CHAPTER-2

REVIEW OF LITERATURE

2.1 INTRODUCTION

The history of herbal medicine is old as human civilization. The living and noon living elements of nature all are depend on each other. Food, cloth and shelter most important requirement of life: supplied by the nature to human being. We are having vast knowledge of drugs because of accumulation of knowledge from ancient time period (Kokate et al 2010).

According to WHO three fourth of plant derived drugs correlated directly with their traditional uses in native culture. As global market for herbal medicine is growing enormously. US are the fastest growing market for herbal products, Europe leads in retail sales. Categorized as medicinal health food; natural cosmetics, personal hygiene products world demand of 60 billion dollar was likely to touch 4 trillion by 2050. China and India remain the major supplier of herbauls to the world market (Trivedi et al 2006).

About 800 plants may posses anti diabetic effect. Beneficial actions of different medicinal plants are extensively documented peoples are use as dietary adjuvant unknowingly about proper functions and active constituents. Numerous synthetic drugs are available in markets safe and effective treatment yet to achieve.

According to WHO as traditional plant are effective and less toxic with fewer side effects so considered as extremely good for therapeutic uses (Shoken 2008).

Traditional natural drugs are having lack of side effects and drug related toxicity. As modern drugs posses lots of toxic effect and emergence of resistance. Nowadays drug resistance is a major problem so natural products are help in development of lead molecule and enrich our health care system. Nature always plays a vital role in discovery of new drug molecule.
Mechanism of insulin secretion:

Insulin secretion occur from pancreatic β-cells, when glucose molecule enter through GLUT2 inhibit the ATP-sensitive K⁺ channel resulting in partial depolarization of the pancreatic β-cells. This increases intracellular Ca⁺ availability and exocytotic release of insulin occurs. Oral hypoglycemic agents block ATP sensitive K⁺ channel and due blockade of this channel accumulation of Ca⁺ ion occur which leads to depolarization.

Figure: 10. Mechanism of insulin secretion
Different factors regulate insulin secretion

1. Presence of food
2. Glucagon
3. Somatostatin
4. Parasympathetic nerves
5. Sympathetic nerves
1. **Presence of Food:**

Presence of food stimulate vagus nerve to stimulate insulin secretion.

2. **Glucagon:**

Glucagon secreted by pancreatic $\beta$ cells to stimulate insulin secretion.

3. **Somatostatin:**

Somatostatin act on pancreatic $\beta$ cells to inhibit insulin secretion.

4. **Neural mechanism**

Pancreatic islets are rich with sympathetic and vagal nerves

A. **Activation of adrenergic**

Pancreatic islets are rich with sympathetic and vagal nerves

B. **Activation of adrenergic nerves**

Pancreatic islets are rich with sympathetic and vagal nerves

- Activation of adrenergic $\alpha_2$ receptor decreases insulin release by inhibiting $\beta$ cell adenylyl cyclase.
- Adrenergic $\beta_2$ receptor stimulation increase insulin secretion.

**Activation of cholinergic nerves**

- Cholinergic muscarinic receptor activation by Ach or by vagal stimulation causes insulin secretion.
2.2 THERAPEUTIC POTENTIAL OF DIFFERENT PLANT BELONGS TO FAMILY: CAESALPINIACEAE (Kirtiakar et al. 2006)

i. Caesalpinia erista:

- Tumours, Anthelmintic
- Elephantiasis, Small pox
- Aphrodisiac, Anthelmintic
- Leucorrhoea, Piles
- Wounds healing, Antipyretic
- Tonic, Toothache
- Vesicant, Emenagogue

ii. Caesalpinia sepiaria:

- Laxative, Tonic
- Carminative, Antipyretic
- Emenagogue, Purgative

iii. Delonix elata:

- Rheumatism, Flatulence
- Febrifuge, Antiperiodic

iv. Wagatea spicata:

- Pneumonia, Skin diseases

v. Cassia fistula:

- Leprosy, Tuberculosis glands
- Syphilis, Burning sensation
- Rheumatism, Laxative
• Antipyretic, Antipyretic
• Leprosy, Digestible
• Purgative, Antipyretic
• Disease of heart, Abdominal pain
• Carminative

vi. *Cassia occidentalis*:

• Ring worm, Elephantiasis
• Scorpion sting, Aphrodisiac
• Alexeteric, Cough
• Asthma, Hiccough
• Snake bite, Ringworm
• Ascites, Purgative
• Tonic, Febrifuge
• Diuretic, Constipation
• Antidote.

vii. *Cassia obtusifolia*:

• Skin disease, Tuberculous glands
• Ring worm, Refrigerant
• Anthelmintic, Antipyretic
• Laxative, Diuretic
• Bronchitis, Asthma
• Leprosy, Skin disease
• Piles, Itching
• Heart disease, Ring worm
• Dysentery, Snake bite
• Scorpion- sting
vii. *Cassia obovata*:

- Purgative, Influenza.

viii. *Cassia mimosoides*:

- Spasm of stomach.

viii. *Cassia angustifolia*:

- Constipation, Loss of appetite
- Liver complaints, Abdominal troubles
- Spleenic enlargement, Dyspepsia
- Typhoid, Jaundice
- Anemia, Leprosy
- Bronchitis, Tumours.

ix. *Cynometra cauliflora*:

- Leprosy, cutaneous disease.

x. *Humboldtia vahliana*:

- Leprosy, Ulcer
- Epilepsy.

xi. *Bauhinia tomentosa*:

- Snake bite, Scorpion sting
- Inflammation of liver, Vermifuge
- Tumours, Wound
- Dysenteric, Astringent.
xii. *Bauhinia racemosa*:

