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A REVIEW ON TRADITIONAL MEDICINAL PLANTS USED AGAINST COMMON NEURO-MUSCULO-SKELETAL DISORDERS IN KARNATAKA STATE, INDIA.

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ABSTRACT: Karnataka is a southern state of India with richer diversity of plants and nearly 20% of its land area occupied by forest. Geographically Karnataka state is divided into three major zones, Western Ghats (Sahyadri), Coastal region and the Eastern plains which harbor a diversity of medicinal plants that have been used in traditional medicine by tribes and various ethnic groups for their primary health care systems. Effective herbal folk therapy is a challenge as it requires the knowledge of plants, method of collection, mode of preparation, dosage and many other aspects of treatment. Traditional uses of medicinal plants for neuro-musculo- skeletal disorders in Karnataka specifically have not been reviewed. This review presents the ethnomedicinal plants used for the treatment of common neuro-musculo-skeletal disorders such as arthritis, rheumatism, epilepsy, lumbago, paralysis, sprain, migraine, insomnia, depression, bone fracture, psychosis, anxiety, schizophrenia, bipolar disorder and neural disorders by various ethnic communities of Karnataka. A total 327 species of plants belonging to 93 families have been reviewed and compiled. 325 of them belong to Angiosperms, one Gymnosperm and one Pteridophyte.

INTRODUCTION: Plants have been used to cure variety of human ailments from ancient period. The World Health Organization (WHO) estimates that majority of the population in developing countries depend on folk medicines for their primary health care needs [1, 2, 3, 4]. India is one of the 12 mega-diversity countries of the world due to its species richness. The various tribal and ethnic communities have developed the knowledge and technique of using plants for their basic needs including food and medicine [5, 6, 7, 8].

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Traditional knowledge of using medicinal plants have passed on from elderly people to the ne from elders to the younger generation by oral tradition without any written documents [9, 10]. Herbal traditional medicine is considered as a boon for rural and tribal people in order to maintain good health as it is most effective, reliable and have least side-effects [11, 12] and [13].

Global warming and anthropogenic activities could lead to severe threat to biodiversity of a region. Modern developmental activities and over exploitation of natural resources ultimately causes extinction of certain plant species from their natural habitats [14]. There are re from older ports of intensive ethno-botanical documentation of medicinal plants conducted in different parts of India namely Tamil Nadu [15, 27], Himachal Pradesh [28, 29], Andhra Pradesh [30], Madhya Pradesh [31], [32, 33,

[34], Haryana [35], Kerala [36, 43], Maharashtra [44, 45, 46], Arunachal Pradesh [47, 48], Punjab [49], Uttara Pradesh [50], Uttarakhand [51, 52, 53], Jharkhand [54], Gujarat [55], Manipur [56], Tripura [57], West Bengal [58]. In recent years, the traditional medicinal knowledge is under serious threat due to lack of interest shown by younger generation mainly because of the easy availability of modern medical facilities even in the remote areas. Ethnic drugs have become the source for new formulations in modern medicinal systems. Documentation of medicinal plants is an urgent requirement to preserve the traditional knowledge and all other available information used by various tribes and ethnic communities for different purposes before it is completely lost [59, 60, 61, 61, 62, 63, 64]. Review of literature has been carried out for specific disorders in different regions of India which have brought an assemblage of traditional knowledge and have often provided the platform for pharmacological validation [65, 66, 67, 68, 69, 70, 71, 72]. Traditonal medicine is practiced based on beliefs and experiences mainly by rural people in the maintainence of physical and mental wellness. The various neutraceuticals present in plants develop natural immunity against diseases if taken in certain drug formulation [73]. This review will focus on ethno-medicinal plants used against neuro-Musculo-skeletal disorders such as rheumatism, joint pain, arthritis, sprain, muscular cramps, epilepsy, paralysis, lumbago, bone fracture, migraine, anxiety, neuralgia, depression, bipolar disorder, schizophrenia, psychosis and neural disorders. This is an attempt to bring together the plants used for neuro-musculo-skeletal disorders in Karnataka State and analyzing them statistically there by provide a platform for further research and novel drug discovery.

MATERIALS AND METHODS: This review of traditional medicinal plants used by various ethnic communities of Karnataka state for neuro-musculo-skeletal disorders are compiled from published research articles, thesis, reports and the literature available in different electronic databases (Web of Science, Science Direct, Scopus and Google Scholar). The plant species are arranged alphabetically with their family name, parts used and their ethno-medicinal uses against neuro-musculo-skeletal disorders and is presented in **Table 1.** The scientific names of ethno medicinal plants have been updated using recent literature sources [74, 75, 76]. Complied data is then analyzed as per established standards of ethno-botanical studies [77, 78, 79] and [80].

TABLE 1: LIST OF ETHNOMEDICINAL PLANTS USED FOR THE TREATMENT OF NEURO-MUSCULO-SKELETAL DISORDERS IN KARNATAKA

S. no.	Scientific Name	Family	Parts Used	Ethnomedicinal uses
1	*Abrus precatorius L.* Fabaceae Moench,	Malvaceae	Seed	Nervous debility [80], Rheumatism [81]
2	*Abrus precatorius* L.,	Fabaceae	Leaf, Root, Seed	Paralysis [82, 83], Bone Fracture [84], Joint Pain [83], Mental stress [85]
3	*Abutilon indicum* (L.) Sweet.	Malvaceae	Whole Plant, Leaf, Root	Bone Fracture [86], Lumbago [80], Sprain [87]
4	*Acacia catechu* (L.f.)	Willd.Fabaceae	Bark, Leaf, Gum	Musculo-Skeletal disorders [88]
5	*Acacia leucophloea* (Roxb.) Willd.	Fabaceae	Bark	Arthritis [89]
6	*Acanthus ilicifolius* L.	Acanthaceae	Leaf	Rheumatism [90]
7	*Achyranthes aspera* L.	Amaranthaceae	Whole plant, Leaf	Bone Fracture [86], Arthritis[91, 92]
8	*Acmella paniculata* (Wall.ex DC.)	Asteraceae	Flower, Root	Paralysis [89]
9	*Acorus calamus* L.	Acoraceae	Whole plant, Rhizome	Epilepsy [93] , Mental problems [93], Psychosis[93], Dissociative disorder[85]
10	*Actinodaphne hookeri* Meisner.	Lauraceae	Leaf	Arthitis [92]
11	*Aegle marmelos* (L.)	CorreaRutaceae	Fruit	Mental health [86]
12	*Albizia adianthifolia* (Schum.) W.	WightFabaceae	Root	Alzheimer's disease [94]
13	*Allium sativum* L.	Amaryllidaceae	Leaf (Bulb), Stem	Rheumatism [81], Migraine [95], Paralysis [96]
14	*Allophylus cobbe* (L.) Raeusch.	Sapindaceae	Leaf	Rheumatism [80]
15	*Aloe vera* (L.) Burm.f.	Xanthorrhoeaceae	Leaf	Bone Fracture [81], Insomnia [80], Memory [97], Sprain [98]
16	*Alpinia galanga* (L.) Willd.	Zingiberaceae	Rhizome	Rheumatism [80]
17	*Alpinia malaccensis* (Burm f.) Roscoe.	Zingiberaceae	Rhizome	Arthritis [89]
18	*Alstonia scholaris* (L.) R. Br.	Apocyanaceae	Latex	Rheumatism [89]

