Traditional Knowledge from and for elderly

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Elders are known to be storehouse of traditional values, skills and morale. Present paper is an attempt to discuss the traditional knowledge of elderly people, their role and highlights many areas where it can be useful for elderly themselves. Some insights are offered for strategic utilization of traditional knowledge and experience of elderly to address the need and improve the quality of elderly life in terms of socio-psychological, cultural, economic and health aspects. This valuable traditional information can be made accessible, affordable and adaptable to the specific needs of elderly people.

Keywords: Elderly, Traditional values, Healthcare, Nutritious food

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Presently, the loss of biological diversity and erosion of traditional knowledge systems (TKS) are issues of great concern. Most of these systems of knowledge are unique and are often known only to a few individuals or communities. This traditional knowledge includes mental inventories of local biological resources, animal breeds, local plant, and crop and tree species. Traditional knowledge may include information about trees and plants that grow well together, about indicator plants that show the soil salinity, or are known to flower at the beginning of the rains. It includes practices and technologies, such as seed treatment and storage methods, and tools used for planting and harvesting. Traditional knowledge encompasses belief systems that play a fundamental role in people's livelihood, maintaining their health, and protecting and replenishing the environment. Traditional knowledge is dynamic in nature and is stored in culture in various forms, such as traditions, customs, folk stories, folk songs, folk dramas, legends, proverbs, etc. The UN Declaration on the Rights of Indigenous Peoples, endorsed by the UN Human Rights Council in June 2006, recognizes “that respect for indigenous knowledge, cultures and traditional practices contributes to sustainable and equitable development and proper management of the environment”1,2.

Research on traditional knowledge showed that younger generations often undervalue this knowledge. Moreover, with the commercialization of natural resources, traditional knowledge that managed to maintain sustainable levels of exploitation has been sidelined. In view of its potential value for sustainable development, it is necessary to preserve indigenous knowledge for the benefit of future generations. The best way can be to encourage students to learn from their parents, grandparents and other adults in the community. Such a relationship between young and older generations could help to bridge the generation gap and help develop intergenerational harmony. It may also help young ones to begin to have a glimpse at their own ageing process and to understand the impact of ageing in their lives so that when they grow older, they will be in a position to make decisions affecting society. At the same time, it becomes imperative that we adapt new things without losing the basic character of our long cherished traditions and value which include traditional knowledge2.

Reservoirs and carriers of Traditional Knowledge

Elders are being regarded as invaluable national resource having adaptive and useful information which is time tested and is preserved from generation to generation through oral or trial methods. Old methods, old materials and old products signify the traditional wisdom, which may have relevance even in the contemporary context. Thus, elders are
considered as the “information storage and processing unit” of a society. The acceptable roles for elders differ in each society. Some cultures utilize their elderly in many ways, while others just a few. Elders are valued because they maintain the old traditions, customs, and kinship systems that are imperative to the group’s survival in a difficult region. They are also honored for their extensive knowledge of the land and the usefulness of the local resources. They play an important role in traditional medicine in that most often they act as healers, diviners and herbalists. The elderly contribute immensely to the growth and well being of the society while at the same time they are sustained by the society. Songs, poems, and stories that exist in the oral tradition may be of great value in validating and expanding scientific understanding. The oral tradition of many tribes contains accurate information on past geologic events, such as floods, tsunamis, and earthquakes that can validate contemporary hypotheses. The oral tradition of traditional knowledge offers a detailed prescription for “living in place” and includes both empirical and metaphorical elements. In most cultures, the elderly are responsible for passing down oral traditions and teaching and instructing younger members. By telling stories, myths, legends, and singing songs, the elderly keep their heritage and history alive. This paper attempts to bring out such issues where TKS benefits are viewed as available from elderly people and as useful to them. Activities and knowledge systems useful from elderly people’s view point have been discussed under ten categories.

**Traditional Knowledge Systems**

Potential of TKS can be judged from the fact that in olden times strong clusters of villages were developed based on self-sustaining economy catering to the requirements of local population and tapping the available resources. TK has the potential of being translated into commercial benefits through development of useful products and processes. Modern science can give a broader perspective to local sustainability whereas traditional knowledge provides the in depth experience in the local context.

