**Coix lacryma-jobi**

*Coix lacryma-jobi*

**Synonyms**

*Coix lacryma*
*Lithagrostis lacryma*
*Coix agrestis*
*Coix pendula*
*Coix ovate* Stokes
*Coix exaltata*
*Sphaerium lacryma* [3]

**Vernacular Names:**

<table>
<thead>
<tr>
<th>Malaysia</th>
<th>Jelai</th>
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<tbody>
<tr>
<td>English</td>
<td>Job’s tear</td>
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<tr>
<td>Indonesia</td>
<td>Penggong ileum, Singkoru batu, Singkiru eme, Cingkeru, Lingkhi-lingkhi, Anjalai bareh, Sipiluit, Jelim, Lahya, Togua (Sumatra); Hanyere, Hanjeli, Jali-jali, Jali watu, Japen, Jhangle (Java); Kemangge, Dele (Nusa Tenggara); Jelei, Pare, Pelindas, Luwong (Kalimantan); Buklehang, Tandei ula, Rungkerang, Tataokok, Tie, Boeyango, Lele, Irule, Kalide, Jole kojo, To ulope (Sulawesi); Kase lore, Baba samond, Gafu, Manji-manji bangra, Rore, Jejeane, Sare, Sale, Lore, Minyak (Maluku); Karisi, Klumba (Irian)</td>
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<tr>
<td>Philippines</td>
<td>Adlay</td>
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<td>China</td>
<td>Da Wan Si, Yi Yi Ren</td>
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<td>Japan</td>
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<td>India</td>
<td>Gavethu, Jargadi (Sanskrit); Sankru (Hindi); Gurgur (Bengal)</td>
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<td>Arab</td>
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<td>German</td>
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<tr>
<td>Spanish</td>
<td>Lagrima de San Pedro, Ruema</td>
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<tr>
<td>French</td>
<td>Larmes-de-Job [2][3]</td>
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**General Information**

**Description**

*Coix lacryma-jobi* is a member of the Poaceae family. It is a small herbaceous plant which grows up to 2.5 m high. The leaf sheaths are glabrous and the leaf blades are narrowly lanceolate, measuring 20-50 cm long and 1.5-4 cm wide. The midrib is prominent. The flowers are monoecious, both male and female flowers can be found on
the same plant. Fruit is tear-shaped 8 mm by 1.1 cm, with glossy berries which turn black upon maturity.[1]

Plant Part Used

Roots, leaves and seeds [1][2]

Chemical Constituents

4-ketopinoresinol; alpha-coixin; alpha-sitosterol; beta-sitosterol; coicin; coixan A; coixan B; coixan C; coixenolide; coixlactam; coixol; coixspirolactam A; coixspirolactam B; coixspirolactam C; coniferyl alcohol; ferulic acid; gamma-sitosterol; glucose; methyl dioxindole-3-acetate; myuenolide; palmatate; phytin; potassium chloride, stearate, stigmasterol; syringic acid; syringaresinol; vitamin B1; peracetylated forms of glucose, maltose, maltotriose, maltotetraose, and maltopentaose:[1][4][5][36][37]

Traditional Used:

Gastrointestinal Diseases

*C. lacryma-jobi* is utilized in the treatment of common gastrointestinal symptoms including diarrhoea and dysentery. The seeds are the most frequently used part to be used. Seeds are given for enteritis and persistent diarrhoea in children. It has also been advocated in the treatment of acute appendicitis. The seeds again are vermifuge and is used to treat worms infestation while the roots are specifically given for ascariasis.[1][2]

Respiratory Diseases

A decoction of *C. lacryma-jobi* is believed to be beneficial for the breath. The seeds are remedy for various pulmonary conditions amongst them includes bronchitis, pleurisy, pneumonia, pulmonary abscess, hydrothorax and lung cancer. Infusion of the seed is prescribed for bronchitis, pulmonary abscess and hydrothorax.[1][2]

Genito-urinary Diseases

The seeds and roots of *C. lacryma-jobi* has diuretic properties and this had been taken advantage and used in the treatment of urinary complaints. The seeds had been prescribed for dysuria while the roots are given for urinary tract infection, nephrolithiasis, dysuria and oliguria.[1][2]

Other Uses

The traditional practitioners recognized its anti-inflammatory and antibacterial properties and utilized them in the treatment of infective processes like appendicitis, tuberculosis, gonorrhoea, leucorrhoea, puerperal fever and as mentioned above in both pulmonary and urinary tract infections. The fruits are given for intestinal and lung cancers, cervical and chorionic epithelioma and viral skin affections like warts, verruca plana and eczema. The roots are used in the treatment of fever with drying of saliva and intense thirst, oedema, beri-beri, amenorrhoea and jaundice.[1][2]
Pre-Clinical Data

Pharmacology

Central muscle relaxant activity

One of the pharmacologically active compound isolated from *C. lacryma-jobi* is coixal (6-methoxybenzoxazolone). Gomita et al.[6] reported these activities which includes behavioural and EEG effects on mice and rats. In rats it was observed that it could decrease locomotor activities and produced hypothermia. It is able to potentiate thioptental induced sleep, attenuates writhing syndrome induced by 1% acetic acid, increased the threshold of jumping response to foot shock and prevent convulsion induced by maximal electro-convulsion. On the EEG it could induce drowsy patterns and inhibit EEG arousal response to external auditory stimulus, but failed to suppress the arousal response to midbrain reticular stimulation. These results indicate that coixol can act as a central muscle relaxant with an anti-convulsant effect very much similar to chlorzoxazone.

