



"DRUG EVALUATION METHODS "

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Cardiovascular activity

Introduction -

In affluent nations, cardiovascular illnesses are the number one killer and cause of morbidity. It is particularly challenging to avoid cardiovascular problems since they are complicated complex diseases in which those hereditary and environmental factors are involved. We now have useful insights through into pathophysiology of cardiovascular disease (CVD), including cardiac and atherothrombotic diseases, due to the creation of animal models for these conditions. These models have also been observed for being crucial for assessing new approaches to treatment to identify and avoid such difficulties. An often popular cvd models, including used in both big and small animals, will be outlined below. These models are used to cover every element of these human illnesses with greater precision and understanding. Specifically, . We will discuss models of heart failure and atherothrombotic illnesses in particular, including growing abdominal aortic aneurysms (AAA), thoracic aneurysms, and occlusive atherosclerotic diseases. These circumstances present a substantial issue today since disorders require indicators to assess early identification and anticipate development, but these predictors are understudied.

situation is not anticipated to improve in the coming years, since this number is predicted to grow exponentially². Inactivity is recognised as a phenomena significantly linked to CVD growth such diversity of CVD risk factors, average body mass index². Physical activity's (PA) benefits on CVD risk factors are well established, which accounts for its appeal among healthy people who desire to reduce their chance of developing the disease.

Physical activity (PA) is popular among healthy people who desire to prevent CVD because of its well-known effects on CVD risk factors (e.g., walking, climbing stairs). To counteract the harmful effects of CVD on the organic system, physical exercise (PE), which entails planned and structured body movement intended to improve one or more physical capacities, has been widely advocated as a potent non-pharmacological tool by numerous international associations due to its capacity to offer greater effects than PA^{2,3,4,5,6}. In reality, a number of research, involving published studies and contextual information, suggest that PE may alter the physiologic course of several CVD, including hypertensive (HTN), cerebrovascular disease infarction, and diabetes.

Cardiac, mind, and vascular illnesses all fall under the umbrella term of cardiovascular disease (CVD)¹. Numerous statistics show that CVD is the leading cause of mortality and disability worldwide^{1,2}. As of now, it appears about 30% of yearly fatalities in low- and middle-income nations are caused by CVD². The

1) Antihypertensive activity-

Animal

Male albino adult For the study, 150–200 g Wistar rats of either sex that were purchased from Bharat Serum and Vaccines Ltd. in Thane, India, were utilised. They were kept in polypropylene cages with husk lining that were changed every 48 hours and maintained at a temperature of 25 ± 5 °C. They received water on a regular basis, along with commercial pellet rat food as food. The study was conducted in accordance with the recommendations of the Animal Ethics Committee of MGU and the Council and for Reason of Control and Supervision of Experiments on Animals (CPCSEA), New Delhi, India.

Drugs

The following substances were acquired from Sigma-Aldrich in St. Louis, Missouri, USA: urethane, noradrenaline (NA), phenylephrine (PE), serotonin (5-HT), and adrenaline (Adr). The study's other compounds were all of the analytical variety.

Plant

Beta vulgaris roots, and Dr. S. Jayanti, a scientist with the Botanical Survey of India in Pune, produced them using a specimen.

Result and discussion

research on acute toxicity

a dosage of 2000 mg/kg, no hazards of any kind were detected within any of the organisms.

Heart rate

In animals, the heart rate was measured to be 237.7 ± 13.74 beats per minute. When compared to control, the DEXA taking group's heart rate increased. In compare to the DEXA-only group, animals treated with Beta vulgaris (100 and 300 mg/kg p.o. for 14 days) also demonstrated a substantial (p0.05) decrease in heart rate.

intrusive blood pressure reading

Animals in the control group had blood pressure readings of 73.6 ± 5.87 mmHg. When compared to animals under control, the DEXA treated group had significantly higher blood pressure. In contrast to control animals, no appreciable changes in blood pressure were

seen in the animals given Beta vulgaris (100 and 300 mg/kg p.o. for 14 days). When rats were given DEXA and Beta vulgaris (100 and 300 mg/kg p.o. for 14 days), their blood pressure significantly (p0.05) decreased compared to the DEXA-only group.

