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Ethnobotanical Investigation of Medicinal Plants and their Importance, Traded in the Public Herbal Markets and Centers of Gaza Strip, Palestine

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Mohamed Abou Auda [1,*], Tarek Elbashiti[2] & Samar Alghuff[1]

Abstract: A comprehensive assessment of medicinal plant variety used in folk treatment in Gaza was conducted in order to discover medicinal plants still in use by therapists and their relevance in health care. By interviewing 20 informants from various places, an ethnobotanical survey was undertaken to examine and document plant species utilized in traditional medicine. The research identified 72 different medicinal pqlant species belonging to 33 different families. Plant components that were most commonly used were leaves (41%), stems (18%), and seeds (14%). The most common ailments treated were gastrointestinal, circulatory, and urinary system issues.

Keywords: Ethnobotany, Medicinal Plant, Gaza Strip, Palestine, Traditional Medicine.

Introduction

Throughout history, humans have depended on a variety of natural materials to treat a variety of illnesses (Jaradat, 2005).

Despite the availability of modern medicine in many developing nations, over two-thirds of the population still rely on traditional practitioners and medicinal herbs to satisfy their basic health care requirements. Traditional herbal medicine is frequently utilized for historical, cultural, and ecological reasons, in particular because it is still available, has greater compatibility, and is well accepted (Kunwar et al., 2013).

Reliance on medicinal plant derivative therapies, particularly in impoverished nations where contemporary medicines are either unavailable or too expensive. Because of the poor economic condition in developing nations, medicine prices are higher, making medicinal plants and traditional medicine more appealing to the local population (Randriamiharisoa et al., 2015).

The majority of the world's population still uses herbs as their first line of defense against sickness, although many commonly eaten foods and stimulants can have positive side effects (Nemeth, 2012)

In 2002, the World Health Organization estimated that 80 percent of the world's population in developing countries relies primarily on medicinal plants and traditional medicine practitioners to meet their primary health care needs (Ali-Shtayeh et al., 2011), and previous research has shown that plant extracts are used in about 85 percent of traditional treatments (Quiroga et al., 2012).

From 2014 to 2023, the World Health Organisation, with the objective of providing safe and efficient services and integrating them into health systems to achieve a universal health coverage, aims at implementing strategies to develop rules and standards based on reliable information and data about people with medicinal plants (WHO 2019).

Medicinal plants have a prominent place in primary health care in Palestine, as they do in many developing countries, and are widely utilized as complementary and alternative medicine for health maintenance and the treatment of various illnesses, including chronic diseases in Traditional Arabic Palestinian Herbal Medicine (Ali-Shtayeh et al., 2013). These herbal medicines are regarded an intrinsic part of Palestinian culture, and they serve a crucial and indispensable function in current folk medicine (Jaradat, 2005).

Local plant species have a tremendous impact on Palestinian culture and economics. A variety of wild plant types are commonly utilized in Palestinian cuisine, and many people, mostly in rural regions, continue to rely on medicinal herbs for the treatment of burns, sickness, and other ailments (Hinnawi, 2010).

Many ethnobotanical surveys have been undertaken in Palestine to highlight the usefulness of herbal medicine in the treatment of ailments and diseases (Abd Rabou et al., 2008). However, there is a major paucity of data on the number and type of medicinal plants utilized in Palestine, particularly in the Gaza Strip (Abou Auda, 2011).

This study focused on the market of medicinal plants in the Gaza strip because of the limited documentation of this issue. Moreover, the study placed emphasis on the varieties of medicinal plants utilized by the traditional healers in medical treatments. Additionally, it aimed at identifying the main groups of medical plants, employed by folk practitioners, and detecting the benefits resulting from these plants.

The current study is the first-ever attempt in the arena of medicinal plants in the Gaza strip: It is expected to provide significant information on both the classification and identification of the paramount medicinal plants in the Gaza strip, which local practitioners and therapist utilize in some diseases treatments.

1 Department of Biology, Faculty of Science, Al-Aqsa University, Gaza, Palestine.
*mohamadabouauda2021@gmail.com
2 Department of Biology, Islamic University, Gaza, Palestine.

Furthermore, the study findings are of paramount significance for further related research.

Materials and Methods

Study Area

Gaza strip

The Gaza Strip territory is estimates to be 365 kilometres square in the overall historical territory of Palestine, as Gaza Strip is a small, around 41 kilometers long, and 6 to 12 kilometres wide section of the Mediterranean coastline (Gaza Environmental Assessment 2009). Figure (1)

There is a semi-arid Mediterranean climate in the study region with scorching summers and chilly winters. The average daily temperature in summer varies from 25°C to 13°C, in winter, an-d the average maximum daily temperature in the summer and winter is between 29°C and 17°C and the lowest temperature is between 21°C and 9°C, respectively. In the summer, daily relative humidity ranges from 65 percent during the day to 85 percent at night, while in the winter, it ranges from 60 percent to 80 percent (United Nations Environment Program - United Nations Environment Program, 2003).

