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Original Research Article

PHARMACOLOGICAL EVALUATION OF *JATROPHA CURCAS*

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Abstract

The herbal plants are also known as natural products with their important function. Jatropha curcas is flowering plant and mainly grow in desert and arid region of various continents. Its flowers are ornamental and used for worship also. Its seeds are similar to castor plant and useful source of castor oils. Seeds mainly contain eighty present unsaturated fatty acids and twenty percent saturated fatty acid. The plant is used for antidiabetic, antibacterial and antioxidant activity. Jatropha curcas an important plant was evaluated for its antibacterial potential for the first time against important bacteria and fungus. Current research work mainly exhibits ant-ibacterial effect of Jatropha carcus plant. Analgesic acitivity exhibited by Jatropha carcus extract is produced by two ways peripherally and centrally. For pheripheral activity writhing test is used and writhings are produced by administering acetic acid. Free radical scavenger activity had been determined by various methods as mentioned above diphenyl picrazy hydrazyl, hydrogen peroxide and super oxide dismutase. Ferric ions are reduced to ferrous ion for determining reducing activity of herbal plant extracts of different parts like leaves, aerial part, roots and stem barks. Non-steroidal antiinflammatory medicaments show its anti-pyretic activity by inhibiting enzyme PG synthetase through hypothalamus. Jatropha curcas extract was utilized to test fewer reducing capcity by administering Brewer's yeast to albino wistar rats of either sex male or female. These extracts inhibit biosynthesis of prostandins that are responsible for fever and inflammation. Jatropha extract showed significant effect on pyrexia induced by yeast. Recinolic acid is responsible for defecating the contents from gastrointestinal tract. Extracts are used in therapy and prevention of infantile diarrhea and most widely used in rural areas of developing countries.Jatropha carcus plant extract of stem bark used for healing of wound.Jatropha carcus had been found to reduce glucose levels in albino wistar rats as test groups in comparison with standard drug glibenclaminde. Stem bark of J. carcus has effective constituents in treatment of diabetes. The potencyof these extracts was found to be very effective in treatment of diabetes.

Keywords: Anti-Oxidant activity (Chemical), Anti-diarrhoeal activity, Charcoal meal transit test, Anti-diabetic activity

INTRODUCTION

The herbal plants are also known as natural products with their important functions. These herbal plants have various chemical constituents like carbohydrates, gums (natural and semi synthetics), glycosides (cardiac, saponin, anthracene, flavanols, phenols, aldehydes, coumarins, bitter, cyanogenic, isocyanate), tannins

(simple and condensed), alkaloids (indol, isoquanoline, quanolin, imidazoline, tropane, steroidal), resins (gum, oleo-gum, oleo), terpeniods (mono, Sesqui, di, tri and tetra), minerals, cottons, lignans and other many constituents. These constituents are found in various parts like quinine is found in bark of cinchona, morphine is found in dried juice of opium poppy or paper somaniferum, cocaine in leaves of coca plant, atropine from leaves of atropa belladonna etc [1-5].

Jatropha Curcas

Jatropha curcas is mainly source of biodiesel at present and vast research is going on this plant. It is flowering plant and mainly grow in desert and arid region of various continents. Its flowers are ornamental and used for worship also. Its seeds are simililar to castor plant and useful source of castor oils. Seeds mainly contain eighty percent unsaturated fatty acids and twenty percent saturated fatty acid. The plant is used for antidiabetic, antibacterial and antioxidant activity.The stem of plant is used for basket making by native people. It is the main source of biofuel at present and work is going on at very high speed to stop environmental pollution. The oil contents are 40 to 50 percent present in this plant.

The main focus is given on anti-inflammatory, antidiabetic, analgesic, antioxidant etc activity. The plant is very useful oilseed currently employed for biodiesel production throughout the world. The plant has gain popularity due to this important application for vehicles that causes least toxicity to the environments. Wound healing activity is also important and identified with different parts of plant like stem bark, leaves, seed, fruit, root and entire plants for many types of pharmacological activities like antidepressant, antipsychotic, antihypertensive, antimicrobial, antiepileptic, anti-gout, anti-arthritis, antiviral, anticancer, antiulcer, anti-asthmatic, anti-diarrheal, bronchodilator, extracts used in Gastrointestinal tract, Elementary canal, reproductive tract, respiratory tract etc. The aim of the study is the pharmacological evaluation of Jatropha Curcas [5-8].