Conclusion

The focus of the current study is on the impact of Beta vulgaris methanolic extract on dexamethasone-induced increases in blood pressure. Researchers looked examined how Beta vulgaris affected the pressure rate index, heart rate, blood pressure, and the vascular sensitivity to different catecholamines. When DEXA was delivered, the group's pressure rate index (PRI) increased considerably compared to the control animals. In comparison to the DEXA-treated group, normal animals treated with Beta vulgaris (100 and 300 mg/kg p.o. for 14 days) + DEXA had a substantial (p0.05) drop in PRI. When compared to control animals, the DEXA-administered group's heart rate increased considerably. Beta vulgaris (100 and 300 mg/kg p.o. for 14 days) and DEXA-treated animals had a substantial (p0.05) decline in the condition.[1]

2) Intropic activity

Method

arranged a systematic Medline and PubMed search, over the period 1982–2003, using the following keywords: cardiac surgery, cardiopulmonary bypass, coronary artery bypass grafting, inotropic support, epinephrine, dopamine, dopexamine, dobutamine, amrinone, enoximone, milrinone and levosimendan. Agents considered to be primarily vaso-pressors (e.g. norepinephrine, arginine vasopressin and phenylephrine) and mechanical support (e.g. intra-aortic balloon counter-pulsation and assist devices) are not considered. For reasons of space and the likelihood that they would behave like other agents in their class, the more obscure phosphodiesterase inhibitors (PDIs; e.g. olprinone) not in common usage in the UK and Australia are not considered.

We also looked through the bibliographies of papers found using this technique for any reports that may have escaped our original search of electronic reference libraries. Animal research, child studies, in vitro studies, and publications written in languages other than English are not considered. With the help of this search method, we located 210 documents. This list was narrowed down

to 142 instances in which the agent in issue was applied to individuals who had undergone cardiac surgery in order to sustain heart rhythm or important organ perfusion. All of the contested items were acquired. In accordance with Cook and colleagues' technique [4], papers were chosen and scored on the quality of their supporting documentation (Table 1). The relevant concerns with each agent in individuals who had heart surgery received extra care.

Would the inotropic drug influence the oxygenation of vital organs? Can the inotropic drug have any significant side effects? Does the inotropic drug have an impact on major patient outcomes, such as the amount of time spent in the doctor's office or intensive care unit, the need for airflow, or the likelihood of survival? Data pertaining to the use of each therapy were investigated. "Evidence-based" suggestions were created whenever practical.

Result

Drug classes and molecule are taken into consideration while analysing the findings of our literature review. Beyond the scope of the present study, a complete pharmacology profile of each drug

grading of answers to inquiries and degrees of proof

levels of proof

I) Random studies with low false positive rates (0.05 and 0.8 respectively).

II) Nonrandomized, concurrent cohort studies.

Iii) Historic inclusion criteria without randomization

Case series.

3) cardioprotective activity :

Animals and materials-

Wistar male rats weight between 250 and 350 g were utilised in the study. Male Wistar rats (250–350 gm) were kept in separate groups under ambient conditions (27–2°C, 50–5% relative humidity, and a 12-hour dark–light cycle). Both water and food were freely accessible. Prior to the actual experiment, animals were exposed to the experimental environment for a week. Institutional Animal Ethics Committee (IAEC) of Datta Meghe

Institute of Medical Sciences, Sawangi, Wardha, authorization and acceptance for animal experiments were acquired. The care and management of animals was carried out in compliance under labs with the prescribed standards for animals.

Method:

Use of a commercial kits from Vital Diagnostics, the enzyme sample and buffer were carefully combined to create the functioning reagent. 50 ml of the extract and 1000 mL of working reagent were pipetted into such a spotless, sterile tube within 5 minutes. After precisely 30 seconds, the combination was extracted, and initial absorbance was read at 340 nm. The absorbance was then measured at exactly 60, 90, and 120 seconds, and mean A/minute values were computed. [3]

4) Anticoagulant activity -

Materials and procedures

Materials: Centrifuge, Sodium Chloride, Calcium Chloride, EDTA (Ethylene Diamine Tetraacetic Acid), Glass slides, tubes, capillary tubes, needles, syringes (5 ml), cotton swabs, filter paper, micropipettes, ginger, garlic, clove, and green food colouring

Plant Extract Preparation

Garlic, *Allium sativum*, aqueous extract: We bought *Allium sativum* species of garlic from a nearby market. To make the species sterile, 10g of peeled garlic was weighed, washed with sterile distilled water by soaking for 5 minutes, and then washed with 95% ethanol for 3 minutes. The ethanol was then removed from the garlic by drying it for 10 minutes. After that, 0.5ml of distilled water was added to a sterile mortar and pestle to crush the dried garlic. After being crushed into a paste, the garlic is filtered through Whatman No. 1 filter paper, yielding a 15 ml extract. This extract was thought to be 100% effective. Ginger (*Zingiber officinale*) aqueous extract: *Zingiber* dried ginger

Zingiber officinale (Ginger) aqueous extract: Dried Ginger (Zingiber officinale) rhizomes were acquired at the neighbourhood vegetable store. Fresh rhizomes were crushed into a small particles, and a delicate balance was used to quantify ten grammes such a flour..