- Refrigerant, Antipyretic
- Astringent, Alexipharmic
- Vermicidal, Quarten fevers
- Skin disease, Throat troubles
- Tumours, Disease of blood
- Dysentery, Diarrhoea
- Headache in malaria fever.

xiii. *Bauhinia purpurea*:

- Carminative, Astringent in diarrhoea
- Ulcer, Laxative.
2.3. PHARMACOLOGICAL ACTIVITIES OF PLANTS BELONG TO FAMILY: CAESALPINIACEAE

1. *Sainath S et al* studied that stem bark of *Saraca indica* for their antimicrobial activity against different strains of microbes like: *S. aureus, E. coli, B. cereus*, and the fungi *C. albicans*. Results indicated that the extract poses significant antibacterial and antifungal activity (Sainath et al. 2009).

2. *Prusty KB et al* studied that leaves extract of *C. mimosoide* Linn at different doses showed significant ulcer protective effect in aspirin induced pylorus ligated ulcer in rats (Prusty et al 2011).

3. *Prusty KB et al* studied that chloroform and methanolic extracts of *B. recemosa* Lamk posses significant analgesic, anti-inflammatory, antipyretic activities at the dose of 400mg/kg on experimental animals (Prusty et al 2011).

4. *Subhadradevi V et al* studied that leaves and flowers extracts of *C auriculata* posses significant antimicrobial activity against microbes like *S. aureus, E. coli* [Subhadradevi et al. 2011).

5. *Manimekalai K et al* studied that extract of *Delonix elata* showed significant anti ulcer and anti-inflammatory property against ibuprofen induced gastric ulcer and cotton pellet induced granulomatous inflammation (Manimekala et al. 2010).
6. Samak G et al studied that water and aqueous extracts of plant materials *Wagatea spicata* showed significant antibacterial activity against methicillin resistance *Staphylococcus aureus* by disc diffusion method (Samak et al. 2012).

7. Pahwa S et al. studied that extract of bark of *Bauhinia purpurea* showed anti diabetic activity (Pahwa et al. 2012).

8. Dahikar SB et al studied antibacterial activity by using disc diffusion method against wide range of against enteric bacterial pathogens results indicated that extracts of *Bauhinia racemosa* possess significant antibacterial activity (Dahikar et al. 2011)

9. Khan MA et al. studied that ethanolic and aqueous extracts of *Delonix regia* flowers showed significant wound healing activity against different wound models in albino rats(Khan et al. 2012).

10. Bessedik A et al studied that essential oil extracted from *N. sativa* strains indicated antimicrobial activity against *S. aureus, K. pneumonia, E. coli* (Amina B 2013).


12. Kumar RS et al studied that *B. racemosa* extract showed significant free radical scavenging and antimicrobial property (Kumar RS et al. 2005)
2.4. CHEMICAL CONSTITUENTS

Phytochemical screening of *T. indica* extracts indicate the presence constituents, like; phenolic, glycosides (Rasu et al. 1989), tartaric acid, mucilage, pectin, fatty acids and essential elements; As, Ca, Cu, Fe, Mn, Mg (Ibrahim 1995).

- **Leaf:**
  - Linonene
  - Benzyl benzoate abundant (Samina 2008).

- **Root bark:**
  - *n*-hexacosane,
  - Eicosanoic acid
  - β-sitosterol (Pino 2002).

- **Seeds:**
  - Fatty acid: palmitic,
  - Oleic, linoleic,
  - Eicosanoic acid.

- **Pulp:**
  - Organic acids: tartaric,
  - Acetic and citric acid (Imam 2007).
2.5. TRADITIONAL USES OF DIFFERENT PLANT PARTS (Iyer SR 1995)

✓ **Leaves:**
- Reduce inflammatory, Swelling
- Tumours, Ring worm
- Diseases of blood, Small pox
- Ophthalmia, Eye disease
- Ear ache, And snake bite

✓ **Flower:**
- Appetizing, Urinary discharges
- Bad odour in perspiration.

✓ **Unripe fruit:**
- Astringent, to the bowel, Cure “vata”

✓ **Ripe fruit:**
- Appetizing, Laxative heating
- Tonic to the heart, Anthelmintics
- ‘vata’ and ‘kapha’, Heals wound
- Fracture

✓ **Bark:**
- Astringent properties, Heals ulcer
- Liver complaints
✓ **Root:**
  - Ankylostomiasis (hookworm).

✓ **Seeds:**
  - Snake bite, Diabetes
PHARMACOLOGICAL ACTIVITIES

1. Antidiabetic, Hypolipidemic and antioxidant

- Seed extracts of *T. indica* poses significant antidiabetic activities (Ramchander et al. 2012 Maiti et al 2004).
- Ethanolic extract of *T. indica* shown antioxidant activity on diabetic rats (Bhutkar et al. 2011).

2. Antimicrobial

- *T.indica* has large spectrum antibacterial activity that could be useful for infectious disease (Doughaari 2006).
- Ethanolic extract of leaf and stem *T. indica* extracts shows antibacterial activity against some gram negative bacterial (Uchechuku et al 2011).

4. Hepatoprotective

- Flower extracts shown hepatoprotective effect on anti TB drugs induced hepatotoxicity (Mahesh et al. 2010).

5. Anti-inflammatory disease

- Fruit pulp extracts modulate anti-inflammatory disease (Paula et al.2009).

6. Analgesic activity

- *T. indica* aqueous fruit extract posses both central and peripherally acting analgesic activity (Khalid et al. 2010).