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Original Article

A COMPARATIVE EVALUATION OF ANTI-DIABETIC POTENTIALITY FOUND IN DIFFERENT MARKETED POLYHERBAL FORMULATION USING GLUCOCORTICOID-INDUCED HYPERGLYCAEMIA IN RABBIT

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ABSTRACT

Objective: The aim of this study was performed to evaluate Antidiabetic potentiality found in different marketed polyherbal formulation using glucocorticoid-induced hyperglycaemia in the rabbit.

Methods: The potentiality of different polyherbal formulation was investigated using dexamethasone (DEX) induced hyperglycaemia in Rabbit. Eight male rabbits were divided into four groups of two each. The first group is regarded as control group received 3 ml of normal saline daily by using the gastric tube for 15 d and remaining three group received (0.35 mg/Kg B.W. single dosage) of dexamethasone tablets which were powdered, dissolved in 3 ml of normal saline daily for 15 d. After 15 d the blood glucose estimated by using a glucometer and it is found that DXE treatment leads to significant increase in levels of glucose and a significant decrease in body weight. After that second group received metformin tablet. The third and fourth group received polyherbal formulation A and formulation B, which are powdered and dissolved in 3 ml of normal saline daily for 15 d at the dose of 0.5 gm/kg body weight orally. After completion of regular administration for 15 d, the blood glucose was again estimated and compare the results of each the group.

Conclusion: The Anti-diabetic polyherbal marketed formulations were having less side effect as compared to standard metformin tablet (e. g. body weight loss). And both the polyherbal formulations were found a therapeutic equivalence to each other, also having the approximately similar potentiality to standard metformin tablet.

Results: The result was found that the polyherbal marketed formulations were having less side effect as compared to standard metformin tablet (e. g. body weight loss). And both the polyherbal formulations were found significantly decreased in blood glucose level at equal potentiality, which can be consider as therapeutic equivalence to each other, and both the formulation also having the approximately similar potentiality to standard metformin tablet.

Keywords: Therapeutic equivalence, Polyherbal formulation, Dexamethasone, Hyperglycaemia

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INTRODUCTION

Diabetes mellitus is a group of heterogeneous disorder, where polyuria or excessive urine production is the most common initial significant. Diabetes mellitus is associated with less insulin secretion or less insulin sensitivity or both. And it leads to a reduction in carbohydrate metabolism increase in protein and lipid metabolism [1].

According to WHO, the prevalence of diabetes is likely to increase by 35% by the year of 2025 currently there are over 150 million diabetics worldwide and this is likely to increase to 300 million or more. Statistical projection about India suggests that the number of diabetics will rise from 15 million in 1995 to 79.4 million by 2025, making it the country with the highest number of diabetics in the world [2]. The effects of diabetes mellitus include long–term damage, dysfunction and failure of various organs. In its most severe forms, ketoacidosis or a hyperosmolar state may develop and lead to stupor, coma and, in absence of effective treatment, death. Often symptoms are not severe or may be absent, and consequently, hyperglycaemia sufficient to cause pathological and functional changes may be present for a long time before the diagnosis is made [3]. The long-term effects of diabetes mellitus include progressive development of the specific complications of retinopathy with potential blindness, nephropathy that may lead to renal failure, and neuropathy with risk of foot ulcers, amputation, Charcot joints, and features of autonomic dysfunction, including sexual dysfunction. People with diabetes are at increased risk of cardiovascular, peripheral vascular and cerebrovascular disease [4].

Type 2 diabetes mellitus (T2DM) is known as non–insulin-dependent diabetes mellitus T2DM is a chronic illness due to endocrine dysfunction which is known as insulin resistance. T2DM is a rapidly growing health concern in both developed and developing nations. In adults, type 2 diabetes accounts for about 90% to 95% of all diagnosed cases of diabetes [5]. The risk for developing type 2 diabetes is associated with older age, obesity, family history of diabetes, history of gestational diabetes, impaired glucose metabolism, physical inactivity etc [6]. Glucocorticoid hormones are also responsible for developing of T2DM. Glucocorticoids are cause various degrees of β-cell dysfunction, reducing insulin sensitivity and impairing β-cell function [7] by acting through glucocorticoid receptors which are also expressed on pancreatic β-cells. Glucocorticoids may also impair the uptake and the metabolism of glucose in β-cells through genomic actions which lead to a decrease in the efficacy of cytoplasmic Ca2+on the exocytotic process of insulin secretory vehicles [8].

MATERIALS AND METHODS

Selection of standard drug

Metformin tablet was selected as a standard drug for this study. Each tablet contains Metformin Hydrochloride 0.5 gm.

Collection of polyherbal formulation

The two different marketed polyherbal formulation were collected from the ayurvedic medical store from Guwahati. They are selected based on their different composition. And both the composition contains an almost equal number of extract.

