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An overview on medicinal plants of Sikkim Himalayas region with emphasis on antidiabetic: A review

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Abstract
Nature always stands as a golden mark to exemplify the outstanding phenomena of symbiosis. Plant has been used to prevent and treat many types of disease along with the epidemic from thousand of year ago. Some medicinal plant has been used as nutraceuticals. Nature exemplify as an inexhaustible origin of novel chemo types and pharmacophores, a source of medicinal agent from Vedic era. The traditional medicinal uses of 36 plants species belonging to different families from Sikkim Himalayan region are reported in this review article giving emphasis in antidiabetic activity reported.

Keywords: medicinal plant, Sikkim Himalayas region, emphasis, antidiabetic

Introduction
Diabetes is one of the most challenging global epidemics of the twenty first century. In India 62 million people are currently affected by diabetes. The highest absolute number in any countries. Respectively by 2030, the estimated number will rise to 101.2 million. The existing burden of this disease is rapidly raised in the Indian middle class, coupled with sedentary lifestyles and a shift in dietary pattern [1].

In India highly developed traditional system of Ayurveda, Unani and Siddha are practiced and all of these are based on drug derived from plant and are indeed awe-inspiring. The utilization of natural product by traditional system of medicine has been for thousands of years all over the world and they have burst forth into orderly regulated system of medicine. In this several forms, they may have unquestionable defects, but they are still a valuable repository of human knowledge [2]. Currently there are number of effective western medication available for the treatment of diabetes but still its higher cost and side effect is a big challenge for its management. Use of herbal medicine for the protective treatment of diabetes has been in the history of several thousand years in the Indian and Chinese culture [3]. Plant and its products are being used as traditional medicine for primary health by 90% of the population in developing countries, as stated by World Health Organization (WHO). Among 21,000 plant listed by WHO having medicinal property 2500 species are found in India. It's reported that 800 plants show antidiabetic potential [4].

Sikkim with a total geographical area of only 7096 Sq. kms extends between 270 4'46" to 280 7'48" N and 880 58'00" to 880 55'25" E. containing 4000 flowering species [5] The unique geographical position and wide range of topography, high fertile soil, ample rainfall and existence of immense number of perennial stream making Sikkim one of the jewels of bio-diversity in the country. Sikkim has immeasurable stock of medicinal plants and wealthy of folk medicine. Sikkim Himalayas region have about 550 medicinal plants, which are used by the people for various diseases in, out of which few are utilized on commercial basis [6].

To support the discoveries of new drugs for the well-being of mankind the traditional knowledge on medicinal use of plant has been weighed as a greatest importance. Plants directly or indirectly are the main source of the current available medicine. Medicinal plants offer alternative remedies with tremendous opportunities. Natural product play chief role in the growth of modern medicinal system and crucial source of pharmaceutical agents [7].

In modern day drug industries traditional plant medicine still have an important position due to minor adverse effect and synergistic action of the combination of compounds. Even today plant are not only essential in health care, they are the best and safe hope of future medicine [8]. These local ethnomedicinal plant found in Sikkim has been scientifically evaluated and information spread widely so that the people get better information regarding efficacious drug treatment and improve health status.

Table 1: Plant found in Sikkim Himalayan Region with reported antidiabetic activity