MATERIAL AND METHODS

Plant Materials

J curcas Laenous bark was being obtained from a hilly and plane part of Jaipur were being identified by botany of botany, University of Rajasthan, Jaipur. A voucher specimen number RUBL 20844 was being deposited in the botany department of University of Rajasthan.

Preparation of plant extract

Stem bark of Jatropha plant was dried in air and sun light in open area for few days. the dried part of stem bark was collected and pulverized with help of size reduction mill and then finally powedered with machine. The powder was droped into soxhlet apparatus and proper amount of solvents methyl alcohol: acetone: H2O (70:20:10) was taken and poured into soxhlet apparatus. The extraction was collected and concentrated with heat. There many chemical constituents were found in extraction like glycosides, alkaloids, flavonoids, terpenoids, saponins and other compounds.

Calculation of percentage yield

The percentage yield of extract was calculated by using following formula:

$$\text{Percentage yield} = \frac{\text{Weight of extract}}{\text{Weight of powdered drug taken}} \times 100$$

$$= \frac{7.5}{180} \times 100$$

$$= 4.16\%$$

Study of acute toxicity

This study was performed on albino Wister rats. There were four groups formed and three albinorat were kept in each group. The experiment was performed according to OECD guidelines. The albino rats were kept fasted overnight before experiment. Extract of Jatropha plant was dissolved into aqueous solution. Amount of extract were taken as 100

milligram, 300 milligram,1000 milligram and 2000 milligram and dissolved into aqueous solution of water. Different dosages were administered to various groups of animals and these were observed after 4 hours of administration of dosage. Next observation was taken after 24 hours. This observation was continued for 14 days. Then all the animals were tested for acute toxicity. There were no animal was killed by the dosage of extracts from Jatropha carcus plant dosages of100 milligram, 300 milligram, 1000 milligram and 2000 milligram. The dosage of 2000 milligram per kilogram is also safe for administration to albino rat.

Anti-microbial effect on culture of micro-organism

Test micro-organisms utilized in the research are Pseudomonas aeruginosa, Escherichia coli, Staphylococcus aureus, Enterococcus faecalis, Bacillus cereu, and Fungi are fusarium solani and Alternaria alternata

In-Vitro anti-bacterial effect

Anti-bacterial activity was determined with cup plate method. Standard reference drug was utilized as ciprofloxacin. Agar was prepared according to requirement of bacteria adding peptone, soyabeen, yeast ang solidifying agent glidium agar. After preparation of media the wells were prepare the depth of 7 mm and Jatropha carcus extract was filled in wells. Standard solution of ciprofloxacin was also filled in wells. Before that process Medias were inculated with slant or inoculums of bacteria. After 24 hrs period diameter of inhibition was measured with help of Vernier caliper. The comparison of results were noted and observed with standard drug ciprofloxacin. The solvent was used as dimethyl sulphoxide for preparation of extract solution and standard antibiotic solution [9-12].

Susceptibility testing of fungi by In-vitro Method

Similar method was used for detection of antifungal activity. Anaerobic bacteria or fungal stains have similar media for antifungal and antibacterial activity. PDA method was used for detection of antifungal activity. PDA powder had been dissolved in distilled water and the sterilization is done for 15 minutes at temperature 121°C. The solution was cooled after sterilization and various antifungal concentrations from 2 % to 10 % were added to different agars and standard drug was also put with 1% dimethyl sulphoxide solution. The positive and negative control groups were also prepared. These solutions were kept aerobically for 7 days after adding inoculums and the antifungal activities were measured after 7 days by measuring zone of inhibitions and results were obtained and compared.

Analgesic activity

Animals for analgesic activity were albino wistar rat either male or female of weight 150 to 200 grams. These animals were kept in polyethylene cage in institutional area with proper dieting and water facilities. Albino wistar rat had been kept on fast before starting experiment as prior condition of experiment. The rats were kept under standard animal husbandry conditions as per IAEC (institutional Animal Ethical Committee) guidelines

Writhing Experiment

For writhing test of Jatropha carcus extract (JCE) six groups of albino waster rats of either female or male each contains six rats. Wistar rats were kept in glass jar for free measurement of writhing's. Standard solution of acetic acid 10 milliliter per kilogram (0.6%) was administered intraperitoneal (IP) route to every albino wistar rat. After administering dose writ things were counted down separately. The results were analyzed.