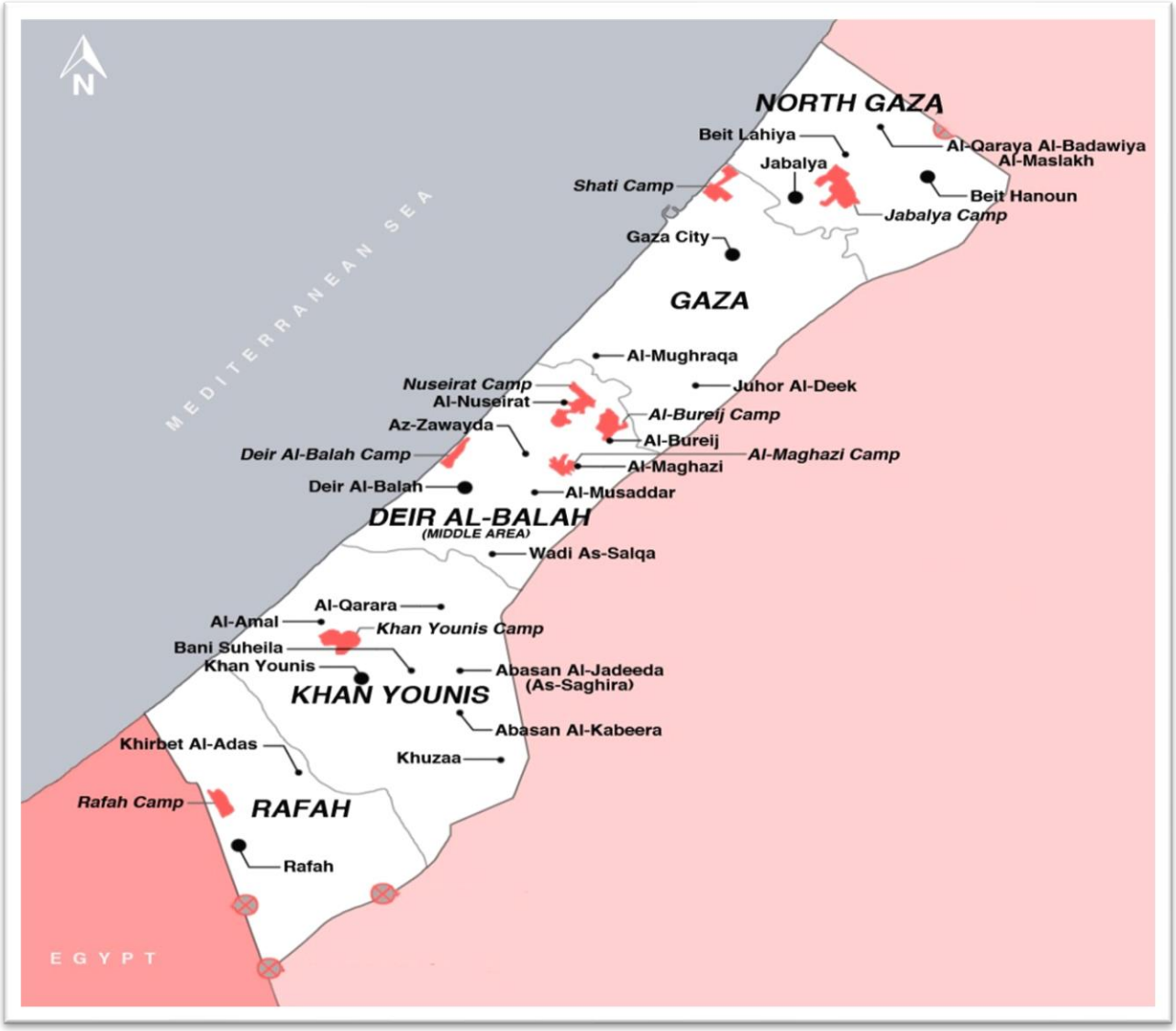

Figure (1): Gaza strip map.

Study population

The interview was performed with 20 informants from various regions of the Gaza Strip, comprising two girls and eighteen males ranging in age from 30 to 65 years. Informants with varying levels of schooling were interviewed (Illiterate, primary, secondary, diploma, university).

Medicinal Plants Markets

These medical herbs, combinations, or oils derived from these plants are offered in popular markets, which are specialty stores. These herbs are also used in alternative medicine treatment facilities.

During this study, field investigations and surveys were conducted in the great majority of these markets and institutions to identify the most frequent plant species utilized by folk therapists in the treatment of several illnesses. They were dispersed across Gaza (7 in Gaza City, 2 in Jabalya, 3 in Khan Younis, 3 in Nuseirat, 2 in Deir al-Balah, 1 in Rafah, 2 in Maghazi).

Methods

Survey and Identification

Ethnobotanical data was gathered through interviews with people who utilize medicinal plants in folk treatments in popular markets in Gaza City.

Questions posed to the therapist thus mostly focused on the aim of plant application, components utilized, methods of preparation and administration, forms of use, purchasing method, method of storage and collection, types of ailments treated, and how to create certain common prescriptions.

