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Research Article

Exploration of the Distinctive Flower Diversity and their Therapeutic Efficacy from Surajpur District of Chhattisgarh, India

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ABSTRACT

The present research spots light on diversity and therapeutic potentiality of flowers collected from Surajpur district of Chhattisgarh, India. Recently, the traditional knowledge of flowers as therapeutics is gaining increased attention across the globe. The curative potentiality of flowers based on the traditional knowledge of local healers and village dwellers of Surajpur unturned the enigma of enormous efficacy of flowers against several alarming diseases. The different colours of same flower collected from six adjoining tehsils of Surajpur district also divulge that the flower possesses diverse colour and morphology in different areas which is an indicator of rich floral diversity of this region. Despite of immense flora, the region is relatively untouched with special reference to flower diversity and its ethno-medicinal studies. Keeping the above facts into consideration, an attempt was made to focus on the floral diversity and therapeutic efficacy of 68 flowers which covers twenty nine families to cure seventy eight dreadful diseases. The above documentation accord a clear insight on the vast biological and pharmacological potentiality of all the flowers under investigation. Although, the present work is an initial step towards the documentation of local potential flowers having tremendous healing ability with natural, cost effective and without any side effects. However, in time ahead vigorous efforts will be envisaged to extract the active compound from the flowers and to elucidate the complete structure of bioactives using spectral analysis. The above study will lay the strong foundation of floriculture and will definitely pave the path for natural floral medicine as curatives in years ahead.

Introduction

India has been identified as one of the 12 mega-diversity countries across the world and it is estimated that these 12 countries possess 70% of the world total flowering plants. India is known to have a vast floral diversity.[1-5] The floral diversity is on account of topological conditions, immense difference in climatic conditions and wide range of habitat favoring the lifecycle of different plants.[6] The traditional primary health care system in India is entrenched with a very effective and region specific health practices involving several species of flowers. Since time immemorial, the traditional healers have well recognized the therapeutic properties of several flowers. Although, the kingdom of flowers is incredibly vast but in general it can be categorize based upon the purpose for which they are grown into four major classes *viz*., commercial, edible, medicinal and ornamental flowers.[7] The flower therapy generally employs essential oils, flower waters, flower juice, flower petals and aroma to heal mind and body. Flowers are directly eaten as petals or made as juice decoction, tincture or mixing them with some other ingredients and then administered. Different formulations of flowers are used as juice, powder, syrup, scents and soups.[8]

The flowers possess a very significant role to maintain human health, treat various diseases, manufacture of cosmetic products and also create a fresh, elegant and warm atmosphere that helps in relaxing one's mind.

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In current scenario most of the people are suffering from several lifestyles related diseases. As per the above prospects the prerequisite need of the present day generation is to deduce a fast and correct method of diagnosis, prevention of diseases before its onset, less expensive treatment with no side effects. However, several flowers are available in our surroundings are widely used in medicinal practices but there are only a hand full of reports available in the literature depicting the therapeutic properties of flowers.[9,10] A good number of the flowers still remains unexplored for their potency as therapeutics, due to lack of awareness and systematic documentation. Hence, the present endeavour intends to document the significance of flowers in curing several diseases. Thus, there is an urgent need of extensive research in the area of flowers with the aim of exploring their ethno-medicinal properties and subsequently the isolation, characterization and identification of bioactive compounds will definitely contribute for the better, safer and cost effective flower based medications for better human health in years to come.

Materials And Methods

The present study deals with the exploration of therapeutic potentiality of different flowers belonging to diverse plant families collected from Surajpur district of Chhattisgarh, India. In the current investigation periodic field visits and surveys were conducted in the forest area of Surajpur district during July to October. The field survey was executed by conducting personal interview regarding the curative potentiality of different flowers with the local traditional healers, herbal medicine practioners, tribals and village dwellers. Different types of flowers have been used by the traditional healers as therapeutics to heal several dreadful ailments since time immemorial. The information was gathered and compiled by making transit visit to the extensive forest area of the study site. The therapeutic efficacy of different flowers based on the field visit and survey was collected and documented disease wise. Moreover, it was found that some of the information documented in the present study has not so far been available in literature or explored till date.

