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Preparation and Investigation of the Ayurvedic Churna Formulation for Diabetes

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ABSTRACT

Out of most of the dreadful diseases in the world Diabetes, shortly known as DM, is the most dreadful. The primary cause of diabetes is the lack of insulin due to the insufficient secretion of insulin by the pancreas or the insensitivity of the body to reuptake the insulin. This results in the accumulation of the sugar or glucose in the blood, only thereby disturbing all the other physiological conditions in the body. Herbs, as we know, are devoid of or have very fewer side effects when compared to the antidiabetic synthetic drugs. There is evidence to show that the herbs are safer and the chemical leads that are isolated from the medicinal plants are potent in controlling diabetes. The antidiabetic activity of herbs was proven, and the mechanism of action of the drugs was also established in many pieces of research. The polyherbal churna was prepared using various herbs like Tinospora, Glycerrihiza etc. that are already proven for the antidiabetic activity. This formulation was investigated for the antidiabetic activity at two doses and was compared with a marketed formulation and also a standard synthetic drug in STZ induced DM method. The prepared churna formulation showed a better activity compared with the standard and the marketed churna. The prepared churna at 200mg dose showed better activity than the 100mg dose.

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INTRODUCTION

Out of most of the dreadful diseases in the world Diabetes, shortly known as DM, is the most dreadful. The primary cause of diabetes is the lack of insulin due to the insufficient secretion of insulin by the pancreas or the insensitivity of the body to reuptake the insulin. This results in the accumulation of sugar or glucose in the blood, only thereby disturbing all the other physiological conditions in the body [1]. The major part of the world, almost 50% of the world population is suffering from diabetes and its complications. Most of part of the population affected are the elderly and the obese people [2]. Diabetes causes other complications like neuropathy, Nephropathy etc.

It is caused mainly due to the unhealthy food habits like too much of processed food and plain sugars, lack of fibres in the food etc., and also improper lifestyle conditions and stress too [3]. There are a lot of synthetic drugs that treat diabetes, but there is no established cure for the disease. Different mechanisms are used to treat DM, but most important of them being the insufficient secretion of the insulin by the pancreas and making the body receptors more sensitive to the insulin. But the synthetic drugs apart from being effective they contain a lot of side effects. That is where the herbs act much better.

Herbs, as we know, are devoid of or have very

fewer side effects when compared to the antidiabetic synthetic drugs [4]. There are pieces of evidence to show that the herbs are safer and the chemical leads that are isolated from the medicinal plants are potent in controlling diabetes. The antidiabetic activity of herbs was proven, and the mechanism of action of the drugs was also established in many pieces of research [5]. There are a lot of animal models available to investigate the antidiabetic activity of drugs, alloxan and streptozotocin are the most important and efficient methods to investigate the activity [6].

In the current work, the ayurvedic churna preparation was prepared and tested for the antidiabetic profile in two doses and compared to the marketed herbal antidiabetic preparation.

Preparation of the churna

Preparation of Herbal material

The plant material as per table 1 was collected and duly authenticated. The herbariums of the specimens collected were deposited in the college for future reference. The plant material was appropriately dried for five days under the shade and in the ambient temperature and humidity in March [7]. The dried crude drug material was then finely powdered using a blender and then sieved to achieve a fine powder which is even in size and freely flowing. This powder was stored in an airtight container and is used directly in the experiments to investigate the antidiabetic activity.

Lab animals

For the experiments, the animals used are of albino Wistar strain of rats which weighed about 170-185gm in weight. They are all around 3months of the age or prime. They are of both the genders and displayed no signs of abnormal behaviour, and they are healthy. They are kept in the air and humid controlled climate. They have placed int heir cages and are given free access to the water and food pellets.

Diabetes induction

Diabetes in the laboratory animals was induced by STZ (Streptazotocin). This was mixed int eh 4.5 pH solution of citrate buffer and the dose equivalent to the 45mg of the drug was injected in the IP route. The rats were gone into the initial hypoglycemic state, and immediately 25% glucose solution was administered to the rats, and they recovered. With a single shot of the drug the diabetes was induced to the rats and the blood glucose level was raised to more than 240mg/dL of blood, and those animals were selected for the study [8–10].

