Comparative assessment of cerebroprotective and other pharmacological properties of plants family Shikshevy (Empetraceae)

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Comparative estimation of cerebroprotective and other pharmacological properties of plants family empetraceae

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SUMMARY

The successful use of plants of the Shiksheva family in folk and traditional medicine for epilepsy is not based on their anticonvulsant properties, which were not found experimentally. Only the ability of some drugs from shiksha species to increase tolerance to convulsive poisons and influences, but not to provide full protection, has been revealed. The cerebroprotective properties of shiksha species are also manifested in the preservation and restoration of the conditioned and unconditioned reflex behavior of mice after their injury, and in the prevention of akinesia and mortality in mice after electrical injury. Some of them are effective in hypoxia models.

Key words: herbal medicine, cerebroprotective plants, multiple sclerosis.

RESUME

The successful treatment of patients with epilepsy in folk and traditional medicine by plant Empetrum is not based on their anticonvulsive properties which were not identified experimentally. Only ability to raise tolerance to convulsant poisons was found in certain preparations from empetraceae, but not full protection. Cerebroprotective properties of Empetrum plants are manifested in preserving and restoration of conditional and unconditional reflex behavior of mice after injury, preventing motionless and mortality after electrical shock. Certain preparations from Empetrum plants are effective in hypoxia models.

Keywords: phitotherapy, cerebroprotective plants, multiple sclerosis.

INTRODUCTION

The attention of doctors, phytopharmacologists is attracted by the information of folk and traditional medicine about the nutritional and versatile medicinal use of berries (fruits) and shrubs of the shiksha species (crows, crowberries). The names of the plant are due to the diuretic effect of the fruits (shiksha - siksha), the black, black color of the berries, their wateriness, and therefore relatively low taste. For this reason, the food use of shiksha in Russia is dying out. However, during the exile of Menshikov in Berezovo, at fairs, the watercorn was sold in wagons. The peoples of the Far North, Kamchatka, the Far East, Northern Sakhalin and to this day store shiksha berries. “Sweet berries are harvested for future use by the population of the Kola Peninsula. In Norway, it is frozen for future use with milk, in Iceland - with sour milk. In Greenland, it is considered a delicacy and is used as a seasoning for fish and seal fat, to make a drink reminiscent of lemonade. " In the "Plant Resources of the USSR" [21], for which the quotation is given, information is given in detail about the chemical composition of various types of shiksha. This information, as well as the fact that the berries are used for food, make it possible to consider them non-toxic. The report on the intoxicating effect of berries when eating them in large quantities [23] most likely refers to a fermented crowberry and is not confirmed by our observations.

An analysis of the medicinal use of shiksha species in destructive and other diseases of the central nervous system allows us to note the stability of its effective use in epilepsy, paralysis of various, most often not specified etiology, "fear of hydration" (rabies), tick-borne encephalitis, memory loss, sleep disorders, headaches, fatigue, rapid fatigue, with typical psychosomatic diseases, for example, with hypertension [4, 5, 10, 16, 18, 21, 22, 24, 26]. Among the Lapps, it is considered a general tonic, energizing, and relieving fatigue. One of the names is Lappish berry. The effectiveness of the application is indicated by the popular name "dear

herb, ”although siksha is not ginseng at all. Its natural resources are enormous. In Siberia and the Far East, it is possible to harvest hundreds of tons of the aboveground part [26], used in folk and traditional medicine. The red crowberry Empetrum rubrum, which does not grow in our country, is used by the aborigines of Patagonia for similar indications [26], who, of course, did not have ethnoyatric ties with the inhabitants of Eurasia. A similar, stable, centuries-old use of representatives of the genus Empetrum by different, especially geographically dispersed peoples is evidence of their effectiveness.

Special attention should be paid to the use of types of shiksha in traditional, in particular Tibetan medicine, which remains a source of new directions, methods and means of treatment [1, 28, 31]. Even A. Pozdneev [18] in the first translation of the main treatise of Tibetan medicine "Chzhudshi" focused on the use of shiksha for anthrax, kidney disease. In the Buryat and Mongolian branches of Tibetan medicine, shiksha is used for the previously listed nervous diseases, as well as as a hepatoprotector [8, 10]. The effectiveness of the aqueous extaract of the aerial part of the Siberian Empetrum sibiricum shiksha in epilepsy and post-stroke central paralysis was confirmed in Tomsk by Academician N.V. Vershinin and neurologist, Cand. honey. D.D. Yablokov [9]. According to their data, the range of motion increased in patients with hemiparesis and hemiplegia,

Despite the abundance of data on the effectiveness of shiksha species in diseases of the brain and a number of other diseases, in the pharmacological and chemical aspects, they remain poorly studied and not accepted by scientific European medicine.

