functional disorder of the liver. Besides, grapefruit juice helps to dissolve and eliminate stones from the gall bladder. Eating grapefruits lowers blood pressure, improves the whole-organism performance and helps to restore strength in fatigue [6, 10, 11].

Current studies [9, 12] show that a rich vitamin and mineral composition of grapefruit juice can calm the nervous system, get it back on track, help to cope with cardiac arrhythmia, lower fever, and improve

appetite. Regular consumption of fresh grapefruit juice strengthens the teeth and gums, improves the immune system, removes stones and sand from kidneys and bladder, contributes to excretion of excess fluid from the organism and reduction of body weight, as well as facilitates the clinical course of diabetes. The bitterness of the fruit pulp is caused by the naringin. It is exactly naringin that helps the body to effectively fight against the hepatitis C virus. Drinking grapefruit juice during the treatment period allows preventing hepatitis from turning into chronic stage. Naringin prevents the hepatitis virus against infecting healthy cells. This greatly facilitates treatment of the disease giving greater prospects of recovery. Besides, fresh squeezed grapefruit juice is very useful for hypertension sufferers because it helps to reduce high blood pressure. Daily intake of the grapefruit juice or pulp helps to reduce cholesterol in the blood [11]. Due to availability of pectin substances and a small amount of calories, grapefruit pulp and juice are used in special pectin diets to normalize body weight. A rich vitamin composition of the grapefruit does not allow developing chronic fatigue and quickly restores the body after sports and exercise [12, 8].

The aim of the present study was to determine the natural effect of fresh squeezed grapefruit juice on the human body, as well as to reveal a change in the biological activity of human organs.

MATERIALS AND RESEARCH METHODS

To analyze change in the state of biological activity of organs under the effect of the grapefruit juice we have used the software and hardware system RUNO (thermoalgometry). The diagnostics is based on the reflectory connection between the activity of autonomic centers and the sensitivity of skin zones. The **less** the sensitivity threshold of the corresponding acupuncture point of the organ’s meridian the **higher** the biological activity of the respective organ. Professional medical diagnostic system RUNO is included in the State register of medicines and medical products, and certified by the Ministry of Health of the Russian Federation. Today it is the most accurate, complete, and at the same time, the simple technology for express-diagnostics, which allows identifying the change in the organs biological activity within 3-5 minutes.

The study was conducted on apparently healthy men and women [14, 15] under the most socially significant age from 20 through 69 years.

To obtain “control measurements” of the average annual biological activity of the organs, measurements were performed on apparently healthy people every 2 weeks during 3 years (since November 2012 through October 2015) in the fasted state from 7.00 a.m. to 8.00 a.m. To identify the average biological activity of the organs, 557 measurements were carried out during this period. The number of measurements and the average age of the studied groups are presented in Table 2.

Table 2: The number and the average age of apparently healthy men and women tested in control measurements conducted in various age groups.

Age group	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years
Number of testees	40	165	65	169	118
Average age of the group, years	27.7±0.02	37.0±0.08	43.1±0.03	51.7±0.02	64.0±0.01

To assess *change* in the biological activity of the organs under the effect of 50 ml of used fresh-squeezed grapefruit juice, 39 persons were tested twice *immediately after* drinking the juice and *one hour* after ingesting it in the same time period of the day (from 7 a.m.) employing the software and hardware system RUNO.

RESULTS AND DISCUSSION

The analyzed databases were created in Microsoft Excel 2003. The variational series were constructed with regard to each of the following indicators:

1. The age of the testees;
2. Measurements of the biological activity of twelve body meridians:
 - 2.1 “control measurement” of the biological activity of the organs;

- 2.2 the biological activity of each organ immediately after ingestion of fresh squeezed grapefruit juice;
- 2.3 the biological activity of each organ one hour after ingestion of fresh squeezed grapefruit juice.

The average value of indicators based on the mode, meridian, moments techniques, and the boundaries of their confidence intervals, were revealed. The critical level of significance was taken as $p = 0.05$. Indicators of the biological activity status of the organs are presented in Table 3 and shown in Fig. 1.

