India is a storehouse of plants which are useful from the health point of view. Many of them are not known outside, though they were used from ancient times in Ayurveda. The example of a plant like ‘Sarpagandha’ world famous as Serpasil shows some of our medicinal plants, well known in ancient times, are even now proving of great medicinal value.

By experiment through the ages men have found certain plants would relieve their aches and pains. Boneset, catnip, horehound, pennyroyal, sage and certain other plants were dried in attics and even fireplaces for home use. They were called ‘simples’ from which the village doctor prepared mixtures called ‘compounds’. Today they are called drugs from an Anglo-Saxon word for ‘dry’.

The medicinal plants contain complicated chemical substances and food materials. These chemicals are stored in various parts of the plants – roots, stems, leaves, flowers or fruits. Some plant substances, if eaten by a person, can kill him or make him very ill. Other substances – even the same ones in small amounts – can make a sick person well.

In ancient times men tried out different plants to see which ones helped cure certain diseases. They probably watched to see what plants the animals ate, especially when they are sick. By trial and error, over the ages, men came to use thousands of plants as remedies for their ills. For example, many American Indian tribes used willow bark to treat rheumatism. How they selected it is not known, but scientists have found that the willow bark contains a pain killing chemical related to one used in aspirin.

Many medicinal plants discovered by primitive people are still in use today. The leaves of ‘Foxglove’ furnish digitalis for the treatment of heart ailments. Quinine, from the bark of the South American Cinchova tree was long used to combat malaria. Curarae, a powerful poison applied by South American Indians to the tips of their arrows, is valuable in the treatment of disease that causes muscular spasms and anesthesia. Rauwolfia, used in the treatment of high BP is derived from the root of a plant that grows in Southeast Asia. It has long been used to treat fevers, insomnia and nervousness. Belladonna and atropine, obtained from the deadly night shade are important in the treatment of eye diseases, painful spasmodic conditions and other ailments. Ephedrine, used for hay fever and in nose drugs is one of the few drugs that are derived from conifers. Spagnum moss is used for surgical dressings.

Antibiotics produced by molds are the most important medicinal discoveries of 20th century. Many plants are rich source of vitamins. Some plant drugs are violent poisons and habit-forming narcotics.

About 4500 years ago, when the great civilizations arose in ancient China, India, Babylon and Egypt, men put their knowledge of plant remedies in writing. These written accounts were called ‘herbals’. The earliest herbal known was probably written by the Chinese emperor, Shen Nung, about 2700 BC. It contains the accounts of the healing value of about 250 plants.
In India, the references to the curative properties of some herbs in the Rigveda seem to be the earliest records of use of plants in medicine. But references to plants in the Rigveda are very brief. More detailed account is available in the Atharva-veda. The period of Rigveda is estimated to be between 3500 and 1800 BC. After the Vedas, there is no information on the development of this science in India for a period of about 1000 years. Charak-Samhila (1000 BC), one of the earliest treatises on Indian Medicine, records the use of over 340 drugs of plant origin; some of these drugs were not indigenous to India.

In Egypt carvings on tomb and temple walls show that people used plants for medicine as early as 3000 BC. A long document written about 1500 BC describes more than 800 remedies for all sorts of ailments, from headaches to heart trouble and from sore throats to insect bites.

India recognizes more than 2500 plant species as having medicinal value, Sri Lanka about 1400 and Nepal around 700. In Ayurveda about 2000 plant species are considered to have medicinal value. The Indian Pharmacopoeia (1966) recognized 85 drug plants whose ingredients are used in pharmaceutical preparations. The Chinese Pharmacopoeia lists over 5700 traditional medicines, most of which are of plant origin.

It has been estimated that out of about 2000 drugs that have been used in curing human ailments in India, only about 200 are of animal origin and a similar number are of mineral origin. The rest, i.e., about 1500 are of plant origin. This number is not very large considering the vast area of our country and the wide variety of plant wealth occurring there in. The great range of temperature (about 49 C to -43 C), rainfall (from 100 mm to over 10,000 mm) and altitude (sea level to over 6000 m) in India account for the occurrence of some 20,000 different species of higher plants in India.