Result and discussion

To use the theories of coagulation time, a research was conducted to assess the impact of Allium sativum (Garlic), Zingiber officinale (Ginger), Syzygium aromaticum (Clove), and Camellia Sinensis (Green Tea) as an anticoagulant in blood samples from healthy adults.

Conclusion

Remarkable anticoagulant characteristics were observed for all four aqueous extracts' anticoagulant activity. Therefore, additional characterisation and determination of the active compounds in charge of action were to be discovered in the later. Consuming these aqueous plant extracts on a regular basis may greatly aid in preventing cardiovascular problems. To identify the compounds, their pharmacological characteristics, and other effects, more research is necessary.[4]

2)Respiratory activity

Introduction-

Remarkable anticoagulant characteristics were observed for all four aqueous extracts' anticoagulant activity. Therefore, additional characterisation and determination of the active compounds in charge of action were to be discovered in the later. Consuming these hydrophilic herb preparations on a regular basis may greatly aid in preventing cardiovascular problems. To identify the compounds, their pharmacological characteristics, and other effects, more research is necessary. [5,6]

.There are four different kinds of histamine receptors in every cell, namely H1, H2, H3, and H4 [7]. Antihistamines (H1) are a notable family of drugs that are extremely useful in treating a variety of hypersensitive disorders, including rhinitis, urticaria, roughage sickness, and even breathing problems [8,9]. Histamine H1 receptor antagonists, often known as antihistamines, have been one of the most commonly used families of medications for adversely sensitive conditions since their discovery and early development in the 1940s [10]. Although several of these drugs exhibit restriction preferences for various classes of cell

receptors, more seasoned basic antihistamine have strong restriction liking for H1 receptors. sleepiness. However, it's possible that some of the newer allergens are suited for muscarinic receptors as well as histamine H1 receptors in the brain. [12]

MODELS FOR ANTIHISTAMINIC ACTIVITY SCREENING

In-vivo model/animal model

- 1) Produced bronchoconstriction by histamine in rats, mice, and guinea pigs.
- Rats, guinea pigs, and mice with passive paw anaphylaxis.
- Mouse leukocytosis brought on by milk.
- Mouse eosinophilia brought on by milk.
- The catalepsy that clonidine causes in mice.
- Catalepsy in mice brought on by haloperidol.

In-vitro model

- The production of an individual goat trachea ring.
- Creation of an isolated guinea pig trachea chord.
- Development of guinea pig ileum cells.
- Ileum tissue generation in rats and mice.

MODEL

- Forced bronchoconstriction by histamine in guinea pigs, mice, and rats Eight groups of animals (n=6) were created. The control group received distilled water, while the other groups received a single dosage of the extract (75, 150, 200, 300, 600, and 1200 mg/kg p.o.). As a positive control, chlorpheniramine maleate (2 mg/kg) is used. Each animal was housed in the histamine chamber and given a 0.2% histamine aerosol treatment.

3)Anticancer activity -

Introduction -

One of the most fascinating fields of study has been cancer research, and its diversity is what makes it so fascinating. Research into the causes and spread of disease, the many cell types that might be examined as therapeutic targets, and methods for diagnosing and treating disease are all included. Whatever the subject of research, curing the ailment is the ultimate objective. Though partially accomplished, this objective is still not completely met. Or perhaps the results of 30 years of study are poised to mature. A staggering number of resources are being used for drug discovery and design in the fight against cancer, and the field of cancer drug research is still evolving at an astounding rate. The crucial phase is the examination of any such ideally developed therapeutic molecule.

The crucial phase of a drug development programme is the assessment of any such ideally developed therapeutic comments A promising agent may be dropped from future growth if an crucial approach is improperly chosen. The main screening technique is high throughput screening with cell lines. But additional inspection using an appropriate in vivo model is required due to restrictions like reduced relevance with clinical situation. The choice of animal model seems critical in such a situation. The human sickness should be as accurately modelled in the animal as feasible.