The purpose of this work: a comparative assessment of a number of pharmacological properties of drugs from4 types of shiksha.

MATERIAL AND RESEARCH METHODS

We studied some of the pharmacological properties of drugs from the following types of shiksha:

1. Black shiksha Empetrum nigrum. Decoctions 1:10 dry fruits, aerial part (n.p.), dry extracts from them with 40% ethanol, dry ethyl acetate fraction, n.p., total n.p. flavonoids
2. Bisexual Shiksha Empetrum hermaphroditum. Decoctions and dry alcoholic extracts of n.p.
3. Siberian shiksha Empetrum sibiricum. The same drugs as in paragraph 2.
4. Near-Holarctic shiksha Empetrum subholarcticum. The same drugs and ethyl acetate fraction (sum of polyphenolic compounds) n.p.

A number of drugs, in addition to those prepared extemporally (decoctions), were kindly provided to us by a phytochemist, professor at Tomsk University E.A. Krasnov.

Acute toxicity was studied after 5-fold enteral administration of SHR mice to male (less often to females) mice of the SHR line through a tube (in terms of dry raw material, 5 g / kg × 5 times, i.e., a total of 25 g / kg). Dry alcohol extracts, ethyl acetate fraction, the amount of flavonoids in the form of a 10% emulsion on Tween80 were injected enterally twice at 50 mg / kg (total 100 mg / kg).

Anticonvulsant activity was studied by conventional methods with a preliminary single or 7-day enteral administration of drugs to mice: decoctions at 5 g / kg (in terms of dry raw materials), alcohol extracts and ethyl acetate fractions at 100 mg / kg. Control animals were injected with water or Tween80 emulsion in equal volumes (0.5 ml / 10 g). Methods:

1. A convulsive-lethal dose of corazole was titrated when slowly injected into the tail vein mice, 0.1 ml of 0.5% corazole solution for 20 s before the onset of seizures.
2. Intraperitoneally injected mice with 2 mg / kg of strychnine (supramaximal test), taking into account seizure latency and life time.
3. Using the oral electrodes designed by us [5], the maximum electric shock (25 mA, 50 Hz, 0.1 s), recording the number of surviving animals and without tonic convulsions [29, 30].
4. On rats of the Krushinsky-Molodkina line with genetically fixed audiogenic convulsions [12, 14] compared the anticonvulsant activity of aqueous extracts from raw materials after a single and 7-day enteral administration at 5 g / kg (in terms of dry raw materials). The experiments were carried out in the laboratory of genetics of the Institute of Physiology of the Russian Academy of Sciences. We selected 60 rats with pronounced (4 and 3 points) convulsive reactions to a strong (90 dB) sound. We were convinced that the 7-day introduction of water through a tube does not change the convulsive responses in all animals. Then they were divided into 4 groups to study the action of n.ch decoctions. plants. The number of rats with a reaction to

sound at 0, 1, 2 (non-convulsive responses), 3, 4 points. Subsequently, after 2 weeks, we studied the effect of alcohol extracts from n.ch. and shiksha fruits. The model of audiogenic seizures was used for the first time to study the anticonvulsant activity of plant preparations.

5. Models of nicotine (1 mg / kg intravenous) seizures and arecoline (10 mg / kg subcutaneously) tremor, which made it possible to reveal the presence or absence of central H and Mcholinolytic action.

We studied the influence of phytopreparations on the normal and disturbed exploratory behavior of mice in the open field (adaptation to novelty, Pavlovian reflex “What is it?”, Motor component of the orienting reflex - DKOR), counting the number of visited quarters of the field and orienting getting up in 3 minutes. in the arena of 30 × 50 cm. Violation of the DCOR was caused by subcutaneous injection of corazole (60 mg / kg), maximum electric shock or moderate, but leading to akinesia, not causing death of the animals by electric shock. Changing current parameters were selected in each experiment: 8–12 mA, 3–10 sec, 50 Hz. In these 30 methods, the RCOR was recorded after 60, 40 and 15 minutes, respectively. Violation of the conditioned passive avoidance reflex (passive avoidance reflex) was caused by maximum electric shock [7, 13]. The number of mice that survived, as well as those that did not lose CPAR, were counted.