Results

Taxonomic diversity of most cited plants and remedies under investigation

The study identified 72 medicinal plant species from 33 families that were the most often utilized in Traditional Arabic Palestinian Herbal Medicine in the Gaza Strip. As indicated in the graph, the most represented families were Lamiaceae (8 species), Apiaceae (8 species), and Asteraceae (7 species) (figure 2)

According to the results of the survey, the technique of preparation of these plants differs depending on the kind of sickness and the component employed. The classification of the most commonly utilized plants in popular therapies in the Gaza Strip is shown in Table (1). Also, if the plant is cited by more than two therapists, it is considered as a medicinal plant. According to the ailment and preparation technique, the remedies were taken orally or used topically. The 37 plants represented the greatest number of remedies used to treat gastrointestinal problems. The second most frequent remedy was for the treatment of the circulatory system, which was represented by 22 plants. Twenty plants were represented as urinary system treatments.

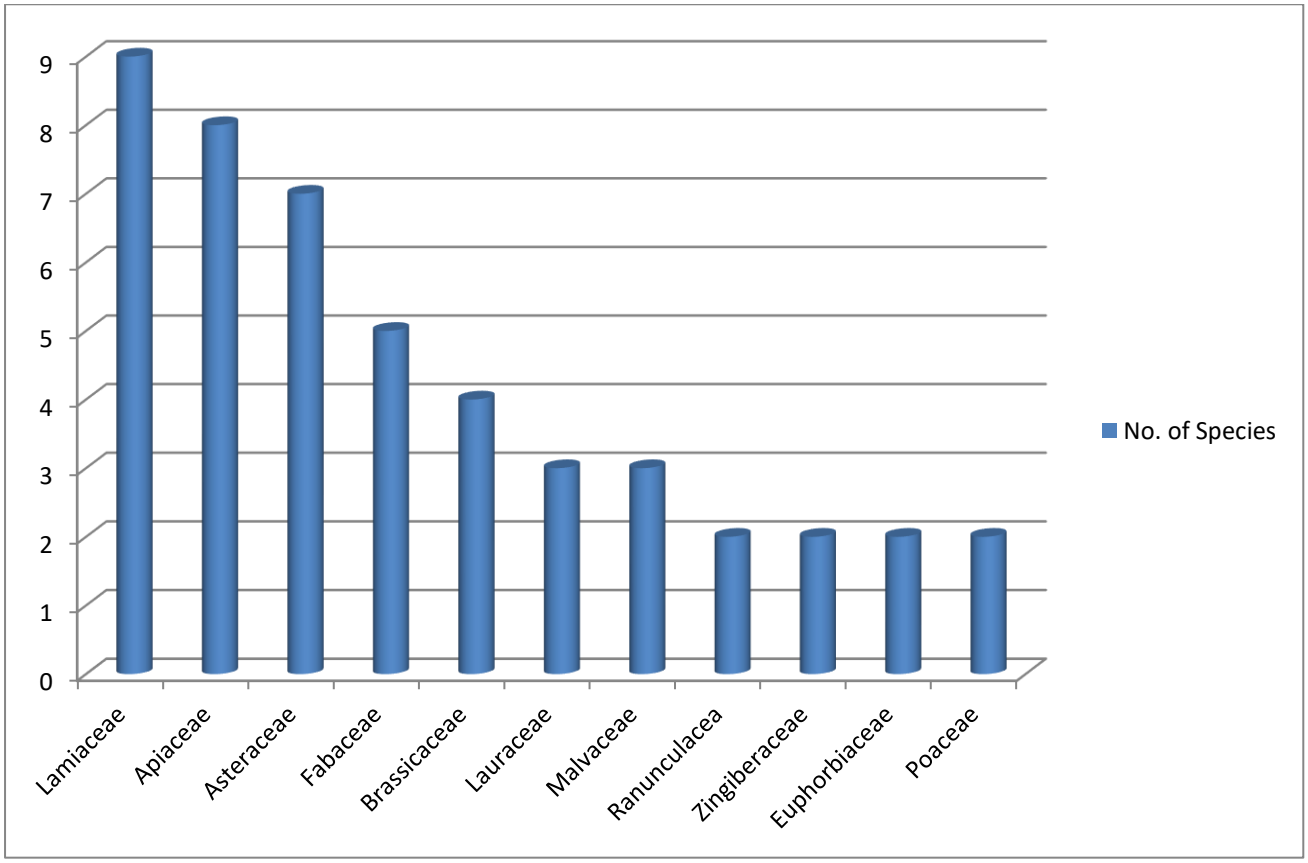

Figure (2): Distribution of plant families by number of species.

Table (1): Classification of the most used plants in popular treatments in the Gaza Strip.

No	Scientific name	Family	Common name	Part used	Medicinal use	Mode of preparation and use
1	*Origanum majorana L.*	Lamiaceae	Marjoram	Above-ground part	Urinary tract infections and hormonal regulator	Boiled leaves
2	*Foeniculum vulgare Mill.*	Apiaceae	Fennel	Leaves and Seed	Diuretic - digestion disorder - asthma	Boiled seeds