19	*Alternanthera sessilis* (L.) R. Br. ex Dc.	Amaranthaceae	Whole plant	Migraine [99], Mental health [93]
20	*Amorphophallus bulbifer* (Roxb.)	Blume.raceae	Stem (Corm)	Neuralgia [80], Bone Fracture [80]
21	*Amorphophallus paeoniifolius* (Dennst.) Nicolson.	Araceae	Stem (Corm)	Bone Fracture[84]
22	Andr*ographis paniculata* (Burm.f.) Wall.	ex NeesAcanthaceae	Whole plant, Leaf	Joint pain [98], Lumbago [100]
23	*Anisomeles malabarica* (L.) R.Br.ex Sims.	Lamiaceae	Leaf	Arthritis [95]
24	*Annona reticulata* L.	Annonaceae	Fruit	Schizophrenia [85]
25	*Annona squamosa* L.	Annonaceae	Fruit	Depression [85]
26	*Antidesma acidum* Retz.	Phyllanthaceae	Bark	Bone Fracture [84], Arthritis [92]
27	*Antidesma montanum* Blume.	Phyllanthaceae	Leaf	Bone Fracture [80, 81]
28	*Aphanamixis polystachya* (Wall.) R.	Parker Meliaceae	Seed	Rheumatism and Muscular pain [80]
29	*Areca catechu* L.	Arecaceae	Fruit	Neural disorders [93]
30	*Argyreia cuneata* (Willd.) Ker.	Convolvulaceae	Leaf	Rheumatism [101]
31	*Aristolochia indica* L.	Aristolochiaceae	Leaf, Root	Epilepsy [102], Migraine [87], Lumbago[100]
32	*Artocarpus heterophyllus* Lam.	Moraceae	Leaf	Rheumatism [80]
33	*Artocarpus hirsutus* Lam.	Moraceae	Bark, Seed	Arthritis [92, 99]
34	*Asclepias curassavica* L.	Apocyanaceae	Whole plant	Epilepsy and Mental problems [89]
35	*Asparagus racemosus* Willd.	Asparagaceae	Whole plant, Root (Tuber), Ste m	Epilepsy [93], Rheumatism [81, 83], Bone Fracture [84], Paralysis [103, 104]
36	*Asystasia gangetica* (L.) T. Anders.	Acanthaceae	Whole plant	Rheumatism [80, 89]
37	*Atalantia monophylla* DC.	Rutaceae	Fruit	Paralysis & Rheumatism [80]
38	*Averrhoa carambola* L.	Oxalidaceae	Fruit	Rheumatism [80]
39	*Avicennia marina* (Forssk.) Vierh.	Acanthaceae	Leaf	Rheumatism and Joint pain [90]
40	*Azadirachta indica* A.	Juss. Meliaceae	Bark, Seed, Leaf	Bone Fracture[82, 105], Rheumatism [81], Joint Pain [106], Paralysis [107]
41	*Baccharoides anthelmintica* (L.) Moench.	Asteraceae	Fruit	Arthritis [99]
42	*Bacopa monnieri* (L.) Wettst.	Plantaginaceae	Whole plant, Leaf	Epilepsy [82, 93], Schizophrenia and Dissociative disorder [85]
43	*Baliospermum solanifolium* (Burm.) Suresh.	Euphorbiaceae	Root	Bone fracture [84]
44	*Barringtonia racemosa* (L.) Spreng.	Lecythidaceae	Fruit	Insomnia [100]
45	*Basella alba* L.	Basellaceae	Leaf	Anxiety [85], Insomnia [80]
46	*Benincasa hispida* (Thunb.) Cogn.	Cucurbitaceae	Fruit, Seed	Bipolar disorder [85]
47	*Biophytum sensitivum* (L.) DC.	Oxalidaceae	Whole Plant, Leaf, Root	Epilepsy [82, 89], Muscular cramps [89], Bone Fracture [108]
48	*Bixa orellana* L.	Bixaceae	Flower	Vata [89]
49	*Blepharis integrifolia* (L.f.) E.Mey. & Drege ex Schinz.	Acanthaceae	Whole plant, Leaf	Bone fracture [84, 109]
50	*Blepharis maderaspatensis* (L.) B.Heyne ex Roth.	Acanthaceae	Whole plant, Leaf, Seed	Nervous disorders [89], Bone Fracture [86, 106, 108]
51	*Blumea lanceolaria* (Roxb.)	Druce Asteraceae	Leaf	Arthritis [92]
52	*Boerhavia diffusa* L.	Nyctaginaceae	Stem	Rheumatism [81]
53	*Brassica nigra* (L.) K.Koch.	Brassicaceae	Seed	Paralysis [106]
54	*Brassica oleracea* L.	Brassicaceae	Leaf	Insomnia [85]
55	*Breynia retusa* (Dennst.)	Alston Phyllanthaceae	Bark	Nervous disorders [89]
56	*Bridelia retusa* A.	Juss Phyllanthaceae	Fruit, Leaf, Stem	Arthritis [92]
57	*Bridelia stipularis* (L.) Blume.	Phyllanthaceae	Bark	Bone Fracture [84]
58	*Butea monosperma* (Lam.) Taub.	Fabaceae	Bark, Flower	Bone Fracture [81, 108], Arthritis [80, 92], Sprain [110]
59	*Cadaba fruiticosa* (L.) Druce.	Capparaceae	Bark, Leaf	Bone Fracture [86, 105]
60	*Caesalpinia mimosoides* Lam.	Fabaceae	Bark, Root	Arthritis [99], Rheumatism [81]
61	*Cajanus sericeus* (Baker) Maesen.	Fabaceae	Seed	Mental disorders [102]