The antihypoxant activity of the preparations was studied using three models: 1) hypobaric hypoxia was induced by a conventional method in a ventilated pressure chamber, "raising" mice to a height of 10,000 m in 6.5 minutes; 2) hypoxia with hypercapnia was achieved by placing 4 mice in a hermetically sealed vessel with a volume of 0.5 l; 3) hemic hypoxia was obtained using sodium nitrite methemoglobin-forming agent, a 2% solution of which was injected into mice intraperitoneally at a dose of 200 mg / kg. The lifespan of mice under hypoxic conditions was compared. Each group used 20-30 mice. Control animals were injected inside water or emulsion Tween80 at 0.5 ml / 10 g, and experimental - studied drugs in the previously indicated doses within 7 days before the experiment.

All results were statistically processed according to the adequate Fisher-Student test, χ^2, Wilcoxon-Mann-Whitney.

RESULTS AND ITS DISCUSSION

With repeated enteral administration, it was not possible to achieve toxic dosages of preparations of the crowberry species. Moreover, 1–2 times their introduction in high doses did not lead to a decrease in the FOCR of animals in the open field and the time spent on the vertical rod. The exception was ethyl acetate fractions of n.p. black shiksha, w. near-Holarctic and alcoholic extract first. They reduced the number of visited quarters of the open field (transitions) to 74, 88, and 78%, respectively, and did not significantly change the number of tentative arrivals (the most vulnerable component of adaptation to novelty). It is obvious that the broths of shiksha used in folk and traditional medicine are non-toxic, do not have a depressing effect on the central nervous system, do not deform adaptation to novelty, and do not exhibit neurotoxic properties. It is essential that it is the ethyl acetate fractions that

With a single enteral administration, none of the preparations of 4 types of shiksha showed anticonvulsant properties, did not increase the convulsive dose of corazole. An exception was a decoction of the aerial part of the black crowberry (5 g / kg in terms of dry raw material once inside), which in single experiments significantly increased the lethal dose of corazole to 129–156%. However, this result was not always reproducible. Control drugs (phenobarbital - 35 mg / kg, medinal - 125 mg / kg, barbamil - 40 mg / kg, seduxen - 10 mg / kg) completely protected the animals from seizures when slowly injected 1 ml of 0.5% corazole solution. With 7-day enteral administration, complete protection against seizures by phytopreparations was also not achieved, but some of them (Table 1, mostly reliable positive results are shown) increased the convulsive-lethal dose of corazole.

The results of the experiments were reproduced many times on mice of different sexes. The most reproducible results were obtained for decoctions of the aboveground parts of w. bisexual, w. black, sh. Siberian, sh. almost-Holarctic (in descending order of activity). Consequently, Crowberry preparations cannot be counted among anticonvulsants, since none of them demonstrated the effect of complete or even high protection against seizures, as was observed against the background of synthetic

anticonvulsants. It is more correct to interpret their ability after prolonged administration to mice as an increase in tolerance to corazole, as a manifestation of an antitoxic effect, an increase in resistance to the convulsive action of corazole. This interpretation supports the theory of the state of nonspecifically increased resistance (SNPS) of the organism, developed by N.V. Lazarev and his school [2, 3, 11, 15, 27].

Table 1

Comparative assessment of the effect of drugs of shiksha species
with 7-day enteral administration on a convulsively lethal dose of corazole

Type and part of the plant	A drug	Single dose	LD100 corazole in mg / kg	LD100 corazole in% of control
Control	Water emulsion Tween80	0.5 ml / 10 g 0.5 ml / 10 g	66.8 ± 8.2 65.9 ± 9.1	one hundred % one hundred %
Shiksha black				
Fruit	Decoction Alcoholic extract	5 g / kg 100 mg / kg	92.0 ± 7.5 * 89.8 ± 10.3 *	138% * 136%
Nadz. part	Decoction Alcoholic extract	5 g / kg 100 mg / kg	97.4 ± 11.3 88.5 ± 12.2 *	146% * 134% *
Bisexual shiksha				
Fruit	Decoction Alcoholic extract	5 g / kg 100 mg / kg	89.4 ± 13.0 * 81.2 ± 12.7 *	136% * 123% *
Nadz. part	Decoction Alcoholic extract	5 g / kg 100 mg / kg	113 ± 15.6 * 97.3 ± 13.2 *	169% 8 * 148% *
Siberian shiksha				
Fruit	Decoction Alcoholic extract	5 g / kg 100 mg / kg	81.7 ± 9.2 * 79.1 ± 8.6	122% * 120%
Nadz. part	Decoction Alcoholic extract	5 g / kg 100 mg / kg	91.3 ± 14.0 * 80.1 ± 10.8	137% * 121%
Shiksha almost-holarctic				
Fruit	Decoction Alcoholic extract	5 g / kg 100 mg / kg	77.6 ± 12.0 68.3 ± 7.2	116% 104%
Nadz. part	Decoction Alcoholic extract	5 g / kg 100 mg / kg	82.6 ± 10.1 * 65.3 ± 8.0	123% * 99%

