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LETTER TO THE EDITOR

Could We Really Use *Aloe Vera* Food Supplements to Treat Diabetes?

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For thousands of years, mankind has used plants as a source of medicine either in their crude mixture forms or purified single chemical entities. While the use of crude plant extracts in prescription drugs today is extremely rare, we still have a significant number of our drug therapies tracing their origin back to natural products. In principle, drug therapeutic approach for complex metabolic disorders like diabetes and associated diseases, where a single key universally accepted biological target is not available, could be designed through a multifunctional (one drug⟶ multitarget⟶ multidisease/complex disease) or polypharmacology (multidrug⟶ multitarget⟶ multidisease/complex disease) principles [1]. On this basis, I read the diabetes UK website under the heading of "Herbal and Natural Therapies" [2] with great interest. The site lists herbs and spices that have been clinically shown to improve blood glucose control in type-2 diabetes patients and diabetes high risk group. Top in the list is the miraculous *Aloe vera* which has been further illustrated, as with other herbal medicines (Bilberry extract, Bitter melon, Cinnamon, Fenugreek, Ginger and Okra), in its own webpage [3]. To quote one statement from the website: "Preliminary research suggests that intake of *Aloe vera* juice can help improve blood glucose levels and may therefore be useful in treating people with diabetes". The beneficial effect of *Aloe vera* as a lipid lowering and wound healing agent along with other health benefits are also outlined. The site even gives guidance on where to buy *Aloe vera* and the health and beauty/food retailers among which 'The Body Shop' and 'Holland & Barrett' were specifically mentioned. Even though advice is given to patients in the main website to consult their doctor before using herbal medicines, the presentation of these potential antidiabetic medicines to the general public is nothing less than an endorsement by the highest authority in the UK for disseminating information on diabetes.

One should therefore ask a simple question:

Is there a consensus among the scientific community on using Aloe vera by its own to treat diabetes?

The answer is very simple and short - NO! Any diabetic patient who wishes to try out *Aloe vera* must be told that there is as such no overwhelming clinical evidence to justify its use as a replacement to metformin or other prescription antidiabetic drugs. This being the starting point of advice, one can highlight the antidiabetic therapeutic potential of the plant further.

After being used by our ancestors for thousands of years, our obsession for *Aloe vera* (L.) Burm. f. (*Aloe barbadensis* Mill; Family *Asphodelaceae*) products seems to be only growing by the year. Native to the East African/Mediterranean region, its traditional uses were employed by the Egyptians, Assyrians and Mediterranean civilizations as far back as 4000 BC. Its official record of usage in the western medicine was evident from the 14th Century as purgative and a topical treatment of wounds and skin conditions and it was incorporated in the London Pharmacopoeia by 1650; London Dispensatory in 1742; United States Pharmacopeia in 1820; British Pharmacopoeia in 1867; FDA list of approved food additives in 1959 [4]. Today, *Aloe vera* is one of the most widely utilized commercial plant by the food, beverage, pharmaceutical, herbal and cosmetic industries.

The therapeutic implication of *Aloe vera* for diabetes and associated diseases has been scrutinized through a number of scientific study models. Earlier studies from the 1950's to early 1990's showed that *Aloe* extracts, particularly the inner gel, possess antihyperglycemic ef-

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Figure 1: *Aloe vera* products available to the general public at the Holland & Barrett outlet.

fects in diabetic animals [5]. The controversies that arose due to reports of some preparations (in some studies) completely failed to show beneficial effects have been largely explained by variabilities in the preparation and doses employed and we now seem to have a good set of evidences from animal experiments to demonstrate the hypoglycaemic effect of the plant [6-10]. Beyond its effect on glucose control in animal models, the beneficial effects of *Aloe vera* in ameliorating the various diabetes-associated abnormalities have been documented in recent years. Among them were improvement of the diabetes-induced liver and kidney damage; its effect to reduce fat/cholesterol level; its antioxidant potential, etc. [11-18]. Variabilities in the data with respect to the degree of efficacy have always been an issue, however, and the lack of one standardized drug preparation that all scientific studies could utilize remains a major problem. A number of clinical trials from the 1980's have also been conducted and in almost all cases, some kind of beneficial effects that have been observed in animal studies, but most importantly a reduction in blood glucose level, have been documented [5,19-30] Unfortunately, most of the clinical studies on *Aloe vera* so far have been brutally criticized for their limitations due to heterogeneity of the drug preparations, doses, patient's status (e.g., uncontrolled dietary and physical state, etc.), study methodology (blinding, duration of study, etc.) and the results itself which have been often contradictory (e.g. cholesterol lowering effect).

Hence, what has not been shown for *Aloe vera* is very crucial - Is the observed benefit merit its use as an alternative drug therapy to the known clinically useful drugs? This unfortunately has not been answered and the use of *Aloe vera* by its own as antidiabetic therapy cannot be advocated from the clinical evidences available so far. For example, a small reduction of blood glucose in short term studies, no matter how statistically significant, does not warrant a plant extract to be used as antidiabetic therapy. On the other hand, such effect could have additive effect when used together with prescription drugs and endanger a diabetic patient due to acute hypoglycemia. A large scale, well-controlled, long-term and multicentre clinical trials on universally accepted standardised *Aloe vera* preparation is thus needed to answer this question. Recent meta-analysis studies [31-33] also came with the conclusion that only a well-designed comprehensive clinical study would be able to unequivocally confirm the antidiabetic clinical potential of *Aloe vera*. In the meantime, organizations like Diabetes UK with responsibility in disseminating accurate information to the general public should be a little more cautious when listing available antidiabetic drug therapies and their sources.

While visiting some local sources of *Aloe vera* products recommended by Diabetes UK, I could not see anything of relevance to diabetes at 'The Body Shop' (only skin care products of *Aloe vera* were on display) while the 'Holland & Barrett' appeared to have a good range of products (Figure 1). None of them are of course sold as medicine or specific therapy for diabetes but are formulated/stabilised products in capsule, tablet or juice forms with most of them seem to be targeting the gastrointestinal system. They contain *Aloe* leaf inner gel or whole leaf extract or both while some contain a blend of several other plant extracts. The biggest source of controversy in using such products for chronic disease like diabetes will arise from the diversity of preparations and composition of active ingredients in these products

- hence giving rise to variability in their health benefit outcomes. Even if the observed, sometimes marginal, antidiabetic effect of *Aloe vera* warrants its clinical use, one would wonder again which one of these products the general public should choose to treat diabetes. Overall, there are few unresolved issues that weigh against recommending the use of *Aloe vera* for treating diabetes by its own. Products which are blended or optimised for other health benefits should not be even considered suitable for diabetes therapy until an overwhelming body of scientific evidences are provided in their favour. In the absence of unequivocal clinical evidence available for such formulations, the justification of using these preparations for diabetes far beyond food supplements is based only on judgement on balance of probabilities.

Conflict of Interest

The author declares no conflict of interest.

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