**Primary healthcare**

Elderly have traditional ethno-pharmacological knowledge of the active ingredients in plants used in ethnomedicine. For example, use of rhizome of *Curcuma domestica* (*haldi*) for cuts, bums and scalds; the fruits of *Piper nigrum* (black pepper) for coughs and colds; the fruits of *Trachyspermum ammi* (*ajawain*); use of infusions of the leaves of *Ocimum sanctum* (*Tulsi*) for coughs and colds and mild fever, fomentation with the hot leaves of *Ricinus communis* (castor) and *Aloe barbadensis* (Geekuar) for relieving inflammations, swellings of joints and sprains; and resin of *Ferula spp.* (*heeng*) for stomach troubles and whooping cough; the seeds of *Sesamum indicum* (*Til*) for ulcers and boils, etc. Different use of animal-based drugs to treat various diseases in different landscapes of India including cough, asthma, tuberculosis, paralysis, earache, herpes, weakness, muscular pain, etc. has been established. Older people still use various animal products and by-products for cure of various diseases due to the presence of bioactive compounds. For example, honey for a wide variety of ailments, such as cough, liver disorders and gastrointestinal disorders, *Camelus dromedaries* (*camel*) & *Capra sp.* (sheep) milk for muscular pain, ash of *Lissemys punctatus* carapace for burn, *Macrobrachium* (*prawn*) for tuberculosis, antler of *Cervus unicolor* for herpes, shell of *Mactra sp.* and *Pila sp.* for weakness, ash of carapace of hard shelled turtle (*Kachuga tentoria*)- for cough, asthma, TB, etc.

**Physical and mental health**

Significant physical, physiological, psychological and endocrinial changes have been reported by elderly following various *Yogic* regimes over a period of time. *Panchkarma* and *Yoga* are proven to be effective in neuro-muscular, musco-skeletal, psychosomatic and other chronic health problems of elderly people. *Asanas* and *Pranayama* have shown beneficial effects on the body. They calm the mind, increase the concentration and give the ability to cope with tension.

**Food processing and food habits**

The traditional fermented foods and beverages form important constituents of staple diet of the people, which includes production of wine, beer, bread, yoghurt, cheese and pickles to improve the quality and storage life of some food materials. The processing and preparation of traditional foods is different in different regions, based on the availability of local materials and requirements keeping in view the climate and general occupational pattern of the area.
Animal healthcare practices

There has been a rich tradition and indigenous knowledge about animal healthcare in India. Traditional practical knowledge about the plants and animal based remedies for the treatment of ailments has evolved in the form of indigenous animal healthcare practices that have minimal dependence on external input, which helped in conservation of plants and sustain people in the resource scarce ecosystem. For example, fresh leaves of Bauhinia sp. fed to Buffaloes for cooling effect, dried Ber leaves to increase milk production, use of mixture of herbs-Micromeria biflora, Hemis lanceolatus and Trichoderma indica for reproductive disorders in Buffaloes. Though, folk recipes were reported for almost all ailments, the most commonly treated ailments dealt in practices were cuts and wounds, diarrhoea, lactation, and boils and sores.

Plant protection and post-harvest management

Traditional storage methods based on local resources are usually well adapted to all the types of grain and the environment in which they are employed, offering minimal storage losses. These methods are time tested and entail many insights, perceptions, and intuitions, relating to agricultural practices, health, local environment, etc. It is estimated that 60-70 % of food grains produced in the country are stored at home level in traditional storage structures. The basic materials used for the construction of these structures include wood, bamboo, mud, wheat straw, etc. Different types of containers were used for packaging of food commodities. The use of basic material depends upon local availability and specific property of the material. The use of antimicrobial agents like neem and mint leaves in grain storage is also well documented. Crop production and pest management practices are centuries old activities carried out by Indian elders, compatible with their socioeconomic conditions. Few examples include preparation of substances from concentrated hot peppers/chillies, neem leaves, datura, castor oil, papaya leaves and wood ash, clay, turmeric, wheat, etc. to get rid off caterpillars, weevils, beetles, aphids, garden bugs and other pests. Use of fermented cattle and goat urine, sand, ash and practices like intercropping, border cropping, crop rotation, and use of botanicals are some of the weapons used against field and storage pests. The following traditional agro ecosystems were adapted to minimize crop loss due to insect and pests:

(a) Ploughing, hoeing and basin preparation to influence soil inhabiting pests through “microclimate manipulation”, e.g. goat droppings burnt along with dried Euphorbia spp. to maintain a smoke blanket layer throughout the night arresting the pathogenic activity,

(b) Intercropping of diverse plant species to provide habitats for the natural enemies of insect pests as well as alternative host plants for pests, and also to prevent competition of crops from weeds,

(c) Shifting cultivation that helped the easy migration of natural pest predators from the surrounding forest,

(d) Genetic diversity of cropping systems followed to delay the onset of diseases and reduce the spread of disease-carrying spores, and modify environmental conditions less favorable to the spread of certain diseases,

(e) Practice of integrated crop-livestock systems to balance the biomass and nutrient inputs and outputs.