No	Scientific name	Family	Common name	Part used	Medicinal use	Mode of preparation and use
3	*Pimpinella anisum L.*	Apiaceae	Anise	Seed	Calming the nerves - colic - cough and asthma	Boiled seeds And oil as an external treatment
4	*Matricaria aurea (Loefl) Sch.Bip*	Asteraceae	Golden cotula	Leaves and flowers	Cough - headache - skin - colic - wounds	Boiled leaves and flowers
5	*Punica granatum L.*	Lythraceae	Pomegranate	All part of fruit	Anemia - stomach ulcer - heart	Raw fruit Boiled peel
6	*Cinnamomum verum J.Presl.*	Lauraceae	cinnamon	bark	Nausea - Diabetes	Boiled bark
7	*Hypericum perforatum L.*	Hypericaceae	Saint John's wort	Above-ground part	Depression - the effects of addiction	Drenched flowers Oils as an external cream
8	*Tilia cordata Mill.*	Malvaceae	Little-leaf Linden or greenspire	Above-ground part	Respiratory Allergy - Cough - Calming the stomach	Boiled flowers or leaves
9	*Nardostachys grandiflora DC.*	valerianaceae	spikenard	Root	Indigestion - Epilepsy	Oil Extract Boiled roots
10	*serenoa repens (w. bartram) small*	Arecaceae	saw palmetto	Fruits	Prostate - urinary tract infection	Boiled dried fruits
11	*Trigonella foenum-graecum L.*	Fabaceae	Fenugreek	Seed	Increase breast milk - diabetes	Boiled seeds
12	*Urtica urens L.*	Urticaceae	Nettle	Whole plant	Hemorrhoids - diabetes - inflammation of the nerves	Boiled leaves or roots or eaten raw
13	*Lupinus albus L.*	Fabaceae	White Lupine	Seed	Diabetes - diuretic - constipation - high cholesterol	Soaked crushed seeds
14	*camellia sinensis (L.) Kuntze*	Theaceae	Green tea	Leaves	Hypertension - Indigestion - Immunodeficiency	Soaked leaves
15	*Equisetum arvense L.*	Equisetaceae	Horsetail field	Leaves	Kidney stones - Arthritis - Pulmonary tuberculosis	Soaked leaves
16	*Ocimum basilicum L.*	Lamiaceae	basil	Above-ground Part	Diarrhea - headache - sunburn - urinary tract infection	Extract Oil Boiled leaves
17	*Rheum Palmatum L.*	Polygonaceae	Rhubarb	Root	Stomach disorder - constipation - tonic for the liver	Boiled roots
18	*Nigella sativa L.*	Ranunculacea	Black cumin	Seed	Rheumatism - Hypertension - diabetes - colon	Extract oil and raw seeds
19	*Artemisia monosperma Delile*	Asteraceae	White Wormwood	Leaves	Gastrointestinal disorders - Elimination of intestinal worms	Soaked leaves and branches
20	*Zingiber officinale Roscoe*	Zingiberaceae	Ginger	Rhizome	Hypertension - stomach pain - vertigo - memory activation - high lipids	Boiled Rhizomes
21	*Ricinus communis L.*	Euphorbiaceae	Castor beans	Fruits and Seed	Gastrointestinal tract - hair loss - skin	Extract Oil

No	Scientific name	Family	Common name	Part used	Medicinal use	Mode of preparation and use
22	*Coriandrum sativum L.*	Apiaceae	Coriander	Leaves and Fruits	Dysentery - vomiting - indigestion - colon disorder	Dried fruits or fresh leaves
23	*Ferula hermonis Boiss*	Apiaceae	Zallouh	Roots	Diabetes - sexual impotence	Boiled roots
24	*Hibiscus sabdariffa L.*	Malvaceae	Rosella	flowers	Hypertension - Circulatory system	Boiled or Soaked Flowers
25	*Rosmarinus officinalis L.*	Lamiaceae	Rosemary	Above-ground Part	Gastrointestinal pain - tonic for memory – colds	Boiled leaves
26	*Boswellia sacra Flueck*	Burseraceae	Olibanum or Frankincense	Gum	Colon - intestinal disinfectant - activates memory - diabetes	Soaked gum
27	*Cymbopogon schoenanthus Spreng*	Poaceae	Geranium grass	Whole plant	Overweight - Asthma - High cholesterol	Boiled leaves and extract oil from seeds
28	*Dracaena cinnabari Balf.f.*	Asparagaceae	dragon blood tree	Barks and Fruits	Gastrointestinal tract - urinary system -gingivitis- hair	Extract gum
29	*Ginkgo biloba L.*	Ginkgoaceae	ginkgo	Leaves	Asthma - activates memory – Hypertension- Diabetes	Boiled leaves
30	*Thymus sepyllum L.*	Lamiaceae	Wild thyme	Above-ground Part	Respiratory System - Digestive System - Circulatory System	Boiled leaves and extract oil
31	*Paronychia argentea Lam.*	Caryophyllaceae	Silvery Whitlow wart or silver nailroot	Above-ground Part	Urinary tract infection - anemia - rheumatism	Boiled leaves
32	*Vitellaria paradoxa C.F.Gaertn.*	Sapotaceae	shea butter tree	Seed	Skin - Diabetes - Overweight	Soaked seeds or added to milk or bread
33	*Salvia officinalis L.*	Lamiaceae	Sage	Above-ground Part	Digestive system - Hypertension	Boil the leaves and twigs
34	*Curcuma longa L.*	Zingiberaceae	Turmeric	Rhizome	Antibacterial - gallstones	Dry Rhizomes powder
35	*Senna occidentalis (L.) Link.*	Fabaceae	coffee senna	Leaves	Intestinal disinfectant - Constipation	Boiled powder leaves
36	*Malva parviflora L.*	Malvaceae	mallow	Leaves	Laxative for the stomach - Calming cough - Diabetes	Cooked or boiled leaves
37	*Anethum graveolens L.*	Apiaceae	Dill	Seeds and leaves	Gastrointestinal tract - urinary system	Boiled seeds or eat raw leaves
38	*Cynanchum argel Delile*	Apocynaceae	Ghalisum	leaves	Diuretic - laxative - joint pain	Soaked leaves
39	*Crataegus aronia L.*	*Rosaceae*	Hawthorn	Above-ground Part	Heart tonic - blood vessels	Boiled , dipped or emulsified
40	*Saussurea costus (Falc.) Lipsch*	Asteraceae	Costus	stalk	Gonorrhea - Thyroid - analgesic	Boiled powder twigs