Study Site

Surajpur is a district located in northern Chhattisgarh, India. The administrative headquarter of Surajpur district is Surajpur city. It was selected as the study site for the current investigation since it is one of Chhattisgarh's tribally prosperous districts. The coordinates of Surajpur are 23.223047 latitude and 82.870560 longitude. 23° 13' 22.9692" N and 82° 52' 14.0160" E are its GPS coordinates. Six tehsils, namely Bhaiyathan, Odagi, Pratappur, Premnagar, Ramanujnagar, and Surajpur, constitute the Surajpur district (Fig. 1). Along with its abundant natural resources, Surajpur is surrounded by forested

Fig. 1: Location of Surajpur district in Chhattisgarh, India

areas, waterfalls, and streams. Tourist destinations and ancient temples including the Bhageshwari Devi, Durga, Mahamaya, Patal Bhairav, and Shyam Baba temples are located in the nearby area of interest. A pleasant and moderate environment, with the winter months typically lasting from November to February, is a gift of nature to the Surajpur district. The summer season, however, runs from March through June. Central India is located along the tropic of cancer, which causes a rise in temperature of up to 46°C. Rainfall in this area ranges from 1000 to 1050 mm, and it is driven by south-western disturbances in the Arabian Sea.

Results and Discussion

The present study deals with the diversity of 68 flowers which covers twenty nine plant families and their traditional usage by the tribal communities of Surajpur as therapeutics against 78 diseases. However, there are a good number of reports documenting the flower diversity in different areas of the world.[11,12] The study gives a clear picture of the biological and pharmacological efficacy of various flowers used by the tribal healers of this area in the amelioration of several dreadful diseases *viz*., fever, gonorrhea, asthma, tuberculosis, ring worm, pneumonia, adrenal gland disease, anemia, heart problem, urinary tract infection, hypertension, hypoglycemia, cough, respiratory problem, drug resistance, hepatitis, pimples, snake bite, breast cancer, diabetes, endocarditis, wound, malaria, skin disease, antioxidant, fungal infection, skin problem, bone marrow disorder, solid organ tumors, AIDS, hair loss, viral infection, anaphylaxis, pleural disease and hemorrhoids (Table 1). The collected flowers under investigation were categorized based on their plant families and their inherent potentiality as therapeutics to cure several diseases. Similar reports depicting the therapeutic properties of medicinal plants from Bastar district of Chhattisgarh was also documented.[13] The results showed that all the flowers under investigation were found to possess disease curative potentiality and are enormously effective as therapeutics (Table 2).

The flower diversity under investigation was further categorized based on the number of flowers and family.