Notes: 1) 20–30 mice were used in each group; 2) the mean values ± confidence interval are given; 3) the introduction of water served as a control to the broths, and Tween80 emulsions to the alcoholic extracts; 4) * - the differences are significant with their control at $p \leq 0.05$.

A single administration of shiksha preparations did not have any effect on the latency period of strychnine-induced convulsions and the life span of animals, as in the experiments with corazole. After 7 days of their administration, only 3 drugs showed the ability to increase strychnine tolerance. Broths of supervision. parts of bisexual shiksha, black shiksha and Siberian shiksha significantly lengthened the latent period of seizures from 2.8 min. up to 4.5-4.0-3.5 minutes, and the life time from 3.2 minutes. up to 7.5–6.1–6.1 minutes, respectively. Considering the severity of this test, it should be noted the possibility of increasing the resistance of mice to the lethal effect of strychnine against the background of the studied decoctions. It is symptomatic that only decoctions of the aerial parts of 3 types of shiksha were effective, which is consistent with previously obtained data on where exactly these drugs are most active.

Table 2 demonstrated the absence of the anticonvulsant effect of decoctions and dry alcoholic extracts in the model of maximum electroshock (MES), which was historically introduced to confirm complete protection against the background of barbiturates and a number of other anticonvulsants.

[29]. Ethyl acetate fractions, the sum of flavonoids from n.p. the black shikshi were also ineffective in these as well as in all other experiments. An essential point is the ability of n.ch decoctions. and fruits of black shiksha, bisexual shiksha, increase the number of mice surviving after MES, increase resistance to electrical injury. A decoction of n.ch. was also effective. Siberian shiksha. Increased tolerance to electroshock, as well as to corazole, strychnine against the background of course, but not a single injection of decoctions from shiksha species confirms the mechanism of action of these phytopreparations
- achieving a state of nonspecifically increased body resistance [2, 3, 5, 6, 11, 15, 19, 27]. The non-specific nature of the increase in resistance to convulsive agents, influences is confirmed by the absence of pronounced anticonvulsant, as well as central depriving, H and Mcholinolytic, properties.

table 2

Comparative evaluation of the effect of course administration of galenic preparations from shiksha species on amnesia of the conditioned passive avoidance reflex (passive avoidance reflex), hypokinesia and survival of mice after maximum electroshock (MES)

Type and part of the plant	A drug	Single dose	LD100 corazole in mg / kg	LD100 corazole in% of control
Control	Water emulsion Tween80	0.5 ml / 10 g 0.5 ml / 10 g	66.8 ± 8.2 65.9 ± 9.1	one hundred % one hundred %
Shiksha black				
Fruit	Decoction Alcoholic extract	5 g / kg 100 mg / kg	92.0 ± 7.5 * 89.8 ± 10.3 *	138% * 136%
Nadz. part	Decoction Alcoholic extract	5 g / kg 100 mg / kg	97.4 ± 11.3 88.5 ± 12.2 *	146% * 134% *
Bisexual shiksha				
Fruit	Decoction Alcoholic extract	5 g / kg 100 mg / kg	89.4 ± 13.0 * 81.2 ± 12.7 *	136% * 123% *
Nadz. part	Decoction Alcoholic extract	5 g / kg 100 mg / kg	113 ± 15.6 * 97.3 ± 13.2 *	169% 8 * 148% *
Siberian shiksha				
Fruit	Decoction Alcoholic extract	5 g / kg 100 mg / kg	81.7 ± 9.2 * 79.1 ± 8.6	122% * 120%
Nadz. part	Decoction Alcoholic extract	5 g / kg 100 mg / kg	91.3 ± 14.0 * 80.1 ± 10.8	137% * 121%
Shiksha almost-holarctic				
Fruit	Decoction Alcoholic extract	5 g / kg 100 mg / kg	77.6 ± 12.0 68.3 ± 7.2	116% 104%
Nadz. part	Decoction Alcoholic extract	5 g / kg 100 mg / kg	82.6 ± 10.1 * 65.3 ± 8.0	123% * 99%

Notes: 1) 20–30 mice were used in each group; 2) the mean values ± confidence interval are given; 3) the introduction of water served as a control to the broths, to alcohol extracts -

emulsions Tween80; 4) * - the differences are significant with their control at $p \leq 0.05$.