Weather forecasting

The elders have earned knowledge through the experience of generations for prediction of weather as it was important factor in determining the success or failure of agricultural enterprises. Such weather forecast capabilities supported seasonal planning and selection of crops best suited to the anticipated climatic conditions. These traditional skills depend upon the correct interpretation of indicators and methods of rainfall forecasting, and other natural weather phenomena such as flood, cyclones, etc. Basically, interpretation requires expert knowledge of the position and movement of planets and stars, and environmental phenomena comprising changes in vegetation, changes in animal behaviour, interactions between the flora and fauna, etc. for predicting nature of the year (Table 1). Elderly had traditional calendars to control the scheduling of agricultural activities and utilized weather indicators based on the phenologies of local vegetation to cope with climatic seasonality. Observing the date of emergence of certain plant species as "early warning signals" of an approaching environmental disaster was used to determine any preventive measures and prepare for mitigation measures.

Sustainable natural resources management

Traditional community resource management systems have been found in different areas such as the ‘kans’ of Uttar Kannada, ‘Cumindad’ lands in Goa,
### Health and primary care

a. **Sooor** — a traditional alcoholic beverage to cope with adverse climatic conditions.

b. Use of seed fume of *Solanum surattense* Burm. f. against tooth and gum disorders and fruit of *Melastoma malabathricum* for staining teeth in dark blackish red to strengthen the teeth and protects from gum diseases and cavities.

c. Use of plant parts of *Aloe barbadensis*, *Ceropegia hirsuta*, *Cicer arietinum* and *Anisochilus carnosus* are used for stomachache; *Citrus aurantium* is for diarrhoea and dysentery and *Zingiber officinale* rhizome for acidity and ulcer.

d. Use of paste of fresh leaves of *Nyctanthes arbor-tristis* Linn. *(Parijat)* for antimalarial activity.

e. Preparation of *Amuri* drug from *Musa paradisiaca* L.

f. **Paan** used as a post meal digestive stimulant, astringent, aphrodisiac, nerve tonic, intoxicating agent and for several other purposes due to the antioxidant nature.

g. **Cordyceps sinensis** a parasitic fungus on Lepidopteran larvae used as tonic, medicine, and aphrodisiac.

h. Tubers of *Chlorophytum borivilianum* used as antifertility agent.

i. Reserpine from the herb *Rauwolfia serpentina* and *Derris scandens* bark used to treat snakebites and mental illness.

j. **Hybanthus enneaspermus**, *Ziziphus xylopyra*, *Delphinium denudatum*, *Valeriana officinalis* and *Withania somnifera* used as anticonvulsant and free radical scavenging activity for treatment of Epilepsy.

k. Herbal cream with ingredients—*Cinnamonum camphora*, menthol *(Mentha piperita)* and turpentine oil *(Pinus longifolia)*, used for analgesic and anti-inflammatory actions for relief in joints pain and swelling in elderly and female patients.

l. **Yu** *(local alcohol made from cooked rice and use of Albizia myriophylla Benth., Tectona grandis L.f., Ficus hispida L. and Alocasia indica* *(Roxb.)* also used for treating fever, bodyache, common cold and strains.

m. **Annona squamosa** seed decoction used as abortifacient.

n. **Jamu** or Neem wood for purification of water.

o. Use of *Aegle marmelos* and *Tagetes erecta* as antipyretic, *Calotropis gigantea* and *Sphaeranthus indicus* for piles, *Strychnos nux-vonica* for cholera and epilepsy, *Ricinus communis* and *Tridax procumbens* for headache & cooling effect and *Cascabela thevetia* for dropsy, etc.

p. Use of paste made from leaf of *Tectona grandis* and *Dioscorea pentaphylla* roots for bone setting and pseudobulbs of orchid- *Phaius tankervillae* for bone fractures.

### Physical and mental health

- Practice of *Sowa-Rigpa* *(Science of healing)* based on *Jung-wa-Ina* *(Panch Mahabhuta* /five elements) and *Nespa gSum* *(Tri-dosh/ three humours)* as medical traditions.

- **Uttarbasti** therapy for the management of urinary tract disorders.

- Practice of Makarasana for regulation of the endocrine system, blood circulation and to cure spinal pain.

- **Asanas**—*Surya Namaskar, Tadasan, Konasan, Padmasan, Pranayama, Paschimottanasan, Ardhmatsyendrasan, Shavasan, Uttarbasti* for regulation of the endocrine system, blood circulation and to cure spinal pain.