Tail-clip Experiment

There are six groups are constituted for checking analgesic activity with tail clip method. Each group has six animals either male or female albino wistar rat. These are kept on fasting overnight with water as per experimental requirement. Early morning each albino wistar rat was checked for clip

withdrawal within 10 seconds. Responsive albino wistar rats were selected for evaluating analgesic activity. First group was kept as control group of vehicle recipient. Second group was administered with standard drug aspirin 100 milligram per kilogram body weight of albino wistar rat of either male or female by perorally. Remaining four groups were administered with Jatropha carcus extracts of different dosages 100, 300, 1000 and 2000 milligram per kilogram body weight of albino wistar rat. After administration of extract analgesic activities were measured after every half an hours near about five times from 0 to 180 minutes interval.

Tail flick experiment

This method is dependent on the application of analgesiometer. Instrument contains nicrome wire that is heated and tail of albino rat wistar was put on nicrome wire. If albino wistar rat of either sex removes tail within 10 second is responsive for the test otherwise animal is rejected for testing analgesic activity [13-17].

Anti-Oxidant activity (Chemical)

Chemical required namely ethyl alcohol, trichloro acetic corrosive, ascorbic corrosive, methyl alcohol, Butylated Hydroxy Anisole, rutin, potassium ferricyanide, Folin Ciocalteu's phenol reagent, 1,1 - di phenyl – 2 – picryl - hydrazyl (D.P.P.H.), sodium hydroxide, aluminum chloride, sodium nitrite had been utilized within experimental research.

Procedure for Free Radical Scavenger Effect Measured by 1,1 - di phenyl – 2 – picryl - hydrazyl (D.P.P.H.)

The free radical scavenging activity of JCE was measured by 1,1-diphenyl-2- picryl-hydrazil (DPPH•) utilzing procedure of Bloise. 0.1 milli Molar mixture of diphenyl picryl hydrazyl in ethyl alcohol had been formulated along with Jatropha carcus extraction of 3 ml. Different concentrations (20 to 60 microgram per milliliter). Solution had been agitated fastly to mix wellt then permitted to cool at 25°C temp upto thirty minutes. Double beam UV-Visble spectrophotometer had been utilized for measuring absorbance of solution at 518 nanometers. Higher free radical scavenging capacity was indicated by observing low values of absorbance.

diphenyl picryl hydrazyl scavenger capacity (%) = (A_0-A_1)/A_0 × 100

Where,

Ao indicates absorbance reading of control group reaction

A1 indicate absorbance due to Jatropha carcus extract

Anti-oxidant activity by Ferric Reducing Power

Oyaizu method was used for determining anti-oxidant activity by ferric reducing power of Jatropha carcus extracts. Different concentrations of bark leaves extract were required in concentrations of microgram per milliliter from 20, 40 and 60 micrograms. These concentrations had been being with phosphate buffer pH 6.6 (0.2 molar in 2.5 milliliter) along with potassium ferricyanide of 2.5 milliliter with 1 percent. Trichloro acetic acid solution of 2.5 milliliter with 10 percent was being added to above solution. Final solution had been centrifuged at 3000 revolution per minutes for 10 minutes. Upper layer of solution was taken alone and ferric chloride solution was added to it. The aborbance of final solution was being measured with double beam UV-Visible spectrophotometer utilizing Shimadu company instrument. Higher values of absorbance indicate good reducing power of Jatropha carcus extracts [18-21].

Anti-pyretic activity (Brewer's yeast-induced pyrexia)

Three groups were made with albino wistar rat of either sex male or female of 140 to 180 gram body weight. Six animals were kept in each group and proper house keeping was done for their care. Albino wistar rats were being kept on fast before experimental night and there temperatures were noted down carefully. No body temperature increase was noted among all albino wistar rats. Thermometer utilized to

measure temperature was inserted into rectum of rat and fasted there with help of tap or other aids. The brewer's yeast was administered to albino wistar rat and temperature rise were being noted for different rats. The dosages of Jatropha carcus extract 100 and 300 milligram per kilogram were administered orally to every albino wistar rat and the temperature was being noted in every one hour for seven hours. The results were analized.