Table 1: Diversity and therapeutic properties of flowers from Surajpur

S. No	*Family*	*Botanical Name*	*Common Name*	*Flower Colours*	*Therapeutic Properties*
1	Acanthaceae	*Ruellia simplex*	Desert Petunia	Violet, Pink, White	Gonorrhea, Adrenal Gland Disease, Hypoglycemia, Urinary Tract Infection, Anemia, Ring Worm
2	Acanthaceae	*Thunbergia grandiflora*	Blue Trumpet Vine	White, Blue, Yellow	Fever
3	Acanthaceae	*Peristrophe speciosa*	Purple Rice Plant	Pink, Blue, Red, White	Dementia
4	Apocynaceae	*Cascabela thevetia*	Yellow Oleander	Yellow	Ulcers, Scabies, Hemorrhoids and Dissolve Tumors
5	Apocynaceae	*Allamanda blancheti*	Purple Alamanda	Blue, Purple, Orange, Dark Pink	Malaria, Fever, Breast Cancer
6	Apocynaceae	*Tabernaemontan divaricata*	Grape Jasmine	White	Hypertension, Bleeding, Pulmonary Embolism
7	Apocynaceae	*Gladiolus hybridus*	Sword Lily	Light Green, Pink	Fever, Pleural Disease
8	Asteraceae	*Sphagneticola trilobata*	Trailing Daisy	Yellow	Fever, Wound, Kidney Dysfunction, Hepatitis
9	Asteraceae	*Gaillardia pulchella*	Indian Blanket	Yellow, Red, Pink	Skin Disorder, HIV, Solid Organs Tumors
10	Asteraceae	*Cosmos sulphureus*	Sulphur Cosmos	Yellow, Orange Pink, White, Red	Inhibit Bacteria and Virus, Liver Inflammation, AIDS
11	Asteraceae	*Tridax procumbens*	Coat Buttons	White, Yellow	Skin Disease, Anti-fungal
12	Asteraceae	*Zinnia peruviana*	Field Zinnia	Red, Yellow, Pink	Fever, Hepatitis, Bone Marrow Disorder
13	Asteraceae	*Tagetes erecta*	African Marigold	Yellow, Red, Orange ,White	Relieving Pain, Fungal Infection, Heart Problem, Tuberculosis, Pneumonia
14	Asteraceae	*Helianthus annuus*	Sun Flower	Yellow, Red	Heart Problem, Tuberculosis Pneumonia, Anemia, Fever
15	Asteraceae	*Ageratum conyzoides*	Goat Weed	White, Blue, Purple	Gonorrhea, Adrenal Gland Disease, Hypoglycemia, Urinary Tract Infection, Anemia, Ring Worm
16	Asteraceae	*Dahlia pinnata*	Garden Dahlia	Red, Yellow, Bright Pink, Orange, Green	Gonorrhea , Adrenal Gland Disease, Hypoglycemia, Urinary Tract Infection, Anemia, Ring Worm
17	Asteraceae	*Coreopsis gigantea*	Giant Coreopsis	Yellow, Brown	Heart Problem, Tuberculosis, Pneumonia
18	Asteraceae	*Erigeron canadensis*	Horse Weed	White, Yellow	Hemorrhoids, Fever, Breast Cancer, Heart Problem, Tuberculosis, Pneumonia
19	Asteraceae	*Chrysanthemum indicum*	Indian Chrysanthemum	White, Yellow Pink, Purple	Fever, Anemia, Asthma, Heart Problem, Tuberculosis, Pneumonia
20	Asteraceae	*Acmella paniculata*	Toothache Plant	Yellow	Fungal Infection, Drug Reaction
21	Amaryllidaceae	*Cyrtanthus elatus*	Fire Lily	Pink, White, Yellow, Red, Purple	Pimples, Pleural Disease, Heart Problem, Tuberculosis, Pneumonia
22	Amaryllidaceae	*Zephyranthes carinata*	Pink Rain Lily	Pink, White, Yellow, Red	Respiratory Problem, Endocarditis, Malaria
23	Amaranthaceae	*Celosia argentea*	Cock Scomb	Red, Pink, Yellow, Purple, Violet	Heart Problem, Tuberculosis, Pneumonia Fever, Endocarditis, Hepatitis
24	Araceae	*Remusatia hookeriana*	Hitchhiker	Yellow	Analgesic, Hypertension, Pimples, Hemorrhoids