62	*Callicarpa tomentosa* (L.) L.	Lamiaceae	Flower	Neural disorders [93]
63	*Calophyllum apetalum* Willd.	Calophyllaceae	Seed	Rheumatism [80]
64	*Calophyllum inophyllum* L.	Calophyllaceae	Seed	Rheumatism [80, 81]
65	*Calotropis gigantea* (L.) Dryand.	Apocyanaceae	Flower, Leaf, Root, Stem, Latex	Rheumatism [80, 81], Lumbago [80], Arthritis [92,] Paralysis [106], Nervous disorders [89], Migraine [111], Epilepsy [89]
66	*Calotropis procera* (Aiton.) Dryand.		Latex, Leaf	Bone Fracture [84], Rheumatism [110], Muscle Pain [108], Joint Pain [98]
67	*Canavalia rosea* (Sw.) DC.	Fabaceae	Root	Rheumatism [112]
68	*Cardiospermum halicacabum* L.	Sapindaceae	Whole plant, Root	Neural disorders [80, 93], Rheumatism[80, 81]
69	*Careya arborea* Roxb.	Lecythidaceae	Bark, Root	Arthritis [92], Vata [113]
70	*Carica papaya* L.	Caricaceae	Fruit	Bone Fracture [84]
71	*Cascabela thevetia* (L.)	Lippold Apocyanaceae	Bark	Insomnia [85]
72	*Casearia tomentosa* Roxb.	Salicaceae	Leaf	Bone Fracture [84, 100], Lumbago [100]
73	*Cassia fistula* L.	Fabaceae	Bark, Root, Seed	Bone Fracture [84], Paralysis [83], Rheumatism [83], Joint Pain [106]
74	*Casuarina equisetifolia* L.	Casuarinaceae	Whole plant	Bone Fracture [114]
75	*Catharanthus roseus* (L.)	G. Don Apocyanaceae	Flower, Leaf, Root	Rheumatism [115], Bipolar disorder [85]
76	*Catunaregam spinosa* (Thunb.)	Tirveng.Rubiacea e	Fruit	Rheumatism [80]
77	*Centella asiatica* (L.)	Urb. Apiaceae	Whole plant, Leaf, Stem	Psychosis [93], Epilepsy and Insomnia [88], Mental disorders [93. 116], Memory [98, 117]
78	*Ceropegia candelabrum* L.	Apocyanaceae	Stem	Mental disorders [89]
79	*Chassalia chartacea* Craib.	Rubiaceae	Root	Rheumatism [113]
80	*Chloroxylon swietenia* DC.	Rutaceae	Leaf	Rheumatism [89]
81	*Chrozophora plicata* (Vahl.) A.Juss. ex Spreng.	Euphorbiaceae	Leaf	Joint Pain [86]
82	*Chrysopogon zizanioides* (L.)	Roberty Poaceae		Insomnia [110], Joint pain [110], Muscle pain [110], Nervous disorders [110]
83	*Cinnamomum wightii* Meisn.	Lauraceae	Bark	Bone Fracture [84, 118]
84	*Cinnamomum camphora* (L.)	J.Presl Lauraceae	Resin	Joint pain [106]
85	*Cinnamomum sulphuratum*	Nees Lauraceae	Bark	Arthritis [95]
86	*Cissampelos pareira* L.	Menispermaceae	Whole plant	Arthritis and Muscle Cramp [91]
87	*Cissus adnata* Roxb.	Vitaceae	Root (Tuber)	Bone Fracture [89]
88	*Cissus quadrangularis* L.	Vitaceae	Leaf, Stem	Bone Fracture [81, 84, 88, 93, 106, 116, 117] Rheumatism [81], Lumbago [80], Joint pain [88]
89	*Citrus aurantifolia* (Christm.)	Swingle Rutaceae	Fruit	Migraine and Insomnia [99]
90	*Citrus limon* (L.)	Osbeck. Rutaceae	Fruit	Bone Fracture [84], Paralysis [96], Migraine [119]
91	*Citrus medica* L.	Rutaceae	Leaf	Muscular and Joint Pain [116]
92	*Cleome gynandra* L.	Cleomaceae	Leaf	Rheumatism [95], Epilepsy [117]
93	*Clerodendrum phlomidis* L.f.	Lamiaceae	Bark	Paralysis [106]
94	*Clitoria ternatea* L.	Fabaceae	Root	Mental disorders [93, 97, 120]
95	*Coccinia grandis* (L.) Voigt.	Cucurbitaceae	Fruit, Leaf, Stem	Nervous tension and Insomnia [80], Rheumatism [88]
96	*Cocos nucifera* L.	Arecaceae	Fruit, Seed	Rheumatism [80, 81, 110], Lumbago [110], Bipolar disorder [85], Joint Pain [99, 116], Sprain [112], Bone Fracture [100, 121]
97	*Codariocalyx motorius* (Houtt.) H.	OhashiFabaceae	Leaf	Rheumatism [80]
98	*Commelina benghalensis* L.	Commelinaceae	Root	Epilepsy [122]
99	*Couroupita guianensis* Aubl.	Lecythidaceae	Bark	Paralysis [123]
100	*Crateva religiosa* G.Forst.	Capparaceae	Bark, Leaf	Neuromuscular cramps [80]
101	*Croton persimilis* Mull. Arg.	Euphorbiaceae	Leaf, Stem	Neurosis [81], Arthritis [92]

102	*Croton tiglium* L.	Euphorbiaceae	Seed	Rheumatism [81]
103	*Cuminum cyminum* L.	Apiaceae	Seed	Rheumatism [80], Joint pain [99]
104	*Curculigo orchioides* Gaertn.	Hypoxidaceae	Leaf, Root	Lumbago and Neuralgia [80], Dislocation of bones [104]
105	*Curcuma longa* L.	Zingiberaceae	Rhizome	Arthritis [88], Bone Fracture [100]
106	*Cuscuta reflexa* Roxb.	Convolvulaceae	Whole plant	Epilepsy [82]
107	*Cyclea peltata* (Lam.) Hook.f. &Th.	Menispermaceae	Whole plant, Leaf	Sprain [82], Insomnia [80]
108	*Cymbopogon citratus* (DC.) Stapf.	Poaceae	Whole plant, Root	Arthritis [93], Rheumatism [81]
109	*Cynarospermum asperrimum* (Nees.) Vollesen.	Acanthaceae	Whole plant	Bone Fracture [80, 82]
110	*Cynodon dactylon* (L.) Pers.	Poaceae	Whole plant	Bone Fracture [84], Insomnia [80], Rheumatism [81]
111	*Cyperus rotundus* L.	Cyperaceae	Root	Mental disorders [86]
112	*Dalbergia malabarica* Prain.	Fabaceae	Stem	Arthritis [92]
113	*Dalbergia volubilis* Roxb.	Fabaceae	Seed	Rheumatism [81]
114	*Datura metel* L.	Solanaceae	Leaf, Seed	Rheumatism [80, 81, 117]
115	*Datura stramonium* L.	Solanaceae	Leaf	Parkinson's disease [115]
116	*Decaschistia trilobata* Wight.	Malvaceae	Root	Joint Pain and Muscular Pain [80]
117	*Delonix regia* (Hook.) Raf.	Fabaceae	Leaf	Arthritis [89]
118	*Dendrophthoe falcata* (L.f.) Ettingsh.	Loranthaceae	Leaf	Migraine [82], Arthritis [99]
119	*Desmodium triflorum* (L.) DC.	Fabaceae	Whole plant, Leaf	Epilepsy [89], Nervous debility [80]
120	*Dicliptera paniculata* (Frossk.) I. Darbysh	Acanthaceae	Leaf	Bone Fracture [84]
121	*Dillenia pentagyna* Roxb.	Dilleniaceae	Bark	Joint pain [123]
122	*Diospyros candolleana* Wight.	Ebenaceae	Fruit	Sprain [80]
123	*Diospyros malabarica* (Desr.) Kostel.	Ebenaceae	Bark	Bone Fracture [111]
124	*Diospyros montana* Roxb.	Ebenaceae	Leaf	Bone Fracture [84]
125	*Dipterocarpus indicus* Bedd.	Dipterocarpaceae	Stem	Rheumatism [80]
126	*Dodonaea viscosa* (L.) Jacq.	Sapindaceae	Bark, Leaf	Bone Fracture [117], Rheumatism [89]
127	*Elaeagnus conferta* Roxb.	Elaeagnaceae	Stem	Arthritis [92]
128	*Elaeocarpus serratus* L.	Elaeocarpaceae	Bark, Fruit, Leaf	Nervous disorders [88]
129	*Elephantopus scaber* L.	Asteraceae	Root	Migraine [124]
130	*Elettaria cardamomum* (L.) Maton.	Zingiberaceae	Seed	Migraine [106, 107]
131	*Embelia ribes* Burm.f.	Primulaceae	Leaf	Paralysis [103, 104]
132	*Embelia tsjeriam-cottam* (Roem. & Schult.) A.DC.	Primulaceae	Leaf, Root	Arthritis [92]
133	*Entada rheedei* Spreng.	Fabaceae	Seed	Lumbago and Joint pain [80]
134	*Erythrina suberosa* Roxb.	Fabaceae	Root, Seed	Dissociative disorder [85]
135	*Erythrina subumbrans* (Hassk.) Merr.	Fabaceae	Bark, Flower	Epilepsy and Rheumatism [89]
136	*Erythrina variegata* L.	Fabaceae	Bark	Rheumatism [80, 81], Arthritis [80, 93]
137	*Eucalyptus globulus* Labill.	Myrtaceae	Leaf	Migraine [125], Rheumatism [103, 104]
138	*Euphorbia antiquorum* L.	Euphorbiaceae	Latex	Rheumatism [81]
139	*Euphorbia nivulia* Buch.-Ham.	Euphorbiaceae	Latex	Rheumatism [81]
140	*Euphorbia tirucalli* L.	Euphorbiaceae	Latex	Migraine [125], Neuralgia [89]
141	*Evolvulus alsinoides* (L.) L.	Convolvulaceae	Whole plant	Epilepsy [89], Nervous disorders [80], Psychosis [89], Schizophrenia [85]
142	*Excoecaria agallocha* L.	Euphorbiaceae	Latex	Paralysis [90]
143	*Ficus benghalensis* L.	Moraceae	Bark, Leaf, Latex, Root	Bone Fracture [84, 88], Rheumatism [83], Lumbago [83], Arthritis [92]
144	*Ficus microcarpa* L.f.	Moraceae	Bark	Rheumatism [80, 81]
145	*Ficus religiosa* L.	Moraceae	Bark	Bone Fracture [88]
146	*Ficus semicordata* Buch.-Ham.ex Sm.	Moraceae	Root	Rheumatism [81]
147	*Flueggea leucopyrus* Willd.	Phyllanthaceae	Root	Rheumatism [81]
148	*Foeniculum vulgare* Mill.	Apiaceae	Seed	Joint pain [106]

