AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

UDK: 615.32:615.244:543.054:543.635.33-092

# MOMORDICA CHARANTIA - A POTENTIAL HEPATOPROTECTOR

**Musayeva Dilfuza Makhmudovna**
Bukhara State Medical Institute named after
Abu Ali ibn Sina, Uzbekistan, Bukhara.
e-mail: dilyafarma@mail.ru
dilfuza.musayeva@bsmi.uz

**Annotation,** This article discusses the pharmacological properties of a plant widely used in folk medicine - Momordica charantia - also known as bitter melon, Indian pomegranate, etc. In our research, we studied the hepatoprotective properties of a dry extract of this plant in experimental hepatitis, using pharmacodynamic and biochemical research methods. It turned out that the studied substance has a strong hepatoprotective property and is in no way inferior to the famous hepatoprotective drug - Karsil, which can serve as a basis for creating a new hepatoprotective drug of plant origin.

**Key words:** folk medicine, Momordica charantia, Indian pomegranate, hepatoprotector, pharmacodynamics of the test drug, dry extract of the plant Momordica charantia.

**Relevance**

The past century has been marked by the development of drugs that directly target the causal factors of diseases. At the same time, the etiology of many diseases remains unclear, which does not allow us to disregard drugs with a pathogenetic focus that suppress primary or secondary mechanisms of pathological processes, particularly in hepatology [5, 8, 17].

Damage occurring during pathological processes in the liver can lead to significant disruptions in metabolism, immune response, detoxification, and antimicrobial functions of the organ. Many liver diseases that end with recovery leave a “trace” of metabolic disturbance that persists for years and often progresses to conditions requiring pharmacological correction. Hepatoprotective agents are often used in the pharmacotherapy of such liver dysfunctions [6, 9].

Finding an ideal liver protector that meets all requirements is unlikely at present, but natural hepatoprotectors are becoming increasingly popular [7, 14].

Momordica charantia (also known as bitter melon, karela, Indian cucumber, Indian pumpkin, balsamic pear), which grows in the tropics of Asia and Africa, is one of such plants and is used in traditional medicine [3]. Momordica has a valuable composition in its leaves, fruits, and seeds. The green mass of the plant and the seeds are used in pharmacognosy, while the pulp of the fruit is more widely used as a food product with therapeutic effects. The higher the dry matter content in the fruit pulp, the greater its functional value [13, 16].

Momordica contains a wide range of valuable chemical compounds. In young plants, these are represented by glycosides (momordicosides), in the leaves – proteins and alkaloids. The fruits are rich in proteins (α- and β-momorcarn), triterpenoid glycosides of the cucurbitane type (momordicosides F1, F2, G, J, K, L), lectins, pectin, other unidentified alkaloids, amino acids, and fatty oils. In the pericarp of Momordica charantia, five phenolic compounds and five organic acids have been identified [2, 10]. The phenolic compounds include caffeic and ferulic acids, esculetin, rutin, and coumarin. Among the organic acids, oxalic and ascorbic acids predominate. Seeds contain amino acids (tyrosine, glutamine, arginine, alanine, lysine), lectins (momordin,

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

agglutinin), cytokinins (zeatin riboside), glycosides (momordicosides C, D, E), and polypeptides [15]. The fruits contain B and C vitamins, as well as trace elements such as calcium and carotene, amino acids, alkaloids, phenols, and oils [1].

In this regard, we were interested in studying the pharmacological properties of the dry extract of Momordica charantia fruits experimentally.

**Objective of the Study:** To investigate the hepatoprotective activity of the dry extract of Momordica charantia fruits experimentally.

**Materials and Methods**

Staff of the Department of Pharmacology at Bukhara State Medical Institute carried out the introduction of Momordica charantia and obtained the dry fruit extract. The pharmacological properties of this extract were studied experimentally on 60 nonlinear rats of both sexes aged 2 months. Experiments were conducted in accordance with regulatory and methodological documents of the Republic of Uzbekistan, considering the requirements of the European Convention for the Protection of Vertebrate Animals Used for Experimental and Other Scientific Purposes (ETS No. 123, Strasbourg, 1986), as well as the National Guidelines for the Care and Use of Laboratory Animals.

An acute drug-induced hepatitis (ADH) model was chosen, reproduced by intragastric administration of acetaminophen (paracetamol) (OAO "Pharmstandard-Leksredstva," Russia) at a dose of 1500 mg/kg once daily on an empty stomach for 2 days. The laboratory animals were then divided into 6 groups:

1. Intact (healthy);
2. Untreated (ADH + $H_2O$);
3. ADH + Momordica extract 25 mg/kg;
4. ADH + Momordica extract 50 mg/kg;
5. ADH + Momordica extract 100 mg/kg;
6. Comparison group (Karsil 40 mg/kg).