Due to the impact of other systems of medicine and by the rapid progress and spread of modern medicine and surgery, faith and popularity of the herbal medicine is decreasing. But there is much to say in favour of the use of native medicinal herbs. A country whose 80% of the population resides in small and often remote villages where the per capita income is about 80-90 paise/day, expensive, difficult to procure and complicated prescriptions can not be a thing of the masses.

Medicinal plants have curative properties due to the presence of various complex chemical substances of different composition which are found as secondary plant metabolites in one or more parts of these plants. These plants metabolites, according to their composition are grouped as alkaloids, glycosides, cortico-steroids, essential oils etc. Of these, alkaloids form the largest group which includes morphine, codeine, strychnine, quinine, cocaine etc. Glycosides form another important group represented by digoxin, barbolic etc.

Medicinal plants are found in the forest areas throughout South Asia, from the plains to the high Himalayas with the greatest concentration in the tropical and subtropical belts and arid regions of Thar desert.

**How the herbal medicines act?**

Herbal medicines have the ability to affect the body systems. The effects are dependent on the chemical constituents present in the plant.
Plants increase stamina, help the nervous system to function correctly, provide a good supply of B vitamin and maintain regular bowel function.

Plants are being used for improving the quality of diet and sustaining or regulating good health. Herbal medicines not only provide nutrients but also strengthen and support the action of the digestive system, speeding up the rate of processing food and improving the absorption of nutrients. Herbal medicines encourage blood flow to the surface of the body. Others stimulate heart to pump more efficiently while others relax the muscles of the arteries lowering BP.

Some herbal medicines improve the body's ability to remove toxins. Once the toxic load is reduced, the body is able to invest greater resources repairing and strengthening damaged tissues and weakened organs.

Antiseptic plants fight infection while vulnerary (wound healing) herbals such as comfrey encourage blood clotting and help speed the healing of wounds.

Good health is dependent on a healthy balanced nervous system; this system does not work in isolation. It is complimented by the endocrine system and the immune system which controls the ability to resist infection and to recover from illness and injury. Several herbal work with the immune, nervous and endocrine systems to help the body adopt more effectively to stresses and strains of all kinds.

Role of Herbal Medicines in Wound Healing and Regeneration

The following factors influence wound healing:

1. **Vascularity:** Wounds in very vascular parts of the body heal quickly due to well supplied blood.
2. **Infection:** If the wound is not infected by microbial agents (bacteria, fungi etc.) the wound heals faster.
3. **Nutrition:** Nutrition deficiency or imbalance may have an important influence on metabolic processes and can be reflected in healing as follows:
   a) **Vit. A deficiency** – This vitamin is concerned, *inter alia*, with the integrity of epithelium and, if deficient, epithelialization is retarded.
   b) **Vit. C** – is vital to the formation of collagen; deficiency causes poor scar-tissue formation. It plays important role in wound repair and activate metabolism.
   c) **Vit.E** – aids the formation of new capillaries which are necessary for wound restoration.
   d) **Vit. K** – the antihemorrhagic vitamin helps to preserve the normal state of the capillaries and deficiency causes petechiae, echymoses and delayed clotting time. It has a strong influence on the maturation of collagen and the development of tensile strength in wounds.
   e) **Protein deficiency** - as fibrin and collagen are proteins, wound healing is retarded during protein deficiency and subsequent disruptions common.

The mechanism of the action of the herbal medicines, in general, is already explained. The medicinal plants which are used to treat the wounds give satisfactory results because they contain all
the ingredients/factors required for the proper healing of the wound and the regeneration of the new
tissue. They act as antiseptics preventing the growth of microbia (bacteria and fungi) like onion
(Bulbus Allii Cepae) and Garlic (Bulbus Allii Sativi) Some plants like Neem (Azadirachta indica) have
antibiotic activity also. Herbal medicines like Turmeric (Curcuma longa L) and Seabuck thorn
(Hippophae rhamnoides) besides acting as antiseptics contain proteins, fats, vitamins (A,B,C etc.) all
of which play important role in wound healing and regeneration.

