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Peculiarity of the Functional State of the Small Intestine in the Use of Diets from Uzbek and European Dishes in Case of Chronic Poisoning with Bagir Insecticide and Correction of Metabolic Processes by Medicinal Plants

[1]Mukaddaskhon Khamrakulova, [2]Askar Sadikov, [3]Ernazar Navruzov, [4]Munisa Ilyasova, [5]Nargiza Ergasheva

Abstract--*Today, it is necessary to take into account the traditional features of nutrition of the population of Uzbekistan in many ways different from the nutrition of other peoples and developed over the years under the influence of climatic, geographical and social-economic living conditions.*

Objective--*To determine experimentally the peculiarities of influence of national and European dishes on biochemical processes of the small intestine in case of chronic poisoning with Bagir insecticide using decoction from complex of plant preparations.*

Methods--*The experiments were carried out on 312 white male rats weighing 170-190 g. In animals poisoned with "Bagir" insecticide in a dose of 1/20 LD_{50} (44.4 mg/kg), the efficacy of Uzbek dishes was studied by studying the activity of intestinal hydrolase enzymes.*

Results--*The results of experimental studies are presented, showing that the experimental comparison of the assessment of the Uzbek and European dishes and the specific feed of vivarium on the state of biochemical indicators of carbohydrate energy, protein metabolism of the mucous membrane of the small intestine of laboratory animals differed little. At the same time, the activity content of amylase peptidase and the activity of digestive enzymes of splitting peptides of carbohydrates (invertase, amylase) and phosphohydrolase of monoethers of orthophosphatase and alkaline phosphatase,glutamatdehydrogenase (GDG), succinatdehydrogenase (SDH) increased respectively in comparison with animals on the vivarium diet, and the obtained all indicators were close to the control group.*

[1]*MD, Head of the Laboratory of Medical and Biological Research in Hygiene Research Institute of Sanitation, Hygiene and Occupational Diseases of the Ministry of Health of the Republic of Uzbekistan, Uzbekistan email: mukaddas-khamrakulova@mail.ru*
[2]*Doctor of Medical Sciences, Professor at the Research Institute of Sanitation, Hygiene and Occupational Diseases of the Ministry of Health of the Republic of Uzbekistan; Uzbekistan*
[3]*Candidate of Medical Sciences, Senior Researcher at Research Institute of Sanitation, Hygiene and Occupational Diseases of the Ministry of Health of the Republic of Uzbekistan*
[4]*Junior Researcher, Research Institute of Sanitation, Hygiene and Occupational Diseases of the Ministry of Health of the Republic of Uzbekistan, Uzbekistan*
[5]*associate professor of the chair of "Neurorehabilitation and Oriental Medicine" of Tashkent Institute of Postgraduate Medical Education. Uzbekistan*

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***Conclusions**--Regulation of biochemical processes of mucous membrane of small intestine in poisoned animals received Uzbek dishes with decoctions of medicinal plant preparations have the same effect between the received European cuisine, except for a few indicators - the activity of dipeptidase, alkaline phosphatase and pyruvic acid, more effective effect was revealed in animals received Uzbek dishes.*

***Keywords**--Uzbek dishes, Bagira insecticide, medicinal plants, intestinal enzymes.*

I. INTRODUCTION

The population of the Republic of Uzbekistan is geared and adapted to the use of dishes from national cuisine made of local products. During the transition to the use of European dietetic dishes, there is time for the reorganization of activity of digestive enzymes and adaptation to new food [4, p. 60; 5, p. 45].

Currently, the current principles of dietetic nutrition do not fully take into account the nature of nutrition of the Uzbek population and domestic food raw materials are not fully used in the preparation of Uzbek dishes [1, p. 30; 2, p. 74].

Today, it is necessary to take into account the traditional features of the diet of the population of Uzbekistan in many ways different from the nature of nutrition of other peoples and developed over the years under the influence of climatic, geographical and social-economic conditions [6, p. 40; 8, p. 15].