Anti-diarrhoeal activity

Albino wistar rats were utilized for anti-diarrheal activities. The body weights of rats were taken as between 150 to 250 gram. Diet and water were properly administered to rats as per animal husbandry conditions. The rats of either sex female or male were kept on fast overnight before experiment. Institutional animal ethical committee standards were following during testing of activities.

Castor oil-induced diarrhoea

This method included albino rats (200-250gm) for testing of antidiarrheal activitied in castor oil induced diarrhea in albino wistar rats. Castor oil was being utilized for inducing diarrhea. 1 milliliter dose of castor oil was being administered to each albino wistar rat for inducing diarrhea. The albino wistar rats that were suffered from loose motion after oral administration of castor oil were selected for experiment. Three groups of animals were generated as control group, standardgroup and test group with six albino rat in each group. Control group was treated with tween 80 solvent only and standard group was treated with loperamide standard drug and test group was treated with Jatropha carcus extracts. Balloting papers were kept under each cage of albino wistar rat and counting of loose motion was done in every hour. Total four hours readings were noted and analyzed.

Magnesium sulphate induced diarrhoea

Similar procedure was adopted in this test only magnesium sulphate is used in place of castor oil for induction of diarrhea in control, standard and test groups of albino wistar rats. Dosage administration of magnesium sulphate was 2 gram per kilogram. Rat was weighed and divided into four groups (n=6) and further method was similar to castor oil induced diarrhea. Test group was administered at doses of 100 and 300 milligram per milliliter. All administrations were carried out through oral route. During an observation period of 4 h, the total number offaecal output and the number of diarrhoeic faeces excreted by the animals were recorded. [22-25].

Charcoal meal transit test

This activity was checked by preparing four groups of animal each contains six albino wistar rat of 150 to 250 gram body weight of either sex male or female. Three groups of standard, test and control were formulated. Control group was administered with saline solution of 10 milliliter per kilogram. Standard group was administered with atropine of 0.1 milligram per kilogram. Test groups 3 and 4 were administered with Jatropha carcus extracts of 100 and 300 milligram per kilogram. Charcoal was administered as suspensions with tragacant.They were anaesthetized with opening of stomach. The results were obtained and analyzed.

Wound-healing activity

5 pecent weight by weight ointment of Jatropha carcus plant extract was prepared and added to 100 gram of base. Silver sulphadiazine is used as standard wound healing drug for comparison of plant extract ointment for checking results of each other's. The extraction of plant was prepared in the form of semisolid with base. Ointment was prepared in mortar and pastle with simple trituration method [26-29].

Animals

Albino wistar rats are best suitable for wound healing activity. The body weight of albino wistar rat was taken as 150 to 250 gram. These animals were kept in poly propylene cages with proper diet and water arrangements. These animals were kept under the observation of Institutional

animal ethical committee with prior approval for experiments. The abino wistar rats are kept on fast before starting experiment on wound healing acitivities.

Grouping of animals

Six groups were formulated for wound healing activities with albino wistar rat of either sex female or male. Two control groups, two standard drug groups and two test groups were made for experiment. Each group contains six albino wistar rats.

In vivo studies

Wound model of Excision

Albino wistar rats were divided into control, test and standard groups that contain six albino rats in each group. The albino rat was anaesthesized by diethyl ether before treatment with standard drug and JCE and ointment base. These albino wistar rats were saved skin for incision. Each albino rat was excisized 300 mm2 thicknesses are of particularly anesthized area of skin of albino wistar rat. After excision of skin there is formation of wound on skin of albino wistar rat of either sex female or male. Control group was treated with ointment base on wound while standard drug silver suphadiazine was applied on standard group and Jatropha carcus extract ointment was applied on test animals (albino wistar rats). Wound healing activities were observed with these three groups in each two days. Results were obtained and calculated. Histopathological examinations were conducted from specimen sample collected from albino rat wound.