The effect of three herbal products – Honey, Turmeric (Curcuma longa) and Neem
(Azadirachta indica) on the wound healing process, in the domestic animals is as follows: Honey and
Turmeric were used for treating the wounds in the rats (Sudhakar Rao et al., 2003) while Neem was
also used, along with other two, in buffaloes (Gupta et al., 1992, Anil Kumar et al., 1993). The clinical
observations on wound healing were as follows:

i) in rats:

On the 3rd day the wounds were pinkish in both Turmeric paste and Honey- treated groups. A little amount of granulation tissue was noticed on the 5th day (in Honey group) and 6th day (in Turmeric group). Scab over the wound started appearing from 10th day and 12th day in both the groups respectively.

Histopathological studies

Turmeric paste-treated wounds on seventh day revealed complete covering of the defect by a
thin layer of epidermis. A few macrophages and lymphocytes were seen beneath the newly formed
epidermis. Fibrous tissue was seen filling the defect at the dermis. On 14th day, the defect was
bridged by epidermis. Fibrovascular tissue which filled the defect lacked skin adnexa. Moderate
number of neutrophils. lymphocytes and macrophages were evident at the level of subcutis.

Honey-treated wounds on 7th day revealed bridging of the defect by stratified squamous
epithelial cells. Fibrovascular tissue was seen extending from the newly formed epidermal layer into
the cutis and subcutis. Few macrophages were seen scattered in the fibrovascular tissue. There was
absence of dermal structures like sebaceous and sweat glands. On 14th day there was complete
bridging of the defect by a thin layer of epidermis. Observations on the macrophages and the dermal
structures were as on 7th day.

ii) in buffaloes

Granulation tissue appeared after 4-5 days in Honey-treated wounds. The cavities of
wounds were filled with granulation tissue nearly two-thirds of its size by days 10-12 and filled
completely by 18-22 days with a thick scab. The wound surfaces showed complete healing by 28days
(Gupta et al., 1992; Anil Kumar et al., 1993).The repair process of Honey was closely followed by
Turmeric and Neem respectively (in that order). The rate of wound healing was also in the same
sequence (Honey, Turmeric and Neem).

Histomorphology

Honey exhibited maximum anti-inflammatory reaction. An early and rapid fibroblastic and
angioblastic activity was observed. The fibrous connective tissue was dense and well organized and
the process of its laying was much faster. The epithelization was also faster (Gupta et al., 1992).
Progressive fibroblastic proliferation with marked angioblastic activity in Honey-treated wounds of buffalo were observed on 7th day by Anil Kumar et al., (1993) also. These authors also observed anti-inflammatory reaction (on 15th day of wound) and complete epithelization (on 30th day of wound). According to them, the histopathological findings on the Turmeric- treated wounds (in buffalo) were almost comparable to those observed in Honey- treated wounds; the histopathological findings in Neem-treated wounds showed Neem is less effective than the other two.

The early and rapid healing in honey-treated wounds might be because it (Honey) possesses a high level of glycine, methionine and proline which play an important and definite role in collagen formation. The high concentration of sugar content in Honey may also be favourable for an early formation of granulation tissue. Further, the anti-microbial property of Honey was due to production of hydrogen peroxide by enzymatic oxidation of glucose and due to the presence of inhibin which are bacteriostatic in action. Honey is also an excellent energy source in catabolic environment. This is one of the factors enhancing the healing process (Gupta et al., 1992)

Turmeric possesses anti-inflammatory property and the presence of Vit A and proteins result in the early synthesis of collagen fibers by initiating fibroblastic activity (Anil Kumar et al., 1993). The beneficial effect of Neem on wound healing may be due to its antiseptic and fly-repellent properties.

References