In experiments with intravenous administration of nicotine, only a decoction of oversight. part of bisexual shiksha with 7 days of administration slightly, but significantly prolonged the life of animals from 3.0 min. in control up to 4.2 min. The central Nholinolytic pedifen (15 mg / kg orally) completely protected the animals from death. It is obvious that Shiksha preparations do not have a central Nholinolytic effect.

Arecoline tremor and salivation, in contrast to metamizil (5 mg / kg enterally), preparations from shiksha species did not completely stop, but the duration of tremor (15.2 ± 4.2 minutes in control) significantly reduced decoctions of the aerial parts of bisexual shiksha (8.1 ± 3.4 min.), Black shiksha (8.4 ± 2.2), Siberian shiksha (9.2 ± 3.1) and bisexual shiksha fruits (9.7 ± 3.0). Here, as in Table 1, the mean values ± confidence interval are given for ease of comparison. Shiksha preparations do not have a central Mholinolytic effect, but increase the tolerance to the central Mholinomimetic arecoline.

Due to the fact that experiments on rats of the Krushinsky-Molodkina line could not be carried out as widely as on mice, the effect of only decoctions of the aerial parts of 4 types of shiksha was studied in the first series. All decoctions were ineffective with a single administration, and with a 7-day entral administration they significantly increased the latent period of reaction to sound, the first circular run, from 2.8 to 5.3–8.8 s. Without changing the latent period of the convulsive reaction (12–16 s), all decoctions of n. including shiksha species reduced the duration of tonic convulsions from 18 s in control to 11–12 s. The number of animals with non-convulsive forms of response to a strong sound (0, 1, 2 points) did not increase the decoctions. Seduxen, even with a single administration at a dose of 5 mg / kg, converted almost all forms of response into non-convulsive ones. In the second series of experiments on the same animals, we were convinced of the even lower efficiency of alcoholic extracts from n.p. and fruits of black shiksha and sh. bisexual. They only significantly lengthened the latent period of the first reaction to sound, without changing the rest of the indicators. The model of audiogenic, genetically fixed seizures is interpreted in different ways. Perhaps they are analogous to the "musical epilepsy" in humans described by V.N. Bekhterev. Their interpretation as a stress reaction, and, accordingly, active drugs as stress-limiting agents seems to be more correct. Despite the fact that drugs from n.ch. of all types of shiksha showed low activity, they should be considered natural limiters of the stress response, not causing, unlike benzodiazepines, any neurotoxic reactions, and therefore suitable for long-term, constant use. Earlier, on a model of immobilization stress, stress-limiting properties of decoctions from shiksha species were found [5], which is confirmed by the results of experiments with audiogenic seizures. Taking into account the triggering role of stress in exacerbation of multiple sclerosis, special attention should be paid to the ability of decoctions from the aerial parts of shiksha species to limit its damaging effect on the central nervous system, to exert cerebroprotective effect in various destructive and lethal effects: convulsive poisons (corazole, strychnine, nicotine), strong sound, maximum electric shock.

The CPAR amnesia model after MES is standard in screening drugs with a nootropic effect. It was also used to register the positive effect of the extract of the roots of Eleutherococcus spiny on amnesia of passive avoidance reaction. The ability of drugs from shiksha species to prevent the erasure of passive avoidance reaction in mice can be regarded as a manifestation of the nootropic effect inherent in classical phytoadaptogens [5, 13]. Preventing the damaging effect of electrical trauma on conditioned reflex activity, the cerebroprotective effect is a particular manifestation of the state of nonspecifically increased body resistance caused by classical adaptogens, shiksha preparations. In the descending sequence, the most active decoctions are n.h. shiksha bisexual, w. black, sh. Siberian, a decoction of fruits w. bisexual, w. black, sh. Siberian, dry alcoholic extracts of fruits w. bisexual, n.h. her and w. black. According to the cerebroprotective effect, the decoction of n.ch. sh. bisexual reliably surpasses alcoholic extracts and decoctions from fruits of all kinds, and a decoction from n.ch. sh. black the same preparations, except for the extract from the fruits of w. bisexual. The obtained result, as well as the above data, confirms the legitimacy of using a decoction of the aerial parts of shiksha species in folk and traditional medicine.