25	Balsaminaceae	*Impatiens balsamina*	Guarden Balsom	Pink, Red, White, Orange, Blue, Purple	Gonorrhea, Adrenal Gland Disease, Hypoglycemia, Urinary Tract Infection, Anemia, Ring Worm
26	Bignoniaceae	*Tecoma stans*	Yellow Elder	Yellow	Heart Problem, Tuberculosis, Pneumonia
27	Cannaceae	*Canna indica*	Canna Lily	Red, Yellow, Orange	Menstrual Pain
28	Cactaceae	*Epiphyllum oxypetalum*	Lady of the Night	White, Pink, Red, Purple, Yellow	Urine Infection, Pericardial Disease
29	Caryophyllaceae	*Dianthus chinesis*	China Pink	Pink, Pink, White, Red, Black, Purple, Orange, Violet	Myocarditis, Hypertension, Gonorrhea, Adrenal Gland Disease, Hypoglycemia, Urinary Tract Infection, Anemia, Ring Worm
30	Cleomaceae	*Cleome viscosa*	Asian Spider Flower	Yellow, Pink	Malaria, Wound, Healing, Myocarditis, Seizer Disorder
31	Combretaceae	*Combretum indicum*	Rangoon Creeper	Pink, Red, White	Cough, Fever, Hair Loss
32	Convolvulaceae	*Ipomoea triloba*	Little Bell	White, Pink, Blue	Malaria, Fever, Cough, Hypertension
33	Convolvulaceae	*Ipomoea nil*	Morning Glory	White, Blue, Purple, Violet	Asthma
34	Convolvulaceae	*Ipomoea quamoclit*	Cypress Vine	Red, White, Yellow, Orange	Respiratory Problem, Asthma, Cancer
35	Cucurbitaceae	*Momordica charantia*	Bitter Gourd	Yellow	Fever, Skin Disease, Cough
36	Cucurbitaceae	*Cucurbita pepo*	Summer Squash	Yellow, White	Anti-inflammatory, Anti-viral, Analgesic, Urinary Disorders, Anti-ulcer, Anti-diabetes, Antioxidant
37	Cucurbitaceae	*Cucumis sativus*	Cucumber	Yellow	Alleviate Stomach Problem, Indigestion, Nausea, Chills, Fever
38	Euphorbiaceae	*Euphorbia milii*	Crown of Thorns	Red, Pink, White	Hypertension
39	Euphorbiaceae	*Jatropha curcus*	Bubble Bush	Yellow, Red	Fever, Asthma, Heart Failure, Endocarditis
40	Fabaceae	*Pueraria lobata*	Japanese Arrowroot	Purple, White, Yellow	Stomach Problem
41	Fabaceae	*Desmodium hetrocarpon*	Tick Clover	Pink, Violet, White	Tuberculosis, Liver Disease
42	Fabaceae	*Crotalaria longirostrata*	Rattle Pods	Yellow	Adrenal Gland Disease
43	Fabaceae	*Calliandra haematocephala*	Powder Puff	Red, White, Pink	Fever, Asthma
44	Fabaceae	*Clitoria ternatea*	Butterfly Pea	Blue, Violet, White	Skin Problem, Anemia, Solid Organ Tumors
45	Lamiaceae	*Mesosphaerum suaveolens*	Pignut	Violet, Purple	Teeth Wash, Bone Marrow Disease, Diabetes, Acute Kidney Injury
46	Lamiaceae	*Clerodendrum infortunatum*	Glory Bower	White, Yellow	Cough, Viral Infection, Anaphylaxis, Drug Resistant
47	Lamiaceae	*Ocimum tenuiflorum*	Holy Basil	Red, Green, Pink	Fever, Cough
48	Lamiaceae	*Sideritis syriace*	Iron Wort	White	Wound
49	Malvaceae	*Hibiscus sabdariffa*	Florida Cranberry	White, Pink, Red	Ring Worm
50	Malvaceae	*Urena lobata*	Congo Jute	Pink, Violet, White	Bone Fracture, Skin Disease, Asthma, Ring Worm
51	Malvaceae	*Abelmoschus esculentus*	Lady Finger	Yellow	Gonorrhea , Skin Problem, Pimples