Table 3: The average values of indicators of biological activity status of body organs

Meridian	Vb	F	P	G	E	Rp	C	Jg	V	R	Mc	Tr
	Gall bladder	Liver	Lungs	Large intestine	Stomach	Pancreas - Spleen	Heart	Small intestine	Urinary bladder	Kidney	Pericardium (vascular system)	Triple heater (hormonal system)
Control measurement	100.17 ±1.49	100.74 ±1.19	100.65 ±1.17	101.40 ±1.22	99.90 ±1.20	101.83 ±1.41	101.69 ±0.95	100.82 ±2.31	100.96 ±2.31	99.99 ±1.39	100.45 ±1.14	101.88 ±0.99
Immediately	101.3 ±4.51	100.5 ±4.11	98.9 ±2.99	100.2 ±3.95	102.2 ±4.45	98.8 ±4.88	100.3 ±2.75	100.9 ±2.62	102.2 ±5.33	104.1 ±3.79	99.8 ±3.47	99.8 ±2.37
After an hour	99.1 ±5.91	92.2 ±4.37	98.3 ±4.16	98.5 ±3.83	92.5 ±5.06	92.2 ±4.63	96.9 ±3.34	95.9 ±3.64	92.6 ±7.13	93.4 ±3.79	96.7 ±3.64	97.3 ±3.65

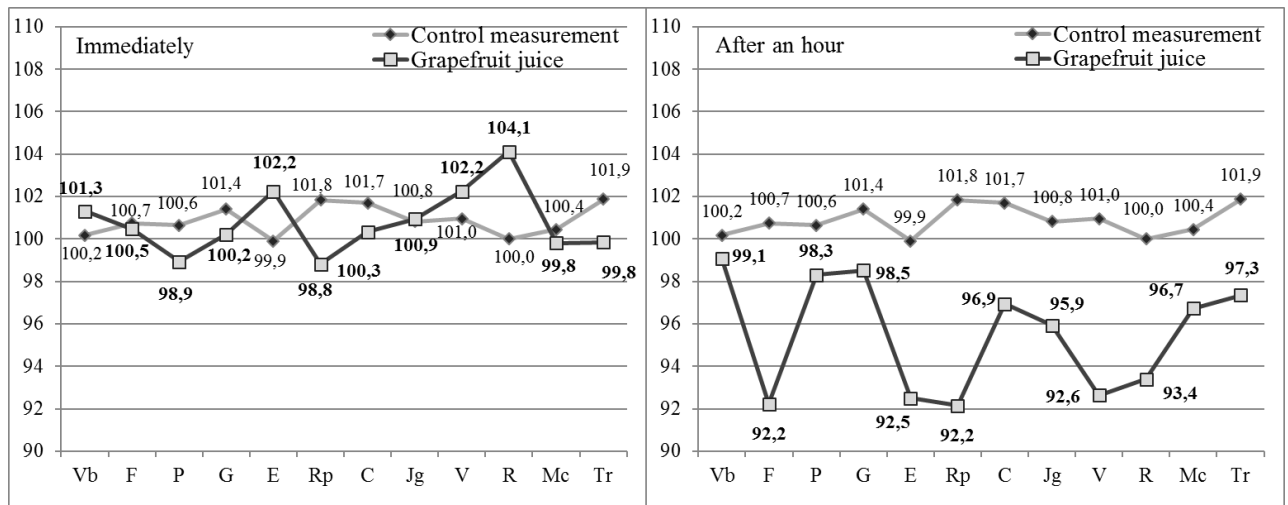


Figure 1: The indicators of the biological activity status of the organs.

The change of the biological activity of the organs when drinking grapefruit juice with regard to “control measurement” is presented in absolute values and percentage ratio in Table 4 and shown in Fig. 2.

Table 4: The change of the biological activity of the organs in absolute values (Δ , points) and percentage ratio (Δ , %) against the indicators of biological activity obtained for “control measurements”

Meridian	Vb	F	P	G	E	Rp	C	Jg	V	R	Mc	Tr	
Immediately	Δ , points	-1.14	0.27	1.71	1.18	-2.34	3.02	1.36	-0.12	-1.28	-4.11	0.65	2.03
	Δ , %	-1.14	0.27	1.70	1.17	-2.34	2.96	1.34	-0.12	-1.26	-4.11	0.65	2.00
After an hour	Δ , points	1.08	8.52	2.34	2.88	7.40	9.67	4.75	4.89	8.33	6.59	3.71	4.53
	Δ , %	1.07	8.45	2.32	2.84	7.41	9.50	4.67	4.85	8.25	6.59	3.70	4.45

