

Neuroprotection

Anti-inflammatory

Lipids

Glutathione

anti-oxidant, anticarcinogenic, anti-inflammatory and antidiabetic effects

anti-inflammatory and anti-apoptotic effects to prevent testicular dysfunction [93], ameliorated male arousal [94], reduced diarrheal symptoms in albino rats [95] and reduced oxidative stress in liver and inflammatory with atherosclerosis

calm state of mind while dealing with cognitively demanding works
nerve injury, neurological function of rats

Nutritional, antioxidant, glycaemic index and Antihyperglycaemic properties

attenuated atherosclerotic lesion

antibacterial effect, antioxidant activity, anticoagulant effect,
phytoinsecticide

reducing cell sickling in sickle cells anemia in vitro, antioxidant
presence of sickle cell of decrease of sickle cells
and increase of spherical erythrocytes.

against cerebral ischemia/reperfusion induced brain injury

improved sexual performance, stimulated sexual motivation

Cyperus esculentus (also called chufa, tiger nut, atadwe, yellow nutsedge, earth almond, and in Chishona, pfende) is a species of plant in the sedge family widespread across much of the world. It is found in most of the Eastern Hemisphere, including Southern Europe, Africa and Madagascar, as well as the Middle East and the Indian subcontinent. *C. esculentus* is cultivated for its edible tubers, called earth almonds or tiger nuts (due to the stripes on their tubers and their hard shell), as a snack food and for the preparation of horchata de chufa, a sweet, milk-like beverage.

Cyperus esculentus can be found wild, as a weed, or as a crop. It is an invasive species outside its native range, and is readily transported accidentally to become invasive. In many countries, *C. esculentus* is considered a weed. It is often found in wet soils such as rice paddies

and peanut farms as well as well-irrigated lawns and golf courses during warm weather.

Dried tiger nut has a smooth, tender, sweet, and nutty taste. It can be consumed raw, roasted, dried, baked or as tiger nut milk, tiger nut drink or oil. tubers of *C. esculentus* contain 20-36% oil,

Cyperus esculentus was one of the oldest cultivated plants in prehistoric and Ancient Egypt, where it was an important food. Roots of wild chufa have been found at Wadi Kubbaniya, north of Aswan, dating to around 16,000 BC. Dry tubers also appear later in tombs of the Predynastic period, around 3000 BC. During that time, *C. esculentus* tubers were consumed either boiled in beer, roasted, or as sweets made of ground tubers with honey. The tubers were also used medicinally, taken orally, as an ointment, or as an enema, and used in fumigants to sweeten the smell of homes or clothing.

PMID: 35206077... tiger nut has the radical scavenging ability, in vitro inhibition of lipid peroxidation, anti-inflammatory and anti-apoptotic effects and displays medical properties. (MUFA) account for 73.83–76.16%, polyunsaturated fatty acids (PUFA) account for 8.92–9.84% and saturated fatty acids (SFA) account for 14.60–17.12%. lower level of the total cholesterol, triglycerides, low-density lipoprotein cholesterol and higher levels in the high-density lipoprotein cholesterol and glutathione compared with that of rats fed with soybean oil. Jing et al. [42] evaluated the antioxidant activity of tiger nut oil in vitro and in vivo. Specifically, the oil at 0.8 mg mL⁻¹ resulted in 26.96% DPPH• radical scavenging ability. The oil at 0.2 mg mL⁻¹ and 0.4 mg mL⁻¹ had antioxidant abilities similar to vitamin C.

flavonoids quercetin and myricetin show a wide range of biological activities that include strong anti-oxidant, anticarcinogenic, anti-inflammatory and antidiabetic effects. Due to the presence of quercetin, this tuber has aphrodisiac activity, enhancing male sexual libido and performance [17]. 17. Vega-Morales T., Mateos-Díaz C., Pérez-Machín R., Wiebe J., Gericke N.P., Alarcón C., López-Romero