1) Friend leukaemia:

Friend originally identified this tumour in adult Swiss mice. By injecting leukemia-spleen homogenates with cell-free filtrates, it can spread to other animals. Several assessment criteria include preventing spleen weight increase, lowering the viral titre (measured by bioassay), and extending life expectancy. The 2-4 month window between viral infection and the onset of leukaemia as well as rigorous and time-reduction assessment criteria

prevent the use of these animals in anticancer revolution research.

2) Rous sarcoma: Rous originally identified this tumour in young chickens. It can be spread by the implantation of tumour pieces or the injection of cell-free tumour homogenates. The most often used assessment criteria are survival time and tumour growth prevention. Since this tumour is confined, it is simple to gauge its growth. However, because it is resistant to a wide range of substances, some significant molecules might go unnoticed.

3)Radiation produced tumors: UV radiation is known to cause cancer. This characteristic is taken advantage of to give trial animals radiation exposure at carefully calculated levels in order to cause cancer. The majority of these models are skin tumour models. Radiation can occasionally be used in conjunction with chemical agents like TPA or DMBA. Skin tumorigenesis brought on by UV in the hairless SKH-1 mouse. Samples of this sort of model include two-stage models for the development of skin tumours, etc. The fact that tumours form on the skin and are therefore easily accessible is one advantage of these types.

The drawbacks of these kind of models include laborious assessment parameters and a lengthy tumour initiation period. However, according on the assessment parameters employed, this sort of model can be used to predict a broad antitumor activity. These models aren't employed in standard screening programmes.

4)Analgesic activity

Introduction-

Analgesics are substances that, without altering awareness, appropriately reduce pain via functioning on peripheral and CNS pain mediators. A narcotic or non-narcotic analgesic can be used.

Although no one suffering, it is one of our bodies natural most vital defence systems and an indication of anything that is not ordinary.

Acute and chronic pain are the two basic classifications of pain, respectively, based on the degree and intensity of the threshold. Acute pain happens repeatedly and goes away within a short period of time, either with or without treatment, but chronic pain develops over an extended period of time and progresses slowly or insufficiently. The central and peripheral nerve systems are both involved in the perception of pain from the site of origin to the point of receiving it. Pain relief relies on a number of variables, such as the type of pain,

5. After injecting the medicine (plant extract) into the experimental animal, let it dissolve, and then put them back on a hot plate, record the baseline response time.

6. Contrast the answer time in between taking a medication. 7. Retry the technique if you don't get the desired outcomes.

5)Anti-inflammatory activity-

Introduction-

The body uses agitation as a kind of self-defense to try to get rid of dangerous stimuli like viruses, irritants, or damaged cells as well as to start the healing process. By producing cells and mediators that fight off foreign objects and ward off infection, the inflammatory process shields our body against sickness. However, chronic, excessive, or inappropriate inflammation is the root of many illnesses, such as colitis, psoriasis, and rheumatoid arthritis. 2 Chemical therapeutic agents that are steroidal or non-steroidal anti-inflammatory in nature make up the majority of clinically significant medications for the treatment of inflammatory diseases. Even though these medications have strong anti-inflammatory effects, managing chronic inflammatory disorders calls for their lengthy use.

These medications also carry a risk of many, serious side effects. Therefore, it is necessary to replace pharmaceutical therapeutics with naturally derived therapies that have minimal adverse effects. The ideal medication would boost inflammation's beneficial effects while controlling its negative and destructive side effects. 3 Therefore, it is desirable that agents produced from natural sources that have fewer adverse effects replace the anti-inflammatory drugs that are now accessible in allopathic therapy. To support their current position as anti-inflammatory drugs, these therapeutic substances must be scientifically backed up. Some medications available from the ayurvedic stream have a great deal of potential as anti-inflammatory treatments. Among these, *Moringa oleifera*, which is widely accessible across the nation, has shown anti-

Models for Evaluating Analgesic Activity-

Any analgesic drug's research and clinical testing process must include monitoring. On several in-lab animal models, the medication or plant extract is being tried. Since not all models are based on the same underlying theory, choosing the right model requires careful consideration and precision

In an irregular and open access journal literature survey, I discovered the unexpected finding that the majority of scientists used only one or two models for evaluation purposes. This survey also revealed that only two models were frequently used: the hot plate method and the oxalic and acetic acid induced writhing test.