52	Malvaceae	*Sida acuta*	Wireweed	Yellow, White	Asthma, Gonorrhea, Snake Bite, Antioxidant
53	Malvaceae	*Hibiscus rosa-sinensis*	China Rose	White, Pink Yellow, Red	Breast Cancer, Fever, Pimples
54	Nyctaginaceae	*Bougainvillea spectabilis*	Bougainvillea	Pink, White, Red	Antioxidant, Snake Bite, Asthma, Drug, Myopathy
55	Nyctaginaceae	*Bougainvillea glabra*	Paper Flower	Purple, Pink, Royal Purple, White, Orange, Yellow, Violet, Blue	Fever, Respiratory Problem, Ischemic Ring Worm
56	Oleaceae	*Jasminum sambac*	Arabian Jasmine	White, Pink	Hair Loss
57	Poaceae	*Setaria viridis*	Green Foxtail	Green	Antibiotic, Snake Bite, Asthma
58	Primulaceae	*Lysimachia ciliata*	Fringed Loosestrife	Yellow	Asthma, Gonorrhea
59	Portulacaceae	*Portulaca grandiflora*	Moss Rose	Pink, White Yellow, Red Orange, Blue, Purple	Anaphylaxis, Bone Marrow Disorder, Nephrolithiasis, Diabetes
60	Rubiaceae	*Ixora coccinea*	Jungle Geranium	Pink, Light Pink, Yellow	Gonorrhea, Adrenal Gland Disease, Hypoglycemia
61	Rubiaceae	*Ixora chinensis*	Chines Ixora	Pink, Blue, White, Red, Orange, Yellow	Tuberculosis, Neutropenic Fever, Viral Infection, Fungal Infection, AIDS
62	Rutaceae	*Murraya paniculata*	China Box	White	Drug Reaction, Ring Worm
63	Solanaceae	*Burnfelsia latifolia*	Kiss Me Quick	Blue, White, Violet	Gonorrhea, Adrenal Gland Disease, Hypoglycemia, Urinary Tract Infection, Anemia, Ring Worm
64	Solanaceae	*Solanum lycopersicum*	Tomato	Yellow	Tooth Pain
65	Verbenaceae	*Duranta erecta*	Golden Dewdrop	Violet, White	Mosquitocidal, Thrombin Inhibitory, Anti-viral
66	Verbenaceae	*Verbena rigida*	Stiff Verbena	Pink, Pastel Blue, White, Orange, Red	Mild Gum Disease, Depression
67	Verbenaceae	*Lantana camara*	Ham and Eggs	Yellow, Pink, Red, White	Gonorrhea, Anemia, Ring Worm
68	Zingiberaceae	*Curcuma longa*	Turmeric	Yellow, White	Diabetes, Respiratory Problem, Pneumonia

The results revealed that total 68 flowers belonged to 29 different plant families which comprises of Acanthaceae (3), Apocynaceae (4), Asteraceae (13), Amaryllidaceae (2), Amaranthaceae (1), Araceae (1), Balsaminaceae (1), Bignoniaceae (1), Cannaceae (1), Cactaceae (1), Caryophyllaceae (1), Cleomaceae (1), Combretaceae (1), Convolvulaceae (3), Cucurbitaceae (3), Euphorbiaceae (2), Fabaceae (5), Lamiaceae (4), Malvaceae (5), Nyctaginaceae (2), Oleaceae (1), Poaceae (1), Primulaceae (1), Portulacaceae (1), Rubiaceae (2), Rutaceae (1), Solanaceae (2), Verbenaceae (3), Zingiberaceae (1). The results clearly indicated that maximum 13 flowers were of family Asteraceae followed by 5 plant species of Fabaceae and Malvaceae, 4 flowers of Apocynaceae and Lamiaceae, 3 flowers of Acanthaceae, Convolvulaceae, Cucurbitaceae and Verbenaceae, 2 flowers of Amaryllidaceae, Euphorbiaceae, Nyctaginaceae, Rubiaceae and Solanaceae. Rest of the family under investigation consisted of one flower each. The results revealed that family Asteraceae followed by Fabaceae, Malvaceae, Apocynaceae, Lamiaceae, Acanthaceae, Convolvulaceae, Cucurbitaceae, Verbenaceae, Amaryllidaceae, Euphorbiaceae, Nyctaginaceae, Rubiaceae and Solanaceae are the dominant plant families with more than one flowers possessing immense therapeutic potency against several diseases (Fig. 2).

