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Editorial

Traditional Mongolian medicine: Past, present and future

Traditional Mongolian medicine (TMM) forms an essential part of traditional Chinese medicine (TCM) with its own unique and profound theoretical system, drug resources, processing technologies, and drug usage procedures. TMM has the characteristics of being "raw, simple, inexpensive, and green". It has unique advantages and remarkable efficacy in treating common diseases, frequently-occurring diseases, and certain rare diseases. TMM has been increasingly recognized in recent years, together with an increased understanding and appreciation of its advantages. The development of the TMM industry can not only meet the health needs of local people but also had great significance for the economic and social development of ethnic minority areas.

Mongolian ancestors not only accumulated healthcare experience compatible with the geographical environment, climate conditions, and way of life but also developed distinctive diets, medicines, and other treatments. According to historical records, the Mongolians had a proficient knowledge of medicine at least 2000 years ago. *The Secret History of Mongolia* is a literary masterpiece, containing information on medicinal herbs, such as *Pyrus betulaefolia*, cypress, red artemisia, *Sanguisorba officinalis*, *Tephroseris kirilowii*, mountain leek, and wild onion, amongst many others. In addition, Mongolians make good use of animal medicines, which is inseparable from the production and lifestyle of hunting and husbandry. For example, wild boar dung, fox lung, wolf stomach, bear bile, musk, vulture dung, bat meat, and deer antlers have been used as valuable medicinal materials up to the present day. The TCM theoretical system significantly influenced and promoted the development of TMM medical theory. In addition, with the spread of Buddhism, ancient Indian and Tibetan medical works were also introduced into Mongolia, including the *Astanga Hrdaya Samhitd* (Eight Branches of Medical Classics) and the *Four Medical Tantra,* which had a significant influence on the TMM theoretical system during the 16th century. Furthermore, since the founding of the People's Republic of China, nearly 100 ancient Mongolian medical books have been re-edited and published, and around 2200 Mongolian medicinal herbs and prescriptions have been summarized. This indicates an unprecedented development in TMM under the support of the government.

At present, there are increasing numbers of evidence-based investigations into TMM. A variety of studies have been conducted to improve the quality and safety of TMM by optimizing the harvesting time, processing, preparation, and storage of Mongolian medicinal materials. With the development of modern pharmaceutical science, researchers are putting their efforts into the extraction and isolation of active compounds, pharmacology research, the formulation of quality standards, and dosages. Research on the chemical components of the TMM has developed rapidly. Modern chromatographic separation techniques, spectral analysis, and other technologies have been used to isolate and identify the chemical components of the TMM. The quality standard of Guanxin Shutong Capsule, a Mongolian medicine-based new drug was included in *Chinese Pharmacopoeia*. The application of the internet and big data-mining technology has been used for further improving the quality standards of TMM medicinal materials, using controlled conditions and processing, together with accurate descriptions of the functions and indications.

However, there are still many challenges in the TMM field. First, the basic research into TMM has often been relatively weak, with less emphasis on innovative research and the development of new products. This affects the standardization, modernization, and industrialization of TMM significantly. For example, research into the formation of a complete set of quality standards and specifications, including the standardization, material basis, mechanisms of action, and compound preparations is still insufficient. Second, enterprises dealing in Mongolian medicine tend to have low production levels with weak innovation and development capacities. The cooperation between enterprises and universities and research institutions is relatively poor, and scientific research and production cannot be effectively combined. The production process of Mongolian medicine tends to be primitive, using mostly traditional forms of dosage, and many of the preparations lack the attributes of modern pharmaceutical products, such as quick-acting, long-lasting, and sustained-release properties. Last but not least, Mongolian medicine is deficient in wild resources and artificial planting technology has tended to lag. For a long time, Mongolian medicinal materials were largely obtained from the wild, with few planted artificially. With the increasing demand for the raw materials of Mongolian medicine, the output and reserves of wild medicinal materials are declining rapidly, and many medicinal plants are on the verge of extinction. However, there is little research into the artificial cultivation of Mongolian medicinal materials, and the present limited cultivation cannot meet the needs of TMM production, thus threatening the sustainable development of the TMM industry.

It is thus important to focus on the combination of modern medicine and traditional Mongolian theory, giving full play to the advantages of the unique characteristics of TMM, and using modern science and technology for Mongolian pharmaceutical industry production and process standardization, quality control, drug standardization, standardization of clinical evaluation, accelerate the realization of the process of transforming TMM research achievements into productivity. At the same time, we should aim to

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develop a new generation of high-efficiency and low-toxicity pharmaceutical products that are in line with international standards, improve the level of Mongolian medicine research and the development of engineering technology to ensure the quality of TMM preparations, and cultivate more senior engineering and technical personnel. We firmly believe that with the implementation of the "Healthy China" strategy, the advantages of TMM will be further demonstrated and will make greater contributions to human health.

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