Products grown in the local region mainly differ in chemical composition (protein, carbohydrates, lipids, vitamins, trace elements), high caloric value and easy assimilation from products of other regions [3, 25; 7, p. 26].

Purpose of work

To experimentally determine the peculiarities of influence of Uzbek and European dishes on biochemical processes of the small intestine at chronic poisoning with Bagir insecticide using decoction from a complex of plant preparations.

II. MATERIALS AND METHODS

Experimental studies were carried out on white male rats with an initial mass of 170-190 years. The studies were conducted in accordance with the European Convention for the Protection of Vertebrate Animals used for Experimental or Other Scientific Purposes (Strasbourg, 18 March 1986) ETS N 123. All animals were kept in the vivarium and the laboratory for medical and biological studies in hygiene at the Hygiene Research Institute of Sanitation, Hygiene and Occupational Diseases of the Ministry of Health of the Republic of Uzbekistan.

312 animals were used in the experiment.All experimental animals were divided into the following groups: 1st control group - animals were kept on a vivarium diet; 2nd control group - animals were kept on a diet from Uzbek dishes; 3rd control group - animals were kept on a diet from European dishes; 4th experimental group - animals were kept on a common vivarium diet and intragastricular injection of Bagir insecticide in a dose of 1/20 LD_{50} (44.3 mg/kg) for 55 days and after a 5-day break on 15, 30, 60 days slaughtering was performed; 5th experimental group - animals were kept on a diet of European dishes + decoction from a complex of medicinal

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plants; 6th experimental group - animals were kept on a diet of Uzbek dishes made from products of masha (mashkichiri, mashhurda); 7th experimental group - animals were kept on Uzbek dishes cooked from leguminous products nohat (Uzbek peas) (nohatshurak, mohora); 8th experimental group - animals were kept on Uzbek dishes cooked from Karakalpak and Khorezm rice (pilaf, shavla).

All 5-8 experimental groups were poisoned with Bagir insecticide and in addition to food received decoction from a complex of medicinal plants consisting of rosehips, licorice root, peppermint, yarrow, caraway for 15, 30 and 60 days in a dose of 1 ml per 100 g of animal weight. Decoction was prepared in 5 g of each plant in 500 ml of boiled water [10, p. 4].

After the end of the test period, the animals were decapitated and the abdomen was opened and the proximal part of the small intestine, including the 12 thighs, was extracted, then 0.9% sodium chloride solution was washed with a syringe. Filter paper was dried, a cut along the length of the intestine was made and the mucous membrane was removed.

The activity of invertase [9, p. 4], amylase [9, p. 5], dipeptidase [9, p. 8], alkali-phosphatase [9, p. 7], lactate [9, p. 6], pyruvate [9, p. 6], glycogen [9, p. 10] and total protein [9, p. 3] in the mucous membrane of small and duodenum were studied in all animals.

III. RESULTS

Experimental data on the study of the functional state of small intestine including 12 duodenum are presented in Table 1-3.

Table 1 presents the results of studies on the activity of digestive enzymes: invertase, amylase, dipeptidase. The table shows that in the first control group of animals that received general vivarium nutrition the activity of the studied hydrolases - invertase, amylase, dipeptidase and alkaline phosphatase in mucous membrane was 10.81±0.53 days on 15, 30, 60 days, respectively; 11.06±0.47; 3.86±0.56; 4.30±0.17; 39.17±0.79; 39.89±0.67; 20.13±0.45; 21.2±0.29 mmole/g.h.

The animals of the second and third control groups, which received the diet of European and Uzbek cuisine, had no reliable changes in the studied indicators in comparison with the indicators of the 1st control group.

