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Study of the Chemical Composition of the Plant of the Ephedra Family

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ANNOTATION: Medical significance of ephedra Sympathomimetic properties of ephedrine alkaloids. Pharmacological effects depend on the phytochemical composition of individual Ephedra species. The variable composition and ratio between secondary metabolites identified in different Ephedra species reflect their metabolic activity. The use of UPLC-UV is to isolate species and quantify this method in sensitive, selected, and complex biological matrices.

KEYWORDS: Ephedra, alkaloids, vitamins, phenols, flavonoids, spectrophotometry, polyurethane.

I. INTRODUCTION

Living nature has been of interest to humans since ancient times as a source of nutrients. In ancient cultures, people knew how to extract dyes, medicines, and other essential products from plant and animal raw materials, as well as how to process them. Efforts to explain scientifically the phenomena of living organisms are found in the works of ancient Indian, Greek, and Roman thinkers. Their ideas were developed by medieval (Renaissance) scholars. In nature, the species covers the Caucasus, the Trans-Volga region in the southeast of the European part of Russia, Western Siberia, the mountains of Central Asia, the Eastern Tien Shan, Mongolia, and China.

As a result, by the end of the 18th century, it was fully and convincingly established that simple and complex chemical changes in matter formed the basis of the vital activity of organisms. Ephedra is one of the oldest drugs and has been used by the Chinese for at least 5,000 years. It contains alkaloids of the ephedrine type that act as sympathomimetics. Pharmacological and toxicological effects depend on the type of individual alkaloid, its enantiomeric form and the properties of its binding to receptors. Ephedrine stimulates heart rate, raises blood pressure, enhances bronchodilation, and acts on the central nervous system by binding to adrenergic receptors. Many plants that have a stimulatory effect on the CNS synthesize substances containing phenylethylamine or xanthine structures that are able to enhance the catecholaminergic effect and act on adrenoceptors. Today, there is a growing interest in the Ephedra program in increasing efficiency and suppressing appetite. Herbal remedies have a number of advantages over synthetic drugs. Complex, they contain many ingredients that give them valuable properties and have a multifaceted effect on the body, each of which is stronger than the individual effects. Cell and tissue culture of higher plants is an unconventional way of preserving medicinal plants, preserving the valuable gene pool of tree and herbaceous plant forms, obtaining, treating, renewing plants at the expense of year-round production of regenerants and is a method of reproduction. and mass yield of planting material by clone micropropagation. Unlike most other herbal supplements, Ephedra products pose an incredible health risk, which is aggravated by their misuse and consumption. According to a 2005 assessment by the Food and Drug Administration, food supplements containing type E alkaloids represent an unacceptable risk to health, given the conditions of use.

II. MATERIALS AND METHODS

Consequently, the FDA has banned all drugs containing ephedrine. Reviews of reports on human activity have described cardiovascular and cerebrovascular adverse events, possibly related to the preparation of dietary supplements containing type E alkaloids. The World Anti-Doping Agency has banned E, PE and methylephedrine as stimulants. In addition, E and PE are observed worldwide as pioneers for the chemical synthesis of methamphetamine. In addition to consumer abuse, there are also cases of manufacturer abuse, which is reflected in the preparation of Ephedrae herba or its synthetic E alkaloids. Therefore, the specificity and origin of alkaloids in herbal preparations are often questionable, and analytical methods that provide safety and quality control and verification are of great importance and require

improvement. The phytochemical composition of different Ephedra species is not fully elucidated. Secondary metabolites derived from ephedra species include alkaloids, amino acids and derivatives, volatiles, and phenolic compounds. Ephedra species contain biologically important alkaloids: E, PE, norephedrine, norsevdoephedrine, methylephedrine and methylsevdoephedrine. Other phytochemical compounds include kinurenates, citric, malic and oxalic acids, saponins, calcium oxalate crystals and trace minerals. According to several reports, the volatile compounds present in this plant are mainly represented by terpenoids and they can be used as chemotactic markers. Phenolic compounds and their most important minor flavonoids are common aromatic compounds in the plant world. They are present in the phytochemical composition of ephedra, but to the best of our knowledge, the literature provides information on their overall composition in most of the types of ephedra used in this study. Possession of ephedra species is not considered illegal, unlike species that contain E alkaloids. Quantitative data can be used to control the quality of herbal and synthetic drugs containing E alkaloids, which is very important to ensure their safety and efficacy. Recently, the problems of environmental protection and rational use have become the subject of serious scientific research and an integral part of the organization of modern production. Traditionally, biologically active substances of plants are obtained on the basis of the use of natural raw materials.

