COULD THE LOW PREVALENCE OF DIABETES MELLITUS IN THE EGYPTIAN DESERTS BE THE RESULT OF PROTECTIVE ELEMENTS IN THE BEDOUIN DIET?

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Fourteen years after the first administration of insulin to a diabetic patient, by Banting and Best in January 1922, Falta and Himsworth suggested that there must be at least two types of diabetes mellitus: one insulin dependent and one insulin nondependent. Until the late 1950's, when the first oral hypoglycemic agent was introduced, dietary and hygienic measures, combined with an early detection and treatment of complications, were all that could be done for patients suffering from non-insulin dependent (or type II) diabetes mellitus.[1] And still no definitive cure for type II diabetes has been found,[2] leaving the care for this relatively large group of patients both complicated and expensive.[3,4,5] At present, research is aimed not only at new natural and chemical antidiabetic agents, but also at the ethnic and social context of type II diabetes. Studies among groups with a high prevalence, such as the Pima Indians or the populations of certain Pacific Islands,[6,7,8,9] have given an insight in the causes of the disorder and its complications. Likewise, the study of groups with a remarkably low prevalence yields knowledge about prevention, and may lead to adjustments in the treatment protocol if useful local therapies are discovered. Some of these therapies got a worldwide recognition,[10,11] others are valuable in the regional setting where modern Western medicine is unavailable or unacceptble.[12,13]

In Egypt, we hope to find an explanation for the remarkable difference between the prevalences of diabetes mellitus among desert dwellers and inhabitants of the Nile valley[14]. As a part of this, we review some traditional remedies which have been recorded and evaluated, but little is known yet.[14,15] This may enable us to encourage the more favourable and suppress the disadvantageous.[16, 17] Traditional remedies are usually cheaper, and more easily accepted than industrially produced therapeutics, and may play an important role in the implementation of a treatment protocol and or the continuity of care.[18] In the long run, they may contribute in the formulation of a national drug policy,[19] and the strengthening of a primary health care system.[20 21]

In Egypt, the first clinical description of DM is found in case 197 in Eber's papyrus; dated 1550 BC, but obviously copied from much older sources. Arataeus, who gave the disorder it's name, lived in Alexandria during the second century AD. Comprehensive description of the disorder was given by Ali Ibn al-Hussein Ibn Sina (Avicenna, 980-1037).[1] Little was known about the prevalence in present day Egypt until a series of epidemiological surveys established the prevalence of diabetes mellitus in various parts of the country. During each of these surveys, the glucose concentration in the capillary blood of between 200 and 500 subjects was measured 2 hours after a carbohydrate load.[22] Although these surveys were necessarily small and well separated in time, a remarkable picture emerges from them. The prevalence of diabetes mellitus among inhabitants, older than 30 years, at the cities in the Nile valley was shown to be almost 12%. This is high compared to Western Europe where usually 3-6% is found, depending on the methods and diagnostic criteria used. The prevalence among inhabitants of rural Egypt, in the same age group, was around 6% and among the inhabitants of the desert, less than 2%. In other words: the prevalence of diabetes mellitus in Egypt increases with the transition to a modern Western life style.

The explanation for this phenomenon could also be in a genetic difference between the inhabitants of the Nile valley and the desert dwellers (Bedouins)[15], combined with the differences in life style, diet and use of folk remedies.[23, 24] These last two factors may prove to be of great importance.

Food products are often used to cure various disorders. World wide, over 400 herbal products have reported antidiabetic properties or are used for the early mainfestations of diabetes mellitus. The most likely of these to play a role in the protection of the Egyptian Bedouins against

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diabetes mellitus are listed in Table 1.

Allium cepa (onion) and *A. sativum* (garlic) are basic ingredients of most Egyptian dishes since prehistoric times, as they are in most countries of the world. *Artemisia sieberi* (shih) is used by Bedouins to season goat butter.

Balanties aegyptica (sugar date) is used in Egypt, and many other African countries, as a cure for diabetes mellitus. This fruit is an ingredient of prescription 274 and 279, for polyuria, in Eber's papyrus.[25,26] *Coffea arabia* (coffee) and *Trigonella foenum-graecum* (helba), both with a lot of sugar, make two of many popular Egyptian hot drinks. *Coriandrum sativum* (Kuzbara) and *Nigella sativa* (black cummin) are used as condiments in Egypt since Pharaonic times. From those days onward, fenugreek, coriander and *Zizphus spina-christi* (Nabaq) are also used as herbal medicines.

Leaves of *Gymnema sylvestre* contain gymnemic acid that temporarily destroys the capability to taste sugar. The antidiabetic effect is supposed to be due to the induction of regeneration of the islets of Langerhans by a still unknown component. This herb is an ingredient of the remedy for "honey urine" advocated by the Indian physican Susruta in the 6th century BC. The boiled seeds of *Lupinus albus* (termis) and the raw fruit of *Opuntia ficus indica* (prickl pear, Tin Showky) are popular sancks sold in the streets of Egyptian villages and cities. *Poterium spinosum* (tut ath-tha'lab) is used by Bedouins when symptoms of diabetes mellitus occur. The effect may be due to the high ion content that is able to cure mal-nutrition-related diabetes mellitus. The same may be true for *Haloxilon salicornicum* (rimth).[29] Branches of *Salvadora persica* (meswak) are used throughout the Arab world to clean the teeth.[38]

The observed habit of Egyptian diabetics to consume honey with crushed eggshells is not listed, since it is most unlikely to have a positive effect on glucose tolerance.[39] It may, however, be one of the differences between the inhabitants of the Nile valley and those of the desert, that is responsible for the remarkable differences in the epidemiology of diabetes mellitus.