149	*Gardenia gummifera* L.f.	Rubiaceae	Resin	Nervous disorders [93]
150	*Gliricidia sepium* (Jacq.) Walp.	Fabaceae		Bone Fracture [110], Rheumatism [110]
151	*Glochidion heyneanum* (Wight &Arn.) Wight.	Phyllanthaceae	Stem	Bone Fracture [84]
152	*Gloriosa superba* L.	Colchicaceae	Root (Tuber)	Rheumatism [89, 97], Neuralgia [89]
153	*Glycosmis pentaphylla* (Retz.) DC.	Rutaceae	Whole plant, Bark, Leaf, Root	Migraine [95], Rheumatism [80], Arthritis [92]
154	*Gmelina arborea* Roxb.	Lamiaceae	Bark, Leaf, Root	Bone Fracture [84, 121], Rheumatism and Nervous debility [80]
155	*Gnetum ula* Brongn.	Gnetaceae	Fruit, Seed	Rheumatism [80, 81, 89]
156	*Gnidia glauca* (Fresen.) Gilg. Thymelaeaceae	Thymelaeacea	Leaf, Root	Arthritis [92]
157	*Gomph*andr*a tetr*andr*a* (Wall.) Sleumer.	Stemonuraceae	Leaf	Arthritis [92]
158	*Gossypium barbadense* L.	Malvaceae	Seed	Rheumatism [80]
159	*Gymnema sylvestre* (Retz.) Schult.	Apocyanaceae	Leaf	Bone Fracture [108]
160	*Hedychium coronarium* J.Koenig.	Zingiberaceae	Rhizome	Rheumatism [89]
161	*Hemidesmus indicus* (L.) R.Br. ex Schult.	Apocyanaceae	Leaf	Lumbago [100]
162	*Hibiscus hispidissimus* Griff.	Malvaceae	Root	Rheumatism [81]
163	*Holarrhena pubescens*Wall.ex G. Don	Apocyanaceae	Bark, Leaf	Bone Fracture [105, 126]
164	*Holigarna grahamii* (Wight.) Kurz.	Anacardiaceae	Bark	Bone Fracture [84, 100]
165	*Holoptelea integrifolia* (Roxb.) Planch.	Ulmaceae	Bark	Migraine [96]
166	*Hoya ovalifolia* Wight & Arn.	Apocyanaceae	Leaf	Arthritis [99]
167	*Hugonia mystax* L.	Linaceae	Leaf	Insomnia [80]
168	*Humboldtia brunonis* Wall.	Fabaceae	Bark, Leaf	Arthritis [94]
169	*Hydrocotyle javanica* Thunb.	Araliaceae	Leaf	Nervousness [89]
170	*Hydrocotyle rotundifolia* Roxb.	Araliaceae	Whole plant	Nervous and Muscular disorders [80]
171	*Hygrophila auriculata* (Schumach.) Heine	Acanthaceae	Root	Rheumatism [80], Migraine [125]
172	*Impatiens balsamina* L.	Balsaminaceae	Flower	Lumbago [89]
173	*Ipomoea nil* (L.) Roth.	Convolvulaceae	Leaf	Sprain [101]
174	*Ipomoea pes-caprae* (L.) R.Br	. Convolvulaceae	Leaf	Psychosis and Neural disorders [80]
175	*Ixora Coccinea* L.	Rubiaceae	Flower	Insomnia [80]
176	*Jatropha curcas* L.	Euphorbiaceae	Latex, Leaf, Root, Seed	Paralysis [89, 113], Rheumatism [89, 110], Joint Pain and Neuralgia [80]
177	*Jatropha gossypiifolia* L.	Euphorbiaceae	Seed	Rheumatism [117]
178	*Justica adhatoda* L.	Acanthaceae	Leaf, Root	Arthritis [92]
179	*Justicia gendarussa* Burm.f.	Acanthaceae	Leaf, Stem	Rheumatism [80, 81]
180	*Justicia japonica* Thunb.	Acanthaceae	Whole plant	Bone Fracture [80, 81]
181	*Kaempferia galanga* L.	Zingiberaceae	Rhizome	Insomnia and Anxiety [80]
182	*Kingiodendron pinnatum* (DC.) Harms.	Fabaceae	Stem	Rheumatism [80]
183	*Knema attenuata* Warb.	Myristicaceae	Bark	Rheumatism [80]
184	*Lagen*andr*a toxicaria* Dalz.	Araceae	Rhizome	Arthritis [99]
185	*Lagenaria siceraria* (Molina) Standl.	Cucurbitaceae	Whole Plant	Insomnia [99]
186	*Lantana camara* L.	Verbenaceae	Leaf	Rheumatism [101]
187	*Laportea aestuans* (L.) Chew.	Urticaceae	Fruit	Mental depression [127]
188	*Leea asiatica* (L.)	Ridsdale Vitaceae	Whole plant	Bone Fracture [128]
189	*Leea indica* (Burm.f.) Merr.	Vitaceae	Root, Stem	Rheumatism [80], Arthritis [92]
190	*Leucas aspera* (Willd.) Link.	Lamiaceae	Whole plant, Flower, Leaf, Root	Joint pain [87], Migraine [115,126], Rheumatism [81], Musculo-Skeletal disorders [88]