- **Makarasana** for curing back pain and *Anulom Vilom* *(Science of healing)* based on *Mahabhuta* *(Tri-dosh/five elements)* and *Nespa gSum* *(Panch Mahabhuta/five elements)*.

### Food processing and food habits

- **Gulgule** -small oval shape deep fried in oil prepared from wheat flour, made into viscous slurry by adding water, sugar and ‘**Malera**’ *(inoculum)* during religious, and social ceremonies.

- **Seera** a sweet nutritious, easily digestible and fast snack food prepared from soaking of sundried fermented wheat grains without starch and proteins cooked in hot ghee.

- **Sura**: a millet-based *(Eleucine coracana)* fermented beverage and herbal mix of 36 fresh herbs in *Sattu* *(flour of roasted barley)* called *Dhehli* contain bioactive compounds as well as stimulatory effect.

- **Sattu** *(roasted barley flour)* mixed with *Lassi* *(buttermilk)*.

- **Siddu**, a traditionally fermented steam cooked, oval or disc shaped dish prepared from wheat flour, spices, mixed paste of opium seeds/walnut/black gram using inoculum ‘**Malera**’ *(previously fermented left over dough)*.

- Root extract of *Hemidesmus indicus* used for preparation of tea and soft drink for its pleasing odour.

- **Lactuca scariola** leaves good source of iron and calcium used as a vegetable, eaten raw (salad) or cooked and leaf juice used in the treatment of jaundice can alleviate iron, B complex and calcium deficiency.

- Basella alba leaves good source of Vitamin C & B used as vegetable, for preparation of soup and boiled leaves mixed with flour of Sorghum to prepare ‘**Roti**’ used to cures mouth ulcers.

- **Amaranthus spinosus** inflorescence and leaves used as vegetable and young leaves boiled with *Pigeon pea* to make soup. Leaf decoction considered useful for improving digestion.

- **Limonia acidissima** *(wood apple)* fruit pulp used for preparation of cool drinks by adding jaggary and flavours.

- **Physalis minima** ripe fruits used as tonic, diuretic and purgative.

- *Carissa carandas* unripe fruits used for preparation of pickles and sweet, while ripe fruits in juice, salads and jams preparations and considered as anti-scorbutic.

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**Table 1**—Examples of traditional knowledge and practices

| a | Sagar — A traditional alcoholic beverage to cope with adverse climatic conditions. |
| b | Use of seed fume of *Solanum surattense* Burm. f. against tooth and gum disorders and fruit of *Melastoma malabathricum* for staining teeth in dark blackish red to strengthen the teeth and protects from gum diseases and cavities. |
| c | Use of plant parts of *Aloe barbadensis*, *Ceropegia hirsuta*, *Cicer arietinum* and *Anisochilus carnosus* are used for stomachache; *Citrus aurantium* is for diarrhoea and dysentery and *Zingiber officinale* rhizome for acidity and ulcer. |
| d | Use of paste of fresh leaves of *Nyctanthes arbor-tristis* Linn. *(Parijat)* for antimalarial activity. |
| e | Preparation of *Amuri* drug from *Musa paradisiaca* L. |
| f | *Paan* used as a post meal digestive stimulant, astringent, aphrodisiac, nerve tonic, intoxicating agent and for several other purposes due to the antioxidant nature. |
| g | *Cordyceps sinensis* a parasitic fungus on Lepidopteran larvae used as tonic, medicine, and aphrodisiac. |
| h | Tubers of *Chlorophytum borivilianum* used as antifertility agent. |
| i | Reserpine from the herb *Rauwolfia serpentina* and *Derris scandens* bark used to treat snakebites and mental illness. |
| j | **Hybanthus enneaspermus**, *Ziziphus xylopyra*, *Delphinium denudatum*, *Valeriana officinalis* and *Withania somnifera* used as anticonvulsant and free radical scavenging activity for treatment of Epilepsy. |
| k | Herbal cream with ingredients—*Cinnamonum camphora*, menthol *(Mentha piperita)* and turpentine oil *(Pinus longifolia)*, used for analgesic and anti-inflammatory actions for relief in joints pain and swelling in elderly and female patients. |
| l | **Yu** *(local alcohol made from cooked rice and use of Albizia myriophylla Benth., Tectona grandis L.f., Ficus hispida L. and Alocasia indica* *(Roxb.)* also used for treating fever, bodyache, common cold and strains. |
| m | **Annona squamosa** seed decoction used as abortifacient. |
| n | **Jamu** or Neem wood for purification of water. |
| o | Use of *Aegle marmelos* and *Tagetes erecta* as antipyretic, *Calotropis gigantea* and *Sphaeranthus indicus* for piles, *Strychnos nux-vonica* for cholera and epilepsy, *Ricinus communis* and *Tridax procumbens* for headache & cooling effect and *Cascabela thevetia* for dropsy, etc. |
| p | Use of paste made from leaf of *Tectona grandis* and *Dioscorea pentaphylla* roots for bone setting and pseudobulbs of orchid- *Phaius tankervillae* for bone fractures. |
Table 1—Examples of traditional knowledge and practices \(^{14, 19, 33}\) (Contd.)

