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I rebuild your'gut world', JRK's D-Co-D tablets to diabetes mellitus

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ABSTRACT
Diabetes is a chronic metabolic disorder and India is deemed to be the Diabetic capital of world. Even though advancement in medical field has grown several folds still we are not able to control the condition or its complications.
Gut microbiome is different in diabetic patients compared to healthy people. The load of Bacteriodes and Proteobacteria species will be higher in diabetic people and firmicutes bacteria are lower. The ratio of Bacteriodes and firmicutes are which are also positively correlated with decreased insulin resistance. Probiotics has beneficial metabolic effects in the diabetic patients.
In the present study the role of JRK's D-Co-D tablets in improving the load of probiotic species is tested. The probiotic microbes belong to the genus Lactobacillus i.e.,L. plantarum, L. rhamnosus, L. ferciminis, L acidophilus, L. reuteri& L. bifarmentansand Bifidobacterium species i.e.,B. infantis and B. Bifidum& B. adolescentiswere studied.
The results showed that JRK's D-Co-D tablets has increased the load of both Lactobacillus species and Bifidobacterium species significantly which can help the diabetic patients to maintain good gut health and also helps in increasing the insulin sensitivity.
Complete details are presented in the paper.

Key words: JRK's D-Co-D tablets, Diabetes mellitus, Probiotics, Probiotics in diabetes, Insulin resistance and gut microbiome **.**

I. INTRODUCTION

Despite plenty of treatment strategies and huge body of medical wisdom are available today about diabetes mellitus, but still the incidence, complications and prevalence of the disease is growing at the global level reminding the humanity of its altricial state. [1]Lifestyle changes and total change in the diet are being included greatly in the treatment approach of diabetes mellitus. [2]The diet regulation largely focused on probiotics is given utmost importance as probiotics are known to decrease plasma glucose, glycosylated hemoglobin, insulin resistance besides improving the epithelial barrier against pathogen adherence and finally positive immune modulation. [3] Besides all the above, the role of probiotics in bile acid metabolism, fiber metabolism and fat metabolism are also known. Several studies have shown that probiotic world in the gut is not just altered but turned topsyturvy and haphazard in diabetic patients than in non-diabetic, healthy individuals.

Despite the high repository of wisdom about probiotics and their specific positive role in diabetes mellitus, the main line drugs used in the treatment of the disease does not have any direct impact on the gut world directly or indirectly supporting the probiotics. Probiotic drugs are given separately for the above purpose which often makes the budget of the patient heavy, warrant the intake of separate additional medicament and pose unwanted challenge to compliance.

JRK's D-Co-D tablets, is a proprietary Siddha drug formulated with medicinal herbs. The drug has been studied in detail for its efficacy in correcting the problem of diabetes mellitus, cap-a-pie. The uniqueness of JRK's D-Co-D tablets is that from the single drug, the patients can achieve several medical benefits that are essential to correct the problem. In the present paper, we report yet another medical wonder of JRK's D-Co-D tablets, i.e., rebuild the gut world and promote the growth and population abundance of several probiotics. With the above proven benefit, we suggest that inclusion of JRK's D-Co-D tablets in the treatment armamentarium of diabetes mellitus, will correct multivarious metabolic disorders/damages progressively and in long run may help to revert some of the conditions if included as the essential suppliant medicament to the main line therapy. Details of the study is presented in the paper.

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II. MATERIALS AND METHODS

The probiotic microbes belong to the genus Lactobacillus such as L. plantarum, L. rhamnosus, L. ferciminis, L acidophilus, L. reuteri& L. bifarmentans and Bifidobacteriumspecies such as B. infantis and B. Bifidum& B.adolescentis were used for the present study. [4]

The media used for the study was De Man Rogosa and Sharpe Agar (MRS agar) which contains manganese sulfate and magnesium sulfate.

JRK's D-Co-D tablets, the total drug and individual herbal ingredients of the drug were tested separately for their effect on the growth dynamics of each species of probiotics.

Plating the microbes in medium containing the above test materials, organism directly treated with the test materials for 15 minutes prior to inoculate them on MRS agar plate as well as growing the organism in 1/10 diluted MRS agar medium with the test material were performed to understand the growth dynamic effect of the respective test materials.