191	*Leucas lavandulifolia* Sm.	Lamiaceae	Flower, Leaf	Arthritis [82], Rheumatism [80]
192	*Litsea glutinosa* (Lour.) C.B.Rob.	Lauraceae	Bark	Bone Fracture [81]
193	*Lobelia nicotianifolia* Roth ex Schult.	Campanulaceae	Leaf	Arthritis [92]
194	*Ludwigia perennis* L.	Onagraceae	Leaf	Rheumatism [81]
195	*Lygodium flexuosum* (L.) Sw	Lygodiaceae	Whole plant	Arthritis [92]
196	*Macrotyloma uniflorum* (Lam.) Verdc.	Fabaceae	Seed	Rheumatism [80]
197	*Madhuca longifolia* (J.Koenig ex L.) J.F.Macbr.	Sapotaceae	Bark, Seed	Bone Fracture [84], Rheumatism [93]
198	*Madhuca neriifolia* (Moon.) H. J.Lam.	Sapotaceae	Stem (Heart wood)	Rheumatism [80]
199	*Maesa indica* (Roxb.) A. DC.	Primulaceae	Root	Joint pain [113]
200	*Magnolia champaca* (L.) Baill. ex Pierre.	Magnoliaceae	Seed	Rheumatism [81]
201	*Mammea suriga* (Buch.-Ham. ex Roxb.)	Kosterm. Calophyllaceae	Bark, Leaf	Arthritis [92], Rheumatism [81]
202	*Mangifera indica* L.	Anacardiaceae	Leaf	Migraine [106]
203	*Memecylon umbellatum* Burm.f.	Melastomataceae	Leaf	Bone Fracture [103]
204	*Mentha arvensis* L.	Lamiaceae	Whole plant	Paralysis [125]
205	*Merremia emarginata* (Burm.f.) Hallier f.		Whole plant	Neuralgia [89]
206	*Mimosa pudica* L.	Fabaceae	Whole plant, Root	Arthritis [92], Migraine [103, 104]
207	*Mollugo pentaphylla* L.	Molluginaceae	Whole plant	Rheumatism [89]
208	*Moringa oleifera* Lam.	Moringaceae	Bark, Fruit, Gum, Leaf, Root, Seed	Bone Fracture [84, 100], Paralysis [93, 107], Rheumatism [83, 93], Arthritis [92], Migraine [125]
209	*Mucuna pruriens* (L.) DC.	Fabaceae	Leaf, Root, Seed, Stem	Nervous disorders [89], Parkinson's disease [94, 112], Amnesia [85]
210	*Murraya koenigii* (L.) Spreng.	Rutaceae	Leaf	Lumbago [107]
211	*Murraya paniculata* (L.) Jack.	Rutaceae	Leaf	Rheumatism [89]
212	*Musa x paradisiaca* L.	Musaceae	Fruit, Stem	Dissociative disorder and Depression [85]
213	*Mussaenda frondosa* L.	Rubiaceae	Leaf	Insomnia [80]
214	*Myristica fragrans* Houtt.	Myristicaceae	Fruit	Sprain[111], Insomnia, Schizophrenia and Amnesia [85]
215	*Myristica malabarica* Lam.	Myristicaceae	Seed	Joint pain [80]
216	*Naravelia zeylanica* (L.) DC.	Ranunculaceae	Whole plant	Migraine [128]
217	*Naregamia alata* Wight & Arn.	Meliaceae	Whole plant	Rheumatism [80]
218	*Nerium oleander* L.	Apocyanaceae	Latex	Muscular pain [101]
219	*Nyctanthes arbor-tristis* L.	Oleaceae	Root	Bone Fracture [84]
220	*Ocimum americanum* L.	Lamiaceae	Leaf	Rheumatism[80], Arthritis [110]
221	*Ocimum basilicum* L.	Lamiaceae	Leaf	Bone Fracture [84], Migraine [88], Joint Pain[106]
222	*Ocimum tenuiflorum* L.	Lamiaceae	Leaf, Root	Arthritis [99], Mental disorders [93], Epilepsy [88], Joint Pain [106], Migraine [107], Insomnia [110]
223	*Olea dioica* Roxb.	Oleaceae	Leaf, Stem	Arthritis [92]
224	*Olea europaea* L.	Oleaceae	Seed	Epilepsy [119]
225	*Origanum majorana* L.	Lamiaceae	Leaf	Bipolar disorder [85]
226	*Oroxylum indicum* (L) Kurz.	Bignoniaceae	Bark, Root, Stem	Epilepsy [82], Rheumatism [81], Joint Pain [99]
227	*Oryza sativa* L.	Poaceae	Seed	Insomnia [80]
228	*Pandanus fascicularis odorifer* (Forssk.) Kuntze.	Pandanaceae	Leaf, Root, Stem	Muscular cramps [80], Rheumatism [80, 89]

229	*Pavonia zeylanica* (L.) Cav.	Malvaceae	Leaf	Bone Fracture [107]
230	*Pergularia daemia* (Forssk.) Chiov.	Apocyanaceae	Whole plant, Latex, Leaf, Stem	Rheumatism [89], Epilepsy [89], Bone Fracture [108], Paralysis [117], Mental Disorders [89]
231	*Persea macrantha* (Nees) Kosterm.	Lauraceae	Bark, Stem	Bone Fracture[84, 118], Rheumatism[80]
232	*Phoenix sylvestris* (L.) Roxb.	Arecaceae	Stem	Mental Stress [85]
233	*Phyllanthus emblica* L.	Phyllanthaceae	Fruit	Insomnia [80]
234	*Phyllanthus reticulatus* Poir.	Phyllanthaceae	Bark, Fruit	Rheumatism [89]
235	*Phyllorchis nilgherensis* (Wight.) Kuntze.	Orchidaceae	Stem (Pseudobulb)	Arthritis [124]
236	*Physalis minima* L.	Solanaceae	Leaf	Rheumatism [81], Bone Fracture [86]
237	*Piper longum* L.	Piperaceae	Fruit	Muscular pain [93, 120]
238	*Piper nigrum* L.	Piperaceae	Fruit, Leaf, Seed	Arthritis [80, 99], Rheumatism [81], Sprain [99, 111, 112], Migraine [95], Bone Fracture [108], Epilepsy [102]
239	*Plectranthus amboinicus* (Lour.) Spreng.	Lamiaceae	Leaf	Epilepsy [82], Migraine [129]
240	*Plumaria rubra* L.	Apocyanaceae	Bark, Latex, Leaf, Seed	Rheumatism [89], Joint pain [101]
241	*Plumbago indica* L.	Plumbaginaceae	Root	Rheumatism [80]
242	*Plumbago zeylanica* L.	Plumbaginaceae	Whole plant, Bark, Leaf, Root	Rheumatism [81, 117], Bone Fracture [107], Dissociative disorder [85], Arthritis[124]
243	*Polyalthia longifolia* (Sonn.) Thwaites.	Annonaceae	Bark	Rheumatism [93]
244	*Polycarpaea corymbosa* (L.) Lam.	Caryophyllaceae	Whole plant	Neuromuscular tremor [80]
245	*Pongamia pinnata* (L.) Pierre.	Fabaceae	Bark, Fruit, Leaf, Seed	Rheumatism [80, 81,103, 104, 110], Bone Fracture [84], Migraine [117], Musculo-Skeletal [88], Arthritis [100]
246	*Portulaca oleracea* L.	Portulacaceae	Whole plant	Depression and Schizophrenia [85]
247	*Pothos scandens* L. e	Aracea	Whole plant	Bone fracture [84], Sprain [128]
248	*Premna serratifolia* L.	Lamiaceae	Leaf, Root	Arthritis [92, 99], Rheumatism[81]
249	*Priva cordifolia* (L.f.) Druce	Verbenaceae	Leaf	Bone Fracture [86]
250	*Pseudarthria viscida* (L.) Wight &Arn.	Fabaceae	Whole plant	Rheumatism [80]
251	*Psidium guajava* L.	Myrtaceae	Fruit	Rheumatism [100]
252	*Psydrax umbellata* (Wight) Bridson	Rubiaceae	Bark	Bone Fracture [89]
253	*Pterocarpus marsupium* Roxb.	Fabaceae	Gum, Latex, Leaf	Musculo-Skeletal disorders [88]
254	*Putranjiva roxburghii* Wall.	Putranjivaceae	Leaf	Rheumatism [110]
255	*Rauvolfia serpentina* (L.) Benth.ex Kurz.	Apocyanaceae	Root	Mental disorders [80, 93], Rheumatism [81], Arthritis [92], Psychosis [93], Insomnia [80]
256	*Rauvolfia tetraphylla* L.	Apocyanaceae	Leaf, Root	Insomnia and Anxiety [85]
257	*Ricinus communis* L.	Euphorbiaceae	Leaf, Root, Seed	Rheumatism [81], Sprain and Lumbago [80], Joint Pain [106, 130], Bone Fracture [84]
258	*Rotheca serrata* (L.) Steane & Mabb.	Lamiaceae	Fruit, Leaf	Epilepsy [82], Migraine [106]
259	*Rubia cordifolia* L.	Rubiaceae	Fruit, Leaf, Root, Stem	Rheumatism [91], Arthritis [88, 92], Dislocation of bones [121]
260	*Ruta chalepensis* L.	Rutaceae	Whole plant, Leaf	Epilepsy [93, 110]
261	*Ruta graveolens* L.Rutaceae	Rutaceae	Leaf	Epilepsy [115]
262	*Salix tetrasperma* Roxb.	Salicaceae	Bark, Leaf	Rheumatism [89]
263	*Sansevieria roxburghiana* Schult. & Schult.f.	Asparagaceae	Root	Arthritis [92]
264	*Sapindus trifoliatus* L.	Sapindaceae	Fruit	Epilepsy [80]

