

Ethnopharmacological survey of herbs used for the treatment of voice disorders from the West Bank area of Palestine

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Abstract

Medicinal plants have been integral to traditional healing practices, and in recent times, reliance on herbal remedies has grown globally, involving the use of natural products and active compounds. This study focuses on gathering insights from herbal medicine practitioners regarding plants employed in treating voice disorders in the West Bank region of Palestine. Employing a semi-structured questionnaire, data was collected between March and June 2023 from 100 herbal medicine practitioners, unveiling information on 20 herbs for voice disorder treatment, including Latin, English, and Arabic names, parts used, administration methods, and preparation techniques. *Anthemis cotula*, *Pimpinella anisum*, *Zingiber officinale*, and *Mentha spicata* emerged as the most cited herbs, with fidelity levels of 96%, 88%, 88%, and 76%, respectively. Predominantly, leaves and fruits were the utilized plant parts, and Lamiaceae and Apiaceae stood out as the most frequently employed herb families. This pioneering investigation represents the first comprehensive dataset on herbs for treating voice disorders globally. Future endeavors should delve into *in vitro* and *in vivo* studies to corroborate the effects of the prominently cited plants on voice disorders.

Introduction

The human voice serves as our innate instrument, enabling us to articulate speech for self-expression. It stands as the foremost and primary mode of communication. The voice emerges from the intricate integration and coordination of numerous structural and physiological systems (1). It reflects the internal and external status of the individual, such as long-term and short-term physical status, emotional status, and psychological status (2). In addition, the voice is an important tool for social communication and is also strongly related to one's professional/vocational and/or educational status, it is influenced by cultural context and social expectations (3). A good voice can be defined as one with a habitual pitch level that is suitable for the age, sex, and size of the individual sufficient loudness appropriate inflection involving pitch and loudness a pleasing quality, and the proper balance of oral and nasal resonance (4).

Several studies indicated that voice disorders have an influence on participants' life such as a limitation on social activities due to some psychological problems. Also, some physical discomfort due to voice disorders was reported (1). The persons who depend on their voices for their occupation "professional voice user" are the most vulnerable to voice disorders (1, 2, 4). Human voice users are at risk of developing occupational voice disorders, the pathogenesis of their voice disorders is mainly related to their occupation and will most likely require prevention and treatment (5).

Voice disorder is a difficulty with generating voice that is mainly caused by a disruption or loss of normal laryngeal function and is defined by abnormal vocal features and elements such as pitch, and loudness as a result of disrupted laryngeal, respiratory, and/or vocal tract functioning (5). Voice disorders happen when vocal health (VH) is affected (6). Voice disorders are known to be a serious occupational threat (3), and numerous risk factors contribute to voice disorder, such as personal factors including gender, family history of vocal problems, allergies, vocal load, work-related stress, and others, can also contribute to voice disorders (4).

Dejonckere has reported some risk factors that could increase the probability of having voice disorders. They began with voice use patterns like talking loudly, throat cleaning, and laughing. In addition, some specific acute respiratory conditions such as upper respiratory system viral and bacterial inflammations could also increase the risk factor of having voice disorders. Family history also may play a role in having a voice disorder. At the same time, the risk factor of having a voice disorder increases with the increase in chemical exposures. On the other hand, they reported that some abusive behaviors like tobacco smoking, and alcohol do have a serious effect on the voice (3, 5).

A voice disorder is referred to as "functional" when the abuse or misuse of the physically and physiologically intact vocal apparatus is the major cause of a voice problem. The cause may be unclear or obvious, but repeated vocal cord misuse can result in nodules, polyps, ulcers, or granulomas later (7). Voice disorders are referred to as organic if physiological voice disorders are affected by changes in one or more of these mechanisms: the respiratory, laryngeal, or vocal tracts. Organic disorders include structural and neurogenic voice disorders. Structural voice disorders are caused by physical abnormalities in the voice system and are known as organic voice disorders such as edema, vocal nodules, and changes in the larynx as a result of aging. While neurogenic voice disorders are caused by problems in the central or peripheral nervous system which innervate the larynx such as vocal tremors, spasmodic dysphonia, or partial or complete paralysis of vocal cords (2, 6–9).