The fourth experimental group of animals poisoned with Bagir's insecticide during 55 (10, 25, 55 days) and in 5 days on 15, 30 and 60 days of experiments were conducted slaughtering of animals. Inhibition of activity of investigated enzymes of hydrolase at chronic poisoning by Bagir's insecticide and the vivarium which was on a general diet was marked in animals, especially different decrease was marked amylolytic and dipeptidase activity (up to 57,4-66,7%; 59,0-60,3%) 63,3-83,5%. The activity of alkaline phosphatase and invertase decreased to 62.1-64.3% on day 15 and 30, while on day 60 of poisoning it approached the control group.

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Table 1. Influence of Uzbek dishes cooked from local products on some indicators of mucosal enzymes of 12 thighs and small intestines of laboratory animals

Groups	**Research Days**	**Stat. indicators**	**Invertase**	**Amylase**	**Dipeptidase**	**alkaline phosphatase**
Control 1	15	M_{av}±m	10,81±0,53	4,20±0,25	39,44±2,33	21,20±0,29
	30	M_{av}±m	10,22±0,40	3,86±0,56	39,17±0,79	20,13±0,45
	60	M_{av}±m	11,06±0,47	4,3±0,17	39,89±0,67	21,09±0,39
Control 2	15	M_{av}±m %	11,01±0,44 101,8	4,27±0,15 101,7	39,22±0,86 99,4	21,08±0,47 99,4
	30	M_{av}±m %	4,75±0,51 46,5	4,03±0,21 104,4	38,67±0,97 98,7	19,30±0,37 95,9
	60	M_{av}±m %	10,82±0,43 97,8	4,63±0,19 107,6	40,72±0,71 102,1	21,26±0,32 100,8
Control 3	15	M_{av}±m %	10,62±0,41 98,2	4,41±0,18 105	37,89±0,83 96,1	20,22±0,45* 95,4
	30	M_{av}±m %	11,06±0,51 108,2	4,04±0,22 104,7	38,89±0,67 99,3	19,44±0,37 96,6
	60	M_{av}±m %	11,11±0,49 100,4	4,27±0,16 99,3	37,5±0,78 94	20,75±0,27 98,4
experimental 4	15	M_{av}±m %	6,84±0,44*** 63,3	2,40±0,18*** 57,4	23,28±1,23*** 59,0	13,17±0,74*** 62,1
	30	M_{av}±m %	8,53±0,37 83,5	2,58±0,18 66,8	23,13±1,75 59,0	12,95±0,58 64,3
	60	M_{av}±m %	7,73±0,31 69,9	3,48±0,19 80,9	24,07±1,13 60,3	14,40±0,69 98,3
experimental 5	15	M_{av}±m %	10,32±0,42 95,5	3,96±0,16 94,3	38,17±0,85 96,8	20,33±0,42 95,9
	30	M_{av}±m %	8,83±0,45 86,4		36,89±0,90 94,2	18,75±0,33 93,1
	60	M_{av}±m %	10,22±0,39 92,4	4,0±0,18 93,0	36,44±0,71 91,3	18,43±0,27 87,4
experimental 6	15	M_{av}±m %	11,09±1,33 102,6	4,18±0,19 99,5	39,33±0,80 99,7	20,38±0,48 96,1
	30	M_{av}±m %	10,12±0,44 99,0		32,61±0,70 83,2	19,75±0,58 93,5

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	60	M_{av}±m %	10,61±0,38 95,9	4,22±0,19 97,8	37,44±0,67 93,8	19,85±0,41 94,3
experimental 7	15	M_{av}±m %	10,91±0,48 100,9	4,09±0,17 97,4	40,06±0,81 101,6	20,45±0,48 96,5
	30	M_{av}±m %	10,12±0,51 99,0		38,33±0,73 97,8	19,25±0,51 95,6
	60	M_{av}±m %	10,32±0,37 93,3	4,18±0,17 97,2	38,33±0,59 96,1	19,37±0,43 91,8
experimental 8	15	M_{av}±m %	11,39±0,54 105,4	3,96±0,21 94,3	39,11±0,87 99,2	20,33±0,42 95,9
	30	M_{av}±m %	11,53±0,82 112,8		39,11±0,78 99,8	19,59±0,45 97,3
	60	M_{av}±m %	10,41±0,28 94,1	4,59±0,15 106,7	39,39±0,66 98,7	19,53±0,42 92,6

Note: Reliability: * - P<0,05; ** - P<0,01; *** - P<0,001 by the ratio of control groups.

