A few years ago, whilst running the clinical trials against malaria and bilharzia with Artemisia plants in Maniema, RD Congo, Dr. Jerome Munyangi noticed that these plants had cured or alleviated the diabetes of several patients.


This finding was recently confirmed by a case study in Burundi (see annex 1).

In the PPIJ paper of 2020 we had tried to explain the antidiabetic effect by several molecules present in Artemisia plants: arachidonic acid, proanthocyanidins, arginine, chlorogenic acid, polysaccharides, pentacyclic triterpenes and saponins. We had mostly based the efficiency on hepatic effects.

In this paper we also bluntly stated that flavonoids and essential oils only have a minor impact and that their role is controversial. It is difficult to find scientific papers on this subject. Our opinion might also be based on a prejudice. In 2010, we were astonished that an extensive analysis on flavonoids we had made did not detect quercetin or luteolin in Artemisia annua samples from Luxembourg, Cameroun, Brasil

Dr Cécile Beauve, Mme Stéphanie Dessy, Dr Stéphane Kohnen, Celabor, B-4650 Herve. 29 avril 2010.

But recently a more thorough analysis of the scientific literature, shows that luteolin and quercetin analogues were indeed not identified in Artemisia annua, but are well present in Artemisia afra.


The presence of luteolin in Artemisia afra and its absence in Artemisia annua was confirmed by a recent personal communication from M Fréderich, ULg, Belgium (project ARES «Emptying Plasmodium reservoirs to accelerate malaria elimination in high transmission settings: case study in Cameroon »).
Analyse TLC. On the left Artemisia afra with the yellow luteolin spot.

Artemisia annua does not show a luteolin spot

In our paper we also neglected the essential role of the pancreas in diabetes. This organ is responsible for the secretion of insulin, the hormone that regulates blood glucose levels. Pancreatic β-cells are essential for the generation of insulin.

Again our opinion may have been based on an apprehension. It is often claimed that artemisinin present in Artemisia annua and eventually in other Artemisia plants is the key molecule responsible for many therapeutic properties, but has also some serious side effects. It is well documented that artemisinin inhibits and even causes the apoptosis of β-cells. The consumption of ACTs concommittant with Artemisia herbal tea could thus enhance the diabetes of the patients.

Artemisia afra is widely used in South Africa to treat hyperglycemia, but the mechanism of action has yet to be elucidated. A study from South Africa explored the effect of oral administration of aqueous leaf extract of Artemisia afra on the pancreas of streptozotocin-induced diabetic rats. It was found that the extract significantly reduced blood glucose levels, accompanied by an increase in the serum insulin concentration. Diabetes also leads to constriction of the pancreatic beta cells, an indication of damage to the pancreas. Treatment of diabetic rats with Artemisia afra extract enhanced pancreatic weight, and this can be attributed to regeneration of β-cells.
Effects of Oral Administration of Aqueous Extract of A. afra treatment during 14 days
on Blood Glucose, Insulin Concentration, and Pancreas/Body Weight Ratio in Diabetic Rats.


Sangeetha R. Luteolin in the Management of Type 2 Diabetes Mellitus. Curr Res Nutr Food Sci 2019; 7(2). doi : http://dx.doi.org/10.12944/CRNFSJ.7.2.09


In Iraqi folk medicine Artemisia herba alba has been widely used for the treatment of diabetes mellitus. Oral administration of an aqueous extract (0.39 g/kg) of the aerial parts of this plant to normoglycemic and to alloxandriabetic rabbits produced significant hypoglycemic activity. A subsequent study shows for 2-4 weeks treatment a significant reduction in blood glucose level, prevents elevation of glycosylated haemoglobin level and possesses a hypoliposis effect, in addition to the protection against body weight loss of diabetic animals.


In Egypt it was found that aqueous and alcoholic extracts of Artemisia judaica from the Sinai desert significantly reduced the blood glucose level in experimentally diabetic rats. The authors relate this effect to the flavonoids present in the plant.
As a natural flavonoid, low-dose diet supplement of Luteolin ameliorates diet-induced obesity and insulin resistance in mice, suggesting a new therapeutic and interventional approach for these diseases.


Findings from a Chinese study demonstrate that luteolin protects mice from pancreatitis by inducing HO-1-mediated anti-inflammatory and antioxidant activities, in association with the suppression of the activation of the NF-κB pathway.