Therefore, in addition to traditional methods for obtaining and preserving plants - a source of biologically active substances, there are other methods, such as introduction, organization of reserves, creation of reserves, plantations. At present, the price of the product must be high enough to create a useful cell culture production. In the future, plant cells can participate as competitors of microorganisms in the synthesis of essential amino acids by creating technologies that can increase the productivity of cell strains and increase the amount of product and reduce its production time. , some valuable plant proteins, vitamins and other substances. In this regard, the in vitro cultivation of higher plant tissues and cells (especially Ephedra monosperma) in order to obtain specialized metabolic compounds and use them for industrial purposes to preserve the gene pool determines the relevance of this study. For the first time, conditions were selected for the introduction of ephedra monosperm into in vitro culture, and a callus culture of ephedra monosperm with high efficiency was obtained from a wild donor plant characterized by growth stability. According to Murashige and Skoog, a mineral-based modified nutrient medium has been found to provide the best processes for the vital activity of Ephedra monosperma implants and the accumulation of biologically active substances in callus tissue. It is known that the hormonal composition of the environment affects the accumulation of Ephedra monosperm cell biomass and the amount of alkaloids in it. Callus tissue contains a large amount of alkaloids compared to the young branches of an intact plant, which are almost 2 times higher than in an intact plant. Large amounts of alkaloids (2.20%) were found to be present in callus tissue grown on polyurethane foam substrates. The technological scheme of obtaining alkaloids from ephedra monosperm callus tissue was proposed and the cost-effectiveness of obtaining alkaloids from Ephedra monosperm cell culture was evaluated. Perennial, densely branched shrub up to 1-1.5 m in height. The root is thick, long, branched. Stem single or branched, thick, branched from base, stiffened, gray; inner branches up to 2 cm in diameter, 1.5–2 mm, upward-pointing, straight, protruding, articulated, smooth, green, finely grooved.

The leaves, including two, are bark-like, opposite, clustered at the base, in the form of a short triangle at the top, devoid of chlorophyll. Chloroplasts are located in the cells of the bark of young, non-browned stems. Male spikelets one or two or three in number, 4-5 mm long, crowded, located along the branches, two to four flowers, almost spherical; outer rounds round-oval, flat, one-third soldered, slender, inner rounds round, longer, with barely opened anther column; anthers with six to eight, almost seated, very rarely short threads.

Female spikelets anther-like, 1–2 mm long, located on legs, single-flowered; bracts are two or three pairs, the lower part is broadly oval, narrow membrane along the edge, one-third soldered, the inner part soldered two-thirds below. Pollinated by wind. Fruits are red or orange, fleshy, spherical elongated single-seeded fruit (cone), 6–7 mm in length. Seeds are round, convex on both sides, 4-6 mm long. Flowering in May-June. The seeds ripen fully in July, the cones fall in September.

III.CONCLUSION

The conclusion is that in this study, different Ephedra species were examined using spectrophotometry in relation to TAC, TPC, and TFC. Chromatographic methods are simpler and more useful in phytochemical analysis to ensure adequate sensitivity. Therefore, E-type alkaloids were used to separate in the first Ephedra species. In contrast to many studies and reports, the methods used have provided a set of qualitative and quantitative parameters that help to determine the specificity of the plant material. Quantitative analysis has become a crucial and most common approach in controlling the quality of herbal preparations and plant ground materials. The composition and absence of the identified Ephedra alkaloids determine the pharmacological and toxicological effects and reflect the metabolic



pathways found in different Ephedra species. Comparing the ratio between secondary metabolites, it can be concluded that species with high TAC are expected to be rich in TPC and TFC. It is important for all of us to protect this species and use it wisely. Its useful properties include a large number of high-grade plants.

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