Composition of polyherbal formulation

(Each 100 gm contains the following extract)

Table 1: Composition of both formulation A and B

Formulation>A		Formulation>B	
1.	Gurmarpatti (*GymnemaSylvestre*)–20.0 gm	1.	Meshashringi (*Gymnemasylvestre*)–15 gm
2.	Jamunguthli (*Syzgiumcumini*)–8.0 gm	2.	Asana (*Fterocarpusmarsupium*)–10.0 gm
3.	Giloy (*Tinosporacordifolia*)–10.0 gm	3.	Yashtimadhu (*Glycyrrhizaglabra*)–10.0 gm
4.	Karela (*Momordicacharantia*)–5.0 gm	4.	Saptarangi (*Caseariaesculenta*)–10.0 gm
5.	Kattha (*Acacia catechu*)–5.0 gm	5.	Jambu (*Syzygiumcuminii*)–10.0 gm
6.	Haldi(*Curcuma longa*)–5.0 Gm	6.	Shatavari (*Asparagus racemosus*)–10.0 gm
7.	Amla (*Emblicaofficinalis*)–5.0 gm	7.	Punarnava (*Boerhaaviadiffusa*)–6.0 gm
8.	Vijay Sar(*Petrocarpusmarsupium*)–5.0 gm	8.	Mundi (*Sphaeranthusindicus*)–4.0 gm
9.	Tejpata (*Cinnamomumtamala*)–5.0 gm	9.	Guduchi (*Tinosporacordifolia*)–4.0 gm
10.	Shatavari (*Asparagus racemosus*)–5.0 gm	10.	Kirata (*Swertiachirata*)–4.0 gm
11.	SudhSilajit (*Asphaltumpunjabicum*)–5.0 gm	11.	Gokshura (*Tribulusterrestris*)–4.0 gm
12.	NeemPatta (*Azadirachtaindica*)–5.0 gm	12.	Bhumyaamlaki (*Phyllanthusamarus*)–4.0 gm
13.	GularpattiChurna (*Ficusglomerata*)–4.0 gm	13.	Gambhari (*Gmelinaarborea*)–4.0 gm
14.	Kutki (*Picrorhizakurroa*)–4.0 gm	14.	Karpasi (*Gossypiumherbaceum*)–3.0 gm
15.	Chitrakmool (*Plumbagozeylanicum*)–4.0 gm	15.	Daruharidra (*Berberisaristata*)–1.0 gm
16.	Methi(*Trigonellafoenum*)–3.0 gm	16.	Kumari (*Aloe vera*)–1.0 gm
17.	Bang Bhasm–1.0 gm		
18.	YasadaBhasm–1.0 gm		

Experimental animal

All the experiments were carried out by using adult male rabbits. Eight healthy adult male rabbits were brought from the animal house GIPS, body weight (1500-2000 gm) with the approval of the Institute Animal Ethics Committee (IAEC). Approval no is GIPS/IAEC/B. Ph/2017/5. Experimental animals were kept in individual cages under standard husbandry condition with alternate 12 h light/dark period with regular fedon green alfalfa and normal drinking water. And animal maintained in a normal temperature [9].

Equipment

One-touch simple select blood glucose monitoring system (Flextronics Industrial Co, Ltd) is used for determination blood glucose

Experimental design

Antidiabetic potentiality of different polyherbal formulation was investigated using dexamethasone (DEX) induced hyperglycaemia in Rabbit. Eight male rabbits were divided into four groups of two each. The first group is regarded as control group received 3 ml of normal saline daily by using the gastric tube for 15 d and remaining three group received (0.35 mg/Kg B.W. single dosage) of dexamethasone tablets which were powdered, dissolved in 3 ml of normal saline daily for 15 d. After 15 d the blood glucose estimated by using a glucometer and after that second group received metformin tablet and the third and fourth group received polyherbal formulation A and formulation B, dissolved in 3 ml of normal saline daily for 15 d at the dose of 0.5 gm/kg body weight orally. After 15 d again blood glucose was estimated and compared the results of each the group [9].

RESULTS

Body weight

The table 2 shows the body weight of control, DXE treated groups from zero days to 15 d of administration. Table no.2 also shows the body weight after treated with the polyherbal formulation A, Formulation B and metformin for another 15 d in DXE induced hyperglycemic rabbit. The result reflects that dexamethasone causes a significant decrease in body weight after 15 d when compared with zero time in the same group, also dexamethasone combination with metformin causes a significant decrease in body weight in dose 0.5 g/kg B.W. But at same dose the polyherbal formulation A and formulation B treated DXE induced hyperglycemic rabbit, the body weight was found similar with the control group after comparisons.