Which of the listed food products and non-conventional therapies are, at least partly, protecting the Bedouin from this disorder is still subject to research. When this is established, it could be laid down in a treatment protocol, adapted to the local situation,[30] that is acceptable, accessible and affordable.[12]

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Table 1: **EGYPTIAN FOOD PRODUCTS AND NON-CONVENTIONAL THERAPIES PROTECTING AGAINST NON-INSULIN-DEPENDENT DIABETES MELLITUS**

Name in Latin	**Name in Arabic** (transcription)	**Active component** (used part of plant)	**Used test animals** (tested plant variety)	**References** (present in Ancient Egypt?)
Allium cepa	(basal) بصل	alkyldisulphides (bulb)	diabetic rabbits	1 (yes)
Allium sativum	(thom) ثوم	alkyldisulphides (bulb)	healthy rabbits	2 (yes)
Aloe barbadensis (a)	(halasat as-sabar) خلاصة الصبار	? (aerial)	diabetic humans	3 (yes)
Artemisia abyssinica A. absinthium A. sieberi (b)	(shih) شيح	? (wood)	diabetic mice (A. abyssinica, A. sieberi)	4 (A. absinthium?)
Balanites aegyptica	(balah hawarah, balah halaib, hala'ig) بلح حوارة، حلايب، هلعيج	alkaldois and glyciosides (fruit)	diabetic mice	5 (yes)
Bryonia cretica	(tafwah, enab al-hiah) طفوة، عنب الحية	? (aerial)	activity not yet demonstrated	6 (unknown)
Catharanthus roseus (c)	?	alkaloids (leaf, flower)	healthy rats	7 (unknown)
Chrozophora oblique	(samwah) سموة	? (wood)	activity not yet demonstrated	personal observation (unknown)
Coffea arabica	(bonn, qahwah) بن، قهوة	caffeine (seed)	healthy humans	8 (no)
Coriandrum sativum	(kuzbarah) كزبرة	? (seed)	diabetic mice and rats	9 (yes)
Cuminum nigram (d)	(habat al-barakah) حبة البركة	? (seed)	diabetic rabbits	10 (yes)
Cupressus sempervirens	(sarw) سرو	? (cone)	activity not yet demostrated	11 (yes)
Gymnema sylvestre	?	glycosides (leaf)	diabetic humans	12 (unknown)
Haloxilon salicornicum (e)	(rimth, rimh) رمث، رمح	? (aerial)	diabetic mice	13 (unknown)

Juniperus communis J. oxycedrus J. phoenicae J. sabina	عرعر، سفينة، حبل (arar, safinah, habal)	? (fruit)	diabetic mice (J. communis)	14 (J. oxycedrus, J. phoenicae?)
Lupinus albus (f)	ترمس (termis)	alkaloids (seed)	diabetic rats	15 (yes)
Melia azadirachta (g)	زنزلاخت، شجرة حرة، نيم (zanzalagat, shahrat harah, neem)	? (seed)	diabetic rats	16 (unknown)
Momordica balsamina M. charantia M. foetida	تفاح العجائب (tufat al-aga'ab)	glycosides (aerial, fruit)	diabetic humans (M. charantia, M. foetida)	17 (M. balsamina?)
Opuntia ficus-indica O. streptacantha	صبار، صبير، تين شوكى (sabar, sabir, tin shawky)	? (sap)	diabetic humans (O. streptacantha)	18 (unknown)
Poterium sanguisorba P. spinosum	توت الثعلب (tut ath-tha'lab)	ions (MNRDM) (aerial)	activity not yet demonstrated	19 (no)
Rubus fructicosus R. steudneri (h)	توت شوكى، عليقة (tut showky, alyqah)	? (leaf)	diabetic rats (R. fructicosus)	20 (unknown)
Salvadora persica	مسواك، اراك (meswak, arak)	? (wood)	healthy mice	21 (unknown)
Sugenium cumini S. jambolana (i)	?	? (fruit)	diabetic rabbits (S. jambolana)	22 (unknown)
Tecoma stans (k) (Tecomaria capensis)	تيكومة، ميكروبل امريكا (tikumat mikronil, tikumat amrika)	alkaloids (leaf)	diabetic rabbits (T. stans)	23 (unknown)
Teucrium oliverianum T. polium	?	? (aerial)	diabetic mice (T. oliverianum)	24 (T. polium?)
Trigonella foenum-graecum	(helba) حلبة	alkaloids (seed)	various diabetic animals	25 (yes)
Zizyphus spina-christi	(nabaq, sadar) نبق، سدر	glycosides (leaf)	diabetic rats	26 (yes)

CAPTION TO THE TABLE

This table is based on the work of C.J. Baily and C. Day of the Diabetes Research Unit of Aston University in Birmingham (UK).[31] The information on the presence of the herbs in Ancient Egypt was found in: Germer R. Flora des pharaonischen Ägypten. Mainz am Rhein (Verlag Philipp von Zabern) 1985. The botanical information was checked by R.T.J. Cappers of the Berenike Project of Leiden University (NL) for which the authors would like to thank him. It should be noted that medicines made from the ingredients in the table are not necessarily without dangerous side-effects.[32, 33, 34]

NOTES TO THE TABLE

a. Syn. *Aloe vera* L.
b. Syn. *Artemisia herba-alba* auct. non. Asso.
c. Syn. *Lochnera rosea* (L.) Reichb.
d. Syn. *Nigella Sativa.*
e. Syn. *Hammada salicornica* (Moq.) lljin. et *Hammada elegans* (Bge.) Botsch.
f. Syn. *Lupinus termis* Forssk.
g. Syn. *Melia incica* Brand. et *Azadirachta indica* A. juss.
h. Syn. *Rubus sanctus*
i. Syn. *Eugenia jambolana*
k. Syn. *Campsis radicans.*

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