Test

Hot plate method -

1. Weight and count the experimental mice and rats.
2. Divided the animals into three groups:
 - (1) Control
 - (2) Experimental
 - (3) Reference Groups.
3. After putting the animal on the hot plate, observe the animal's licking or jumping response to note the rat's response time.
4. 15-second time limit will be set as the cutoff to prevent needless suffering and harm.

inflammatory potential. Studies examining this drug's anti-inflammatory efficacy, however, have shown conflicting results.

Method-

Procedure for inducing granulomas on the cotton palate: This technique was used to assess subacute inflammation. Used were sterile cotton pellets weighing 10 mg apiece and treated with 0.4 ml of an ampicillin aqueous solution. Each animal had one pellet placed subcutaneously through a skin incision at the nape of the neck while it was under anaesthesia. Ketamine at a dose of 60 mg/kg i.p. and Xylazine at a dose of 8 mg/kg intraperitoneally were used to produce anaesthesia. 19 The animals were then treated and the incision was closed with silk 2.0 sutures and sealed with betadine solution to stop infection. After the placement of the cotton pellet, the drug therapy began two hours later and lasted for five days in a row. The pellets were removed on day six and dried for 24 hours.

After 24 hours of drying at 60 °C, the dry weight was calculated. By deducting the beginning weight from the ultimate dry mass of the cotton pellets, the weight of the granulomas generated was determined, and the percentage of drug safety was computed.

Conclusion -

Aqueous extract of *Moringa oleifera* leaves (200 mg/kg) showed anti-inflammatory effect in all models of inflammation, according to the results of the current experiment. The results of this study have shown that the aqueous extract of *Moringa oleifera* leaves may be useful in reducing inflammatory diseases, and it is anticipated that this extract will make an excellent bio-resource for producing an easily accessible herbs mixture.

6)Anti obesity activity

Introduction

In the current situation. Obesity and its related secondary consequences have been treated using traditional medicinal herbs and their strong phytoconstituents. Clinical experiments have also proven the efficacy of several active medicinal plants and the bioactive substances they contain in the treatment of obesity. The endogenous phytoextracts with their mechanisms of action and developmental animal studies are the main focus of this review. The expression of these lipid-metabolizing enzymes in medicinal plants. Keywords: Obesity. Antiobesity medicines. Acetyl-CoA carboxylase (ACC) is deactivated by 5' AMP- activated protein kinase (AMPK), which also increases the production of carnitine palmitoyltransferase-1 (CPT-1), PPAR, and uncoupling protein to enhance fatty acid oxidation.

These days, greater diets and changes in human behaviour have increased the prevalence of obesity and even made it a danger factor for the population of youngsters [11,12]. Numerous pharmacologic chemicals are accessible as anti-obesity medications, but they have risky side effects, thus in many Asian nations, natural items are employed instead. Natural remedies for the treatment of obesity are yet mostly untapped but provide a great alternative to the development of safe and efficient anti-obesity medications.

The obesity are different types

1. Diet-induced (hypercaloric diets) obesity
 - 1.1 High fat diet
 - 1.2 High fat high carbohydrate diet
 - 1.3 High fat high salt high sucrose diet
 - 1.4 Cafeteria diet
2. Maternal overfeeding
3. Drug induced obesity

1)Ovariectomy in female rats

Pre -clinical research in the rat population suggests that ovariectomy-induced abrupt hormone deprivation results in a reduction in oestrogen level, which promotes obesity and associated metabolic aftereffects. Leptin sensitivity, which results from the first reduction of leptin levels followed by a spike after seven weeks, is caused by ovarian suppression. Obesity-causing bilateral ovariectomy has been linked to leptin resistance, insulin resistance, adiposity, and total and LDL cholesterol levels, according to ovariectomies investigations in rats. 28 We can better understand the impact of hormonal changes on female obesity with the aid of ovariectomy. 29 The drawback is that each animal must have surgery, and obesity development might differ.

2)Castration in rat

The main steroid hormone generated by the male gonad, androgen, is crucial for maintaining a healthy level of body fat. In addition to increased hepatic triglyceride levels, excess visceral fat, abdominal adiposity, and fasting blood sugar levels, androgen deficiency causes obesity. Obesity is also linked to low testosterone levels. Rats that have been castrated tend to store fat mostly under their skin in the abdomen. In C57BL/6J mice fed a high-fat diet, hypogonadism following castration has been demonstrated to result in abdominal obesity.

