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PHARMACOTOXICOLOGICAL AND ANTIDEPRESSANT ACTIVITY OF CISTANCHE MONGOLICA EXTRACT

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Relevance. According to the WHO, 3.8% of the world population suffers from depression, and the number of patients exceeds 300 million. Current synthetic antidepressants often cause adverse effects and have relatively high toxicity. Developing effective and safe herbal medicines from local plant raw materials is therefore an urgent task. The psychopharmacological properties of Cistanche mongolica, which grows in the deserts of the Fergana region and Karakalpakstan, have not been studied before.

Aim – to evaluate the acute toxicity and antidepressant activity of Cistanche mongolica extract in experimental animals in comparison with fluoxetine.

Materials and methods. The study object was an extract of the aerial and underground parts of C. mongolica. Experiments were performed on male white mice (18–24 g) and white rats (180–220 g). The extract was administered orally at doses of 50, 100 and 200 mg/kg, and the reference drug fluoxetine at 10, 20 and 30 mg/kg.

The following methods were used:

acute toxicity (LD_{50}) and a 28-day cumulation test;

forced swim test (Porsolt R.);

tail suspension test (Steru L.);

reserpine-induced blepharoptosis (2.5 mg/kg, s.c.) and the open field test;

haloperidol-induced catalepsy (1.0 mg/kg) and the light–dark box test.

Data were analysed using Student's t-test; differences at $p \leq 0.05$ were considered significant.



Results. The oral LD_{50} of the extract in white mice exceeded 10,000 mg/kg, placing it in toxicity class V (practically non-toxic). The LD_{50} of fluoxetine was 360 mg/kg (class III). No deaths occurred during 28 days of administration (total dose 127,200 mg/kg).

In the forced swim test, the active swimming period in the control group was 233.2±43.5 s. The extract increased it to 265.0±46.7 s at 50 mg/kg (+25.1%) and to 294.6±57.2 s at 100 mg/kg (+48.4%; $p \leq 0.05$). This is twice the effect of fluoxetine at 10 mg/kg (+24%). At 200 mg/kg the effect declined (+5.2%).

In the tail suspension test, the extract increased the mobility period by 21–26% compared with the control group at all doses ($p \leq 0.05$). For fluoxetine, this value was 13–31.5%.

In the reserpine model, the palpebral fissure width was 2.1±0.1 mm in the control group and 3.4±0.4, 4.0±0.3 and 3.8±0.4 mm with the extract ($p \leq 0.05$). The extract also restored the locomotor and exploratory activity suppressed by reserpine.

The extract showed dopamine-positive activity in haloperidol-induced catalepsy over 5 hours. In the light–dark box test, its anxiolytic effect was 4.3–5.2 times greater than in the control group.

The mean effective dose (ED_{50}) of the extract was 100 mg/kg, compared with 20 mg/kg for fluoxetine. The therapeutic index of the extract exceeded 100, versus 18 for fluoxetine, making the extract 5.56 times safer.

Conclusion. Cistanche mongolica extract is practically non-toxic ($LD_{50} > 10,000$ mg/kg) and has no cumulative properties. Its antidepressant activity is not inferior to that of fluoxetine, with the maximum effect at 100 mg/kg. Serotonergic and dopaminergic systems are involved in its mechanism of action. Owing to its high therapeutic index, the extract is a promising candidate for a herbal medicine for the treatment of depressive states.