Wound model of Incision

In this method wound is incisized with needle at distance of 1 centimeter to each other. The anesthetic agent was light diethyl ether administered to rat for experiment. These wounds were stitched with curved needle of silk thread. After stitching of wound, standard drug, plant bark extract ointment and ointment base were applied to standard group, test group and control group. The tensile strength of each wound was measured with ensiometer after ten days of treatment to all groups.

Anti-diabetic activity

Experimental Albino Wistar Rat Male

Animals were obtained after Institutional Animal Ethical Committee approval in laboratory for experiment. These were kept in poly ethylene cage in groups of six male albino wistar rats. The animals are kept in isolated area or quarantine area with standard room temperature, standard relative humidity and 12 hours day and night cycle. Proper diet and water were provided to every albino wistar rat. One caretaker was kept permanently to animal house area for nutritional requirements and water supply to every albino wistar rats with proper environmental protection.

Diabetes Induction in Albino Wistar Rat

Diabetes is induced in albino wistar rats by two different chemicals that are alloxan and streptozocin. Alloxan is tetra hydroxyl pyrimidine derivative that can be obtained from breakdown of xanthine ring by different techniques. Alloxan is analogous to glucose in structure and destroy insulin secreting cells in pancreas. This type of diabetes produced in rats or rodents is called type I diabetes. There is no formation of insulin in this type of diabetes due to destruction of beta cells in pancreas. This is auto immune disease. Alloxan monohydrate and all the other chemicals used were of analytical grade and were acquired from commercial sources.

Alloxan-induced diabetic in rats

The animals were kept on fast for 16 hours with drinking water and the level of glucose was measured after 16 hours. Alloxan is administered to each rat with dose of 120 milligram per kilogram body weight of albino Wister rat. When glucose level reached more than 250 milligram per 100 milliliter blood, animal is ready to examine antidiabetic activity. Various types of groups were formed for testing of antidiabetic activity. Group A is called normal control and no drug was administered to this group. Group B is called diabetic control group after

administration of alloxan along with vehicle. Group C is called standard drug group that is administered with Glibenclamide as 10 milligram per kilogram body weight and know as standard group. Group D and E groups are called test groups because these are treated with test solution (Jatropha carcus extracts of 150 and 300 milligram of extract to per kilogram of body weight

Oral glucose tolerance test (OGTT)

OGTT for nondiabetic rats were performed according to the standard method. Animals were taken as body weight of 150 to 220 gram for antidiabetic experiment. Albino wistar rats were prepared to study. I to IV groups was made for study in which Group I is known as control group. Group II was known as standard group because rats were administered with standard drug metformin. Group III and IV are known as test groups because these are treated with test extracts of plant. Group III and IV animals were adminstered at dosage of 150 and 300 milligram per kilogram. Serum sugar level is measured with glucometer at half an hour intervels for five times.

Statistical analysis

Analysis of variance (ANOVA) one way and two method were used for analysis of results on SPSS software. Mean plus standard error, student t test, z- test, chi squar test, coefficient of correlation and coefficient of regression were used for analysis of data produced in experiments. Mean, mode and medians were also used for calculation. Variance, standard deviation and average mean are also very helpful for various types of calculations and data analysis for results.

RESULTS AND DISCUSSIONS

Antibacterial activity

Antibacterial agents are used to treat bacterial infections. Antibiotics are atntimetabolites of bacteria. Antibiotics are very important tool for treatment of bacteria diseases like cholera, typhoid, tuberculosis, diphtheria, gonorrhea and other ailments. Bacteria develop resistance against antibiotics by producing mutation in genes. Plasmid is mainly responsible for development of resistance. There are many antibiotics have been prepared by fermentation on large scale utilizing various slants on inoculums for production. Proper media was prepared for commercial production. Plants, herbs, shrubs have very important roles in finding of antibacterial agents and extracts from various parts like leaves, stems, barks, roots, fruits, seeds, flower buds, rhizomes and entire plant or aerial part of herbs or plants.

Jatropha curcas an important plant was evaluated for its antibacterial potential for the first time against important bacteria and fungus. Current research work mainly exhibits ant-ibacterial effect of Jatropha carcus plant. Phenolic compounds of Jatropha carcus extract are mainly responsible for anti-bacterial activity against many diseases like typhoid, tetanus, cholera, diphtheria etc.