The dry Momordica extract, dissolved in distilled water, was administered intragastrically once daily for 6 days. Pharmacodynamics of the test drug, lipid peroxidation (LPO) products, antioxidant system (AOS) enzyme activities, and liver biochemical parameters were studied.

Pharmacodynamic evaluation was performed using sodium thiopental at 30 mg/kg administered intraperitoneally. The pharmacological activity of the test preparation was assessed by the duration of lateral recumbency of the rats and absence of the "righting reflex," measured in minutes.

To establish the mechanism of hepatoprotective action, the microsomal-cytosolic liver fraction was analyzed for LPO products and AOS enzyme activity. Rats were euthanized under light ether anesthesia in a cold room (0–2°C) via single-step decapitation. The excised liver was homogenized in a glass homogenizer with a Teflon pestle. LPO intensity in the microsomal-cytosolic fraction was assessed by acetylhydroperoxide (AcHP) and malondialdehyde (MDA) levels. AOS status was evaluated by catalase (CAT) and superoxide dismutase (SOD) activities.

AcHP content was determined using the method of V.V.Gavrilov and M.M. Mishkorudnaya, while MDA content was measured according to L.I.Andreev et al. CAT activity was assessed by M.A.Korolyuk et al.

Data were processed using Biostat 2009 software with standard methods of variation statistics, evaluating significance (M±m) and differences between groups using Student's t-test. Statistical significance was accepted at $P<0,05$.

**Results**

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

Pharmacodynamics of the test drug reflects liver functional capacity. In our study (Fig. 1), the sleep duration in the untreated AcDH group increased by 94% (P<0,001) compared to intact rats. Under the influence of Momordica extract at 25 mg/kg, sleep increased by 64,8% (P<0,002), improving liver functional capacity by 15,1% (P<0,05); at 50 mg/kg, sleep increased by 46,8% (P<0,02), with efficacy of 24,4% (P<0,02); at 100 mg/kg, the pharmacological sleep duration increased by 22,2% (P>0,05) and liver functional capacity recovered by 37% (p<0,0001), which was superior to Karsil, where sleep increased by 30,14% (P>0,05) and efficacy was ~33% (P<0,01).