And so, at chronic poisoning with Bagir's insecticide in a dose of 1/20 LD_{50} the activity of hydrolase enzymes - invertase, amylase, dipeptidase and alkaline phosphatase in the mucous membrane of the small intestine was inhibited in all terms of the study. Consequently, the obtained data indicate high sensitivity of enzyme synthesis systems of enterocytes to the action of insecticide.

The fifth poisoned group of animals on the diet of European cuisine, which received a decoction consisting of medicinal plants invertase activity of 15 and 60 days of experience was at the level of the control group, and on day 30 the activity decreased to 86.4%, the activity of other hydrolases in all study periods were within the control group.

The sixth poisoned group of animals that received Uzbek dishes made of the product mash and additionally decoction from plant preparations differed in activity of intestinal enzymes from the control group 1 by 0.5 - 0.3% and 2.6%; in all studied enzymes.

The 7th group of poisoned animals that received Uzbek dishes from leguminous knockout had invertase activity on 15, 30 and 60 days of experience within the control group - 100.9%; 99.0 and 93.3%, amylase activity was at 97.4 - 97.2%, peptidase activity was also close to the control group (101.6; 96.1%). The activity of alkaline phosphatase was at the level of 20.45±0.41 mmol/l.h.

In the 8th poisoned group in animals that received Uzbek dishes from rice, the activity of enzymes was close to the control group in all the study periods and was as follows: invertases on 15, 60 days were 105.4 - 94.1%, and 30 days of experience activity increased to 112.8%. The activity of amylase, dipeptidase and alkaline phosphatase at all trial dates was 94.3 - 106.7; 99.2 - 98.7; 95.9 - 92.6%, respectively.

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Thus, the activity of intestinal enzymes in animals on a diet from Uzbek dishes cooked from legumes - mash, peas, as well as from local rice did not differ much from that of animals who received European dishes.

Chronic poisoning with Bagira insecticide in a dose of 44.3 mg/kg inhibits the intensity of enzyme-forming function of the small intestine, inhibits the activity of invertase, amylase, dipeptidase and alkaline phosphatase. Poisoned animals with Bagira insecticide, found on the diet of European and Uzbek dishes and received decoction from a complex of medicinal plants normalizes or brings the intestinal enzymes of the small intestine closer to control.

Table 2 presents metabolites of carbohydrate metabolism and content of common protein of small intestine mucosa of control and experimental groups of animals, which received their diet from common vivarium, Uzbek and European cuisine.

Table 2. Influence of Uzbek, European dishes and fodder of vivarium on some biochemical indices of small intestine mucosa of laboratory animals