| a. | Herb tea from *Carthamus tinctorius* flowers and root bark from *Cinnamomum tamala* acts as cardiac and nerves tonic, aids digestion, and stabilizes bowel movements. |
| m. | Herbal tea from *Carthamus tinctorius* flowers and root bark from *Cinnamomum tamala* acts as cardiac and nerves tonic, aids digestion, and stabilizes bowel movements. |

**Animal healthcare practices**

| a. | Hot soup of Cumin and garlic being analgesic and antipyretic fed to animals affected by fever and cold. |
| b. | Use of bark of belly tree/crushed leaves of karu tree as antiseptic for speedy healing. |
| c. | Mixture of ash of Burning grass (*Jawanlari*) and black cloth along with oil fed to cows to cure dysentery. |
| d. | Mixture of sulphur and mustard oil for prevention and control of skin diseases. |
| e. | Use of bamboo leaves and bark boiled with paddy husk and fed to cows for expulsion of placentae. |
| f. | Treatment of diarrhea with leaves of *Leucas lanata* (*Safeeda*) and bamboo leaves. |
| g. | Traditional moulting practices - Dipping in water, applying ash and mud, quarantine the birds to dark locations in separate mini huts, fixing feathers on to the beak followed for shedding and regrowth of feathers and rejuvenation of poultry birds. |
| h. | Use of garlic (*Allium sativum*) and vinegar for deworming. |
| i. | Juice of marigold/*Annona squamosa* leaves to kills maggots and heal wound. |

**Plant protection and Post-harvest management**

| a. | Packaging of food commodities using containers made of bamboo sticks and internally lined with cow dung for grains, potato, maize cobs, etc or lime and sand for millets. |
| b. | Use of neem/menthol/walnut/sweet flag leaves/*Pongamia pinnum* as antimicrobial agent for grain storage. |
| c. | Storage of pulses by mixing with turmeric powder or mustard oil. |
| d. | Storage for seed crops in underground pits dug in fields with a pitcher and covering the top of pit with ash and soil to create zero energy cool chambers. |
| e. | Pickled mango, lime, etc. packed in sterilized earthen pots using fumes generated from burning red chilies along with *Asafoetida* and mustard oil. |
| f. | Storage of cabbage, ginger was done under ground pits which provided cool condition for storage ensuring freshness for prolonged use. |
| g. | Storage of sugar/jaggery in large earthen pots with top cover made of wood. |
| h. | Enhancement of shelf life of fruit and vegetables by wrapping in moist gunny bags. |
| i. | Use of smoke for protection of fruit crops from frost damage. |
| j. | Practice of applying a thin paste of cow dung, clay and cow urine to pruned ends of twigs and cuts to prevent access to pathogens. |
| k. | Use of wood ash on vegetables to ward off pests and to enhance nutrient status of soil. |
| l. | Use of kerosene oil to kill stem and shoot borers. |
| m. | Use of powder of leaves and pods of *Mucuna prurita* to reduce rat damage to the crop. |
| o. | Use of chillies and other hot peppers powder against caterpillars, flies, aphids, ants and other pests of vegetables. |
| p. | Use of *Pulses* soaked in whey to prevent wilting. |
| q. | *Euphorbia nerifolia* milk for seed protection of various crops like paddy, castor, pearl millet, maize and Sorghum. |

**Weather forecasting**

| a. | Presence of visible spectrum with a greater diameter around the sun than around the moon, indicates rainfall after a day or two. |
| b. | On a hot summer day cry of the bird called *Naila* for water brings rainfall. |
| c. | If centipedes emerge from their holes carrying their eggs in swarms an early rainfall is predicted. |
| d. | If Dragon fly swarm in a large group over water surface a dry weather is predicted, if they swarm over open dry lands then early rainfall is predicted. |
| e. | If the first 10-15 of the month May-June are very hot a good rainfall is predicted. |

