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Biological Activity of Honey as Natural Health Product.

Olga I Ustinova*, and Yuri V Ustinov.

Medical Institute "REAVIZ" 227, Chapaevskaya Str., Samara, 443001, Russian Federation.

ABSTRACT

The issue of alimentary correction of health by natural products, metabolically relevant to the organism and having immune protective properties, is the most important for maintaining human health. Honey, immediately after intake, enhances the biological activity of the cardiovascular system, as well as liver and renal systems, whereas one hour after the intake, biological activity of almost all organs and body systems increases. Therefore, honey is a universal product for soft natural correction of the human health condition.
Keywords: Alimentary correction of health, honey, biological activity of organs, biological activity of honey.

Corresponding author

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INTRODUCTION

A healthy life pattern involves healthy (providing health) nutrition. It is the food, which is the basis for a healthy lifestyle, provides longevity and quality of human life. According to the World Health Organization, human health is conditioned by 50% on life pattern [1]. Therefore, the issue of alimentary correction of health nutrients and minor components of natural products, as immunoprotectors, most relevant to human organism, is very important for improving public health [2, 3, 4, 5, 6]. Honey is one of the principal foodstuffs, which is used not only to improve the taste of food, but also for correction of human health.

The chemical composition of honey is variable and depends on the source of the nectar, growing region of the nectar plants, time of collection, maturity of honey, bee species, weather and climatic conditions, etc. However, some features of the honey composition are defining andquite typical. Thecompositionofhoneyiscomplex. It contains more than 300 substances: carbohydrates, organic acids and their salts, nitrogenous compounds (amino acids, proteins, amides, amines); mineral substances, vitamins, hormones, enzymes, higher alcohols, essential oils, pigments, terpenoids, sterols, phospholipids and some other lipids [7, 8]. The average composition of minor components of different types of honey is presented in Table 1.

Table 1: The average content of vitamins per 100 g of honey

Vitamins							
Vitamins	Vitamin B1	Vitamin B2	Vitamin B3	Vitamin B5	Vitamin B6	Vitamin B9	Biotin
Content in the honey	0.01 mg	0.03 mg	0.20 mg	0.13 mg	0.10 mg	15.00 mg	0.04 mg
Dailydemand	1.5mg	1.7mg	20 mg	10 mg	2 mg	200 µg	0.3mg
Mineralnutrients							
Mineralnutrients	Iron	Potassium	Calcium	Magnesium	Sodium	Sulphur	Phosphorus
Content in the honey	800 µg	36 mg	14 mg	3 mg	10 mg	1 mg	18 mg
Dailydemand	10-20 mg	1-2 g	1000 mg	400 mg	4-5 g	500-1000 mg	1000 mg

Mineralnutrients	Chlorine	Iodine	Manganese	Copper	Fluorine	Zinc
Content in the honey	19 mg	2 µg	34 µg	59 µg	100 µg	94 µg
Dailydemand	3400 mg	150–200 µg	2 mg	2 mg	2-4 mg	15 mg

In addition to the above listed minor components, honey contains a number of other elements, such asaluminum, boron, lithium, molybdenum, nickel, lead, silver, strontium, antimony, titanium, chromium, etc., which are important components of physiological and biochemical processes [8, 9].

Because of its unique composition, honey has important properties that are beneficial for human. These properties include antitoxic, wound-healing, sedative, immunomodulatory, anti-inflammatory, desensitizing, and anti-hypertensive properties. Besides, the honey increases the resistance of organism against influence of various damaging factors, normalizes metabolism and stimulates liver function, enhances the pharmacological properties of drugs and neutralizes their side effects [10, 11]. Honey has strong antibacterial, antiviral and antifungal properties, it dramatically accelerates the healing of wounds, burns, ulcers, and therefore it is used as an antiseptic [9]. Honey is fully absorbed by the body, it has a high calorie capacity, the ability to quickly satisfy hunger, normalize the activity of the digestive tract, improve sleep, itprovides a beneficial effect on the cardiac muscle, metabolism, and increases body resistance. Clinical studies have proved that *regular consumption* of honey does not cause increase of blood sugar level, though conversely, honey contributes to reduction in this indicator.Daily intake of 150g of honey in patients with coronary heart disease during remission leads to a statistically significant decrease in the content of cholesterol in the serum, thus, eating honey regulates lipid metabolism.Daily intake of honey over 8 weeks in a dose of 0.5-1 g per 1 kg of body weight by male volunteers provided the normalized diet caused an increase of physical performance capability indicators based on PWC 170 tests, pneumotachometry and dynamometry [12]. Honey improves blood quality by controlling the amount of free radicals. It helps at inflammation of the tissues, holds calcium in the body, relieves nasal congestion and cough, improves digestion, and regulates acidity of gastric acid. It is proved that buckwheat honey helps efficiently in the treatment of anemia, because it is buckwheat honey that contains large amounts of iron.