J.M. Chemical composition of industrially and laboratory processed *Cyperus esculentus* rhizomes. *Food Chem.* 2019;297:124896. doi: 10.1016/j.foodchem.2019.05.170

The assessed antioxidants of aqueous extracts of the tiger nut as typified by 1,1-diphenyl-2-picrylhydrazyl (DPPH) and hydroxyl (OH) radicals showed scavenging abilities and the inhibition of Fe²⁺-induced malondialdehyde (MDA) production in rat pancreas in vitro. The results showed that the EC₅₀ of DPPH· and OH· scavenging abilities, Fe²⁺-chelating ability, inhibition of Fe²⁺-induced MDA production and inhibition of α-amylase and α-glucosidase activities by aqueous extracts of the tiger nut are 9.63 ± 0.7 mg/mL, 3.01 ± 0.12 mg/mL, 0.72 ± 0.07 mg/mL, 2.09 ± 0.10 mg/mL and 0.76 ± 0.06 mg/mL, respectively [92]. The findings support the hypothesis that tiger nut maybe beneficial in the management of type 2 diabetes. In other studies, the tiger nut powder was administered to the rats daily showed anti-inflammatory and anti-apoptotic effects to prevent testicular dysfunction [93], ameliorated male arousal [94], reduced diarrheal symptoms in albino rats [95] and reduced oxidative stress in liver and inflammatory with atherosclerosis [96]. The above results are most likely related to the presence of alkaloids, quercetin, vitamins, steroids and zinc, etc., in tiger nuts. Therefore, in addition to be the food and industrial materials, tiger nuts may also be developed into functional foods.

93. Adelakun S.A., Akintunde O.W., Ogunlade B. Fluoride-induced testicular degeneration and sperm quality deteriorations: Salutary role of *Cyperus esculentus* tubers (tiger nut) extract in animal model. *Rev. Int. Androl.* 2020;19:201–212. doi: 10.1016/j.androl.2020.01.003. [PubMed] [CrossRef] [Google Scholar]

94. Allouh M.Z., Daradka H.M., Abu Ghaida J.H. Influence of *Cyperus esculentus* tubers (Tiger Nut) on male rat copulatory behavior. *BMC Complement. Altern. Med.* 2015;15:331. doi: 10.1186/s12906-015-0851-9. [PMC free article] [PubMed] [CrossRef] [Google Scholar]

95. Shorinwa O.A., Dambani D.T. Antidiarrheal activity of aqueous

ethanol extract of *Cyperus esculentus* tuber in albino rats. *J. Appl. Biol. Biotechnol.* 2020;8:47–50. [Google Scholar]

96. Achoribo E.S., Ong M.T. Tiger nut (*Cyperus esculentus*): Source of natural anticancer drug? Brief review of existing literature.

Euromediterranean Biomed. J. 2017;12:91–94. [Google Scholar]

PMID: 35567128

Cyperus (*Cyperus esculentus* L.): A Review of Its Compositions, Medical Efficacy, Antibacterial Activity and Allelopathic Potentials

she also detected organic acids, vitamins, steroids and terpenes with health care effects, in which the content of vitamin E was 0.15% and the content of sterols was 0.53% [30].

30. Liu L. Masters's Thesis. Northeast Normal University; Changchun, China: 2008. Study on the Active Ingredients of *Cyperus Esculentus* and Oil Extraction Technology; pp. 1–5.

Chen et al. found that the contents of fat, starch, sugar, protein and water in the tubers of *Cyperus* were 26.5%, 23.2%, 23.4%, 8.0% and 7.0%, respectively, and other active components (e.g., organic acids, terpenoids, steroids, etc.) were also detected [29]. 29. Chen X., Chen D., Liu L. *Cyperus esculentus* whole component analysis. *Food Sci. Technol.* 2009;34:165–168.

In addition, *Cyperus* also contains a variety of active substances (e.g., alkaloid, saponin, phytosterol, flavone, terpenoid, tannin, etc.) [25].

These active substances are important pharmaceutical components.