**Sustainable natural resources management**

| a. | Indigenous techniques of harvesting honey and beeswax from bees, using various indigenous styles of hives. |
| b. | *Polygonum hydropiper* Linn. (Smart weed) used as fish toxicant for catching fish from natural aquatic resources as well as for removal of uneconomical fishes from the aquaculture pond. |
| Table 1—Examples of traditional knowledge and practices
c. Mollusc shells-Anadara granosa (Khola), Meritrix meritrix (Gondhi), Meritrix casta. (Patti) and Ceritidea cingulata (Genda) traditionally used for lime preparation.
d. Inhibition of bacterial growth in milk by keeping under the pyramids made out of natural materials as wood.
e. Use of indigenous fishing instrument Polo for capturing fishes in low water raising.
f. Alnus nepalensis cultivated in Jham in Nagaland has multiple usages as a nitrogen fixing tree, as fodder and timber, and retains soil fertility.

**Soil and water management**
a. Construction of kuhls/wooden water channels/ Virdas/Khadins for irrigation.
b. Drip and pitcher irrigation in areas with scanty rainfall.
c. Use of bamboo channels with small holes made at the internodes for water trickling.
d. Roof water harvesting and collection of water in dug out structures (Wells, Bawdi).
e. Sorangas in Karnataka in the lateritic regions to tap the moisture trapped in the large sand depositions, Ahar-pyne traditional irrigation system in Bihar.
f. Harvesting of dew and fog water.
g. Conservation of soil moisture by mulching: Wet soil mixed with seeds of rye (Brassica nigra) is placed inside the holes left between the stones of terrace risers for minimization of water need for germination and use of the unused space of terrace riser for vegetable cultivation.
h. Earthen bunds made of different materials like stones and sticks, Kana bundi using the crop residue, Vetiver zizaniodes grass for controlling soil erosion.
i. Methods used for improvement in soil fertility by burning Butea monosperma and Madhuca indica) leaves and branches, cultivation of crops with trees such as Sesbania grandiflora, Leucaena leucocephala or other leguminous plants, local weeds.
j. Indicators to assess the fertility of soils by better growth of weeds like Setaria tomentosa in light soil, vigorous growth of Desmostachya bipinnata and Cenchrus spp, Echinochloa colonum growth for better paddy yield.

**Handlooms and handicrafts**
a. Use of the traditional pit looms for spinning and weaving aspects of textile production for making items like, Munda, Thorthu, Veshti and Pudave through the handlooms.
b. Preparation of Ahimsa silk spun from pierced cocoon without letting pupae to die.
c. Traditional knowledge and skills of traditional hand embroidery - Kasuti and hand woven khana material of Karnataka, and processing of wood of Uts (Alnus nepalensis D. Don) into various cottage products.
d. Preparation of Mararvari, a type of cloth from the bark tree Aranjali [Antiaris toxicaria (Pers.) Lesch.] used as bed spread.
e. Traditional use of Strobilanthus flaccidifolius plants, Parkia javanica, Melastoma malabathricum, Pasania pachyphylla, Solanum incidum, Bixa orellana, Tectona grandis, Jatropha curcas, etc. for preparing dye.
f. Practice of pottery making without wheel in Hira society of Assam.