Honey has a number of advantages over other sugars: it does not irritate the digestive tract,it is easily and quickly absorbed by the body, quickly releases the necessary energy, allowing athletes and sportsmen,who consume a lot of energy, to quickly restore power.Honey more easily than other sugars is passed by the kidneys;it has a natural slightly laxative effect, as well as a calming (sedative) effect on the body [13, 14].

The aim of this study was identifying the nature of the honey effect on the human body, as well as its effect on change in biological and functional activity of human organs.

MATERIALS AND METHODS

Main part Research: To analyze change in biological activity of organs under the effect of the honey we have used the RUNO software and hardware system (thermoalgometry). The diagnostics was based on the reflectory connection between the activity of autonomic centers and skin zones sensitivity. *The less the sensitivity threshold* of the corresponding acupuncture pointsof the organ's meridian *the higherthe biological activity* of the respective organ. Professional medical diagnostic system RUNO is included in the State Register of Medicines and Medical Products, certified by the Ministry of Health of the Russian Federation. Today it is the most accurate, complete, and at the same time, simple technology of express-diagnostics allowing identifying the changes in the organs' functions activity within 3-5 minutes.

Study was conducted based on the tests of apparently healthy men and women [15] under the most socially significant ages from 20 through 69 years.

Table 2: The number and the average age of healthy men and women in various age groups involved in control measurements

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

To obtain control measurements, i.e. the average annual biological activity of the organs, measurements of the biological activity of organs of apparently healthy people were performed 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 tested persons in various age groups are presented in Table 2.

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To assess *changes* in biological activity of organs under the effect of honey, 39 persons were tested *immediately after*the intake the honey and *one hourafter*the intake within the same time interval of the day (from 7 a.m.) employing the software and hardware system RUNO.

The analyzed databases were created in Microsoft Excel 2003. The ordered samples were constructed for each of the following indicators:

The age of the tested people;
12 measurements of the biological activity of the organs' meridians:

- "Control measurement" of the biological activity of the organs;
- Biological activity of each organ *immediately after* intake of one tablespoon (30 g) of honey;
- Biological activity of each organ *one hourafter* intake of one tablespoon (30 g) of honey.

The average indices based on the mode, median and moments, as well as their confidence limits, were revealed. The critical level of significance was taken as p = 0.05. The indicators of the biological activity status of the organs are presented in Table 3 and in Fig. 1.

Table 3: The average values of biological activity status indicators for various 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	Urinarybladder	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
Immediatelyafter the intake	97.0 ±7.29	99.6 ±4.86	100.5 ±3.36	102.2 ±8.86	104.6 ±6.04	104.7 ±5.82	98.1 ±2.79	98.7 ±2.86	99.0 ±6.84	98.6 ±4.03	99.0 ±4.83	98.0 ±3.02
One hour after the intake	96.1 ±6.23	98.8 ±5.70	98.7 ±4.59	98.5 ±5.68	94.3 ±5.56	94.7 ±5.63	99.0 ±4.25	98.1 ±4.52	98.4 ±7.24	96.8 ±5.38	101.5 ±4.90	97.9 ±3.10

Table 4: Changes of the organs' biological activity in absolute values (Δ, points) and percentage ratio (Δ,%) against the biological activity indicators at "control measurements"

Meridian		Vb	F	P	G	E	Rp	C	Jg	V	R	Mc	Tr
Immediatelyafter the intake	Δ, points	3.14	1.19	0.10	-0.83	-4.69	-2.85	3.58	2.16	1.95	1.38	1.40	3.85
	Δ, %	3.13	1.18	0.10	-0.82	-4.69	-2.80	3.52	2.14	1.94	1.38	1.40	3.78
One hour after the intake	Δ, points	4.04	1.93	1.97	2.91	5.59	7.18	2.64	2.70	2.52	3.21	-1.07	3.98
	Δ, %	4.04	1.92	1.96	2.87	5.60	7.05	2.60	2.68	2.50	3.21	-1.07	3.91