Most flavonoids have strong biological activities, such as an antioxidant effect, and can be used in pharmacological research (Table 2). 25. Guo T., Wan C., Huang F., Wei C., Hu Z. Research Progress on main nutritional components and physiological functions of tiger nut (*Cyperus esculentus* L.) *Chin. J. Oil Crop Sci.*

2021;43:1174–1180. Chinese Language

In India, *Cyperus* tuber is the oldest medicinal material, which can be used to treat critical and serious diseases (e.g., chronic gastritis,

lymphatic tuberculosis, burns and scalds, coronary heart disease, acute cholecystitis, acute intracerebral hemorrhage, etc.) [40]. 40. Jebasingh D., Venkataraman S., Jackson D.D. Physiochemical and toxicological studies of the medicinal plant *Cyperus rotundus* L. (Cyperaceae) Int. J. Appl. Res. Nat. Prod. 2012;5:1–8.

anthraquinone (C₁₄H₈O₂), which has the effects of anti-tumor, anti-oxidation and sterilization [43]. 43. Hu G. Master's Thesis. Lanzhou University; Lanzhou, China: 2014. Study on Synthesis of Anthraquinones and Their Cytotoxic Activity against Tumor Cells; pp. 5–11.

(Cyperol) does indeed have functional food potential and can be used to maintain a calm state of mind while dealing with cognitively demanding works [45]. Jing et al. studied the intervention effect of orientin in *Cyperus* on nerve injury in rats. The results showed that the orientin could significantly improve the neurological function of rats [46]. 45. Wiebe J.C., Lópezríos L., Vegamoraes T., Gericke N. Neurophysiological effects of a special extract of *Cyperus esculentus* L. (Cyperol) J. Herb. Med. Res. 2019;4:34. doi: 10.28933/jhmr-2019-09-2705. 46. Jing S.Q., Wang S.S., Zhong R.M., Zhang J.Y., Wu J.Z., Tu Y.X., Pu Y., Yan L.J. Neuroprotection of *Cyperus esculentus* L. orientin against cerebral ischemia/reperfusion induced brain injury. Neural Regen. Res. 2020;15:548–556. doi: 10.4103/1673-5374.266063

Cyperus extracts can improve the vitality of testis in Wistar rats [49]. Jagpal studied the effects of *Cyperus* oils on reducing cell sickling in sickle cells anemia in vitro. The results showed that the *Cyperus* oil treatments resulted in an increase in the antioxidant presence of sickle cell samples when tested in vitro, as well as a morphological decrease in sickle cells and increase in spherical erythrocytes, thereby alleviating the symptoms of anemia [50]. 50. Jagpal C. The in vitro use of natural antioxidant oils (*Cyperus esculentus*; *Nigella sativa*) to reduce cell sickling in sickle cell anaemia. Biochem. Pharmacol. 2017;139:134. doi: 10.1016/j.bcp.2017.06.030

The results showed that feeding *Cyperus* tubers to mice significantly alleviated the symptoms of atherosclerosis in mice [56]. According to research by Oluwajuyitan and others, *Cyperus* is a food that lowers the glycemic index, and it is suitable for diabetics [57]. 56. Salem M.L., Zommara M., Imaizumi K. Dietary supplementation with *Cyperus esculentus* L. (tiger nut) tubers attenuated atherosclerotic lesion in apolipoprotein E knockout mouse associated with inhibition of inflammatory cell responses. *Am. J. Immunol.* 2005;1:60–67. doi: 10.3844/ajisp.2005.60.67. 57. Oluwajuyitan T.D., Ijarotimi O.S. Nutritional, antioxidant, glycaemic index and Antihyperglycaemic properties of improved traditional plantain-based (*Musa AAB*) dough meal enriched with tiger nut (*Cyperus esculentus*) and defatted soybean(*Glycine max*)flour for diabetic patients. *Heliyon.* 2019;5:22–29. doi: 10.1016/j.heliyon.2019.e01504. [

Cyperus (*Cyperus esculentus* L.) contains a variety of active components, and most of its extracts have antibacterial effect [41]. *Cyperus* (*Cyperus esculentus* L.) contains secondary metabolites of flavonoids, which showed antioxidant activity and an anticoagulant effect [63]. *Cyperus* (*Cyperus esculentus* L.) has great potential in developing phytoinsecticide and reducing people's dependence on synthetic insecticides.