Table Tables 2 and 3 show the results of a comparative assessment of the effect of preparations from shiksha species on the restoration of the motor component of the orienting reflex in mice after MES, moderate electrical injury that does not cause death of the animals, and subcutaneous administration of corazole in a non-lethal, essentially subconvulsive dose. With MES, the number of animals without getting up decreased

only a decoction of n.ch. shiksha bisexual, without transitions - n.ch decoctions. and fruits w. bisexual, n.h. sh. black. The average number of approximate risings was increased by decoctions of n.h. all kinds of shiksha, as well as the fruits of sh. black and w. bisexual. Table 3 shows mostly positive results, data on ineffective alcoholic extracts, fruit decoctions, ethyl acetate fractions, the amount of flavonoids are omitted. The results obtained are in agreement with the results on the MES model. For moderate electrical trauma and corazole shock, decoctions of low purity were effective. all kinds of shiksha. Decoctions of fruits of two types were significantly inferior to decoctions of n.ch.

Table 3

Comparative assessment of the effect of herbal preparations from shiksha species on the restoration of the motor component of the orienting reflex after mild electrical injury or corazole shock

View and part plants	A drug	Number of animals			Average number	
		Total	without			
			standing up	transitions	standing up	transitions
Intact animals		twenty	0 *	0 *	16.8 ± 4.9 *	19.6 ± 5.3 *
Control, electrical injury	water	twenty	9	eight	4.3 ± 1.8	8.8 ± 2.7
Shiksha black oversight part fruit	decoction decoction	twenty twenty	2 * 7	one* 6	11.5 ± 3.6 * 7.8 ± 2.2 *	16.3 ± 4.1 * 9.1 ± 2.8 *
Sh. Bisexual oversight part fruit	decoction decoction	twenty twenty	one* 3	0 * 3	14.8 ± 4.5 * 9.6 ± 3.0 *	18.5 ± 5.2 * 12.0 ± 3.4 *
Sh. Siberian oversight part	decoction	twenty	2 *	2	13.2 ± 3.8 *	16.7 ± 3.9 *
S. almost golar critical oversight part	decoction	twenty	2 *	2	10.4 ± 2.8 *	14.5 ± 4.0 *
Control						
Corazol 60 mg / kg subcutaneously	water	twenty	10	9	2.1 ± 1.1	4.2 ± 1.8
Sh. Black oversight part	decoction	twenty	4	2 *	8.5 ± 2.7 *	9.9 ± 3.0 *
Sh. Bisexual oversight part fruit	decoction decoction	twenty twenty	3 * 6	2 * 6	11.8 ± 4.2 * 5.3 ± 1.7 *	14.7 ± 4.9 * 8.9 ± 2.0 *
Sh. Siberian oversight part fruit	decoction decoction	twenty twenty	4 6	2 * 5	7.5 ± 2.2 * 4.0 ± 1.8	10.1 ± 3.6 * 8.3 ± 2.5 *
S. almost golar critical oversight part	decoction	twenty	3 *	2 *	7.1 ± 2.5 *	13.5 ± 4.1 *

Notes are the same as in table. 12.

When assessing the antihypoxant activity of preparations from shiksha species on 3 hypoxia models, the effectiveness of decoctions of the aerial parts of all plants (7-day administration) in hypobaric hypoxia should be noted. They significantly extended the lifespan of mice from 9.9 min. in control up to 13.8-14.6 min. (ie, up to 139-147%). A decoction of dry fruits of bisexual shiksha was also effective (13.9 min.). The rest of the preparations did not change the life span of the animals under hypoxic conditions. Hypobaric hypoxia is a generally accepted test in the study of the nootropic, cerebroprotective activity of drugs. The detection of antihypoxant activity in 5 out of 19 studied drugs should be considered a high screening result for cerebroprotectors.

