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A COMPARATIVE STUDY OF ANTIDIABETIC EFFECT OF ETHANOLIC EXTRACT OF CYNODON DACTYLON WITH GLIMEPIRIDE AND METFORMIN IN STREPTOZOTOCIN INDUCED DIABETIC ALBINO RATS.

Pharmacology

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ABSTRACT

The aim of this study is to establish and compare the antidiabetic effect of ethanolic extract of Cynodon Dactylon (in Streptozotocin Induced diabetic albino rats) with that of glimepiride and metformin. For this purpose, rats were subjected to induce diabetes by intraperitoneal injection of a single dose of 50 mg/kg body weight of streptozotocin. Rats with serum glucose levels > 200 mg /dl were subdivided into four sub-groups; the first sub-group were remained without treatment and considered as diabetics. The second third and fourth subgroups were orally administered 500 mg/kgbody wt. ethanolic extract of cynodon dactylon, 0.03mg (1.5ml) glimepride and 9mg (0.9ml) metformin respectively for a period of 28 days. Although, ethanolic extract of cynodon dactylon has good effect in lowering of fasting blood sugar in diabetic rats but this effect only become significant after 14 days and have slower onset of action and take more time to achieve euglycemic level of FBS in comparison to Glimepiride and Metformin.

KEYWORDS

Antidiabetic effect, Cynodon Dactylon, Streptozotocin Induced diabetic rats, Glimepiride.

INTRODUCTION:-

There is an emerging global epidemic of diabetes that can be traced back to physical inactivity, rapid increase in weight and obesity. According to WHO About 347 million people worldwide have diabetes, and is predicted to become the seventh leading cause of death in the world by the year 2030.[1,2] According to Diabetes Atlas 2017, released by *'International Diabetes Federation'* India has 72946.4 per lakh population living with diabetes and is only second to China.[3] India is also the largest contributor to regional mortality with 983,000 deaths caused due to diabetes this year.[4] The Atlas said, "Four in every five diabetics are between 40 and 59 years.[5,6] By 2030, one in every 10 adults will have diabetes.[7] Modern lifestyle, advanced food habits, less physical work, mental workloads and other parameters may be responsible for diabetes which was seen in high income families. The metabolic dysregulation associated with DM causes secondary pathophysiologic changes in multiple organ systems that impose a tremendous burden on the individual with diabetes and on the health care system. As the disease progresses tissue or vascular damage ensue leading to severe diabetic complications such as retinopathy, neuropathy, nephropathy, cardiovascular complications and ulceration.[8] Despite the great understanding of pathophysiology and meticulous efforts towards management of diabetes, the disease and related complications are still increasing due to multiple defects.[9] Many oral hypoglycemic agents, such as insulin secretagogue[10] like sulfonylurea, insulin sensitizer like pioglitazone, Biguanides like Metformin and some recently developed drugs like amylin agonist (Pramlintide), GLP-1 analog (Exenatide) and DPP-4 inhibitor (Sitagliptin) are available along with insulin [11] for the treatment of diabetes mellitus, but they have significant side effects,[12,13] and sometimes they are found to be ineffective in chronic diabetic patients.[14]Thus, there is an increasing demand of several medicinal plants or their extracts, that are apparently effective, produce minimal or no side effects[15] and are of relative low costs as compared to oral synthetic hypoglycemic agents. Cynodon dactylon (Doob Grass) has been used as an antidiabetic agent in traditional system of medicine in India.[16] The aims and objectives of this study is to establish and compare the antidiabetic effect of ethanolic extract of Cynodon Dactylon (in Streptozotocin Induced diabetic albino rats) with that of glimepiride and metformin.

MATERIALS AND METHODS:-

The present work was conducted in the Postgraduate Laboratory of the Department of Pharmacology and Therapeutics of tertiary care centre after ethical approval from the Institutional Animal Ethics Committee (IAEC) Guidelines. The experiment was performed on a total of 24 apparently healthy male wistar rats weighing between 180-200 grams. The animals were kept at controlled laboratory conditions (22±2°C, 55±5% RH, and equal dark-light cycle, acclimatization period: 1 week). All the male wistar rats were subjected to induce diabetes by intraperitoneal injection of a single dose of 50 mg/kg body wt. of streptozotocin. Rats with serum glucose levels > 200 mg /dl were subdivided into four equal groups (group A, B, C and D) randomly selecting 6 rats in each group. Group A were remained without treatment and considered as diabetics. Group B, C and D were orally administered 500 mg/kgbody wt. ethanolic extract of cynodon dactylon, 0.03mg (1.5ml) glimepride and 9mg (0.9ml) metformin respectively for a period of 28 days. For the estimation of fasting blood sugar, blood samples were collected from the tail of rat. And, the reading was recorded with the help of glucometer on days 0, 7, 14, 21 and 28 day.