Influence of *Cyperus esculentus* tubers
(Tiger Nut) on male rat copulatory behavior...DOI 10.1186/
s12906-015-0851-9

Background: *Cyperus esculentus* tubers (tiger nut) are one of the ancient food sources known to humanity. It is traditionally used in the Middle East to stimulate sexual arousal in men. However, there has been no scientific evidence about its assumed aphrodisiac properties. This study aimed to investigate the influence of tiger nut on the copulatory behavior of sexually active male rats.

Methods: Two sets of sexually active male rats -highly active and moderately active- were identified depending on

baseline sexual activity. Rats in each set were randomly divided into a control and treated groups. Highly active rats were treated with doses of 1 and 2 g/kg/d of raw tiger nut powder, while moderately active rats were treated with a dose of 2 g/kg/d. After 30 days' treatment, copulatory behavior and serum hormonal levels were measured and compared between the groups within each experimental set. Phytochemical analyses including liquid chromatography/mass spectrometry and atomic absorption were performed to elucidate the main constituents of tiger nut that may be responsible for altering serum hormones.

Results: Tiger nut stimulated sexual motivation in both highly and moderately active rats, indicated by reduced mount and intromission latencies in these rats compared to controls. Furthermore, tiger nut improved sexual performance, indicated by increased intromission frequency and ratio, in treated moderately active rats compared to controls. Serum testosterone levels increased significantly after tiger nut administration. Lastly, phytochemical analyses revealed the presence of quercetin, vitamin C, vitamin E, and mineral zinc in tiger nut.

P29

The in vitro use of natural antioxidant oils (*Cyperus esculentus*; *Nigella sativa*) to reduce cell sickling in sickle cell anaemia
Chloe Jagpal, Abstracts / Biochemical Pharmacology 139 (2017) 105–141

Coventry University, Coventry, UK

Sickle cell anaemia is a genetically inherited red blood cell disorder, currently treated with time-consuming hospital treatments such as blood transfusions, which carry side effects such as iron overload. Sickle patients suffer from painful vaso-occlusive crises, whereby sickle erythrocytes adhere to blood vessel endothelium and block the natural flow of blood. A factor that exacerbates sickling is the low level of antioxidants in sickle cells, along with an increase in reactive oxygen species (ROS) generation. Tiger nut oil (*Cyperus*

esculentus) and black seed oil (*Nigella sativa*) are natural products that have been anecdotally said to reduce crises in sickle cell sufferers, through their antioxidant properties. This research focuses on the potential reversal of sickle cells into normal spherical erythrocytes following treatment with these antioxidant oils. Morphological observation, as well as monitoring the potential reduction of ROS/increase in antioxidant presence, will be used to assess the treatment efficacy. The benefits of these natural oils as supplementary treatments for sickle cell patients include their accessibility to vast populations globally, as well as minimal risk of side effects. Children in particular would benefit as a decrease in cell sickling would require fewer hospital visits and ultimately would lead to improved school attendance. It was found that the oil treatments resulted in an increase in the antioxidant presence of sickle cell samples when tested in vitro, as well as a morphological decrease of sickle cells and increase of spherical erythrocytes. In vivo testing will be the next point of focus within this research.

doi:10.1016/j.bcp.2017.06.030

Chemical Diversity of Essential Oils from *Cyperus articulatus*, *Cyperus esculentus* and *Cyperus papyrus*. DOI: 10.1080/0972060X.2013.813288
BCP= from 0.1 to 7.14 % in tubers and stems
BCPO higher in two species 16-19%