Anti-inflammatory activity

Two out of six benzoxazinoids isolated from the roots of *C. lacryma-jobi* was found to exhibit anti-inflammatory activity. It is observed that the free hydroxyl group at the 2-position in the benzoxazone skeleton is important for the expression of the inhibitory activity.[7]

Effects on Lipid Metabolism

Park Y et al.[8] studied the effects of *C. lacryma-jobi* on lipid metabolism in Sprague-Dawley male rats. They found that it may have an inhibitory action on cholesterol synthesis in liver, a facilitating effect on the biliary excretion of triglyceride, and an acceleratory action on phospholipid synthesis in liver. Kim S.O. et al[9] found that the crude extract of the seeds could modulated the expression of leptin and TNF-alpiga and reduced body weights, food intake, fatsize, adipose tissue mass and serum hyperlipidaemia in obese rats. Based on this they suggested that it could be considered for use in antiobesity therapy. They further found that the water extracts of the seed exhibit anti-obesity activity through regulating neuroendocrine activity in the brain.[10] Huang BW et al[11] the effects of *C. lacryma-jobi* sees oil on plasma lipids, insulin and leptin in rats and found that it could decrease low-density lipoprotein cholesterol (LDL-C), insulin, leptin and thiobarbituric acid reactive substance (TBARS) concentrations after 4 weeks of feed.

Antidiabetic activity

A screening activity of twelve antidiabetic plants used in Mexico by Ramon Ramos et al[13] showed that *C. lacryma-jobi* does have hypoglycaemic effects. Yeh PH[14] confirmed this when they found that the dehulled seed of *C. lacryma-jobi* could reduce the blood glucose level in diabetic rats (streptozocin induced).

Fibrinolytic inhibition activity
Chek JB et al[17] found that coix-mixed diet given to Wistar rats for 30 days could lower fibrinogen level while at the same time created the tendency to reduced fibrinolytic activity.

Macrophage activation activity

Water extract of C. lacryma-jobi seeds and several separated components (dissolved with Tris-Cl buffer and the supernatant (WC1), ammonium sulfate treatment supernatant (WC2) and the pellet (WC3), QAE column chromatography of WC1 and the peak portions; WC4, WC5 and WC6.) were used to determine their effects on murine peritoneal macrophages infected with Toxoplasma gondii. Soh CT et al[18] found that the addition of modulators (C. lacryma-jobi seeds and several separated components) could enhance the production of nitrite by the macrophages and that there was a retroverse relationship between the amount of nitrite produced and the phagocytic index of macrophages and the fold increase of tachyzoites in the macrophages. They concluded that some components other than the non-proteinous and defatted components of C. lacryma-jobi seeds may contribute to activate macrophages through induction of NO for the biostatic activity.

Cytotoxic activity

A number of studies were done to determine the cytotoxic activity of seeds of C. lacryma-jobi. This cytotoxic activity is seen in lung, colon, pancreatic, breast cancers and hepatoma. Numata M et al[19] found the acid fraction of the acetone extract to have antitumour activity against transplantable mouse tumour. This acid fraction was found to be four free fatty acids i.e. palmitic, stearic, oleic and linoleic acids. Chang HC et al[20] found that their methanol extract was not only effective in inhibition of growth of A549 lung cancer cells (inducing cell cycle arrest and apoptosis) but also prevented lung tumourigenesis. This action was attributed to inhibition of COX-2.[21] Dong et al[22] obtain similar results when they use Kanglaite (extracts of seeds of C. lacryma-jobi) injections on A549 lung cancer cells. Shih CK et al[23] found that the feeding of dehulled seeds could suppress early events in colon carcinogenesis but not the formation of tumours. Lee MY et al[24] isolated five active compounds that inhibited cancer cells (A549 lung cancer, HT-29 colorectal carcinoma and COLO 205). These five compounds are of the lactam group (coixspirolactam A, B, C, coixlactam and methylidoxindole-3-acetate). Li SC[33] reported that their seed bran and its ethanol extract and residue could inhibit colonic preneoplastic lesions at an early stage. Another compound that could be responsible for this effect could be ferulic acid through an anti-inflammatory pathway.[34] A neutral lipid isolated from the endosperm of Job’s tears showed anticancer activity against PaTu-8988 and SW1990 human pancreatic cancer cells.[25]

A number of mechanism had been attributed to the anticancer activity of the seeds of C. lacryma-jobi. As already mentioned above the inhibition of COX-2 is one of them. The characteristic gene expression changes noted were recognized by Woo et al[26] to be characteristic of inhibition of NF kappaB-dependent transcription. This was found to be associated with reduced translocation of Rel-A/p65 subunit of NF kappaB to the nucleus. Bao Y et al[25] found that they neutral lipid isolate blocked cell cycle progression at the G(2)/M phase with increase in annexin V binding and DNA fragmentation. They found that the expression of signals of 24 genes was significantly
altered after 24 hours of treatment. These genes were involved in cell cycle control, apoptosis regulation and signal transduction.