Groups	**Re search Days**	**Stat. indic ators**	**Lactate (mmole/g.h.)**	**Piruvat (mmole/g.h)**	**Glycogen (mg/g)**	**Total protein (mg/g)**
Control 1	15	M±m	2,27±0,053	125,66±6,91	8,75±0,17	3,58±0,14
	30	M±m	2,84±0,07	125,0±7,28	8,90±0,16	3,86±0,19
	60	M±m	2,33±0,07	120,89±6,24	8,78±0,19	3,66±0,15
Control 2	15	M±m	2,29±0,05	119,22±6,36	8,87±0,14	3,86±0,12*
	30	M±m	2,43±0,06	127,78±7,54	8,43±0,18	4,05±0,17
	60	M±m	2,30±0,05	129,78±7,74	8,55±0,17	3,49±0,20
Control 3	15	M±m	2,35±0,039	118,22±5,87	8,53±0,14	3,63±0,12
	30	M±m	2,45±0,06	118,56±6,89	8,87±0,13	3,60±0,16
	60	M±m	2,33±0,05	144,44±5,74	8,26±0,24	3,51±0,16
Experimental 4	15	M±m	3,51±0,10***	173,22±5,50***	6,80±0,15***	2,83±0,20**
	30	M±m	3,49±0,19	158,33±7,54	6,92±0,29	2,41±0,14
	60	M±m	3,43±0,14	162,40±7,66	7,30±0,18	2,79±0,15
Experimental 5	15	M±m	2,30±0,06	127,22±4,24	8,71±0,23	3,41±0,15
	30	M±m	2,38±0,08	132,22±9,03	8,72±0,21	3,67±0,14
	60	M±m	2,45±0,09	135,4±5,31	7,29±0,18	3,33±0,15
Experimental 6	15	M±m	2,25±0,06	113,89±5,14	8,79±0,16	3,42±0,16
	30	M±m	2,32±0,05	132,78±8,39	8,09±0,21	3,44±0,16
	60	M±m	2,29±0,06	132,33±6,66	7,73±0,19	3,51±0,12
Experimental 7	15	M±m	2,29±0,05	127,11±5,04	9,06±0,18	3,85±0,10
	30	M±m	2,22±0,04	123,67±7,63	8,03±0,16	3,58±0,16
	60	M±m	2,39±0,06	123,67±6,54	7,82±0,06	3,67±0,13

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Experimental	15	M±m	2,31±0,04	123,11±4,88	8,83±0,15	3,65±0,13
8	30	M±m	2,19±0,12	117,22±7,29	7,91±0,43	3,74±0,14
	60	M±m	2,32±0,06	123,44±6,43	7,89±0,27	3,59±0,12

Note: Reliability: * - P<0,05; ** - P<0,01; *** - P<0,001 by the ratio of control groups.

From the table we can see that the animals of the first control group-1, which are on the feed of the vivarium in all terms (15, 30, 60 days), had the lactic acid content of 2,27±0,05 - 2,84±0.07 mmol/g, pyruvic acid 125.6±6.91 - 120.0±6.4 mmol/g, glycogen from 8.75±0.17 to 8.90±0.16 mg/g and total protein 3.58±0.14 - 3.86±0.19 mg/g in small intestine mucosa.

Thus, the content of metabolites of carbohydrate metabolism and total protein in all terms of experiments remained close in the dynamics of studies. All control and experimental groups were compared with the first control group fed from the common vivarium diet (control-1 was taken for 100 %).

In the control group 2, the Uzbek dishes consisting of products of mash, peas and local rice, content of pyruvic acids, glycogen and total protein in small intestine mucosa (except for 30 days, which decreased by 13.6%) did not differ from those in control-1. Similar phenomena were in the third control group (control-3), animals receiving European dishes during 60 days (15, 30, 60). At the same time, lactic acid activity ranged from 100.0 to 103.5%, pyruvate on 15-30 days was 94.8 to 94.1%, glycogen 94.1 to 99.7%, and on 60 days it increased to 119.5% and total protein 93.3 to 101.4%.

Thus, in all control groups of animals that received the vivarium diet, Uzbek and European dishes during 60 days, there were no significant changes in the metabolism of carbohydrate metabolism and protein in small intestine mucosa.

4-group (Experimental 4) of animals poisoned with Bagira insecticide and fed from the common vivarium diet were slaughtered for 10, 25, 55 days after 5 day break for 15, 30 and 60 days. The content of metabolites of anaerobic glycolysis (lactate, pyruvate) and total protein in the 4th group of animals varies reliably in all the periods of experience. At the same time the level of lactic and pyruvic acids on the 15th - 60th day is up to 147,2 - 154,6% and 126,7 - 137,8% respectively. The level of glycogen and total protein decreased from 77.1 to 89.1% and 62.4 to 76.2% respectively in relation to control-1.