265	*Saraca asoca* (Roxb.) Willd.	Fabaceae	Bark, Leaf	Arthritis [88]
266	*Sarcostemma acidum* (Roxb.)Voigt.	Apocyanaceae	Stem	Mental disorders [93]
267	*Sarcostemma intermedium* Decne.	Apocyanaceae	Bark, Fruit	Rheumatism [89]
268	*Schefflera venulosa* (Wight & Arn.)	HarmsAraliaceae	Leaf	Joint pain [106]
269	*Schleichera oleosa* (Lour.) Oken.	Sapindaceae	Seed	Joint pain [89]
270	*Semecarpus anacardium* L.f.	Anacardiaceae	Flower (Thalamus)	Muscular pain [124, 128]
271	*Senna alex*and*rina* Mill.	Fabaceae	Whole plant	Rheumatism [117]
272	*Senna auriculata* (L.) Roxb.	Fabaceae	Flower, Leaf, Root, Seed, Stem	Rheumatism [88], Muscular cramps [107]
273	*Senna occidentalis* (L.) Link	Fabaceae	Leaf	Nervous disorders [103, 104]
274	*Senna sophera* (L.) Roxb.	Fabaceae	Leaf	Rheumatism [103]
275	*Senna tora* (L.) Roxb.	Fabaceae	Leaf	Bone fracture [84, 100]
276	*Sesamum indicum* L.	Pedaliaceae	Seed	Paralysis[106], Rheumatism [80, 81, 103, 104], Joint Pain[99, 106], Lumbago [107], Bone Fracture[84], Insomnia [99]
277	*Sesbania gr*and*iflora* L. Pers.	Fabaceae	Bark, Flower, Leaf, Root, Seed	Rheumatism [88], Epilepsy [88], Arthritis [110], Mental retardation [85]
278	*Sida acuta* Burm.f.	Malvaceae	Root	Nervous disorders [80], Rheumatism[81], Arthritis [92]
279	*Sida cordata* (Burm.f.) Borss. Waalk.	Malvaceae	Root	Rheumatism[81], Arthritis[92]
280	*Sida cordifolia* L.	Malvaceae	Whole Plant, Root	Nervous disorders [80, 93, 120], Schizophrenia[85], Rheumatism[80]
281	*Sida rhombifolia* L.	Malvaceae	Leaf, Root	Rheumatism[80, 89, 113, 128], Muscular pain and Lumbago [80], Nervous debility [80, 89]
282	*Solanum surattense* Burm.f.	Solanaceae	Flower, Leaf	Arthritis [82]
283	*Solanum torvum* Sw.	Solanaceae	Root	Arthritis [93]
284	*Soymida febrifuga* (Roxb.) A.Juss.	Meliaceae	Bark	Bone Fracture [108]
285	*Sterculia foetida* L.	Malvaceae	Bark	Rheumatism[81], Lumbago [80]
286	*Strobilanthes heyneanus* Nees.	Acanthaceae	Whole plant	Arthritis [113]
287	*Strychnos colubrina* L.	Loganiaceae	Bark, Leaf, Root	Rheumatism [80]
288	*Strychnos nux vomica* L.	Loganiaceae	Bark, Leaf, Seed	Migraine [91], Arthritis [80], Depression[91], Epilepsy [93]
289	*Strychnos potatorum* L.f.	Loganiaceae	Leaf	Muscular Pain [108]
290	*Strychnos wallichiana* Steud. ex.A.DC.	Loganiaceae	Root	Rheumatism [113]
291	*Styrax benzoin* Dryand.	Styracaceae	Flower, Leaf	Epilepsy [119]
292	*Syzygium cumini* (L.) Skeels.	Myrtaceae	Fruit	Joint pain [127]
293	*Tabernaemontana alternifolia* L.	Apocyanaceae	Leaf	Rheumatism [80]
294	*Tabernaemontana divaricata* (L.) R.Br. ex Roem& Schult.	Apocyanaceae	Latex	Mental Stress and Depression [85]
295	*Tamarindus indica* L.	Fabaceae	Fruit, Leaf, Root	Sprain [112], Rheumatism [80, 81], Bone Fracture [84], Paralysis [106]
296	*Terminalia arjuna* (Roxb. ex DC.) Wight & Arn.	Combretaceae	Bark	Bone Fracture [81, 84]
297	*Terminalia bellirica* (Gaertn.) Roxb.	Combretaceae	Bark, Seed	Paralysis [96], Arthritis [92]
298	*Terminalia chebula* Retz.	Combretaceae	Fruit	Schizophrenia and Mental retardation [85]
299	*Terminalia paniculata* Roth.	Combretaceae	Bark, Leaf	Arthritis [80]
300	*Tinospora sinensis* (Lour.) Merr.	Menispermaceae	Whole plant, Leaf, Stem	Rheumatism [80, 81], Bone Fracture [84], Arthritis [88, 110]
301	*Toddalia asiatica* (L.) Lam.	Rutaceae	Fruit, Leaf, Root	Rheumatism [80, 93], Epilepsy [100]
302	*Trachyspermum ammi* (L.) Sprague.	Apiaceae	Seed	Arthritis [99], Paralysis [125]
303	*Trema orientalis* (L.)	BlumeCannabaceae	Whole plant	Epilepsy [113]