No	Scientific name	Family	Common name	Part used	Medicinal use	Mode of preparation and use
41	*Laurus nobilis L.*	Lauraceae	Laurel	leaves	Disinfectant of toxins - reduces cholesterol - skin - indigestion	Boiled dried leaves
42	*Alchemilla Vulgaris L.*	Rosaceae	lady's mantle	Above-ground Part	Vaginitis - diarrhea - stomach analgesia	Emulsion or immersed
43	*Silybum marianum (L.) Gaertn.*	Asteraceae	milk thistle	Seed and leaves	Prostate enlargement - diabetes - hepatitis	raw leaves or boiled seeds
44	*Capsella bursa-pastoris (L.) Medik.*	Brassicaceae	shepherd's purse	leaves	Urinary system - menstrual pain - sores	Boiled leaves
45	*Cinnamomum camphora (L.) J.Presl.*	Lauraceae	camphor tree	leaves	Headache - cough	Boiled leaves or extract oil
46	*Eucalyptus camaldulensis Dehn.*	Myrtaceae	Red River Gum	leaves	Respiratory System - Digestive System - Allergies	Boiled leaves
47	*Alhagi graecorum Medik.*	Fabaceae	Alhagi Manna	Roots	Kidney failure - rheumatism - hemorrhoids	Dry Roots boiled for 10 minutes
48	*Chrysanthemum coronarium L.*	Asteraceae	Chamomile.	Flowers	De-worming - antifungal - anti-inflammatory - gout	Emulsion of flowers
49	*Fumaria officinalis L.*	Papaveraceae	fumitory	Flowers	Arteriosclerosis - skin - psoriasis - urinary system	Boiled flowers
50	*Portulaca oleracea L.*	Portulacaceae	Verdolaga or Purslane	Above-ground Part and seeds	Urinary system - digestive system - antibacterial	Eat fresh or boiled seeds and leaves
51	*Anemone coronaria L.*	Ranunculaceae	Windflower or crown anemone	Flowers and leaves	Cough - nervous tension	Boiled flowers or boiled herb as a whole
52	*Vitex agnus-castus L.*	Lamiaceae	Chaste tree	Whole plant	Menstrual pain - Postpartum bleeding - Prostate enlargement	Grind the herb and mix with honey or Soaked herb
53	*Cichorium endivia L.*	Asteraceae	Endive or escarole	leaves	diabetes **-**bacterial infection and rheumatism	raw or boiled leaves
54	*Syzygium aromaticum (L.) Merrill & Perry*	Myrtaceae	Clove	Flower buds and seeds	Analgesic - Fever - Allergies	Boiled seeds or extract oil from buds
55	*Angelica sinensis (Oliv.) Diels*	Apiaceae	Dong Quai	Roots	Anemia - Digestive System - Headache	Soaked dry roots
56	*Apium graveolens L.*	Apiaceae	celery	Above-ground Part and seeds	Obesity - diabetes - arthritis - digestive system	Raw leaves or boiled seeds
57	*Mentha spicata L.*	Lamiaceae	Spearmint	Above-ground Part	Digestive System - Headaches - Colds	Raw or boiled leaves and extract oil
58	*Anacyclus pyrethrum (L.) Link*	Asteraceae	Akarkara or Pellitory	Roots	Rheumatism - Colds - urinary system	Soaked roots or as bandages
59	*Cyperus esculentus L.*	Cyperaceae	Yellow nutsedge or chufa flatsedge	Fruits	Gout - urinary system - infertility - liver - skin	Soaked Crushed fruits