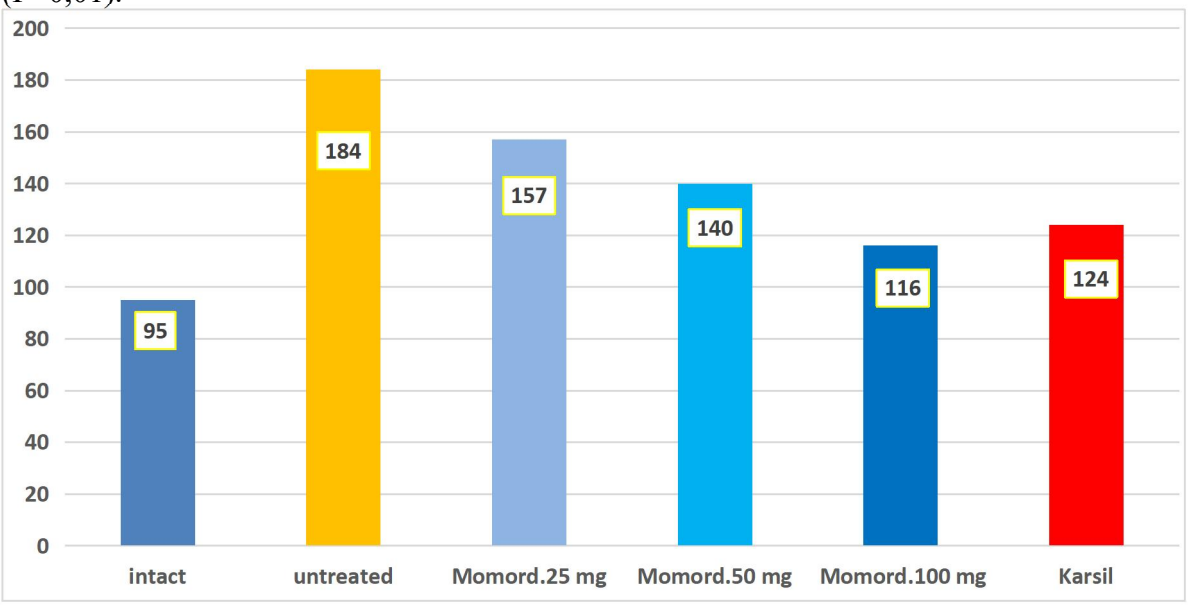


**Figure 1. Effects of momordica extract on the pharmacodynamics of the test drug – sodium ethaminal (minutes)**

To elucidate the mechanism of the hepatoprotective action of the studied extract, the levels of lipid peroxidation (LPO) products—acyl hydroperoxides (AcHP) and malondialdehyde (MDA)—were determined in liver homogenates. It was found that under the influence of Momordica charantia extract administered at doses of 25 mg/kg and 50 mg/kg, the levels of LPO products decreased; however, these changes were not statistically significant. Mechanism studies showed that 100 mg/kg of Momordica extract significantly reduced LPO products: AcHP by 64,3% and MDA by 68,8%, compared to Karsil's 59,1% and 64,3% reductions (Table 1).

**Table 1**
**EFFECT OF MOMORDICA EXTRACT ON THE CONTENT OF LIPID PEROXIDATION PRODUCTS**

| Experimental groups | AcGP (rel. units/mg protein) | MDA (nmol/mg protein) |
|---|---|---|
| 1-Intact (healthy) | 0,718±0,62 | 0,621±0,061 |
| 2-Untreated (ADH + $H_2O$) | 2,958±0,294 | 2,748±0,214 |

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

| | | |
|---|---|---|
| **3-ADH + Momordica extract 25 mg/kg** | 2,275±0,198 | 2,057±0,0191 |
| **4-ADH + Momordica extract 50 mg/kg** | 1,681±0,134** | 1,593±0,142** |
| **5-ADH + Momordica extract 100 mg/kg** | 1,055±0,095** | 0,856±0,084* ** |
| **6-Comparison group (Karsil 40 mg/kg)** | 1,207±0,125** | 0,986±0,066** |

**Note:** * - significant compared to the intact group; ** - significant compared to the untreated group (P<0,05).

Antioxidant systems (AOS) enzyme activity Catalase (CAT) and Superoxide dismutase (SOD) increased significantly under Momordica extract administration. At 25 mg/kg, CAT increased by 41,4% (P<0,05), while SOD increased by 22,8% (not statistically significant). At 50 mg/kg, CAT and SOD activities increased significantly by 91,2% (P<0,01) and 144,1% (P<0.001), respectively, approaching intact group values. At 100 mg/kg, enzyme activity reached or exceeded the levels of Karsil (Table 2).

**Table 2**

**EFFECT OF MOMORDICA EXTRACT ON THE ACTIVITY OF ANTIOXIDANT ENZYMES**

| Experimental groups | CAT (nmol $H_2O_2$/min) | SOD (standard units/min. mg) |
|---|---|---|
| **1-Intact (healthy)** | 1,28±0,126 | 2,816±0,196 |
| **2-Untreated (ADH + $H_2O$)** | 0,521±0,049 | 0,886±0,092 |
| **3-ADH + Momordica extract 25 mg/kg** | 0,737±0,068** | 1,088±0,110 |
| **4-ADH + Momordica extract 50 mg/kg** | 0,996±0,089* ** | 2,163±0,146** |
| **5-ADH + Momordica extract 100 mg/kg** | 1,151±0,101* ** | 2,431±0,246* ** |
| **6-Comparison group (Karsil 40 mg/kg)** | 1,055±0,084* ** | 2,290±0,199* ** |

**Note:** * - significant compared to the intact group; ** - significant compared to the untreated group (P<0,05).

Hepatic transaminases are involved in amino acid metabolism. It is well established that elevated levels of transaminase enzymes serve as indicators of structural damage to hepatocytes [11]. As demonstrated by the biochemical analyses obtained in the present study, administration of various doses of Momordica charantia extract resulted in a significant reduction in alanine aminotransferase (ALT) and aspartate aminotransferase (AST) levels, as shown in Figure 2 (expressed as percentages relative to the untreated group). It should be particularly emphasized that the dry extract at a dose of 100 mg/kg produced the most pronounced effects, not only

AMERICAN ACADEMIC PUBLISHER
INTERNATIONAL JOURNAL OF MEDICAL SCIENCES
ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

compared with the untreated group but also exceeding the efficacy of the reference hepatoprotective agent, Karsil.