Uterine contractile activity

Tzeng et al[27] when studying the abortifacient activity of extracts of seeds of *C. lacryma-jobi* found that the water extract of the seeds could cause foetal resorptions and postimplantation mortality without causing foetal malformations. There was spontaneous uterine contraction when an isolated pregnant uterus of rats was exposed to the water extract. This action was attributed to induction of COX-2 protein expression along with enhancement of extracellular signal-regulated protein kinase (ERK) \(1/2\) phosphorylation and protein kinase C(PKC)-alpha translocation from cytosolic to particulate fraction in the uterus.

Hsia SM et al[28] further fractionated using four solvents (water, 1-butanol, ethyl acetate and n-hexane) of the seed hull and studied the uterine contractility activity. All four extracts and their subfractions inhibited uterine contractions induced by PGF(2 alpha), the Ca\(^{2+}\) channel activator Bay K 8644 and high K\(^{+}\); the most active being the ethylacetate extract. It seems that this extract suppressed the increase in intracellular Ca\(^{2+}\) concentration induced by PGF(2 alpha) and high K\(^{+}\). They found that the major pure chemical components to be responsible for this effect was naringenin and quercetin

Effects on production of hormones activity

The bran extract of seeds of *C. lacryma-jobi* were used traditionally to treat endocrine dysfunction and inflammatory conditions. Hsia SM et al[29][30] studied this effect and found that it decreased the production of progesterone and estradiol by inhibition of the cAMP-PKA and PKC signal transduction pathway, P450scc and 3beta-hydroxysteroid dehydrogenase (3beta-HSD) enzyme activity; P450scc and StAR protein and mRNA expressions and the phosphorylation of ERK1/2 in rat granulose cells.

Chang LL et al[31] used the seed hull acetone extract of *C. lacryma-jobi* to study its effects on cortisone production from rat zona fasciculate-recticularis cells. The results showed that the extract could inhibit corticosterone release; stimulate prehnenolone release; non-competitively inhibit P450 side chain cleavage enzyme (P450scc) and 11beta-hydroxylase; and inhibit the expression of StAR protein. This indicates that the extract has a direct action of rat ZFR cells to diminish corticosterone releases.

In a recent study Hsia SM et al[32] were able to demonstrate that their methanol extract of hull of seeds of *C. lacryma-jobi* could inhibit production of testosterone by rat Leydig cells. This action is mediated through inhibition of the PKA and PKC signal transduction pathways; 17beta-HSD enzyme activity in rat Leydig cells and in vitro Gonadotrophin-releasing hormone induced LH secretion.

Antiosteoporotic activity

Water extract of the seeds of *C. lacryma-jobi* could reverse the decreased alkaline phosphatase activities and calcium levels and increased tartrate-resistant acidic phosphatase activities induced by parathyropid hormone in cultured metaphyseal tissues. In ovarectomized rats, it could reverse the osteoporotic effects.[35]
Toxicities
No documentation

Clinical Data

Clinical Trials

Yu YM et al[12] did a clinical trial on the effects of C. lacryma-jobi (adlay) on plasma lipids and LDL oxidation in hyperlipidaemic smokers. They found that adlay could reduce the total and low density lipoprotein cholesterol (LDL-C) while at the same time increase the lag phase of LDL oxidation. The antioxidative effects was found to be less pronounced in smokers than in non-smokers.

Hidaka et al[15][16] studied the antiviral activity of C. lacryma-jobi seeds based on traditional uses in China and Japan for the treatment of verruca vugaris and verrucae planae juveniles. They found that in seven healthy volunteers who took six tablets of C. lacryma-jobi seeds the percentage of CD3⁺, CD5⁺ cells and CD16⁺, CD57⁺ cells increased significantly. The increase in the peripheral cytotoxic lymphocytes could be the mechanism of antiviral activity i.e. through the enhancement of cytotoxic activity.

Adverse Effects in Human:
No documentation

Used in Certain Conditions

Pregnancy / Breastfeeding
The abortifacient activity would contraindicate the use of seeds of C. lacryma-jobi for whatever reasons during pregnancy.

Age Limitations

Neonates / Adolescents
No documentation

Geriatrics
No documentation

Chronic Disease Conditions
No documentation

Interactions

Interactions with drugs
No documentation

Interactions with Other Herbs / Herbal Constituents

No documentation

**Contraindications**

Contraindications

No documentation

Case Reports

No documentation

**References**

3. Peter Hanelt Mansfeld’s Encyclopedia of Agricultural and Horticultural Crops Volume 5 Springer-Verlag Berlin 2001 pg. 2748