No	Scientific name	Family	Common name	Part used	Medicinal use	Mode of preparation and use
60	*Glycyrrhiza glabra L.*	Fabaceae	Liquorice	Roots	Gastric ulcers - weakened immunity	Soaked or boiled roots
61	*Nerium oleander L.*	Apocynaceae	oleander	Latex	Scabies - psoriasis	Oil extract as external ointment
62	*Lepidium sativum L.*	Brassicaceae	Gardn Cress	Leaves and Seeds	Rheumatism - sciatica - anemia	Boiled leaves or seeds, raw seeds or extract oil
63	*Plantago lagopus L.*	Plantaginaceae	fleaworts	Whole plant	Diabetes - Irritable Bowel - Hemorrhoids - Laxative of the intestine	Soaked of whole plant
64	*Mercurialis annua L.*	Euphorbiaceae	annual mercury	Leaves	Diabetes - Cancer - skin diseases	Soaked leaves
65	*Eruca sativa Miller*	Brassicaceae	Garden rocket	Above-ground Part	Hair loss - Anemia - Hypertension - Cholesterol - Diabetes	Raw leaves or extract oil
66	*Cuminum cyminum L.*	Apiaceae	Cumin	Dry fruits	Gastrointestinal tract - respiratory system - anemia	Boiled dry fruits
67	*Ruta chalepensis L.*	Rutaceae	Rue	Leaves	Digestive System - Menstrual disorders circulatory system	Soaked leaves
68	*Mellisa officinalis L.*	Lamiaceae	Lemon Balm	Leaves	Respiratory system - Irritable colon - a sedative of the nerves	Soaked leaves
69	*Hordeum vulgare L.*	Poaceae	Barley	Seeds	Urinary system - increases immunity - circulatory system - diabetes	Boiled or soaked seeds
70	*Panax Ginseng Baill.*	Araliaceae	Ginseng	Roots	Impotence - Immune Deficiency - Memory Activation	Soaked roots
71	*Teucrium polium L.*	Lamiaceae	felty germander	leaves	Stomachache, colic, Diabetes	Soaked leaves
72	*Brassica alba L.*	Brassicaceae	mustard	Seeds	Diabetes – Cancer- Rheumatism- Gout- Circulatory System	Soaked seeds or Oil extract

Folk medical knowledge sources

In terms of sources, as indicated in figure (3), there is no academically qualified processor for this profession; nevertheless, parents and grandparents appear to be the primary source of traditional knowledge, since 75 percent of the survey population reported gathering their information from these sources. Other sources of knowledge were old medical texts and others.

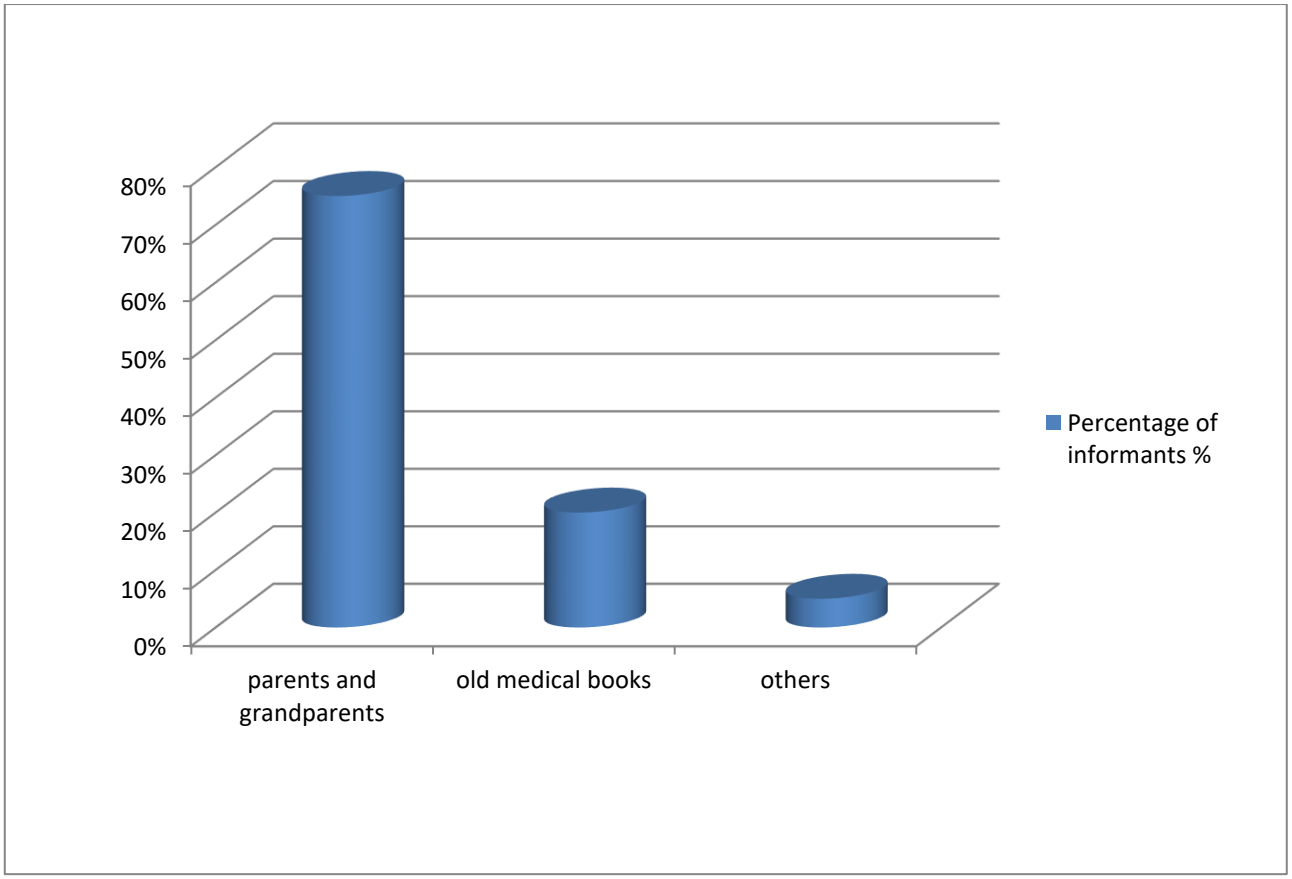

Figure (3): Sources of folk medical knowledge.