III. RESULTS

By different methods of testing such as plating the organism in MRS medium supplemented with JRK's D-Co-D tablets , pre-incubating the organism with JRK's D-Co-D tablets for 15 minutes and then plating on fresh MRS medium and also growing the organism in 1/10 diluted MRS medium supplemented with JRK's D-Co-D tablets and or the individual herbs of JRK's D-Co-D tablets has shown that the Siddha drug-JRK's D-Co-D tablets as well as the individual Siddha medicinal herbs increased the growth dynamics of all species of probiotics tested. There were no colony clumps suggesting of mutation or resistance was noticed, Table 1 – 6.

Table 1 Growth dynamics of probiotics in JRK's D-Co-D tablets supplemented medium

Organism	Initial load	CFU (C= Control, T= test)/ T – 1-5 µg/ml					
		C	T	T	T	T	T
L. plantarum	100	80	100	120	130	169	188
L. rhamnosus		88	111	123	122	131	138
L. ferciminis		79	120	122	119	132	121
L acidophilus		68	132	131	123	133	143
L. reuteri		100	100	113	141	139	140
L. bifarmentans		90	102	121	122	133	138
B. infantis		97	123	131	134	135	141
B. bifidum		100	132	133	111	137	141
B. adolescentis		100	100	111	121	122	132

Table 2 Growth dynamics of probiotics pre-treated with JRK's D-Co-D tablets prior to plating

Organism	Initial load	CFU (C= Control, T= test)/ T – 1-5 µg/ml					
		C	T	T	T	T	T
L. plantarum	120	90	110	110	120	139	138
L. rhamnosus		98	101	113	122	123	118
L. ferciminis		81	110	128	129	112	123
L acidophilus		100	113	118	121	123	133
L. reuteri		100	108	113	121	131	134
L. bifarmentans		99	112	123	125	131	135
B. infantis		100	113	112	131	136	139
B. bifidum		101	112	113	121	131	138
B. adolescentis		107	102	113	122	123	133

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Table 3 Growth dynamics of probiotics in 1/10 diluted MRS with JRK's D-Co-D tablets

Organism	Initial load	CFU (C= Control, T= test)/ T – 1-5 µg/ml					
		C	T	T	T	T	T
L. plantarum	112	66	101	111	120	119	121
L. rhamnosus		64	108	113	121	130	133
L. ferciminis		71	101	112	117	122	123
L acidophilus		62	111	121	121	123	133
L. reuteri		90	102	118	121	131	130
L. bifarmentans		80	100	111	122	131	139
B. infantis		91	117	121	124	125	131
B. bifidum		80	101	113	121	134	138
B. adolescentis		90	91	100	111	120	122

Table 4 Growth dynamics of probiotics in individual ingredients of JRK's D-Co-D tablets in MRS plate (5µg/ml)

Organism	Initial load	CFU								
		Control	Zo	Pn	Av	Ap	Sc	Tc	Mc	Cr
L. plantarum	120	66	60	60	90	98	100	110	99	30
L. rhamnosus		64	88	90	99	99	101	112	90	23
L. ferciminis		71	78	80	98	98	99	111	98	44
L acidophilus		62	56	99	91	88	103	109	88	12
L. reuteri		90	70	100	99	90	111	102	74	54
L. bifarmentans		80	88	90	88	99	98	99	88	43
B. infantis		91	100	99	90	95	99	100	99	34
B. bifidum		80	90	89	90	97	101	101	91	21
B. adolescentis		90	90	91	94	99	100	101	90	81

An = Andrographispaniculata, Sc = Syzygiumcumini, Tc = Tinosporacordifolia, Mc = Momordicacharantia, Cr = Cyperusrotundus, Zo = Zingiberofficinale, Pn = Piper nigrum, Av = Adhatodavasica