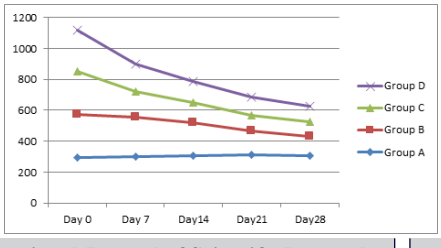
OBSERVATION:-

Table-1 showing sequential changes in FBS in all groups on 0, 7th, 14th, 21st and 28th day. All the values are expressed in mean± standard deviation.

	Group A	Group B	Group C	Group D
Day 0	294.33±10.83	277.16±9.68	279.33±7.20	267.33±5.16
Day 7	301.67±7.08	255.66±6.86	164.33±4.96	176.33±5.57
Day14	306.67±4.84	213.83±5.81	126.66 ±8.64	139.66±7.52
Day21	311.67±5.99	153.34±6.40	104.66 ±4.32	116.66±8.45
Day28	307.33±8.45	122.33±7.31	94.66 ±5.60	103.16±6.94

Group A=Diabetic Control.
Group B=Diabetic rat treated with Ethanolic extract of Cynodon dactylon.
Group C=Diabetic rat treated with Glimepride.
Group D=Diabetic rat treated with Metformin.

Figure-1 shows the group wise changes in FBS with time in the entire duration of experiment.



It is clear from the above table and graph that group A rats show very high value of FBS on 0 day of experiment which confirms the successful induction of diabetes. FBS value shows gradual increment on 7th, 14th, 21st and 28th day, indicating the maintenance and progression of diabetes with time, because these rats were not given any drug treatment. Group B rats that were induced diabetes and administered ethanolic extract of cynodon dactylon in 1% gum acacia for the entire duration of experiment, shows very high FBS on day 0 and on day 7, 14,21and 28, the FBS gradually decreases. Here the decline in FBS on day 7 was around 8%, on day 14 around 16%, on 21 day around 28% and 20% on day 28. Group C diabetic rats that were administered glimepiride shows very high FBS on day 0 and on day 7, 14,21and 28, the FBS gradually decreases. The decline in FBS was more on day 7 (around 41%) and on day 14, decline was around 23% after this, it becomes constant and decline was 7.6 % on day 28. Similarly, Group D diabetic rats that were administered metformin shows very high FBS on day 0 and on day 7, 14,21and 28 the FBS gradually decreases. The decline in FBS was more on day 7 (around 34%) and on day 14, decline was around 21 % after this, it becomes constant and decline was 11 % on day 28.

DISCUSSION:-

Glimepiride and Metformin were used in this study as a standard drug because their role as an antidiabetic has been well established. Cynodon dactylon is a herbal shrub having hypoglycaemic activity which has been used as an antidiabetic agent in traditional system of medicine in India.[16] As compared between diabetic control and ethanolic extract of cynodon dactylon treated group it has been seen that FBS values between group A & B Were significant on day 0, 7, 14, 21and 28, and that the rate of fall of FBS was more in 3rd week of study. While the rate of fall of FBS in group C was early and rapid in comparison to group B and D. But in between group B and D; the rate of fall of FBS in group D was early and rapid in comparison to group B. Thus, ethanolic extract of cynodon dactylon have slower onset of action and take more time to achieve euglycemic level of FBS in comparison to glimepiride and metformin. Hence glimepiride has fast onset of action. Since ancient times, diabetes has been treated orally with several medicinal plants or their extracts, these herbal remedies are apparently effective, produce minimal or no side effects and are of relative low costs as compared to oral synthetic hypoglycemic agents. *Cynodon dactylon reveals the* presences of flavonoids and sterols[17,] which are known to be bioactive for the management of diabetes.[18] It is well known that certain flavonoids exhibit hypoglycemic activity[19] and are also known for their ability of beta cell regeneration of pancreas. Thus the significant antidiabetic effect of *Cynodon dactylon may be due to the presence* of more than one anti hyperglycemic principle and their synergistic properties.

CONCLUSION:-

On the basis of the outcome of the present research it has been observed that ethanolic extract of cynodon dactylon ofcourse has good effect in lowering of fasting blood sugar in diabetic rats, but this effect only become significant after 14 days and also have slower onset of action and take more time to achieve euglycemic level of FBS in comparison to Glimepiride and Metformin.

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