3) Diuretic activity -

Introduction -

Natural esters that are a part of the wider class of plant polyphenols known as gallotannins include gallic acid as one of its constituents. Gallotannins are polyphenolic substances that may be found in drinks, fruits, vegetables, legumes, and vegetables. It is also known by its chemical name, 3, 4, and 5-Trihydroxybenzoic acid. Many plant materials include gallic acid, which may be found as free acids, esters, catechin derivatives, and hydrolyzable tannins. It is widely utilised in the production of paper as well as in the tanning and ink dyeing processes. 1 A recent study showed that over thirty

ayurvedic herbs and their formulations have a high percentage of gallic acid, and these formulations are frequently utilised for treating a number of ailments in India. It is commonly used as a dietary herbal supplement.

2,3 Numerous biological actions, primarily anticancer, antioxidant, antibacterial, and cardioprotective properties, are documented for gallic acid. 4-7 We chose a mouse model of gentamicin-induced kidney injury to investigate the nephroprotective effects of gallic acid since it has demonstrated antioxidant and cardioprotective action. It was discovered over the course of this investigation that rats given gallic acid generated a lot of urine. This coincidental discovery led us to assess the gallic acid's diuretic properties in healthy rats.

methods-

Albino animals The study employed Wistar rats of either sex that were inbred in the main animal house of the A.J.Institute of Medical Science and Research centre. Three rats per cage in a clean polypropylene cage were kept in a controlled environment (24–26 °C) with a 12-hour light/dark cycle and free access to normal food and water. The rats were given a week to become used to these circumstances. Experiments were conducted throughout the cycle's light phase (10:00-17:00hrs). The animals were cared for in accordance with CPCSEA standards and recommendations. The institutional animal ethics committee authorised the study..

Drugs and chemicals

research drug Gallic acid that was received from the Hi-Media laboratory was dissolved in ordinary saline and administered orally. Frusemide (Sanofi Aventis Co.) is a common medication that is used orally and is dissolved in normal saline at a dose of 10 mg/kg/day. study methodology Rats were divided into 4 groups of 6 rats at random.

Result

The Animals were determined to be normal at observed intervals of 5 hours, 12 hours, and 24 hours. There was no sign of dehydration. The usual medication furosemide considerably increases the total urine volume (13.0036 ml) as compared to the control group (6.80037 ml), as shown in table 2, and its diuretic activity was 1.91. The test medication significantly increased urine volume at doses of 25 mg/kg and 50 mg/kg (9.83016 ml and 10.17016 ml, respectively), and an increase in urine activity that was dose dependent was also seen. impact on the excretion of urinary electrolytes Standard medication furosemide considerably increases urine excretion of sodium, potassium, and chloride, as demonstrated in table 3 (p 0.001). although sodium, potassium, and chloride excretion are all markedly reduced by gallic acid at a dosage of 25 mg/kg when

However, the importance threshold drops for potassium excretion (p0.05 when compared to control for potassium excretion) when comparison to sodium and chloride excretion.

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8)immunomodulatory activity

Introduction

Vertebrates have an incredibly complex immune system that guards against outside invaders. It has the capacity to produce different cell types and chemicals that are capable of identifying and removing a virtually infinite number of unwanted and undesired substances. Any alteration to the immune response, including the induction, expression, amplification, or inhibition of any component or stage of the immune response, is referred to as immune system modulation. Therefore, a drug utilised for its impact on the immune system is called an immunomodulator. Based on their actions, immunomodulators may be divided into two categories: immunosuppressants and immunostimulators.

A relatively young and growing area of pharmacology called immunopharmacology seeks to identify immunomodulators. Immunomodulators have potential applications in clinical medicine, such as the treatment

of AIDS and the restoration of immunological deficiency, as well as the regulation of abnormal or excessive immune activity (e.g. the treatment of graft rejection or autoimmune disease). Immunological adjuvants are specific immunomodulators used in conjunction with antigens to enhance the immune response to vaccination components. 1 The immune system's primary job is to defend the body from invading infections and infectious diseases. This is accomplished either through extensive adaptive mechanisms that are extremely particular, complicated, and characterised by variety and memory, or by innate or natural immune systems, which essentially serve as a short-term first line of defence.