IV. DISCUSSION

The present investigation has brought out a new facet of JRK's D-Co-D tablets,the proprietary Siddha drug of Dr JRK's Research and Pharmaceuticals Pvt., Ltd., in the treatment of diabetes mellitus. Several scientific studies that we had done earlier shows that JRK's D-Co-D tablets has significant effect in protecting many vital organs from hyperglycemia, such as kidney cells, liver cells, cardiac cells, lipocytes and pancreas. [5] The enzyme linked positive impact of JRK's D-Co-D tablets was far more significant for diabetes mellitus which includes, alpha amylase, alpha glucosidase, catalase, myeloperoxidase, direct effect on macrophages etc.[6,7]

The clinical experience of several AYUSH practioners in India has undoubtedly stated that JRK's D-Co-D tablets has brought a revolutionary level of improvement in diabetic patients both in reducing plasma sugar burden and improvement in overall wellness when JRK's D-Co-D tablets was given as an additional supplement medication along with main line therapy. The gut delight was also reported in several thousands of patients who have been regularly taking JRK's D-Co-D tablets which raised a doubt in us to probe further to understand whether JRK's D-Co-D tablets rebuildsthe gut world for several species of probiotics.

The roe of probiotics in the treatment of diabetes mellitus in particular and many other

chronic diseases in general is well recognized by the medical world. [8,9] The probiotics known to increase the epithelial barrier effect of gut, reduce insulin resistance, modulate immunity besides also help to reduce glycosylated hemoglobin. The probiotics also known to improve digestion and assimilation. Therefore, we assumed that JRK's D-Co-D tablets may be modifying the gut ecosystem positively for different species of probiotics and that may be the reason for the gut delight reported by the patients. Further the positive impact of JRK's D-Co-D tablets if any has also additional treatment value for diabetes mellitus.

In order to validate our above hypothesis, we selected the following probiotics such asL. plantarum, B. infantis, B. bifidum, B. adolescentis, L. rhamnosus, L. ferciminis, L acidophilus, L. reuteri, L. bifarmentans to study further whether JRK's D-Co-D tablets impacts the growth dynamics of the above species. We have employed three different methods to cross onto MRS plate supplemented with different concentrations of JRK's D-Co-D tablets and or the individual herbs shown that the substances significantly supported the growth of the organism. The pre-incubation study prior to plating also yielded the same result. Initially we suspected with the herbal compounds provide some extra or essentially required nutritional value to the probiotics and hence they could grow well. To understand our doubt further, we studied the growth dynamics of probiotics in 1/10 diluted MRS medium supplemented with JRK's D-Co-D tablets and or the individual herbs. Surprisingly we found that the growth abundance of all species of probiotics tested by us was high in 1/10 diluted MRS whereas the test material not supplemented MRS medium showed very scanty growth pattern.

Whether the herbs provide some additional nutritional requirement or increase the multiplication rate by triggering some aspects of bacterial genetics or biochemistry is not clear. Even if such property exists for the herbal conglomeration or for the individual herbs, we presume such effect can only be on positive direction as our earlier cytotoxic study of several cell lines have shown that JRK's D-Co-D tablets does not have any cytotoxic effect assumedly at very high concentration.

Our present study findings deserve warm welcome to the treatment of diabetes mellitus. Today the role of probiotics is either completely neglected or due to compliance issue suffers limitation in the treatment of diabetes mellitus. The treatment of diabetes mellitus require holistic approach by including every micro aspect for correcting the problem in toto. The basket full of therapeutic benefit being offered by JRK's D-Co-D tablets along with the benefit of rebuilding the gut world for probiotics that we have recently unraveled in the present study necessitate the inclusion of JRK's D-Co-D tablets in the treatment of diabetes mellitus. Like how important is the drug for reducing hyperglycemia in the case of non-insulin dependent diabetes mellitus or insulin in the case of insulin dependent diabetes mellitus, JRK's D-Co-D tablets is also equally important to support the positive health of the patients.

The reason for the pluripotent therapeutic benefit of JRK's D-Co-D tablets can be easily attributed to the polyherbal nature of the drug where each herb is likely to have several phytoactives with singular and synergistic effect. Our findings clearly show that JRK's D-Co-D tablets is if included in the treatment armamentarium of diabetes mellitus and also the predisposed population pro-actively adopt to JRK's D-Co-D tablets supplementation, management of the disease and also low incidence rate, both can be easily achieved.

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