Used parts

The most often used plant components were leaves, stems, and seeds, which were represented by 40%, 18%, and 14%, respectively. Other plant components have also been recorded to be employed in folk medicines, as seen in Figure (4).

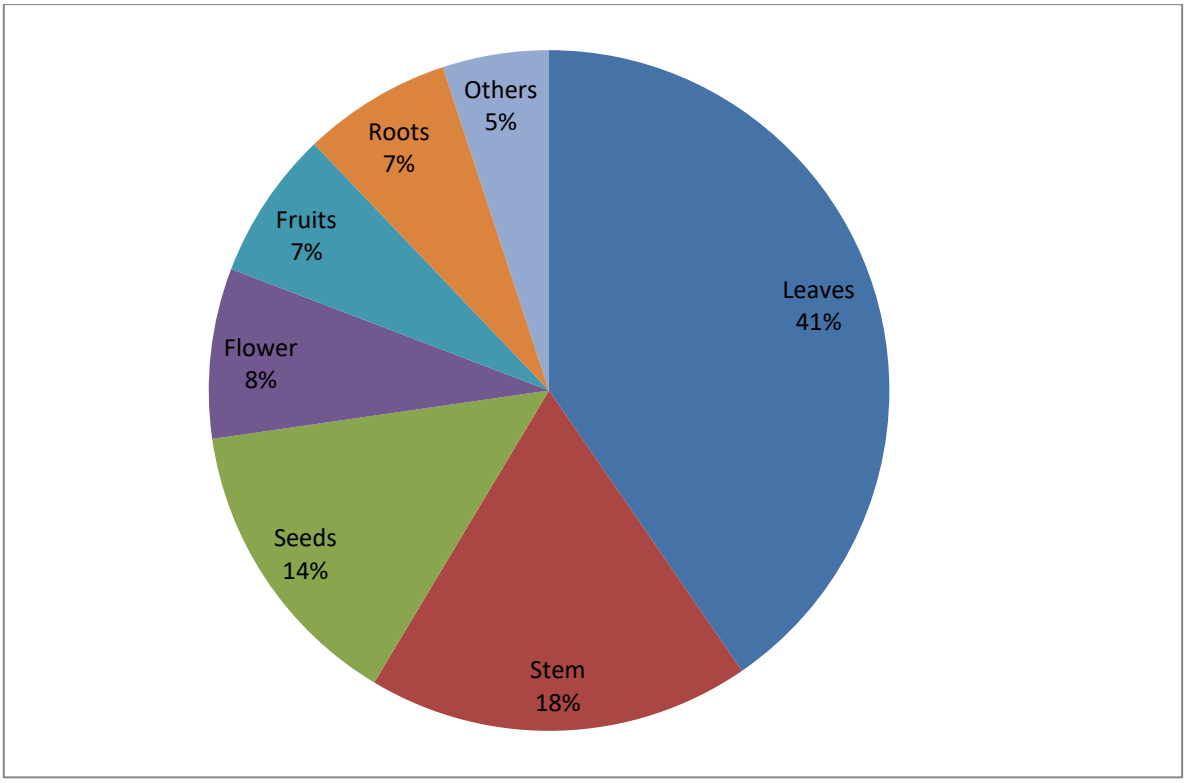

Figure (4): Percentage of used plant parts.

Procurement methods of medicinal plants

According to the current study's findings, 35% of informants imported medical plants from overseas, 30% purchased plants from local markets, 20% gathered plants from nature, and 15% got the plants through the three preceding ways. Special bags or securely sealed plastic containers are frequently used to keep these plants. However, due to the rarity of some of these plants or their high costs, other plant species are difficult to get. Figure (5)