Methods for Testing Immunological Factors

In vitro methods:

1. Restricting mast cell release of histamine
2. Mitogens stimulated proliferation of lymphocytes
3. Reduction in the proliferation of T cells

In vivo methods:

1. Animals with spontaneous autoimmune disorders
2. Rats with acute systemic anaphylaxis

Result

The immune system is a sophisticated organ with highly specialised cells and even a circulatory system that is distinct from blood vessels. In a network of defence against infection, immune system organs and tissues are distributed throughout the body. The activity of white blood cells is necessary for both innate and adaptive immunity. While lymphocytes are a major component of the adaptive immune response and offer long-lasting protection, granulocytes and macrophages play a major role in innate immunity. Immunomodulation is the control of immunological responses, either by inducing them to fight infectious

illnesses or by reducing them when they are unwelcome. Interferon (IFN), steroids, and DMG are just a few of the natural substances, proteins, and amino acids that have demonstrated a considerable capacity to control immunological responses. Since ancient times, plants have been utilised to cure a variety of illnesses and ailments.

9) Anti hyperglycemic activity

Introduction

sweet diabetes Diabetes mellitus is described by the WHO as a metabolic illness with numerous aetiologies that is characterised by persistent hyperglycemia and disruptions of the metabolism of carbohydrates, fats, and proteins as a result of deficiencies in insulin production, insulin action, or both. Diabetes mellitus causes long-term harm to, malfunction in, and failure of a number of organs. The typical signs and symptoms of diabetes mellitus include thirst, polyuria, impaired eyesight, and weight loss.

Screening models for antidiabetes

4.1 Diabetes induced animal model

1. Alloxan

Reactive oxygen species are the mechanism through which alloxan causes diabetes. With the emergence of superoxide radicals, alloxan and the byproduct of its reduction, dialuric acid, start a redox cycle. Hydrogen peroxide is produced by the dismutation of these radicals. After that, the fenton reaction produces extremely reactive hydroxyl radicals. Rapid cell death is brought on by the action of reactive oxygen species and concurrent huge rises in cytosolic calcium concentration. Prior to alloxan's activity in the pancreas, cells quickly absorb it.

2.Streptozotocin

Streptozotocin 2-deoxy-2-[3-[methyl-3-nitrosoureidp]-d-glucopyranose]] is produced by the fungus *streptomyces achromogenes* and utilised to trigger both type-1 and type-2 diabetes. Diabetes is brought on by streptozotocin in practically all animals. The ideal amount needed to cause diabetes was discovered to be [50-60mg/kg i.p. or i.v], in mice [9175-200mg/kg i.p. or i.v], and in dogs [15 mg/kg for 3 days] depending on the species. Rapid intravenous injection seems to be the most effective method of delivery because of its limited solubility.

Result

The number of diabetics worldwide increased from an estimated 30 million in 1985 to over 171 million in 2000, according to the World Health Organization. More than 366 million people are anticipated to exist by 2030, with strong growth in developing economies, notably among those aged 45 to 64. Plant medicines and herbal remedies are thought to be less dangerous and devoid of adverse effects than synthetic drugs.

Plant-derived hypoglycemic medications are essential for use in medicine, according to WHO recommendations. The anti-hyperglycaemic actions of these plants are attributed to their purported ability to restore the function of pancreatic tissues by enhancing insulin production or decreasing intestinal glucose absorption. Therefore, employing herbal medicines as a kind of therapy affects cellular defence and lowers glucose fluctuation. Although the presence of substances like glycosides, alkaloids, terpenoids, flavonoids, etc. has been found in the majority of plants, there is often very little scientific knowledge on the specific mechanisms of action in the treatment of diabetes.

10) Antiarthritic activity

Material

Plant material:

The stem bark of *Acacia auriculiformis* was gathered in the month of September from Panchkula, Haryana, and verified by Dr. Anjula

Pandey, Principal Scientist, National Herbarium of Cultivated Plants, NBGPR, New Delhi. Refer to NHCP/NBGPR/2012-45. The plant material was air-dried at ambient temperature and pulverised into a smooth paste for the investigation.

Drugs and Chemicals

All solvents and other reagents were of analytical quality and were purchased from SD Fine chemicals Ltd. in Mumbai. Horizon Bioceuticals Pvt. Ltd. sent Diclofenac sodium as a gift sample. Kala-amb (Himachal Pradesh).

In vitro Anti-arthritis activity

The albumin denaturation test was used to assess this activity. The various plant extract concentrations, ranging from 100 to 500 g/ml, were produced. A reaction mixture made up of 1 ml of 1% bovine albumin solution and 1 ml of test medication was produced for each concentration. For 15 minutes, these produced solutions were incubated at 27 °C. In order to cause denaturation, the reaction mixtures were then maintained at 70 °C in a water bath for 10 minutes.