**Cosmetics**
a. Gum obtained from bark of Pterocarpus marsupium Roxb. (Fabaceae) used to prevent cracks of lips and Opuntia dillenii Haw. used in lip care.
b. Bixa orellana Linn seeds used for colour, mascaras and lipcare.
c. Sea Buckthorn oil used as a facial care for restorative and anti-aging skin care.
d. Aloe leaves, juice and oil used to promote healing of cracked skin, especially on the foot, as well as various bad healing skin injuries, sores and abrasions.
e. Abelmoschus moschatus Medic. syn. Hibiscus abelmoschus Linn. used to provide musk-like fragrance.
f. Calendula officinalis or Marigold oil used to help preserve skin freshness, protect skin from overdrying, sun-induced wrinkles and sun caused aging during summer time.
g. Kajal, a good coolant put around the edge of the eyes used as protection against eye ailments and relief from the glare of the sun. The ingredients used in preparation (sandalwood/Manjal karsilanganni, castor oil, ghee) have medicinal properties.
h. Traditional mask prepared from sandal wood powder, Majith, Haldi, and Amahaldi used for skin and face problems like acne and pimples, dark shadows, wrinkles.
i. Combination of milk and tomatoes used as skin cleanser and Curcuma longa as ‘ubtan’ to enhance the colour of the skin.
j. Achyranthes aspera Linn. var. aspera (Amaranthaceae), paste of fresh roots used to cure dandruff and hair growth, Eclipta prostrate-fresh juice of the leaves used for hair growth and for blackening of hair, Emblica officinalis fruit powder boiled with sesame oil used as hair dye. Lawsonia inermis leaves used in preparation of hair oil as hair tonic and hair dyes. Dried fruit powder of Sapindus emarginatus Vahl used in washing hair to provide extra shine. Acacia concinna dry powder of the pods prevent hair problems like dandruff, hair falling, hair splitting, scalp care and hair colour.
k. Alsi (Linseed) oil used in soap, ash applied on whole body during bath considered good for skin and soaked seeds used as hair gel.
‘Orans’ in Rajasthan, ‘Shmilat’ forest in Punjab, ‘Sacred groves’ in the Himalayas, and the ‘supply and safety’ forests in Mizoram. Traditionally, available natural resources use to be utilized without depleting them, through intimate knowledge of plants, soils, animals, climate, and seasons. For example, older fishers remember where the productive areas of the lagoon were and retained useful information about the species’ behavior before and after mating, including the use of specific habitat types and susceptibility to different fishing practices. Homestead agroforestry practices use to be a part of resource management, where some useful fruit-bearing trees (e.g. Bauhinia variegata, lemon, banana, guava) and vegetables were raised along with livestock, poultry and/or fish to address the basic needs. Traditional knowledge from elderly people can help to increase the relevance and efficiency of bio-resources conservation efforts in various situations, such as in identification of potential species, documentation, revival and rejuvenation of lost varieties and those on the verge of being lost.

Soil and water management

In India, a rich heritage of traditional methods for water conservation existed. A whole range of indigenous methods were practiced to store and use water for irrigation and other household purposes which were cost-effective and involved the use of locally available material and human skills for construction of the water harvesting structures. Maintenance of crop field bunds, ploughing, relay cropping, mulching, putting weeds and crop remains to fire, etc. were some of the methods of in-situ moisture conservation and soil fertility improvement followed. Traditionally, household wastewater and rooftop water harvesting to supplement water for kitchen garden and household demands, and disposal of excess water from the crop fields were practiced.

Handlooms and handicrafts

In keeping with India’s rich heritage of diversity, there are regional variations in traditional handicrafts (wood and stone sculpture, pottery, wickerwork, etc), traditional textile skills (pattern making, colouring, design making, embroidery, weaving, tapestry, quilting, knitting, lace-making, carpet-making, etc), handlooms, jewelry. Skills such as traditional making, hide tanning, etc. are only available thru “hands-on” instruction from elders, along with specialized vocabularies which go with each of these activities.

Cosmetics

Traditionally, commonly available vegetation and minerals were used for cosmetic purposes to protect from vagaries of nature which have stood the test of time through centuries of continued use. There are records of number of herbs, which are an integral part of healthcare system and beautification of human body because the use of herbal products was considered safe and free from allergic reactions/effects. Traditional remedies like foot baths, herbal massage, Panchkarm, etc. may help reverse and heal foot sores, lacerations, cracked heels, corns, calluses, dry skin, combat bad foot odor, foot skin pealing and help restore healthy skin.

Management of TKs for benefit of elderly

Elderly people are considered storehouse of knowledge, which they acquire through experience. We normally conceive (and experience in our daily lives, wherever possible) that elderly people’s traditional knowledge is beneficial for younger generations. Beneficial use of traditional knowledge for elderly people is generally seen missing or is very limited. Reasons for neglect may include efforts required in traditional knowledge procedures, various types of cognitive and other impairments, solitary attitude/condition, absence of help/support systems, lack of information from other regions and suitability, etc. If a concerted effort is made to make these TKS available to elderly people through required support systems, it will lead to appropriate and sustainable solution at affordable cost, and will be a great help to this growing section of our population. This paper, therefore, tries to highlight those TKS which are directly beneficial to the elderly people and presents a case for initiation of such systematic effort. The available traditional knowledge can be used efficiently in development of technologies/products/processes best suited to the needs and requirements of elderly. Sole reliance on modern products, tools and techniques may not be always good for elderly people and many times they may not feel comfortable with these. Reasons for comfort may include one or more factors like cost affordability, complex operation, fear of risks involved and utility, dependence on others, socio-cultural tradition, etc. On the other hand, traditional knowledge systems are available suiting to specific requirements of different geographic areas covering different socio-cultural conditions, and are time tested.
These TKS developed/evolved in different areas and remained confined to limited areas due to limitations of mobility, transportation and communication. In the modern era of globalization, these traditional knowledge systems have good potential of moving to different areas for use by people who have migrated from the original area of these traditional knowledge systems. Depending on the requirements and subject to suitability under specific conditions, traditional knowledge systems of one region may be tried for application in other regions. Even judicious mix of traditional knowledge from different regions may also be explored under favorable conditions. Elderly people are likely to have more confidence on traditional knowledge systems from other regions in the country rather than going for products and systems from alien environments, for reasons discussed earlier. It is, therefore, felt that TKS have much more relevance for elderly people. TKS have been extensively described in the literature but, to the best of the knowledge of the authors, compilation of TKS especially suitable to elderly people has not been attempted. It is hoped that the present paper will highlight the suitability of certain TKS and create interest among elderly community for revival of traditional knowledge on sustainable basis. Some of the TKS considered especially useful for elderly people are discussed below.