Analgesic activity

Analgesic acitivity exhibited by Jatropha carcus extract given in tables. Analgesic activity is produced by two ways peripherally and centrally. For pheripheral activity writhing test is used and writhings are produced by administering acetic acid to albino wistar rats. Writhings were counted before administration of drugs, solvents or Jatropha carcus extracts. After administration of these above mentioned agents to control, standard and test groups, writhings were reduced in albino wistar rat animals for exhibiting analgesic activities as peripherally. Standard drug for peripheral analgesic effect was selected as aspirin or acetyl salycilic acid. In the present study, the aspirin (Group-II) and extract treated groups (Groups III and IV) showed a significant analgesic effect compared to that of control group (Group I). Results were obtained and analyzed with stastical softwares and given in tables. For centrally acting analgesic morphine is taken as standard drug. There are two methods for determining centrally acting analgesic activities that are tail clip

method and tail flick method. Analgsiometer is used for measuring analgesic activity. Flavonoids in the extract may also contribute for the analgesic activity.

Antioxidant activity

The study of this plant on antioxidant activity showed that DPPH have stability which had been utilized to examine anti-oxidant effect of different herbal plant extracts. Free radical scavenger activity had been determined by various methods as mentioned above diphenyl picrazy hydrazyl, hydrogen peroxide and super oxide dismutase. Instrument is double beam uv-visble spectrophotometer for calculating absorbance of plant extract Jatropha carcus. Higher values of absorbance have high scanvenging capacity in ferric chloride reducing method and lower values of absorbance were shown as good anti-oxidant activity.

The anti-oxidant values by DPPH method was found to be between to 10.17 to 72.60 percent as standard. Phenolic compounds mainly found to be responsible for anti-oxidant acitivity. All extracts of Jatropha carcus had been found to have antioxidant acitivity. Ferric ions are reduced to ferrous ion for determining reducing activity of herbal plant extracts of different parts like leaves, aerial part, roots and stem barks.

Anti-pyretic activity

Non-steroidal antiinflammatory medicaments show its anti-pyretic activity by inhibiting enzyme PG synthetase through hypothalamus. Jatropha curcas extract was utilized to test fewer reducing capcity by administering Brewer's yeast to albino wistar rats of either sex male or female. These extracts inhibit biosynthesis of prostandins that are responsible for fever and inflammation. Jatropha extract showed significant effect on pyrexia induced by yeast.

Anti-diarrhoeal activity

The study of Jatropha curcas about anti-diarrhea was performed and found that methanolic extract of Jatropha curcas plant is most powerful for treatment. Diarrhea is major problem of society and can be treated with oral rehydration therapy and other medicaments but plant medicaments and traditional medicine have important role in treatment of diarrhea. Diarrhea is induced in albino wistar rat through castor oil and magnesium sulphate. Recinolic acid is responsible for defecating the contents from gastrointestinal tract. Extracts are used in therapy and prevention of infantile diarrhea and most widely used in rural areas of developing countries.

Wound-healing activity

From the result we discussed that Jatropha carcus extract can be used for healing of wound because results are positive in comparison to standard silver salfadiazine. Wounds are produced by incision and excision method in albino wistar rat. Albino wistar rat was anesthesized by ether before incision of wound. Wounds were done with incision of needle 1 cm apart from each other. Contraction of wound in treatment is effective method of wound healing. Collegen fibres and hydroxyprolines are secrected to heal the wound as early as possible.

Triterpenoids and tannins are known to promot wound-healing processed that are chief constituent of Jatropha carcus plant. There are 3 groups for treatment that are control, standard and test group. Ointment base was administered to control group, silver sulfadiazine cream was applied to standard group and Jatropha carcus plant extract of stem bark was applied to test animals for healing of wound. Tensile strength of every wound of albino wistar rat was measured for comparison of results of wound healing capacity of eavery groups.

Anti-diabetic activity

Pancreas is the primary site for secretion of insulin from beta cells of langerhens. Secretion of insulin is mainly dependent of food present in gastrointestinal tract. Glucose level is controlled by insulin from blood by two processes. First process is enhacing uptake of glucose from blood to tissue for utilization as food. Second

method is glycogenesis in which glucose is converted to glycogen. Insulin is known as hypoglycemic hormone while glucagon is hyperglycemic hormone that increases sugar level in blood by gluconeogenesis and glycogenolysis.