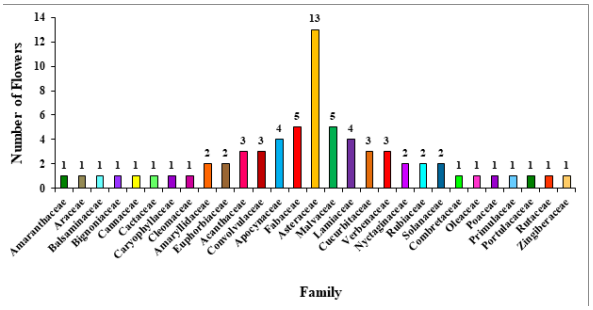
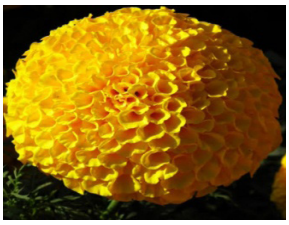
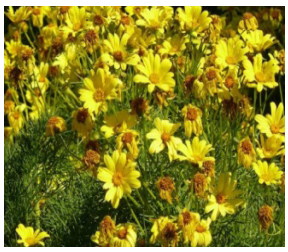
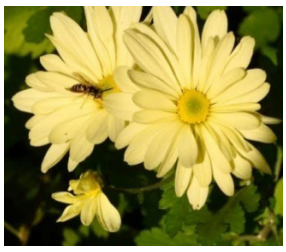
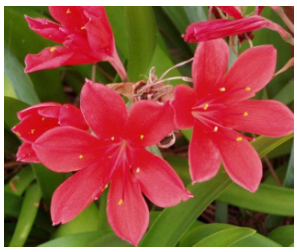
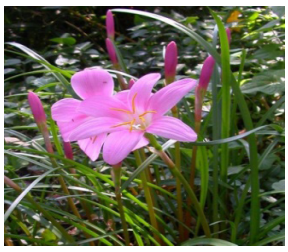
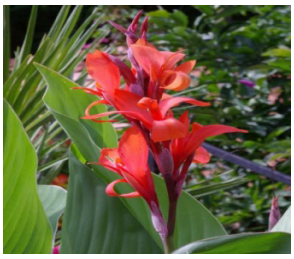
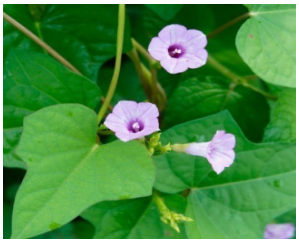
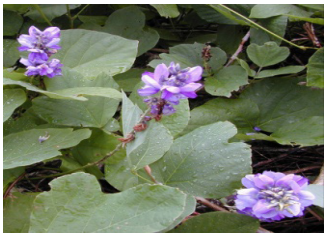


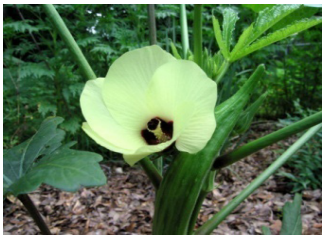
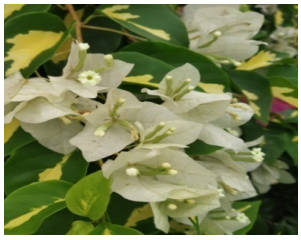
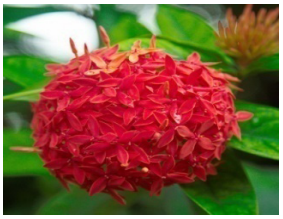
Fig. 2: Flowers of different plant families

The flowers were further categorized based on the number of flowers and their curative potentiality for different diseases. The findings revealed that, out of the 68 flowers that were studied, at most 18 flowers were reported to

Table 2: Photographs showing flower diversity of different plant families from Surajpur

			
Ruellia simplex	*Thunbergia grandiflora*	*Peristrophe speciosa*	*Sphagneticola trilobata*
			
Gaillardia pulchella	*Cosmos sulphureus*	*Tridax procumbens*	*Zinnia peruviana*
			
Tagetes erecta	*Helianthus annunus*	*Ageratum conyzoides*	*Dahlia pinnata*
			
Coreopsis gigantea	*Erigeron canadensis*	*Chrysanthemum indicum*	*Cyrtanthus elatus*
			
Zephyranthes carinata	*Hibiscus rosa-sinensis*	*Celosia argentea*	*Allamanda blancheti*
			
Tabernaemontan divaricata	*Curcuma longa*	*Gladiolus hybridus*	*Remusatia hookeriana*

			
Impatiens balsamina	*Tecoma stans*	*Canna indica*	*Epiphyllum oxypetalum*
			
Dianthus chinesis	*Cleome viscose*	*Combretum indicum*	*Ipomoea triloba*
			
Ipomoea nil	*Ipomoea quamoclit*	*Momordica charantia*	*Euphorbia milii*
			
Jatropha curcus	*Pueraria lobata*	*Desmodium hetrocarpon*	*Crotalaria longirostrata*
			