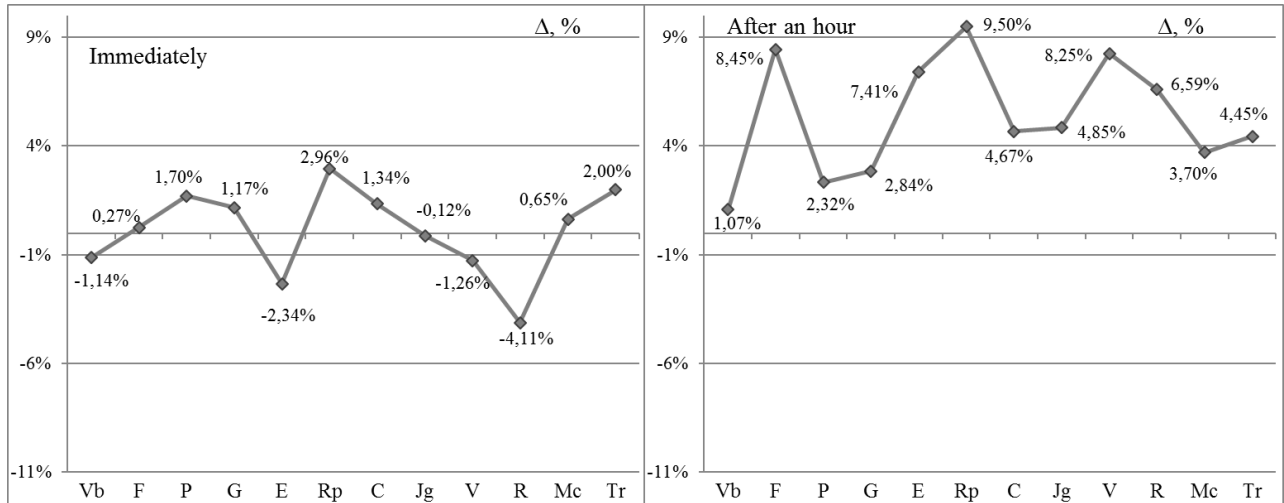


Figure 2: The change of the biological activity of the organs under the effect of grapefruit juice in percentage ratio against the indicators of biological activity obtained for “control measurements”.

The change in the biological activity of the body organs with regard to “control” values *immediately after* intake of fresh grapefruit juice is presented in Table 5, while similar values obtained *one hour after* the ingestion of fresh squeezed grapefruit juice are presented in Table 6.

Table 5: The change in the biological activity of the body organs *immediately after* intake of fresh grapefruit juice, %

Body meridian	Rp	Tr	P	C	G	Mc	F	Jg	Vb	V	E	R
%	3.0	2.0	1.7	1.3	1.2	0.6	0.3	-0.1	-1.1	-1.3	-2.3	-4.1

Table 6: The change in the biological activity of the body organs *one hour after* intake of fresh grapefruit juice, %

Body meridian	Rp	F	V	E	R	Jg	C	Tr	Mc	G	P	Vb
%	9.5	8.5	8.3	7.4	6.6	4.8	4.7	4.5	3.7	2.8	2.3	1.1

The comparison of the results (Fig. 2, Tables 5 and 6) show that the total change of the biological activity of all organs *immediately after* ingestion of fresh squeezed grapefruit juice is “+1.1%”, i.e. the total biological activity of the whole organism increases by 1.1%. Speaking the language of Oriental medicine, grapefruit juice, when ingested, initially displays mild male principle of Yang [15]. At that, the increase in biological activity was noted only in Rp, Tr, P, C, G, Mc, F; i.e. in cardio-vascular system (Tr, C, Mc), spleen – pancreas (Rp) system, and the system of lungs - large intestine (P, G). *An hour after* ingestion of the fresh squeezed grapefruit juice, the total change in the biological activity of all organs becomes equal to “+61.7%”, i.e. the total biological activity of the organism rapidly increases; grapefruit juice, while absorbed by the body, displays a pronounced male principle of Yang [15].

CONCLUSIONS

In summary, we can draw the following conclusions.

- The response of the body to fresh squeezed grapefruit juice *immediately after ingestion* consists in the slight increase of the total biological activity by 1.1%. At that, noticeable enhancement of the biological activity was noted in cardiovascular system (Jg, Tr, C, Mc) (3.9%), lungs - large intestine system (P, G) (2.9%), and spleen – pancreas – stomach system (Rp, E) (0.6%). At the same time, the biological activity of kidneys – bladder (R, U) decreases by 5.4%, while the system of liver – gall bladder loses total activity by 0.9%.
- *An hour after* ingestion of the fresh grapefruit juice, the biological activity of each and all body organs and systems significantly increases (on total by 64.1%). Maximum biological activity was displayed in

cardiovascular system (Mc, Jg, C, Tr), (17.7%), stomach – pancreas – spleen system (Rp, E), (16.9%), kidneys – bladder system (R, V), (14.8%), and liver – gall bladder system (F, Vb), (9.5%). The system of large intestine – lungs (G, P) activates to a lesser extent (5.2%).

- Thus, we can recommend the use of fresh squeezed grapefruit juice for alimentary correction of health to the people suffering from functional weakness of cardio-vascular, stomach – pancreas – spleen, kidneys – bladder, and liver – gall bladder systems.

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