The study of chemical composition and pharmacological action of the alkaloid from plants of Lycoris Herb

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Abstract. Recently, studies on Lycoris type alkaloids received the attention of scholars home and abroad. Lycoris type contains lots of alkaloids, it can be divided into seven types according to its molecular structure, including Lycorine, Crinine, Galanthamine, Tazettine, Narciclasine, Lycorenine, Homolycorine and Montanine. Researches have shown that Lycoris type possess multiple pharmacology activity, such as strong anti-tumor activity of human breast cancer cell (MCF-7), human leukemia cell(HL-60); and strong inhibition effect of flu virus, measles virus, polio virus and SARS virus; Besides, Lycorine type has strong anti-Acetylcholinesterase effect. In a word, Lycorine type, Lycoris type alkaloids carries multiple pharmacology effect and is a promising substance.

1. Introduction
Amaryllidaceae Lycoris Herb mainly produced in Asia, where China is a big country for Lycoris output, at present our country found about 17 species of Lycoris Herb[¹]. The study found that Lycoris herb rich in alkaloids chemical composition and Lycoris type alkaloids variety, diverse structures and pharmacological activities are widely. Currently found Lycorine type alkaloids has anti-tumor, anti-acetylcholinesterase, antibacterial and antiviral effect. In recent years, studies on Lycoris type alkaloids received the attention of scholars home and abroad. Reports on its pharmacological effects are common, but the lack of systems of classification of a Lycoris type alkaloids and pharmacological effects the summary.

2. Lycoris type alkaloids chemical composition
Lycoris herb are mainly distributed in Asia, there are 17 kinds of common Lycoris herb(table 1)[²]. There are many kinds for chemical composition of alkaloids. It can be divided into seven types according to its molecular structure, including Lycorine, Crinine, Galanthamine, Tazettine, Narciclasine, Lycorenine, Homolycorine and Montanine[³].

Table 1. Varieties of Lycoris Herb

| Number | Species   | Number | Species   | Number | Species   |
|--------|-----------|--------|-----------|--------|-----------|
| 1      | L.anhuiensis. | 7      | L.squamigera. | 13     | L.radiata. |
| 2      | L.aurea.   | 8      | L.shanxiensis. | 14     | L.haywardii. |
| 3      | L.incana.  | 9      | L.straminea.  | 15     | L.longituba. |
| 4      | L.caldweltii. | 10    | L.chinensis.  | 16     | L.uncarnate |
| 5      | L.guangxiensis. | 11    | L.albiflora. | 17     | L转会ieren |
| 6      | L.sprengeri. | 12    | L.houdysheli. |        |            |

1st International Global on Renewable Energy and Development (IGRED 2017)
IOP Conf. Series: Earth and Environmental Science 100 (2017) 012045
doi:10.1088/1755-1315/100/1/012045
2.1. Lycoris type alkaloids
It isolated 17 Lycoris type alkaloids from Lycoris herb (figure 1), Lycorine (1) isolated from L. haywardii; 5,6-dehydrodihydrolycorine (2), dihydrolycorine (3) and 7-oxodihydrolycorine (4) isolated from L. haywardii [4-6]; galanthine (5) and Caranine (6) isolated from L. haywardii [7]; Ungminorine (7) isolated from L. haywardii [8-10]; Ungminorine N-oxide (8) isolated from L. incanata [11]; Hippadine (9) isolated from L. haywardii [14]; Pseudolycorine (10) and Norpluviine (11) isolated from L. haywardii [12]; lycoramine A (12) isolated from L. haywardii [11]; (-)-amarbellisine (14) isolated from L. longituba [16]; Pluviine (15) isolated from L. aurea [17]; LT1 (16) and Incartine (17) isolated from L. incanata [18].

2.2. Galanthamine type alkaloids
It isolated 14 Galanthamine alkaloids from Lycoris herb (figure 2), Galanthamine (18) isolated from L. haywardii [15]; Galanthamine N-oxide (19) isolated from L. incanata [11]; lycomarine (20) and Lycoramine N-oxide (21) and Sanguinine N-oxide (24) isolated from L. haywardii [4]; O-demethyllycoramine (22) isolated from L. aurea [16]; Sanguinine (23) isolated from L. sanguinea [12]; epi-galanthamine (25) isolated from L. squamigera [8]; Narwedine (26), Norgalanthamine (27) and N-allylnorgalanthamine (28) isolated from L. guangxiensis [10]; N-demethyllycoramine (29) isolated from L. haywardii [15]; Norsanguinine (30) and nortubanguniinem (31) isolated from L. sanguinea [27].