Calliandra haematocephala	*Clitoria ternatea*	*Mesosphaerum suaveolens*	*Clerodendrum infortunatum*
			
Ocimum tenuiflorum	*Sideritis syriace*	*Cucumis sativus*	*Hibiscus sabdariffa*

			
Urena lobata	*Abelmoschus esculentus*	*Sida acuta*	*Bougainvillea spectabilis*
			
Bougainvillea glabra	*Acmella paniculata*	*Jasminum sambac*	*Setaria viridis*
			
Lysimachia ciliata	*Portulaca grandiflora*	*Ixora coccinea*	*Ixora chinensis*
			
Murraya paniculata	*Burnfelsia latifolia*	*Duranta erecta*	*Verbena rigida*
			
Lantana camara	*Cucurbita pepo*	*Cascabela thevetia*	*Solanum lycopersicum*

be effective against fever, followed by 11 for gonorrhea, 10 for asthma and tuberculosis, 9 for ring worm and pneumonia, 8 for adrenal gland disease, anemia and heart problem, 6 for urinary tract infection, hypertension and hypoglycemia, 5 for cough, 4 for respiratory problem and drug resistance, 3 for hepatitis, pimples, snake bite, breast cancer, diabetes, endocarditis, wound, malaria, skin disease, antioxidant and fungal infection, 2 for skin problem, bone marrow disorder, solid organ tumors, AIDS, hair loss, viral infection, anaphylaxis, pleural disease and hemorrhoids. However, other diseases were found to be cured by only one flower each (Fig. 3).

The above results clearly indicated that a total of sixty eight flowers of 29 plant families possess tremendous therapeutic efficacy for the amelioration of seventy eight dreadful and infectious diseases. There are reports depicting the list of different flowering plants from different corners of the country.[14,15] The information on

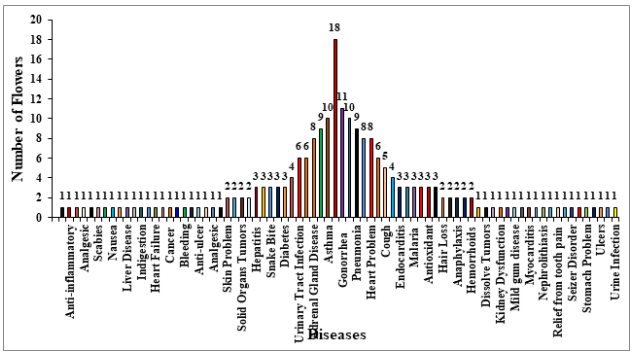


Fig. 3: Flowers and their therapeutic efficacy against several diseases

the study of floral diversity with special reference to rural areas is also recorded in literature.[16] The present study also shed lights on the flower colour diversity collected from 6 tehsils of Surajpur district. However, similar reports documenting the flower colour diversity of different areas were also reported.[17-25] The current research highlights the therapeutic efficacy of different flowers against several diseases. However, similar works documenting the flowers as therapeutics against various ailments are in records.[26-28] The present documentation was based on the ancient therapeutic knowledge of local traditional healers, herbalists and village residents which revealed the mystery of enormous healing potentiality of flowers against a number of diseases using affordable and herbal home remedies. The findings made it quite evident that the collected flowers are very efficient and useful for treating seventy eight ailments without causing any adverse side effects. The varying colours of the same flower that were taken from various locations also showed that the flower has a wide variety of colours and morphologies, which is an evidence of the flower diversity in this region. This report from Surajpur is the first of its kind and sheds light on the immense potentiality of flowers and their diversity. Although the current investigation and documentation is only a preliminary study to reveal local flowers that have the potential to be exceptionally effective in curing several diseases, future efforts will be made to extract the bioactive compound from the flowers and to elucidate the structure of bioactives using a variety of sophisticated instruments, including a UV-visible spectrophotometer, fourier-transform infrared spectroscopy (FTIR), - nuclear magnetic resonance (NMR), and electrospray ionisation mass spectroscopy (ESI-MS). Additionally, extensive research into the bioactive components of flowers will establish the groundwork for flower-based medicines, paving the way for natural floral treatment to become the cornerstone of medical advancement in future.

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