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Cause-Consequence Correction by DcoD in Diabetes Mellitus

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Abstract— *Lipase is produced by pancreas. Lipase plays a major role in fat metabolism. The fat metabolized will be converted to triglycerides and leads to accumulation. This on higher levels may result in insulin resistance due to high cholesterol levels. Even though lipase has great role in diabetes, it has negative effect especially in the Diabetes condition. The lipase production is higher in inflammatory condition of pancreas. In the current paper the effect of JRK's DCOD on Lipase inhibition in live cells were evaluated using Candidal albicans, Pityrosporum ovale and a single strain of Cryptococcus neoformans. Also evaluated the anti-oxidant effect of JRK's DCOD. Both the studies showed the positive result. Complete details are presented in the paper.*

Keywords— *JRK's DCOD, Diabetes mellitus treatment, Lipase, Pancreatic lipase activity, lipase activity.*

I. INTRODUCTION

Sufficient and exhaustive scientific credence we have established through modern scientific tools and methodologies to highlight the multi-level effect of DcoD in treating diabetes mellitus (1-5). However all such findings were leaning more towards increased glucose metabolism and cellular uptake by cells of different organs that are more often gets impaired by hyperglycemia and high level of HbAc1 (glycated hemoglobin).

DcoD was also proven to neutralize the aftermath products of proteinuria such as creatine and creatinine resulting in decreasing the burden of renal cells in clearing the above by-products of reserve fat and protein degradation (5).

Although the real cause of diabetes mellitus is still elusive but the key organ that may regulate the two-way carbohydrate metabolism from glucose to glycogen and glycogen to glucose is by Pancreases, a flat gland located between stomach and upper abdomen; which perform both endocrine and exocrine function by secreting hormones and enzymes essential for carbohydrate metabolism.

Pancreatitis due to several behavioral/habitual action of individual and also due to some pathological causes is known to cause diabetes mellitus (6). Therefore besides managing and regulating hyperglycemic condition, boosting the health of the pancreas is also essential in the treatment of diabetes mellitus.

Even mild inflammation of pancreas can result in increased release of lipase which, in non-diabetic patients, may not harm much but definitely it is very harmful in diabetic patients. Therefore reducing production of lipase is needed in diabetic patients. Along with retarding the activity of lipase, cellular correction effect such as scavenging the reactive oxygen species is also needed to correct or heal the damaged cells.

In allopathic system of treatment, the drugs are always defined as ultra-pure single molecule with target specific absorption and mechanism of action. Due to the above, the cascading effect of the single clinical entity- diabetes mellitus, the patient needs to take several drugs to treat different treatment requirements which often produce severe side effects, drug tolerance and tachyphylaxis.

In the system of Siddha and Ayurveda healing practice, the diseases are always approached in holistic manner (7) where the treatment drugs are prepared with several herbs with pluripotent effect. Interestingly each herb may have several phyto-actives with diverse and sometime contradictory therapeutic effect. Therefore a single polyherbal preparation may offer a basketful benefits which progressively auto-correct the defect and restores the health than just offer instant healing value as in the case of allopathic system of medicine.

In the present paper we report the effect of DcoD in inactivating lipase production using a live cell method. Details are presented in the paper.

II. MATERIALS AND METHODS

Three strains each of *Candidal albicans, Pityrosporum ovale* and a single strain of Cryptococcus neoformans were used for the present study. All the isolates were tested for strong lipase enzyme production earlier.

Details of the JRK's DCOD

JRK's DCOD tablet is a proprietary siddha medicine.

Each tablet contains

Nilavembu *(Andrographis paniculata)***Kalmegh**	: 100 mg
Naval *(Syzygium cumini)* **Jambu**	*: 50 mg*
Seenthil *(Tinospora cordifolia)***Guduchi**	*:* 50 mg
Pagal *(Momordica charantia)***Karela**	: 50mg
Koraikizhangu *(Cyperus rotundus)***Musta**	: 50mg
Sukku *(Zingiber officinale)* **Sunthi**	: 50mg
Milaghu *(Piper nigrum)* **Marich**	*:* 50mg
Adathodai *(Adhatoda vasica)* **Vasa**	: 50mg
Excipients	*: Q.S*

Details of the media used for the test

The media containing 10g of peptone, 5g of NaCl, 4g of Calcium chloride, 5 ml of Tween 80 and 20g of Agar agar per 1000 ml of distilled water was used for the study (8).