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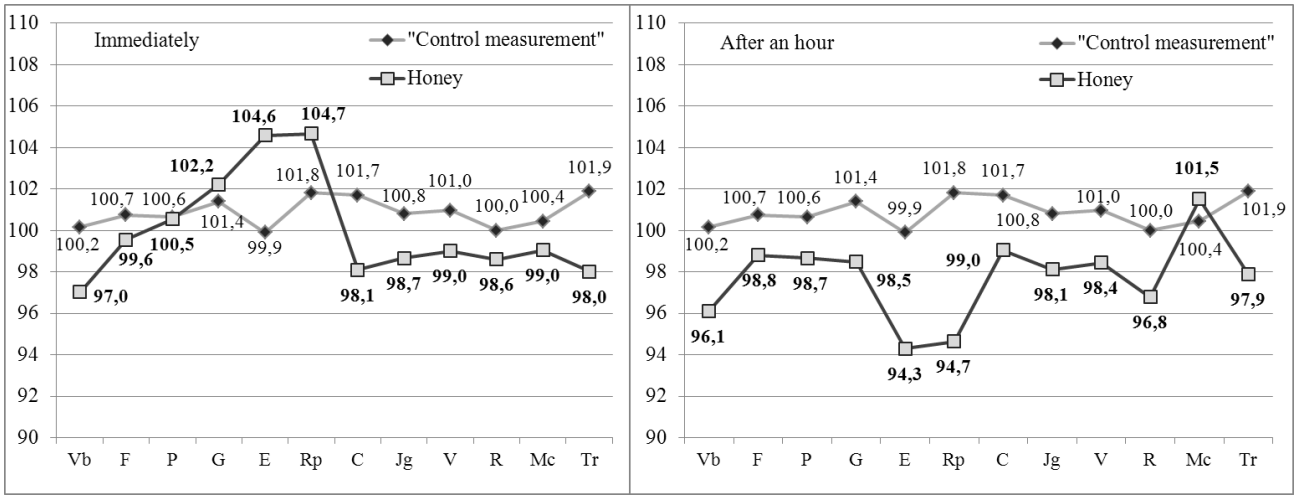

Figure 1: The indicators of the biological activity status for various organs.

Changes in biological activity of the organs after intake of honey with regard to "control measurement" are presented in absolute values and percentage ratio in Table 4 and Fig. 2.