304	*Trichosanthes cucumerina* L.	Cucurbitaceae	Leaf	Obsessive compulsive disorder [85]
305	*Trichosanthes tricuspidata* Lour.	Cucurbitaceae	Leaf	Arthritis [124]
306	*Tridax procumbens* L.	Asteraceae	Leaf, Stem	Arthritis [92]
307	*Trigonella foenum-graecum* L.	Fabaceae	Seed	Joint pain [106]
308	*Triumfetta rotundifolia* Lam.	Malvaceae	Leaf	Migraine [86]
309	*Tylophora indica* (Burm.f.) Merr.	Apocyanaceae	Leaf	Migraine [117]
310	*Typha latifolia* L.	Typhaceae	Root	Mental disorder [86]
311	*Urena lobata* L.	Malvaceae	Whole plant	Bone Fracture [84]
312	*Urena sinuata* L.	Malvaceae	Leaf	Rheumatism [124]
313	*Vanda tessellata* (Roxb.) Hook. ex G.Don	Orchidaceae	Leaf, Root	Rheumatism [115], Nervous troubles [89], Arthritis [115]
314	*Vateria indica* Linn.	Dipterocarpaceae	Seed	Rheumatism [80], Arthritis [99]
315	*Vernonia travancorica* Hook.f.	Asteraceae	Whole plant	Rheumatism [124]
316	*Vigna mungo* (L.)	Hepper Fabaceae	Seed	Arthritis [92], Bone Fracture [103]
317	*Vitex altissima* L.f.	Lamiaceae	Bark	Arthritis and Nervous disorders [80]
318	*Vitex negundo* L.	Lamiaceae	Whole plant, Leaf, Root	Sprain [117], Rheumatism [80, 88, 91, 103, 104, 113, 117, 130], Migraine [124, 128], Arthritis[87, 99, 131], Dissociative disorder [85],Paralysis [98, 130], Bone Fracture [117, 132]
319	*Vitex trifolia* L.Lamiaceae			Rheumatism [127]
320	*Volkameria inermis* L.	Lamiaceae	Root	Rheumatism [80, 81, 97, 110]
321	*Withania somnifera* (L.)	DunalSolanaceae	Leaf, Root, Stem	Nervous disorders [97], Arthritis [92], Rheumatism [110],Amnesia [85],Insomnia [85, 97], Stress and Anxiety [85], Paralysis [103, 104]
322	*Xylia xylocarpa* (Roxb.) Taub.	Fabaceae	Seed	Rheumatism [80]
323	*Zanthoxylum rhetsa* (Roxb.) DC.	Rutaceae	Seed	Bone fracture [84]
324	*Zea mays* L.	Poaceae	Seed	Bipolar disorder [85]
325	*Zingiber officinale* Roscoe.	Zingiberaceae	Rhizome	Rheumatism [81], Migraine [124, 128], Muscularstrength [110]
326	*Ziziphus mauritiana* Lam.	Rhamnaceae	Leaf	Obsessive compulsive disorder and Schizophrenia [85], Muscular strength [110]
327	*Zornia gibbosa* Span.	Fabaceae	Whole Plant	Stress [86]

DISCUSSION: This review reveals a total of 327 plant species belonging to 93 families used in traditional medicine against neuro-musculo-skeletal disorders in Karnataka State **Table 1.** Of these species 325 belongs to Angiosperms, one Gymnosperm and one Pteridophyte. Highest number of plant species belongs to the family Fabaceae (40 species) followed by Apocyanaceae (21 species), Lamiaceae (18 species), Malvaceae (14 species), Acanthaceae and Rutaceae (13 species each), Euphorbiaceae (11 species), Phyllanthaceae (9 species), Zingiberaceae and Rubiaceae (7 species each), Solanaceae, Convolvulaceae, Lauraceae, Asteraceae and Moraceae (6 species each), Sapindaceae, Cucurbitaceae and Poaceae (5 species each). Family Importance Value (FIV) observed in this review resembles to some extent with the earlier reports [133, 134, 135] and [136]. Among the recorded species, 233 are wild and 94 cultivated **Fig. 1.** Most of the plant species used in the treatment belong to trees (118 species) followed by herbs (87 species), shrubs (65 species), climbers (52 species), epiphytes (3 species) and parasites (2 species) **Fig. 2.** Different plant parts such as leaves, stem, root, bark, seeds, fruits, whole plant, flower, latex, rhizome, corm, tuber, heart wood,, pseudo-bulb, mucilage, thalamus, resin and gum are being used for the treatment of different ailments **Fig. 3**, **Table 1.** Sometimes the healers collect these plant parts from wild without taking proper conservation strategies which would lead to scarcity and extinction of useful plant species. Hence encouragement for judicious and sustainable harvesting of medicinal plant species is necessary [70, 137]. External mode of application is mostly preferred for the treatment of neuro-musculo-skeletal disorders in folk medicine **Fig. 4.** Maximum nuFmber of plant species were reported against rheumatism (126 species) followed by bone fracture (71 species), arthritis (70 species),

migraine (30 species), joint pain and epilepsy (29 species each), insomnia and paralysis (24 species each), lumbago (17 species) and sprain (13 species). Reports revealed that more plants are documented against musculo-skeletal disorders than neurological disorders. Drug formulation varies between communities. Herbal paste, decoction, fresh juice, medicated oil, ointment, powder, medicated food, raw forms are the most popular modes in practice in the preparation of medicine. Among the recorded species, Vitex negundo are used to treat maximum number of disorders of neuro-musculo-skeletal category with highest number of citations. For joint disorders the most common drug formulation and method of usage includes the preparation of oil using poly herbal combinations and massaging over the affected parts for a prescribed period. *Cissus quadrangular* is is used for treating bone fracture and has shown maximum number of citations. Rhizome of *Acorus calamus* and whole plant of *Centella asiatica* are exclusively used to treat neurological disorders. Oil from the seeds of *Sesamum indicum, Cocos nucifera* or *Ricinus communis* is used as a medium for the preparation of mono-herbal or poly-herbal drug formulations used to treat joint disorders. This review also reveals that *Calotropis gigantea, Ocimum tenuiflorum, Withania somnifera, Pongamia pinnata, Pergularia daemia, Piper nigrum, Moringa oleifera, Azadirachta indica* and *Leucas aspera* are the notable plant species showing high use-value. Four plant species belonging to the family Malvaceae such as *Sida acuta, Sida cordata, Sida cordifolia* and *Sida rhombifolia* are found to be most effective to treat nervous and joint disorders. The root of *Rauvolfia serpentina* was found to be most effective against neurological and joint disorders. Traditional medicinal practices are often associated with religious faith and few informants are not ready to share their knowledge.