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In brief, the test drug was prepared in normal saline at the concentration required to be tested such as 0.2, 0.4, 0.6 and 0.8 mg per ml were incorporated into the test media at 60C and allowed the media to solidify. Post solidification, inoculum of the above cultures prepared in normal saline was streaked on the plate and plate was kept at 26C for 15 days with daily observation.

The zone of clearance around the growth of the organism was measured and graded as strong, Medium and weak with reference to the control plate where the organism was grown without the test Siddha drug.

Antioxidant study

DPPH based antioxidant effect of DcoD was done using standard procedure (9).

III. RESULTS

DcoD at 0.4 mg/ml concentration onward exhibited strong action in inhibiting lipase production by all test organisms Table I.

TABLE I. Effect of DcoD on lipase production

Organism	Lipase inhibition –Strong(S), Medium (M), Weak (W)/ concentration of Siddha drug (mg/ml)			
	0.2	0.4	0.6	0.8
C.albicans 1	M	S	S	S
C.albicans 2	M	S	S	S
C.albicans 3	M	S	S	S
P. ovale 1	M	S	S	S
P. ovale 2	S	S	S	S
P. ovale 3	S	S	S	S
C.neoformans	M	M	S	S

Dcod at 0.8 mg/ml exhibited very high activity against reactive oxygen species whereas none of the herbal ingredients individually exhibited high activity at 0.8 mg/ml Table II.

TABLE II. Effect of DcoD on reactive oxygen species

Organism	DPPH activity in %			
	0.2	0.4	0.6	0.8
DcoD	31	53	71	88
Herbal Ingredients				
1	18	27	38	49
2	14	31	41	47
3	11	18	22	39
4	22	33	41	48
5	34	44	49	52
6	22	32	38	43
7	11	16	21	38

IV. DISCUSSION

Our present study strongly supports the enormous therapeutic value of JRK's DCoD in the management of diabetes mellitus. Diabetes mellitus being an unexplainable clinical problem with radiating pathology, treatment of the disease cannot be achieved with a single drug with high purity, target specificity and with well elucidated mechanism of action. Instead of approaching the problem more from the symptom per se, we need to deal the entire system holistically and every organ involved directly and or suffer due to the above pathology must be treated by orienting the treatment more towards restoring the health of the organ.

Pancreas is not only a unique organ in our body with dual function such as endocrine and exocrine glands (10) in it, any small damage to the organ can have wired pathological effect. The pancreatitis often results in release of high lipase enzyme which is quite unwarranted in diabetic condition. Therefore source correction in the release of lipase in required along-side reducing its activity.

The high lipase production inhibition effect of DCoD over individual herbs in the formulation clearly explains the synergistic value of the polyherbal preparation which is the strength of herbal drugs and ancient Siddha and Ayurveda systems of healing practices in India.

Our present study using three different species of lipogenic fungi such as *Candida albicans*, *Pityrosporum ovale* and *Cryptococcus neoformans* clearly confirm that DCoD at dose dependent manner, affect the lipase production. Considering the fungi being an independent saprophytic organism, the effect of DCoD in such microbe model in inhibiting lipase production by them assumes high scientific significance. The above findings clearly suggest a similar effect of DCoD on pancreas and other cells involved in lipase production.

Initially we doubted whether DCoD inactivates the protein (lipase) after its release which we are interpreting erroneously as lipase inhibition, at source level. Our subsequent study of DCoD on lipase enzyme proved that the Siddha drug does not have any coagulating or damaging effect on such protein.

The additional activity of DCoD against reactive oxygen species comes handy to the above therapeutic value.

Lipase although under normal condition holds some benefit in breaking down fatty food stuffs, but in the case of diabetes mellitus, high lipase is harmful and further even a small inflammation of pancreas can results in high lipase production which is quite common in diabetes mellitus and at the same time is also very harmful. The free radicle scavenging benefit of DCoD under such inflammatory pathology of pancreas adds further value by helping to the organ to autocorrect the damage.

The present findings prove not only the therapeutic value and inevitability of DCoD in the management of diabetes mellitus but also about how the polyherbal preparation and their wide spectrum of therapeutic effect will be useful in managing several non-communicable diseases.

To the best of our knowledge, DCoD is the first fully formulated polyherbal drug subjected to have such rigorous scientific validation to prove its efficacy.

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