Diabetes can be induced by alloxan and streptozocin. Alloxan mainly destroy beta cells of pancreas and produce conditions of type I diabetes in which there is no secretion of insulin from beta cells. This type of disease is known as autoimmune disease. Second type of diabetes is induced by streptozocin. Type II diabetes is mainly due to overeating or obesity and can be treated with medicaments while in Type I diabetes insulin injection is only treatment. There are five groups are formed for evaluating treatment of diabetes. Group A does not contain any type of drugs and free from alloxan and streptozocin. Group B is known as standard group that is treated with standard drug glibenclamide or metformin. Group C is control group that is treated only with vehicle while Group D and E are treated with Jatropha carcus plant extract and their results were compared and analyzed.

These extracts of plant Jatropha carcus also have heptoprotective and nephroprotective activities due to many constituents present in these extracts so these are more benefial as compared to allopathic medicines for treatment of diabetes mellitus.Similar results for extraction and pharmacological activities are obtained for the fruit Citrullus colycinth and given in detail in the thesis.

SUMMARY AND CONCLUSION

Jatropha carcus or physic not is bush or shrub with family Euphorbiaceae has height of 5 meter and generally found in tropical and subtropical reagion such as south, central Asia, central and South America, India and Africa. Literature survey revealed that J. curcas stem bark exhibits a wide range of ethanomedicinal uses. So, I validated scientific manner that folk medicinal utility and therapeutic effects in many diseases. Current research had been undertaken to investigate Phytochemical and pharmacological parameters of stem bark of plant.

Antimicrobial activity

The present study gives significant details for anti-microbial effect of CH3OH : CH3COCH3 : H2O in ratio 70:20:10 for extraction of J. curcas stem bark. Good inhibitory effect had been noted against many pathogens from stem bark of Jatropha carcus plant. The active constituents that are responsible for antimicrobial effects are phenolic contents.

Analgesic activity

Present study of methanol: acetone: H2O (70:20:10) extraction of J. carcus stem bark gives significant details for Analgesic effect. The study exhibited that therapy along with Jatraopha carcus extracts (100 along with 300 milligram per kilogram) exhibited important $P < 0.05$, 0.01 along with 0.001 as comparison made with control group. Analgesic activity is due to inhibition of biosynthesis of prostaglandins.

Antioxidant activity

Current research provide proof that extraction of Jatropha carcus possessing higher quantities of phenolic and flavonoid constituents, exhibits potent free radical scavenger effect as antioxidat. In-vitro studies exhibited that Jatropha carcus plant stem bark extract are effective in oxidative stress conditions and are natural antioxidants.

Antipyretic activity

The research exhibited that therapy along with Jatraopha carcus extraction (100 along with 300 milligram per kilogram) exhibited important $P < 0.05$, 0.01 along with 0.001 as comparison made with control group. The antipyretic activity of extraction of Jatropha curcas is probably by inhibition of prostaglandin synthesis in hypothalamus.

Anti-diarrhoeal activity

The research observed that therapy along with Jatraopha carcus extracts (100 along with 300 milligram / kilogram) exhibited important $P < 0.05$, 0.01 along with 0.001

as comparison done with control group. Jatropha carcus plant extract causes decrease purging frequency, wet stool weight was reduced and onset of diarrhea time was also decreased.

Wound-healing activity

Plant extract ointments (Jatropha carcus) had shown maximum increase in hydroxyproline and tensile strength ($P < 0.01$) for wound healing effects. Histopathological studies also support in treatment and prevent of wounds with plant extract ointments to control, standard and test group animals (albino wistar rats). Flavonoids, triterpenoids, and tannins are known to promote the wound-healing process.

Antidiabetic acivity

Diabetes and hypertension are two major problems of current cenerio of world and better treatments are tried every day. Jatropha carcus had been found to reduce glucose levels in albino wistar rats as test groups in comparison with standard drug glibenclaminde. Stem bark of J. carcus has effective constituents in treatment of diabetes. The potency of these extracts was found to be very effective in treatment of diabetes.

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