Table 2: Effect of dexamethasone, metformin, formulation>A and formulation>B on body weight of male rabbits

Treatments	Initial body weight in gm	5th day	10th day	15th day
1. Control (Normal saline) (1st group)	1750.66	1781.10	1793.50	1802.35
2. Dexamethasone treated (0.35 mg/kg B.W.)(2nd group)	1740.30	1714.45	1650.70	1580.27
3. Dexamethasone treated (0.35 mg/kg B.W.)(3rd group)	1770.80	1735.20	1695.65	1650.91
4. Dexamethasone (0.35 mg/kg B.W.)(4th group)	1812.10	1782.59	1736.34	1696.43
5. Standard treated metformin (0.5 g/kg B. W) (2nd group)	1580.27	1562.30	1525.68	1488.30
6. Poly herbal formulation>A treated (0.5 g/kg B. W) (3nd group)	1650.91	1663.94	1709.73	1740.87
7. Poly herbal formulation>B treated (0.5 g/kg B. W) (4th group)	1696.43	1712.34	17748.90	1767.56

Table 3: Effect of dexamethasone, metformin, formulation>A and formulation>B on glucose profile of male rabbits

Treatments	Glucose (mg/dl)
1. Control (Normal saline) (1st group)	108.24
2. Dexamethasone-treated (0.35 mg/kg B.W.)(2nd group)	159.60
3. Dexamethasone-treated (0.35 mg/kg B.W.)(3rd group)	162.42
4. Dexamethasone (0.35 mg/kg B.W.)(4th group)	154.89
5. Standard treated metformin (0.5 g/kg B. W) (2nd group)	101.36
6. Polyherbal formulation>A treated (0.5 g/kg B. W) (3nd group)	105.04
7. Polyherbal formulation>B treated (0.5 g/kg B. W) (4th group)	107.20

Blood glucose level

(Effect of dexamethasone, metformin, formulation A and formulation B on glucose profile of male rabbits) table 3 shows the dexamethasone treated (0.35 mg/kg B. W) animal groups causes a significant increase in blood glucose level in rabbits when compared to control group, also the table indicates that the treatment with standard metformin tablet, polyherbal formulation A and formulation B at the same dose at 0.5g/kg B. W causes a significant decrease in glucose level. And blood sugar controlling potentiality or ant diabetic potentiality of both polyherbal formulation A and formulation B were found significantly effective and similar with the standard metformin tablet.

These results also compared in the fig. 1 with a graphical presentation.

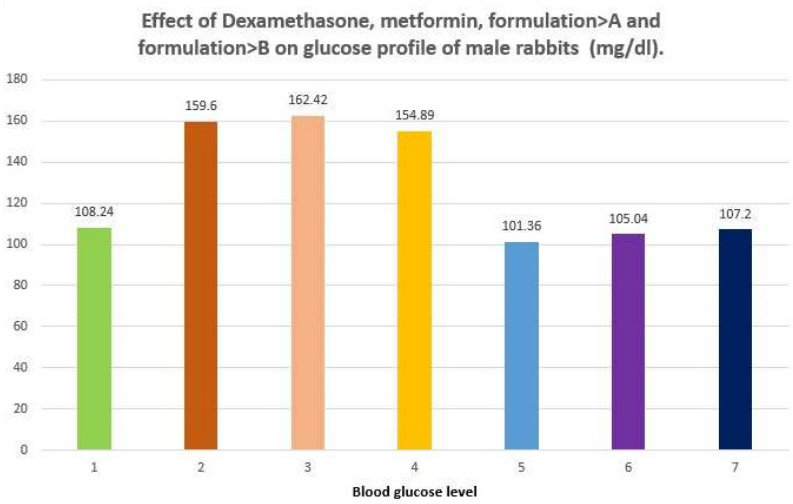

Fig. 1: Effect of dexamethasone, metformin, formulation>A and formulation>B on glucose profile of male rabbits) (According to table 3)

DISCUSSION

Use of marketed polyherbal formulation is a good choice of treatment in type 2 diabetes mellitus (T2DM). Because polyherbal medicines are usually derived from natural plants, they are considered to be relatively safe and have fewer side effects with affordable price than the synthetic or conventional drugs. The synthetic drug which are used in the management T2DM with fewer side effects at lower costs is still a big challenge. These medications frequently have side effects, such as weight loss, bone loss, and increased risk of cardiovascular events [10]. These side effects could become more prevalent due to continuous use. Furthermore, treatment is very costly as well, since T2DM is a chronic disease and long-term medications are necessary. Polyherbal medications can be a good alternative to replace or at least supplement to standard medications [11, 12].

Polyherbal medications treating T2DM can target multiple mechanisms including enhancement of insulin sensitivity, stimulation of insulin secretion, or reduction of carbohydrate absorption [11]. Unlike standard medicine which usually contains a single active ingredient aiming for a specific mechanism, herbal concoctions may contain various active ingredients targeting multiple mechanisms. Standard drugs are sometimes more potent than herbal medicine in lowering blood glucose levels. However, herbal supplements have shown to be able to treat diabetic complications [13]. Thus herbal medicine can also be used as supplementation or in combination with the standard medicine to improve better therapeutic outcomes.

CONCLUSION

The Anti-diabetic polyherbal marketed formulations were having less side effect as compared to standard metformin tablet (e. g. body weight loss). And both the polyherbal formulations were found a therapeutic equivalence to each other, also having the approximately similar potentiality to standard metformin tablet.

According to above results, it can be concluded that polyherbal formulation are useful in the management of diabetes as standard metformin tablet with having less side effect.

CONFLICT OF INTERESTS

Declare none

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