During hypoxia with hypercapnia (survival in a hermetically sealed space), 4 drugs significantly (from 25.4 to 29.5–33.4 minutes, ie, up to 116–131%) prolonged the life of animals: 4 drugs: decoctions of n.p. black shiksha, w. bisexual and w. Siberian, fruits of w. bisexual. Alcoholic extract of n.p. Siberian shiksha significantly shortened the life time of mice to 20.8 min. The rest of the drugs did not change it. In hemic hypoxia caused by the methemoglobin-forming agent sodium nitrite, only 3 drugs showed antihypoxant activity: decoctions of n.p. shiksha bisexual, w. Siberian, fruits of w. bisexual. They extended the lifespan of mice from 16.3 to 20.8-22.1 min. up to 128-136%. The obtained results of the effectiveness of the listed drugs are generally reproducible with greater reliability in female SHR mice and not always in males. On rats with hypobaric hypoxia, all decoctions of n.p. are effective. and fruits of 4 types of crowberry, but alcohol extracts are ineffective. Obviously, in this species of animals, decoctions of shiksha species more demonstratively mobilize antihypoxant protection. In general, the activity of preparations of shiksha species should be recognized as moderate, as in other galenic forms from many plants [5], but it is essential to establish the presence of such, since only a few works are devoted to a comparative assessment of the antihypoxant activity of phytopreparations [5, 17, 19], and phytopreparations are not perceived by clinicians as antihypoxants and cerebroprotectors.

In clinical studies, we use, in accordance with the results of experiments, data from other authors, as well as folk and traditional medicine, the aerial part of the black shiksha and bisexual shiksha. However, relying only on the cerebroprotective properties of shiksha decoctions would be inappropriate when searching for effective methods of treating patients with multiple sclerosis, since the pathogenesis of the disease and the clinic put forward a number of numerous problems for researchers. Following the rules for compiling multicomponent collections in traditional medicine, we include in them a wide range of synergists of cerebroprotectors that mobilize endogenous cytoprotective protection [2, 3, 5, 11, 15]:), valerian, meadowsweet, peony species and other plants. We use plants with proven immunocorrective, desensitizing activity: adaptogens, ginger, turmeric, string, blackhead, duckweed, black currant, calamus, elecampane. At all stages of the disease, especially during the period of exacerbation, the so-called anti-inflammatory plants are shown: raspberry, sage, willow leaves, n.h. string, yarrow, tansy, St. John's wort, wormwood species, meadowsweet flowers, chamomile, etc. For most of them, we have proven the presence of not only antiexudative, antiproliferative (which is well known), but also antialterative, antidestructive action [5, 6]. Hepatoprotectors that mobilize the detoxification function of the liver are necessarily part of the multicomponent fees in traditional medicine. Diretic, anti-exudative agents, vasoprotectors, plants that improve cerebral circulation, complement the composition of multicomponent fees. Tibetan traditional medicine emphasizes indulgence, which is considered "the best of the five remedies." Laxative plants, which in addition have a number of other clinically significant properties, are supposed to be combined with the main plants, in our case with cerebroprotectors, immunocorrectors, antidestructive and anti-inflammatory blocks. The need for laxatives for pelvic dysfunction is self-explanatory. Depending on the specific case, plants should be used that correct the functions of the endocrine glands (licorice, adaptogens, aphrodiaca, emenogoga). Without setting the goal of listing all groups of medicinal plants that may be in demand in the treatment of patients with multiple sclerosis,

Patient M., born in 1948, suffering from multiple sclerosis since 1987, applied in 1996 to

phone (6 years does not leave the house) with a request for an examination at home and the appointment of a collection of medicinal plants. The diagnosis was clinically confirmed many times (6 hospitalizations), once by MRI. Refuses to repeat MRI examinations due to financial insecurity. The patient is well known to the majority of St. Petersburg neurologists dealing with the problem of multiple sclerosis. Recognized, in fact, unbreakable. Due to central tetraparesis, moderate dynamic ataxia, he has difficulty walking on a walker and crawling. Paresthesias, constipation, flatulence, difficulty urinating, urgency, profuse night sweats for 10 years, soreness along the large intestine and in the biliary area. Self service is almost impossible. Lonely. Neighbors, social security, acquaintances help. Deepest depression to suicidal intentions. Intellect is saved. 2 higher technical education. He constantly and competently searches for information about possible treatment, reads, communicates with other patients, thus he went to the Institute of Medical Chemistry of the Russian Academy of Sciences. On his own initiative, he began to ingest the powder of the aerial part of the black shiksha mixed with honey. This dosage form was taken from the formulation of Chinese and Tibetan traditional medicines. Without denying the benefits of such self-medication, we supplemented it with the following collection, the composition of which was changed several times over the next 10 years. This dosage form was taken from the formulation of Chinese and Tibetan traditional medicines. Without denying the benefits of such self-medication, we supplemented it with the following collection, the composition of which was changed several times over the next 10 years. This dosage form was taken from the formulation of Chinese and Tibetan traditional medicines. Without denying the benefits of such self-medication, we supplemented it with the following collection, the composition of which was changed several times over the next 10 years.