After cooling the solutions, turbidity at 660 nm was determined spectrophotometrically. In test extracts, diclofenac sodium was administered at concentrations ranging from 100 to 500 g/ml as a

standard medication. The control group, to which no medication was given, was used to compute the percentage inhibition of denaturation. Averaging was done after each experiment was carried out in triplicate.

The percentage inhibition of protein denaturation was calculated by following equation. % Inhibition of protein denaturation = $100 \times [A_1 - A_2 / A_1]$
Where: A_1 = Absorbance of control A_2 = Absorbance of test /standard sample with albumin solution

RESULTS

Initial phytochemical testing The extracts passed a preliminary phytochemical screening, which identified the presence of sugars, phenols, tannins, saponins, and flavonoids.

References

- 1) Dignesh Patel¹, Rupali Patil¹, Alkesh Patel^{2*}. Antihypertensive activity of Beta vulgaris on dexamethasone induced hypertension in rats. PHARMACEUTICAL AND BIOLOGICAL EVALUATIONS February 2017; Vol. 4 (Issue 1): 37-4
- 2) Sahithya Ravali Ravula^{1*} and Visalakshi Kancherla², A Study on the Pattern of Inotropes use in an Intensive Care Unit. Journal of International Pharmaceutical Research, ISSN: 1674-0440.
- 3) Neha A. Khadse^{1*}, Manish P. Deshmukh², Anjali M. Wankhade¹, cardioprotective activity of herbal formulations in experimental animals, American journal of pharmaceutical research.
- 4) Kartheek Chegu^{*}, K. Mounika, M. Rajeswari, N. Vanibala, P. Sujatha, P. Sridurga, D. R. Brahma Reddy. IN VITRO STUDY OF THE ANTICOAGULANT ACTIVITY OF SOME PLANT EXTRACTS. World Journal of Pharmacy and pharmaceutical sciences. Vol 7, issue 5, 2018
- 5) Kartheek Chegu^{*}, K. Mounika, M. Rajeswari, N. Vanibala, P. Sujatha, P. Sridurga, D. R. Brahma Reddy. IN VITRO STUDY OF THE ANTICOAGULANT ACTIVITY OF SOME PLANT EXTRACTS. World Journal of Pharmacy and pharmaceutical sciences. Vol 7, issue 5, 2018
- 6) Archana M. navale, Animal model of cancer A review, International journal of pharmaceutical sciences and research. 2013; Vol. 4(1): 19-28.
- 7) Pushpendra Kumar Patel, Joti Sahu, Sanket Singh Chandel. review on Nociceptive Models for the Screening of Analgesic Activity in Experimental Animal, international journals of neurologic physical therapy. Vol.2, No 6, 2016
- 8) Amit Mittal^{*}, Monica Sharma, Abhinav David, Pinki Vishwakarma, Manish Saini, Mani Goel, K. K. Saxena. An experimental study to evaluate the anti-inflammatory effect of moringa oleifera leaves in animal models. International Journal of Basic & Clinical Pharmacology
- 9) Satyajit Patra¹, S Nithya B Srinithya² and Meenakshi SM². Review of Medicinal Plants for Anti-Obesity Activity. Translational Biomedicine ISSN 2172-0479.
- 10) Ramya Kateel, Mohandas. S. Rai, Ashok Kumar J. Evaluation of diuretic activity of gallic acid in normal rat. Journal of scientific and innovative research. 2014; 3 (2): 217-220.
- 11) Nagarathna P.K.M¹, Reena K², Sriram Reddy³, Johnson Wesley⁴. Review on Immunomodulation and Immunomodulatory Activity of Some Herbal Plants. Int. J. Pharm. Sci.
- 12) P. Swaroopa^{*}, V. Jaya Sankar Reddy, Mallapu Koshma, Y. Sudharani, S. Jilani Basha and T. Naga Adithya. Review on Antidiabetic Activity on Medicinal Plants, P. Swaroopa et al / International Journal of Pharmacological Research 2017; 7(12): 230-235.
- 13) 10) Dignesh Patel¹, Rupali Patil¹, Alkesh Patel^{2*}. Antihypertensive activity of Beta vulgaris on dexamethasone induced hypertension in rats. PHARMACEUTICAL AND BIOLOGICAL EVALUATIONS February 2017; Vol. 4 (Issue 1): 37-46.