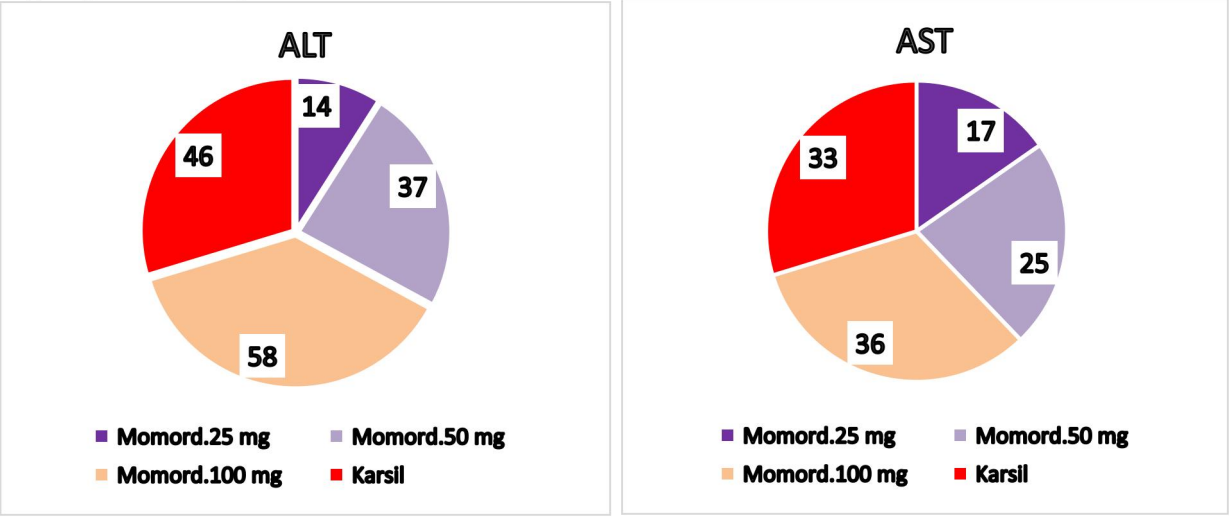


**Figure 2. Effect of momordica extract on blood transaminase levels**
(reduction in levels compared to the untreated group, in %)

Protein metabolism represents one of the principal functions of the liver, and serum protein levels reflect morphological changes in hepatocytes [4, 12]. In our study, administration of different doses of Momordica charantia extract led to a significant increase in total protein and albumin levels. Notably, pharmacotherapy with the dry extract at a dose of 100 mg/kg demonstrated the most favorable results, with values approaching those observed in the group treated with the hepatoprotective agent Karsil (Figure 3).

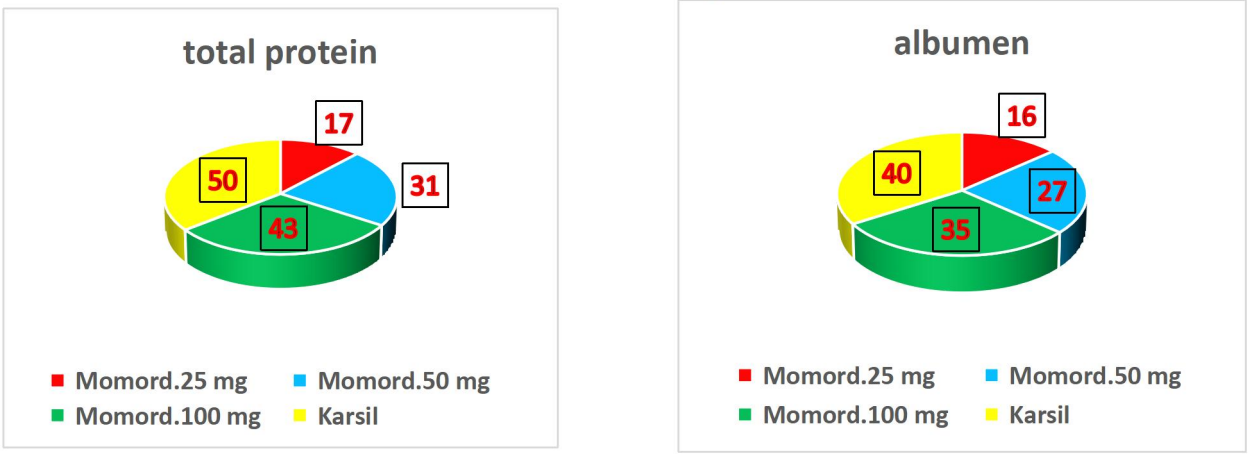


**Figure 3. Effect of momordica extract on protein metabolism parameters**
(increase in parameters compared to the untreated group in %)

**Conclusions**

The dry extract of Momordica charantia positively affects altered morphological and functional liver parameters. It possesses antioxidant activity, reducing lipid peroxidation and hepatocyte membrane damage. The extract demonstrates hepatoprotective activity, particularly in acute hepatitis, with the most effective dose being 100 mg/kg, comparable to Karsil. These results provide a basis for developing a new hepatoprotective drug derived from Momordica charantia, which is natural, accessible, and affordable.