Sl. No	Botanical Name and Family	Common Name (Nepali)	Part Used	Traditionally Used For	Pharmacologically activity reported
1	*Anthocephalus cadamba* Family: Rubiaceae	Kadam	Leaves	Inflammation	Antioxidant and Antidiabetic [9]
2	*Asparagus Racemosus* Family: Liliaceae	Kurilo	Leaves	Diabetes	Hypoglycemic, Antioxidant and Hypolilidemic [10]
3	*Bauhinia vahlii* Family: Caesalpiniaceae	Verla	Stem Bark	Diarrhea, Skin Disease	Antidiabetic [11]
4	*Berberis aristata* Family:	Chutro	Stem Bark	Inflammation, Wound healing	Antidiabetic [12]
5	*Callicarpa arborea* Family:	Guahelo	Stem Bark	Fever and boils	Antidiabetic [13]
6	*Calotropis gigantea* Family:	Anhk	Leaves, Flower	Swelling	Antioxidant and Hypoglycemic [14]
7	*Campylandra aurantiaca* Family: Asparagaceae	Nakima	Flower, Rhizome	Diabetes mellitus, antimalarial, analgesic	Antioxidant and Hypoglycemic [15]
8	*Cassia fistula* Family: Caesalpiniaceae	Raj Briksha	Leaves	Asthma, Diabetes and eczema	Antidiabetic [16]
9	*Centella asiatica* Family: Mackinlayaceae	Gora taprey	Leaves	Asthma	Antioxidant, Antidiabetic [17]
10	*Chenopodium album* Family: Chenopodiaceae	Bethu saag	Root	Piles, eye disease	Antidiabetic Antihyperlipidemic [18]
11	*Clerodendron infortunatum* Family: Verbenaceae	Chitu	Leaves, Flower	Dysentery	Antihyperglycemic [19]
12	*Costus Speciosus* Family: Costaceae	Betlaure	Rhizome	Diabetes	Antidiabetic Antilipidemic [20]
13	*Dillenia indica* Family: Dilleniaceae	Ramphal Paanca phal	Leaves	Fever, Dysentery	Antidiabetic Antihyperlipidemic [21]
14	*Dioscorea alata* Family: Dioscoreaceae	Ghartarul	Fruit	Piles, Constipation	Antioxidant, Antidiabetic [22]
15	*Drymaria cordata* Family: Caryophyllaceae	Abhijalo	Leaves	Pneumonia, Infant fever, Sinusitis	Antidiabetic [23]
16	*Edgewotthia gardener* Family: Thymelaeaceae	Argaily	Flower, Stem bark	Fish poison	Antidiabetic [24]
17	*Fagopyrum esculentum* Family: Polygonaceae	Mithey phapur	Bran	Haemostasis Ulcer	Antioxidant Hypolipidemic Antidiabetic [25]
18	*Ficus semicordata* Family: Moraceae	Khasrey khaneu	Root, Fruit, Leaves	Bladder Complaints	Antioxidant Antidiabetic [26]
19	*Fraxinus floribunda* Family: Oleaceae	Lakuri	Bark	Diabetes, Gout Boils	Antihyperlipidemic Antidiabetic [27]
20	*Garuga pinnata* Family: Burseraceae	Dubdabay	Bark	Dislocation Bone Wound healing	Antidiabetic [28]
21	*Gloriosa superb* Family: Liliaceae	Langarey tarul	Root tuber	Aarthritis	Antioxidant Antidiabetic [29]
22	*Holarrhena antidysentrica* Family: Apocynaceae	Anley khirrn	Bark, Seed	Dysentery	Antihyperlipidemic Antidiabetic [30]
23	*Jatropha curcas* Family: Euphorbiaceae	Hathikana	Bark	Dysentery Skin disease	Antidiabetic [31]
24	*Leea macrophylla* Family: Vitaceae	Bulyettra	Root, leaves, Seeds	Ringworm Stop bleeding	Antidiabetic [32]
25	*Malia azederach* Family: Meliaceae	Bakiana	Entire plant	Astringent Vomiting	Antidiabetic [33]
26	*Oxalis corniculata* Family: Oxalidaceae	Chariamilo	Entire Plant	Dysentery Fever Anemia Appetite	Antidiabetic Antioxidant [34]
27	*Oroxylum indicum* Family: Bignoniaceae	Totala	Flower	Asthama Dysentery	Antioxidant Antidiabetic [35]
28	*Physalis minima* Family:	Raasbhari	Fruit	Diuretic Inflammation	Hypoglycemic [36]
29	*Rubus ellipticus* Family: Rosaceae	Aeiselu	Fruit	Astringent Kidney tonic	Antidiabetic Antioxidant [37]
30	*Ricinus communis* Family: Euphorbiaceae	Rairi	Leaves, Root	Boils, Dysentery Jaundice	Antioxidant Antidiabetic [38]
31	*Smilax zeylanica* Family: Smilacaceae	Kukur Daaino	Rhizome	Urinary compliant Dysentery	Antidiabetic [39]
32	*Stephania glabra*	Tamarkey	Tubers, Root	Diabetes Tuberculosis Fever	Antidiabetic [40]
33	*Syzygium cumini* Family: Myrtaceae	Kyamuna	Stem bark	Diabetes	Antidiabetic [41]
34	*Tamaarindus indica* Family: Caesalpiniaceae	Teet - teetee	Fruit pulp	Ulcer Inflammation	Antioxidant Hypolipidemic Antidiabetic [42]
35	*Tinospora cordifolia* Family: Menispermaceae	Gurjo	Root	Diabetes	Antidiabetic [43]
36	*Zingiber officinale* Family:	Aduwa	Rhizome	Fever, Cold	Antidiabetic [44]

Conclusion

Plant has been a gift from Mother Nature to human being. Many of the modern day medicine are derived from the plant source. But it is always a big question whether the effect of plant and its extract shown in experimental animals and *in vitro* studies can be predicted same effect in human being. Out of 550 medicinal plants available in Sikkim Himalayan region only 36 plants has shown antidiabetic activity in pharmacological studies. Further investigation can be carried out from those plants which show the most promising anti-diabetic efficacy in already performed clinical studies which may lead to non-expensive plant-derived medications against the growing epidemic of diabetes.

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