**Healthcare**

Traditional medical care is the first level of contact for elderly people when they require medical care and they are often familiar with the details, so that they are in a better position to deal with the common ailments in their home setting. Elderly people take traditional medicine with a strong spiritual belief, and derive immense benefit by using the herbal medicines for their primary healthcare. For primary healthcare, a combination of modern medicine and traditional plant therapies can be beneficial on long term basis. Adaptation of the alternative treatment and wellness concepts, such as Teliotherapeutics, spiritual healing, universal life energy, acupressure, suzok, can be helpful in bringing out significant physical, physiological, psychological and endocrinal changes in elderly health. Promotion of health and rehabilitation for elderly can also be achieved through *Panchkarma* and Yoga practice, while acupuncture is reportedly effective in relieving postoperative pain, nausea and vomiting resulting from chemotherapy, and dental pain. It can also alleviate anxiety, panic disorders and insomnia in older people.

**Nutritious food**

Ageing implies predictable progressive universal deterioration in various physiological systems. The physiological and structural changes that affect nutrients and food intake include lack of appetite, atrophy of gastrointestinal tract musculature, reduced BMR, prevalence of anemia, dental problem, etc. In order to overcome the nutrition deficiency for healthy ageing, elderly need a diet which is easily adaptable as well as nutritious. Adaptation of healthy eating habits, focusing of the foods that kept people and cultures healthy for generations is, therefore, recommendable for senior citizens. Elderly knowledge on nature of various food materials and their negative and positive effects on the body such as ash gourd (*Benincasa hispida*), bitter gourd, snake gourd, sponge gourd, bottle gourd, egg plant, cucumber, amaranthus, Indian spinach (*Basella alba*), drum stick tree, *Sesbania*, various legumes, etc. is still useful to facilitate healthy ageing. The fruit pulp of *Limonia acidissima* mixed with jaggery forms a good refreshing drink. These foods not only supplement the food shortage but also would contribute the necessary nutrients requirement of the elderly people. Thus, traditional foods prepared and consumed is a complex dynamics in which nutrition, health, food security, culture, ethics, subsistence economy and ecological sustainability are integral components.

**Livelihood**

Elderly people contribute to the society (and to the economy) by working in paid jobs, doing volunteer work, maintaining a household, counseling for conflict resolution, and/or supporting children and grandchildren. There is need to optimize the resources for elderly citizens to extend their ability to remain independent, active, and productive in later life. Various types of self employment and soft work will be helpful in keeping elderly active, in accordance with their ability and expertise. TKS can play a significant role in the following forms of works:

- Nursery raising, organic food from kitchen gardens, floriculture
- Food processing, bakery, herbal preparations
- Pottery, hand made paper
- Weaving, knitting, handicraft, and other designs
- Toy making, candle making
- Publishing
Conclusion

TKS have potential to provide the benefits in terms of healing, comfort, and support as needed by the elderly people. Traditional knowledge can help benefit the elderly population in the country in selected areas, such as health care and nutritious food, stress management, artisanal skills, etc. The nature friendly healing methods at affordable costs, simplicity and robustness of operations, etc are such infringe benefits of traditional knowledge which are useful for elderly people. Activities and knowledge systems useful from elderly people’s view point have been discussed in this paper. Elderly people are generally aware of traditional knowledge as practiced in their own region. There might be many TKS from other regions in the country which can benefit them if appropriately applied. Sharing of TKS for mutual benefit of elderly people in different regions is not difficult in modern times with vast opportunities available through internet, radios, etc. Events like annual conference of AISCCON, periodic gatherings of Senior Citizen Federations, RWAs, laughter clubs, etc. can act as useful vehicles for propagation of such concepts and knowledge.

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