**References.**

AMERICAN ACADEMIC PUBLISHER

INTERNATIONAL JOURNAL OF MEDICAL SCIENCES

ISSN NUMBER: 2692 - 5206 Volume 6. No 02. February ,2026

1. Abas, R., Othman, F., & Thent, Z. C. (2015). Effect of Momordica charantia fruit extract on vascular complication in type 1 diabetic rats. *EXCLI Journal*, *14*, 179.
2. Arshad, M. U., Aslam, T., & Khalil, A. A. (2018). Hypolipidemic perspectives of bittergourd (*Momordica Charantia* L.) ethanolic extracts in rat model. *Sylwan*, *162*(2), 151–163.
3. Barua, R., Talukder, M. E. U., Islam, M. S., Yesmin, F., Chakma, K., Kabir, M. G., & Bhuiyan, R. H. (2020). Nutritional analysis and phytochemical evaluation of bitter gourd (*Momordica charantia*) from Bangladesh. *Asian Journal of Agriculture and Food Sciences*, *8*(02), 11–17.
4. Jia S, Shen M, Zhang F, Xie J. Recent Advances in Momordica charantia: Functional Components and Biological Activities. Int J Mol Sci. 2017 Nov 28;18(12):2555. doi: 10.3390/ijms18122555. PMID: 29182587; PMCID: PMC5751158.
5. Maksimov M.L., et al. *Clinical Pharmacology and Rational Pharmacotherapy for Practicing Physicians*. 2021.
6. Mirzaeva M.M., et al. Modernization of medical and sanitary care for rural populations. *New Day in Medicine*. 2020;1:49–52.
7. Musaeva D.M., et al. Antioxidant correction of pharmacometabolizing liver function in experimental toxic hepatitis. *Bulletin of Science and Education*. 2020;14-1(92):63–70.
8. .Musaeva D.M., Ochilov A.K., Ochilova G.S. Correction of pharmacometabolizing liver function with antioxidants. *Achievements of Science and Education*. 2018;10(32):62–63.
9. Musaeva D.M., Samadov B.Sh., Ochilova G.S. Hepatoprotective effect of phenobarbital in experimental toxic hepatitis. In: *Liki-Ljudy. Current Problems of Pharmacotherapy and Prescription Drugs. International Conference*, Kharkiv, March 12–13, 2020. Vol. 1. 2020:341–344.
10. Orlovskaya T.V. HPLC analysis of *Momordica charantia* fruits. *Pharmacy*. 2010;1:8–11.
11. Rakhymzhan G.Zh., Aralbaeva A.N., Murzakmetova M.K. Evaluation of the effect of a herbal preparation on blood biochemical parameters in experimental hepatitis. *Electronic Scientific-Educational Journal "Health and Education in the 21st Century"*. 2016;18(12):46–49.
12. Samadov B. S., Jalilova F. S., Jalilov F. S. Analysis of the components of the collection of medicinal plant raw materials of Momordica Charantia L //Scientific progress. – 2022. – Т. 3. – №. 8. – С. 49-57.
13. Samadov B.Sh., Boltaev M.M., Meliboeva Sh.Sh., Jalilov F.S. Hypolipidemic activity of *Momordica charantia* L. fruit raw materials. *Central Asian Academic Journal of Scientific Research*. 2022;8. Available from: https://cyberleninka.ru/article/n/gipolipimidemicheskaya-aktivnost-syrya-plody-momordika-harantsiya-momordica-charantia-l
14. Samadov B.Sh., Musaeva D.M., Dubinina N.V. Comparative characteristics and trends in the epidemiology of hepatitis C in Ukraine and Uzbekistan. *New Day in Medicine*. 2019;4:284–290.
15. Samadov B.Sh., et al. Chemical composition of medicinal raw materials of *Momordica charantia* L. cultivated in Bukhara region, Uzbekistan. *Bulletin of Science and Education*. 2021;15-1(118):106–110.
16. Sampiev A.M., Shevchenko A.I., Nikiforova E.B., Morozov A.I. Pharmacognostic study of the aerial parts of *Momordica charantia*. *Problems of Biological, Medical and Pharmaceutical Chemistry*. 2021;6. Available from: https://cyberleninka.ru/article/n/farmakognosticheskoe-issledovanie-nadzemnoy-chasti-momordiki-harantsiya
17. Yunusov A., et al. Application of drugs in experimental toxic liver injury. *in Library*. 2021;21(1):206–211.