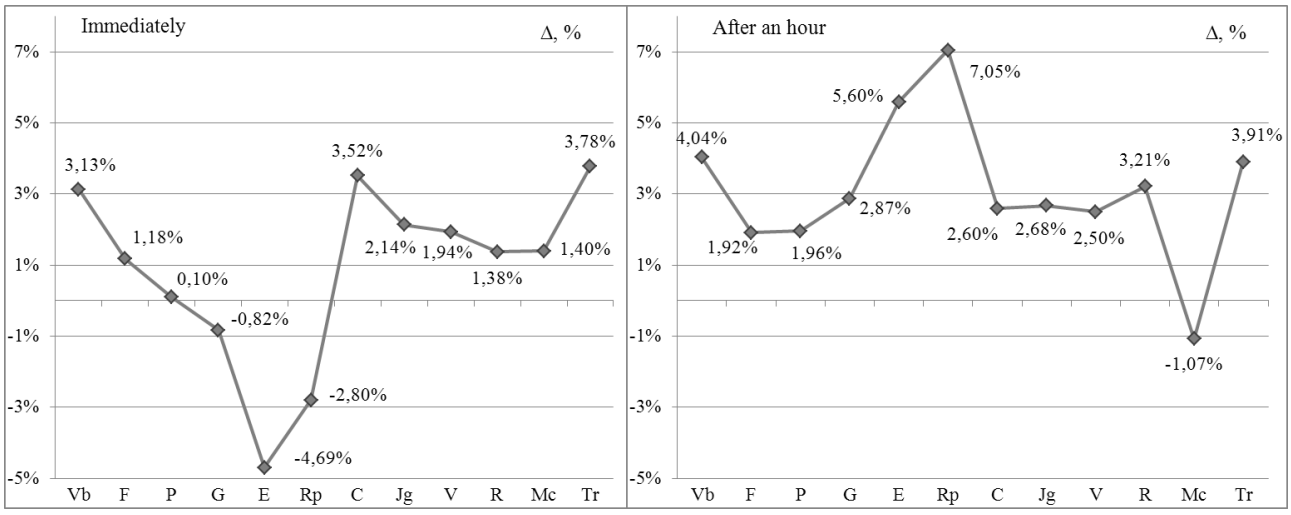

Figure 2: Changes in the biological activity of the organs in percentage ratio against the biological activity indicators at "control measurements".

Final part: Changes in the biological activity of the organs regarding the control measurements *immediately after* intake of one tablespoon of honey are presented in Table 5. Changes in the biological activity of the organs regarding the control values *one hourafter* intake of one tablespoon of honey are presented in Table 6.

Table 5: Changes in the biological activity of the organs *immediately after* intake of honey, %

Meridian of the organ	Tr	C	Vb	Jg	V	Mc	R	F	P	G	Rp	E
Δ, %	3.8	3.5	3.1	2.1	1.9	1.4	1.4	1.2	0.1	-0.8	-2.8	-4.7

Table 6: Changes in the biological activity of the organs *one hourafter* intake of honey, %

Meridian of the organ	Rp	E	Vb	Tr	R	G	Jg	C	V	P	F	Mc
Δ, %	7.0	5.6	4.0	3.9	3.2	2.9	2.7	2.6	2.5	2.0	1.9	-1.1

The comparison of the results (Fig. 2, Tables 5 and 6) show that the total changesin the biological activity of all organs *immediately after* intake of one tablespoon (30 g) of honey is "**+10.3**%", i.e. the total biological activity of the organism increases. Speaking the language of Oriental medicine, honey, when ingested,immediately displays the male principle of Yang [16]. At that, the biological activity of the triple heater (Tr),heart (C), the gallbladder (Vb) and small intestine (Jg) increases more significantly. Thus, the condition of the entire cardiovascular system (Tr, C, Jg, Mc) is activated by "+**10.8**%"; the total activation of liver system (Vb and F) amountsto "+**4.3**%"; renal system (R and U) is activated by"+**3.3**%." The total activity of the lungs system (P and G) is slightly reduced by "-**0.7**%". Biological activity of the stomach-pancreas-spleen system (E and Rp) reduces more significantly amounting in total to "-**7.5**%".

An hour after taking the honey, the total change in the biological activity of all the organs equals to "+**37.3**%", i.e. the total biological activity of the organismincreasesfurther. Speaking the language of Oriental medicine, honey, when ingested, displays the male principle of Yang [16]. The total activity of Rp-E increases most of all by "+**12.6**%"; Tr-Jg-C-Mcis in the second place with a total increase of "+ **8.1**%"; the third place is occupied by biological activity of Vb-F, increased by "+*5.9*%"; activation of renal system R-V is in fourth place amounting to "+**5.7**%"; and finely, lungs - large intestine system (P-G) with increased activity of "+**4.9**%"is in fifth place.

CONCLUSIONS

In summary, we can draw the following conclusions.

1. The response of the body to honey*immediately after intake* consists in the increase of the total biological activity of the cardiovascular system (Tr, C, Jg, Mc), liver system (Vb, F), and renal system (R, U).
2. *An hour after* intake of honey, the biological activity of the all body organs and systems increase further.Stomach-pancreas-spleen system (Rp, E) displays maximum biological activity, which increases by 13.3%;activity of cardiovascular system (Tr, C, Jg, Mc) increases by 8.1%, activity of liver-gall bladder system (R, U) increases by 5.9%, and activity of lungs-large intestine system increases by 5.9%. Renal - bladder system (R, V) activates to a lesser extent – just by 2.1%.
3. Thus, we can recommend the use of honey for alimentary correction of health to the people suffering from functional weakness of *virtually all* body systems, though corrective action of honey is particularly efficient in patients suffering from weaknesses of cardiovascular systems, as well as liver-gall bladder system and stomach-pancreas-spleen system.

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