2.3. Crinine type or Hemanthamine type alkaloids
It isolated 10 Crinine type or Hemanthamine alkaloids from Lycoris herb (figure 3), 6β-acetoxycriamine (32) isolated from L. haywardii [6]; Crinine (33) L. guangxiensis [10] and 6β-hydroxycriamine (34) isolated from L. haywardii [6]; 6α-hydroxycriamine (35) and Macowine (39) isolated from L. longituba [19]; 11-hydroxyvittatine (36) isolated from L. haywardii [6]; Haemanthidine (37) isolated from L. haywardii [4,18]; Vittatine (38) isolated from L. haywardii [4,18]; O-demethylhaemanthamine (40) and haemanthamin (41) isolated from L. haywardii [19].

Figure 1. Lycoris type alkaloids
3. The pharmacological effects of Lycorine type alkaloids chemical composition

3.1. Anti-tumor effect
The chemical composition of Lycoris type alkaloids have anti-tumor activity, which Lycorine type, Crinine type alkaloids anti-tumor activity is particularly significant. The study found that Lycorine is Lycoris type alkaloid first isolated monomer components obtained from Lycoris, such as strong anti-tumor activity of human breast cancer cell (MCF-7), human leukemia cell (HL-60); and strong inhibition effect of flu virus, measles virus, polio virus and SARS virus [21-22]. Scholars of Lycorine antitumor mechanism depth study found Lycorine through the mitochondrial pathway, death receptor pathway and cell cycle arrest pathway inhibit tumor cell proliferation, in three ways to induce tumor cell apoptosis by triggering the mitochondrial pathway play a leading role [23]; Crinine, Crinamine and Haemantamine from Crinine type alkaloids has a good anti-tumor activity, including haemantamine has a strong inhibitory effect on human cervical cancer HeLa cells [24]; Narciclasine and Lycoricidine has inhibitory activity to the variety of human tumor cells [25].

3.2. Anti-acetylcholinesterase effect
Lycoris alkaloids chemical composition have anti-acetylcholinesterase (AchE) activity, among them, the activity of Galanthamine type and Lycorine type alkaloids are most significant [26]. The study found that Galanthamine and O-desmethyl galantamine from Galanthamine type alkaloids have anti-acetylcholinesterase (AchE) activity. Galantamine the performance of AchE inhibition is competitive reversible inhibition, the role of the IC50 is 1.9 μmol/L [27]; 1-O-acetyllycorine of Lycorine
type alkaloids has significant inhibitory activity and its intensity is equal to 2 times of Galanthamine, Lycorine of Lycoris type alkaloids, 1,2 diacetyl Lycorine anti-AchE activity is poor; In addition, the study also found that montanine of AchE showed some inhibition, the strength of galanthamine was slightly lower. Narciprimine and 6-Hydroxycrinamine also has anti-AchE activity.

3.3. Anti-bacterial and Anti-viral effect

The chemical composition of Lycoris type alkaloids have anti-bacterial activity, some scholars have found that Crinine type alkaloids with broad-spectrum antimicrobial activity, Crinine has inhibitory activity against Staphylococcus aureus; Crinine and ainarbellis ine have anti-E.coli activity; The hippeastrine of Lycoris type alkaloids has anti-Candida albicans activity; The chemical composition of Lycoris type alkaloids have anti-viral activity, Lycoris type alkaloids has inhibition effect of flu virus, measles virus, polio virus and SARS virus; Haemanthidine of Crinine alkaloids have anti-transcriptional activity effect on HIV-1 virus, Homolycorine of Lycoris type alkaloids and Colchicine of Tazettine alkaloids also have anti-transcriptional activity.

4. Conclusion

Lycoris Herb as Chinese traditional medicines, has the characteristics of wide distribution, abundant resources, Lycoris Herb rich in chemical composition, in recent years with development of chemical composition and pharmacological effects of Lycoris type alkaloids, increasing the quantity and types of alkaloids, constantly enrich the pharmacological action, but the majority of chemical composition research of Lycoris type alkaloids is still in the initial stage, pharmacological mechanism of action is not clear. Therefore, it is necessary to chemical composition of Lycoris type alkaloids, depth and systematic study of pharmacological mechanisms, provide a theoretical basis for the development of high efficiency and low toxicity of alkaloid chemicals to make Lycoris Herb better play its medicinal value.

Acknowledgments

This work was supported by Harbin municipal science and technology bureau project(2016RQQXJ124, 2016RAXXJ064); Innovation talent project of education department of heilongjiang province(UNPYSCT-2016181); Harbin University of Commerce graduate student innovation project(YJSCX2017-454HSD)

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