Collection 1

Ural licorice root 40.0
Eleutherococcus prickly root 20.0
High zamanihi root 20.0 Aralia root high 20.0
Schisandra chinensis fruit 10.0
Schisandra chinensis liana 20.0
Evasive peony root 20.0 Calamus rhizome 20.0 High elecampane root 20.0 Nadz. part of bisexual shiksha 40.0 part of common heather 20.0
Seed of milk thistle 20.0 Root of common chicory 20.0 Root of finger rhubarb 20.0

Burdock root 20.0 Buckthorn bark brittle 20.0 Fruit of the laxative ghostera 20.0
Cassia acutifolia leaf 20.0 Three-leafed watch leaf 10.0 Nadz. part of field horsetail 20.0 Supervision. part of meadow cornflower 30.0 Lance-shaped cocoa leaf 20.0 Rhizome of medicinal ginger 20.0 Rhizome of aromatic turmeric 10.0Collection 2

Rhizome of Valerian officinalis 30.0
Flowers of meadowsweet 40.0 part of St. John's wort 30.0 Common fennel fruits 20.0
Hanging birch leaf 20.0
Goat willow leaf 20.0
Common raspberry leaf 30.0 Leaf of narrow-leaved fireweed 30.0 Black currant leaf 20.0
Medicinal chamomile flowers 20.0 Sandy immortelle flowers 10.0 Medicinal marigold flowers 20.0 Nadz. part of a series of three-part 20.0 Overs. part of yarrow 10.0

Linden flowers cordate 20.0 Nadz part of common tansy 20.0 Nadz. part of meadow mint 20.0 Supervision part of common oregano 10.0 Nadz. part of creeping thyme 10.0 part of lemon balm 20.0 Nadz part of common blackhead 20.0 Blood-red hawthorn flowers 20.0 Blood-red hawthorn fruits 30.0 Nadz. part of forest geranium 20.0

Cinnamon rose hips 30.0

Method of preparation: 2 tablespoons of chopped collection 1 pour 1 liter of boiling water and evaporate on low heat in an enamel bowl to 0.7–0.8 liters. In 5-7 minutes. before the end of evaporation, add 2 tablespoons of the chopped collection 2. Drain everything with the raw material into a thermos. Take warm according to the principle "the more often the better", ie at least 6-7 times a day, preferably before meals and in the inter-digestive intervals. In the morning, take 2 tablets of mumiyo.

After 3 months, the patient began to go outside. Has become much more active. With the help of friends, I changed the room on the 1st floor in order to go for walks more often (in a wheelchair). After a year of treatment, he drove a hand-controlled car, went fishing with friends. Systematically does exercises, self-massage, prepares food for himself, asks as a cook on an expedition. He constantly communicates on the phone and on the Internet with doctors with multiple sclerosis, writes articles for the Znahar magazine. In every way he promotes herbal medicine, mumiyo, elements of apitherapy, active resistance to disease. The patient's condition for 10 years not only did not worsen, as is the case with the secondary progressive course of the disease, but demonstratively improved.

CONCLUSIONS

1) In the experiments, no anticonvulsant properties were found in preparations from the shiksha species. They only increase the tolerance to seizure poisons and the survival of mice at maximum electroshock. Their successful use in epilepsy is not based on anticonvulsant properties.

2) Preparations from shiksha species prevent amnesia of the conditioned reflex of passive avoidance after maximum electric shock. The cerebroprotective properties of preparations from shiksha species are also manifested in a more rapid restoration of normal unconditioned reflex exploratory behavior in mice, regardless of the method and severity of its damage, in a decrease in the number of animals with complete akinesia.

3) Cerebroprotective properties are most pronounced in decoctions from the aerial parts of the species shikshi, in particular w. bisexual and w. black. Decoctions of fruits do not show cerebroprotective properties on all models and not permanently, yielding to decoctions from aboveground parts. Alcoholic, ethyl acetate extracts, the amount of flavonoids are ineffective.

4) The practice of phytotherapy for 200 patients with multiple sclerosis with decoctions of multicomponent preparations with the inclusion of the aerial part of the shiksha species in them confirms the data of folk and traditional medicine about the effectiveness of this method of treatment.

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