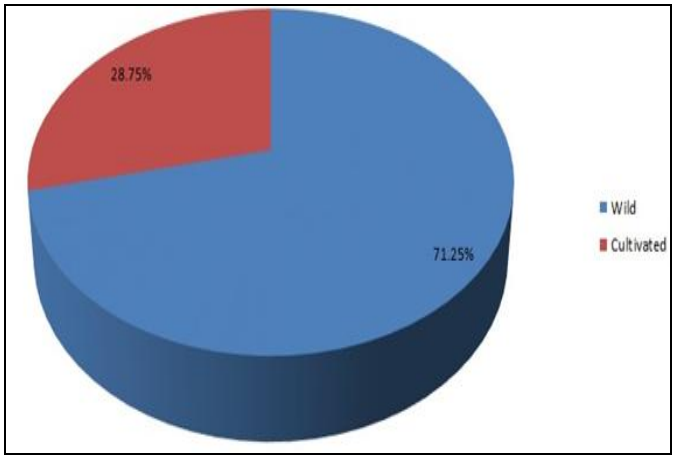

FIG. 1: REPRESENTATION OF HABITAT OF RECORDED ETHNOMEDICINAL PLANTS

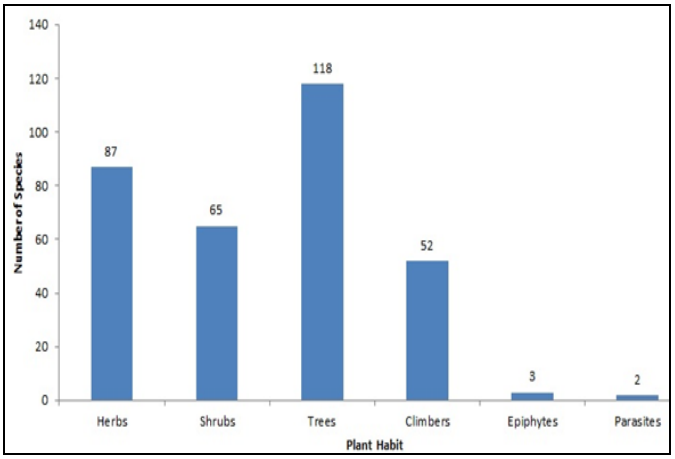

FIG. 2: REPRESENTATION OF HABITS ETHNOMEDICINAL PLANTS

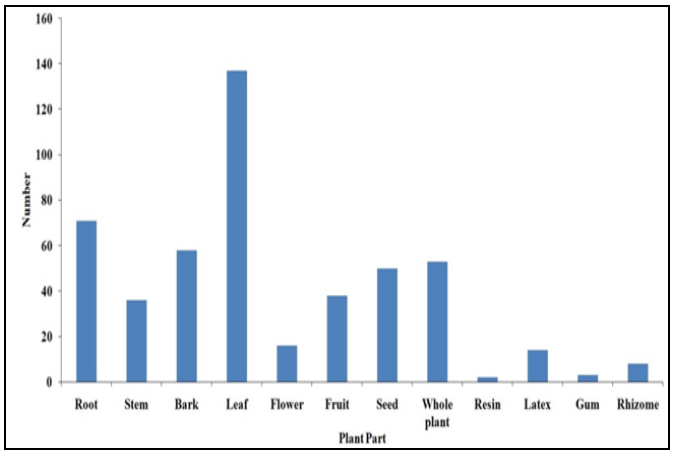

FIG. 3: REPRESENTATION OF PLANT PARTS USED AGAINSTNEURO-MUSCULO-SKELETAL

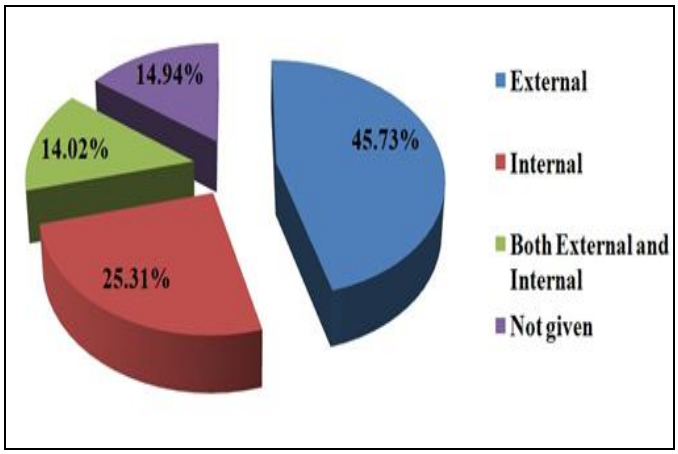

FIG. 4: MODE OF APPLICATION

Pharmacological characterization of some important plant species for their stimulating properties to heal neurological and musculo-skeletal disorders has been carried out in Karnataka. The fruit of *Aegle marmelos* contains steroids and alkaloids which is safer and an effective drug against anxiolytic effects. Bioactive compounds extracted from *Evolvulus alsinoides* have shown antistress effect. Leaves of *Acorus calamus* exhibited antioxidant properties and neuro-protective effects. Dry extract of whole plant of *Bacopa monnieri* promote cognitive functions in elderly patients [138]. Clinical study has revealed that herbal drug of Cissus quadrangular is promotes the development of collagen fibres, callus formation and earlier calcification, hence mainly used in treating bone fractures [139].

Withania somnifera is an important medicinal plant which contains with anolides, alkaloids, saponins, phenolics and sitoindisides. Hence it possesses anti- arthritic activity and is also used to treat nervous disorders as it improves the functional recovery of motor activity. Clinical trials proved that active chemical withaferin-A stimulates differentiation and growth of osteoblasts [140]. Phytochemical analysis of leaf extract of *Vitex negundo* revealed saponins, tannins, phenols, flavonoids, alkaloids thereby showing anti-arthritic property, wound healing potential and CNS depressant activity [141]. Traditional healers prescribed the special diet containing herbal drugs for strengthening bones by the development of synovial fluid and cartilage in the bone joints [142].

Semi-structured questionnaire and open-ended interviews with herbal healers were the main tools used in data collection. Proper documentation of information and collection of plant specimen is carried out during field trips. Collected data was analyzed following standard parameters of ethnobotanical study [77, 78]. However this review has shown that in the past few years the researchers have resorted to analyzing the data based on quantitative techniques such as Use-Value (UV), Informant Consensus Factor (ICF), Relative Frequency of Citation (RFC), Fidelity Level (FI) and Family Importance Value (FIV). Such standard quantitative techniques are essential to compare the uses and cultural importance of different plant taxa [79, 84]. Siddis, Gowlis, Kunabi, Naika, Malekudiya, Koraga, Kuruba, Soligas, Yeravas, Hakki-pikkies, Lambani, Halakki, Valmiki, Brahmin, Saraswath, Vokkaliga, Besta, Idiga are the notable tribes and ethnic communities of Karnataka who have contributed to the available knowledge [80, 81, 82] . It is very unfortunate that a very large number of plant species lost every year due to forest fire. Necessary steps are to be taken for the conservation of medicinal plants which are in endangered category as per IUCN red list [143].

CONCLUSION: Traditional medicine is the backbone for modern medicine.

Pharmacological validation of documented ethno-medicinal plants will contribute to new drug discovery specifically in the areas of musculo-skeletal-neurological ailments. With the modern facilities and the allopathic medical facilities making inroads into remote areas, dependency on traditional medicine system is declining. Also, owing to change in life style, younger generation is less interested in this system. But the information available is rich, useful and developed after centuries of trial and error. There is an urgent need to document and preserve this knowledge which can be of use in evolving less expensive and relatively safer protocols for our healthcare system.

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