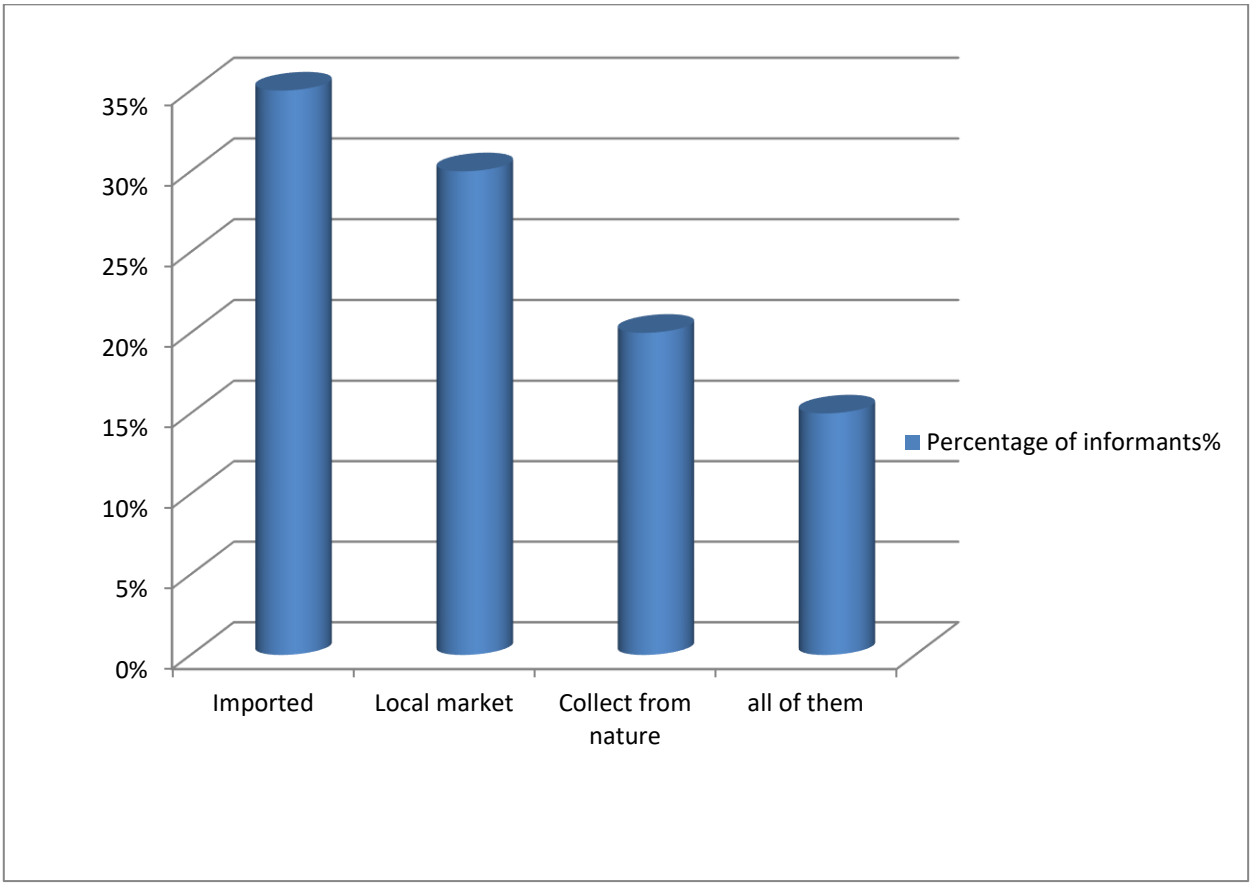

Figure (5): Procurement methods of medicinal plants.

Discussion and Conclusions

The historic cultural usage of plant recipes, as well as their preventive and therapeutic importance, are most likely related to their low cost, few side effects, ease of access, and popular engagement with them.

People continue to use traditional remedies by consuming special medicinal plant species sold at local markets, and due to the scarcity of studies in Palestine in this field (Ali- Shtayeh and Jamous, 2006), the current study aimed to evaluate the traditional use of medicinal plants by therapists in the Gaza Strip, as part of a series of ethno-botanic studies to estimate the status of traditional remedies.

Medicinal Plants Markets

The majority of plant materials used in folk medicine are offered at herbal stores and are primarily imported from other countries. The majority of the plant components were dried and marketed either singly or in combination with other plants for a specific treatment (Idu et al., 2010) In order to gather information on medicinal plant marketplaces, a series of semi-structured interviews were performed with 20 informants from therapists and sellers of medicinal plants in the Gaza Strip. Seventy-two species of ethnomedicinal plants from 33 families were identified as the most commonly utilized by therapists in the Gaza Strip. The most important family was Lamiaceae, which had 9 species, followed by Apiaceae, which had 8 species, Asteraceae, which had 7 species, and Fabaceae, which had 5 species.

Plants and parts used

In the current study, leaves were reported to be the most commonly used plant parts for treatment, which may indicate that leaves are the primary site of active ingredients, and this agrees with the findings of Amiri and Joharchi and Arellanes et al, who discovered that aerial parts are the most commonly used parts in medicinal therapies (Amiri and Joharchi, 2013; Arellanes et al., 2013), but these disagree with previous study of Maneenoon et al which observed that the underground parts were most used by therapies, while the whole plant and leaves were second and third respectively (Maneenoon et al., 2015).

Depending on the kind of sickness, each plant has a distinct technique of usage based on the portion of the plant utilized and the manner of production of the prescription. The majority of therapeutic prescriptions were simply made by boiling or soaking the plant and delivered as tea.

Plant recipes may contain one or many plants, and a single plant can be used to cure a variety of illnesses. This is why it is difficult to identify certain plants as carriers of specific illnesses (Ali-Shtayeh et al., 2000)

These findings support previous research by Amiri and Joharchi and Maneenoon et al., which found that plants sold in traditional marketplaces were primarily utilized to treat

gastrointestinal problems (Amiri and Joharchi, 2013; Maneenoon et al., 2015). However, our findings show that the number of plant species treating the gastrointestinal system was (37) species, followed by the circulatory system (22), urinary system (20), diabetes (18), respiratory system (14), nervous system (13), skin, burns, and hair (12), weight loss (10), skeletal and muscular system (7), immune system (7), reproductive system (7), cancer (3), and (11) for other diathesis.

Conclusion

Folk medicine and the use of medicinal herbs in therapy are still passed down from grandfathers and parents to younger generations and do not rely on academic research.

According to this study, a high number of ethnomedicinal plant (72) species are still the most beneficial in folk therapy in the Gaza Strip. The majority of these plants are imported from other nations, although few are considered indigenous.

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