The 5th group of poisoned animals received a diet from European cuisine and decoction from medicinal plants. At the same time, lactate content for 30 days was 83.8%, and for 60 days it increased to 105.1%, pyruvate from 101.2-112.0 5, glycogen-99.5-83.1%, and protein level was 95.2-90.0%, anaerobic glycolysis indicators at the end of 60 days of experience are increasing.

And so in case of application of masha and peas and decoction of herbal medicines in the 6th and 7th experimental group of insecticide poisoned animals the state of carbohydrate metabolism and protein in the mucous membrane of small intestine slightly exceeds the control group.

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In the animals of the 8th experimental group, the lactate content decreased by 29,1%, while in the rest periods it was within the control level, and the concentration of pyruvate in all the periods of the experimental group was at the control level-1 and made 97,9; 93,8 and 102,1%. The level of glycogen on day 15 was at the normal level (100.9%), while on the other days it was 88.8 and 89.8%, not reaching the control level by 10%. In all terms of the study, the content of the studied indicators was almost at the level of control indicators-1.

Thus, with chronic animal insecticide poisoning and the use of Uzbek dishes consisting of legumes and intragastric decoction from a complex of plant medicines consisting of rosehip fruits, caraway, mint leaves and licorice root, the indices of carbohydrate metabolism and total protein were restored or came close to normal. When Uzbek and European dishes were used, the level of studied biochemical indicators remained within the control group.

The seventh and eighth experimental groups of animals who received Uzbek dishes from bean products of masha and peas with decoction of a complex of plant medicines the process of glycolysis slightly (by 3-11%) surpassed the control-1, while the level of lactate and pyruvate in the mucous membrane of the small intestine decreased by 12-16.2% compared to the experience-5. The level of glycogen cleavage increased by 8.9 and 9.8% on 30 and 60 days, and at first the level of control experience.

Thus, in case of chronic poisoning with Bagir insecticide, the use of Uzbek dishes consisting of legumes and intragastric introduction of decoction from rose hips, caraway, mint leaves and licorice root, the indices of carbohydrate metabolism and total protein were restored or approached to normal. When Uzbek and European dishes were used, the level of studied biochemical indices remained within the control group.

IV. CONCLUSION

1. Healthy animals (control group) fed from the common vivarium, Uzbek and European dishes in biochemical indicators of carbohydrate energy, protein metabolism and activity of intestinal enzymes and the cycle of tricarboxylic acids - dehydrogenase (glutamate, succinate-, malatdehydrogenase) of the small intestine mucosa have not been sharply distinguished.
2. In chronic poisoning of animals with Bagir's insecticide at a dose of 44.3 mg/kg, which are on the feed of the vivarium, a reliable change of biochemical indicators was observed. Inhibition of invertase, amylase, dipeptidase and alkaline phosphatase activity and strengthening of anaerobic glycolysis process with reduction of activity of GDG, SDG, MDG in the mucosa of the small intestine and 12 palms was revealed.
3. Poisoned animals that have received a diet from Uzbek and European cuisine with the introduction of decoction consisting of a complex of herbal medicines (rosehip fruit, caraway, lemon balm, licorice root and mint leaves) have a positive effect on biochemical indicators - dairy, pyruvic acids, glycogen and total protein and the activity of hydrolases - invertase, amylase, dipeptidase, alkaline phosphatase and the activity of GDG, SDG, MDG in the mucosa of the small intestine that were approaching or recovering from the control group.
4. Regulation of biochemical processes of mucous membrane of small intestine in poisoned animals who received national dishes with decoctions of medicinal plant preparations has the same effect between the

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received European cuisine, except for a few indicators - the activity of dipeptidase, alkaline phosphatase and pyruvic acid, more effective effect was found in animals who received Uzbek dishes.

Conflict of interest. All authors state that there is no potential conflict of interest that requires disclosure in this article.

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