Although several drugs are targeting pancreatic β-cell to improve their function, there still lack agents to alleviate pancreatic stress conditions. Screening the Traditional Chinese drug library it was discovered that luteolin improves β-cell function. Moreover, luteolin improved insulin secretion ability. Luteolin is thus a promising agent against pancreatic dysfunction.


Luteolin also strongly inhibits the enzymes α-glucosidase and the pancreatic α-amylase. Twenty-one naturally occurring flavonoids were tested against α-glucosidase and α-amylase for inhibitory activities. Luteolin was the strongest inhibitor among these flavonoids and stronger against α-glucosidase than α-acarbose, a prescribed antidiabetic drug. Alpha-glucosidase and alpha-amylase are enzymes that catalyze the final step in the digestive process of carbohydrates. The inhibition by luteolin offers the possibility to effectively reduce postprandial hyperglycemia. The effect of postprandial hyperglycemia on diabetes complications is well documented, from cardiovascular diseases to the overproduction of thrombin.
In another assay luteolin, quercetin and diosmetin were evaluated as inhibitors against the pancreatic α-amylase.


Luteolin can maintain fasting blood glucose in normal levels. This helps preventing the onset of diabetic cardiomyopathy.


Luo Y., Shang P., Li D. Luteolin: A Flavonoid that Has Multiple Cardio-Protective Effects and Its Molecular Mechanisms. Front Pharmacol. 2017; 8: Article 692

Luteolin attenuates diabetes associated cognitive decline.


The association between diabetes and tuberculosis is known since 1934. Most of us ignore that on Nov 3, 2015 a Convention was signed in Bali declaring the fight against the looming TB-Diabetes co-epidemic, one of the greatest global health challenges.
The association between elevated serum uric acid level and type 2 diabetes mellitus (T2D) has been established for years. Elevated uric acid not only induces insulin resistance in peripheral tissues but also exerts a strongly negative effect on pancreatic β-cell survival and insulin secretion. A study from China found that luteolin prevents uric acid-induced pancreatic β-cell dysfunction.

Ying Ding, Xuhui Shia, Xuanyu Shuaia, Luteolin prevents uric acid-induced pancreatic β-cell dysfunction. The Journal of Biomedical Research, 2014, 28(4):292-298

Luteolin among the flavonoids shows the strongest inhibition of xanthine oxidase, the enzyme which generates uric acid.


Luteolin was found to be stable in assay procedures, which is not the case for other constituents of Artemisia plants, like artemisinin or saponin. Luteolin is heat stable and hence losses due to boiling water decoctions do not incur.

Waithaka J. The evaluation of markers for quality control studies of flavonoid-containing medicinal preparations. Master’s Thesis, Discipline of Pharmacology, School of Pharmacy, University of Western Cape, Bellville

Annex 1.

REPUBLIQUE DU BURUNDI

MINISTERE DE LA SANTE PUBLIQUE ET DE LUTTE CONTRE LE SIDA

IJENDA, HOPITAL

EFFET DE L’ARTEMISIA SUR LE DIABÈTE : CAS D’UN DIABÈTE DÉCOMPENSÉ

- Il s’agit d’un patient diabétique connu, qui nous a consulté pour polyurie, soif intense, altération de l’état général.
- Le diagnostic du diabète était confirmé par une glycémie élevée à 20,13 mmol/l
- Le patient était mis sous insuline ordinaire pendant 4 jours mais la glycémie variant de 20,13-19,1 mmol/l.
- A partir du 4ème jour d’hospitalisation, nous avons débuté l’Artemisia afra ; et 24 heures plus tard la courbe glycémique commençait à descendre progressivement
jusqu'à la valeur normale au 5ème jour du début d’*Artemisia afra* (voir tableau ci-dessous)

• L’état général s’est amélioré au 4ème jour du traitement par Artemisia et la sortie du patient était accordé au 10ème jour d’hospitalisation (c’est-à-dire 5ème jour du traitement par Artemisia).

**Tableau du traitement**

<table>
<thead>
<tr>
<th>Date (Jour/mois)</th>
<th>Traitement Insuline ordinaire</th>
<th>Traitement Artemisia afra</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10/11</td>
<td>12/11</td>
</tr>
<tr>
<td>Glycémie en mmol/l</td>
<td>20,13</td>
<td>19,6</td>
</tr>
<tr>
<td>Glucosurie</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Dr Elkan KATOTOLA, Médecin consultant à l’hôpital Ijenda