Animals test Groups

The animals divided into 6batches which are randomly separated based on the weights and both the sexes of animals were placed in the groups. Each group had about five animals [11].

Group A received a normal saline solution of 1.4ml in a kg of the rat, which had a concentration of 0.9% weight to volume in distilled water.

Group B received the diabetes induction agent, and this group also received just the normal saline solution as above.

Group C received the diabetes induction and the standard marketed ayurvedic churna formulation at a dose that is prescribed in the directions of the bottle.

Group D and E received the induction agent and also the prepared formulation powder at the dose of 100mg/kg and 200mg/kg of the bodyweight of the rats. The formulation was dissolved in the distilled water to make the concentration of 100mg/ml, and the solution was directly ingested into the rat mouth using a syringe. After this 2ml of distilled water is given to the rats and are allowed to have drinking water in the cages.

Group F received the induction agent and also a standard drug pioglitazone at a dose of 2mg/kg of the drug in the oral route.

The prepared churna formulation was investigated for about 28 days, and the blood sample was withdrawn once in every week. The blood was tested for glucose levels. The testing was done using the ace sugar check strips coupled with a digital glucometer.

RESULTS & DISCUSSION

The induction of diabetes was successful with STZ administration. There was a significant elevation of the blood sugar level in the rats with the administration of the drug. An instant spike in the blood sugar was noticed. The rats were given with the marketed formulation of the churna, and it was able to control diabetes effectively at the standard dose as per label claim.Tables 1 and 2

The groups that were administered with the prepared churna at two doses 100 and 200 mg/kg are were noticed a significant lowering of the blood sugar level in the rats. The formulation at a higher dose showed a significant lowering of the blood sugar level. The standard drug also showed a better activity but not as much as the prepared churna. The experiments were continued to 28 days where the blood sugars were normalized towards the end of the investigation. This might be due to the presence

Table 1: Effectof the prepared churna on the blood sugar levels of rats

Groups	Blood sugar level (mg/dl)				
	0th day	1st week	2nd week	3rd week	4th week
Normal saline	104.92±4.78	110.24±5.67	108.122.43	102.19±0.94	100.62±1.06
DM induced group	325±4.29	327.53±4.765	324.24 ±5.65	316.62±5.19	318.19±7.89
Marketed churna	331.83±5.68	286.31±6.243	262.47±4.71	193.74±4.8	139.13±5.56
Prepared churna 100mg/kg	330.14±6.17	271.92±4.879	239±5.61	178±3.58	120.36±4.71
Prepared churna 200mg/kg	325.25±5.82	262.17±0.12	221±1.15	164±6.73	103.79±6.19
Synthetic standard	322.51±4.54	289.74±5.27	274.62±4.37	203.37±3.81	134.50±5.91

Table 2: Preparation of theAyurvedic antidiabetic churna

S.No.	Ingredients	Quantity
1	*Eclipta alba*	50mg
2	*Terminalia bellirica*	50mg
3	*Phyllanthus emblica*	50mg
4	*Asparagus recemosus*	50mg
5	*Terminalia chebula*	50mg
6	*Withania somnifera*	50mg
7	*Ocimum sanctum*	50mg
8	*Centella asiatica*	50mg
9	*Apium graveolens*	25mg
10	*Tinospora cordifolia*	25mg
11	*Piper longum*	10mg
12	*Tribulus terristris*	10mg
13	*Glycyrrhiza glabra*	25mg

of varied chemical constituents that are present in the churna and also the antioxidant activity of the herbs that are used to prepare the churna formulation [12].

CONCLUSION

The polyherbal churna was prepared using various herbs like Tinospora, Glycerrihiza etc. that are already proven for the antidiabetic activity. This formulation was investigated for the antidiabetic activity at two doses and was compared with a marketed formulation and also a standard synthetic drug in STZ induced DM method. The prepared churna formulation showed a better activity compared with the standard and the marketed churna. The prepared churna at 200mg dose showed better activity than the 100mg dose.

Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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