For better production and maintenance of functional human voice, particular home care strategies may help to relieve some symptoms that must be coupled together for a better result. Beginning first with a vocal hygiene program represented by the speech-language pathologist (SLP) that helps in increasing the awareness of avoiding the misuse and overuse of the voice, as well as vocal instruction provided by the SLP to maintain good production of voice (10). In addition, a precise assessment of the impact of organic disease and accompanying medical treatment on voice function is crucial for effective treatment planning. Another home care strategy is natural therapies. Although these natural therapies haven't been studied scientifically for their effects on voice in general and on voice disorder symptoms in specific, professionals of alternative medicine often recommend them to decrease these symptoms (11).

The developing and increasing diversity of pharmaceuticals that were built for this purpose has led to a rise in the pharmacological possibilities for the treatment of voice disorders. Where the symptoms of voice disorders arise as a part of physiological processes or disease, herbal remedies may improve voicing characteristics (12). Dysphonia is characterized by an abnormal voice and is sometimes referred to as hoarseness. There are several reasons for dysphonia and voice changes may develop abruptly or gradually over time. Gravely, breathy, weak, strained, raspy, rough, or hoarse, describe the dysphonia condition (13).

Plants have been utilized for the treatment of voice disorders since prehistoric days, and numerous medicinal plants are currently in use in all cultures for this purpose. The mechanisms of action of these plants include mucolytic, anti-inflammatory, antibacterial, and other general activities; however, mechanisms that could specifically refer to voice are frequently unknown, as are the corresponding molecular targets, making a rational approach in the use of these remedies difficult for phoniaticians to apply. Ethnopharmacological studies provide access to precious indigenous knowledge woven into the fabric of traditional medicine. This study technique serves as a crucial lens through which we investigate the cultural importance of herbal treatments as well as their potential for treating voice issues. Utilizing ethnopharmacological studies can give insight regarding the utilization of medicinal plants for diseases and disorders, in addition to capturing the empirical knowledge inherent in traditional therapeutic practices.

By filling an important gap in the existing body of knowledge, this research specifically investigates the scarcity of data concerning the utilization of botanicals for voice disorders. The necessity to increase our knowledge of traditional medicinal practices pertaining to voice care motivates the investigation. Therefore, the current study aims to collect data from herbal medicine practitioners in the West Bank area of Palestine on herbal remedies used to treat voice disorders.

Methodology

Area of Research

One of the most important parts of Palestine is the West Bank region. The West Bank climate is mostly Mediterranean, with somewhat cooler temperatures in the highlands and hills than along the coast. It encompasses the east of the Dead Sea coastline, and the desert, both of which have a hot and dry environment. The Dead Sea region is about 430 meters below sea level, making it the lowest land elevation on Earth. All of these characteristics, therefore, represented the immense variety of the West Bank's flora. This variety is represented in the distribution and diversity of agricultural patterns, which range from rain-fed agriculture in the highlands (Salfit, Bethlehem, Nablus, Hebron, Ramallah, Jerusalem) to irrigated agriculture in Jericho, Qalqilya, Toulkarem, Tubas, and Jenin regions (14, 15).

According to the World Bank, Palestine is classed as a low-middle-income country (16). The West Bank, a relatively tiny region of Palestine with a total size of 5,655 km², is still occupied by Israel, which negatively impacts its economy. Similarities exist in the socio-demographic, political, and economic conditions of the people (17). Accordingly, research seems that these criteria did not play a significant impact in herbalists' and traditional healers' selection of herbs to cure voice problems.

All areas of the West Bank/Palestine were explored, comprising Hebron, Bethlehem, Jericho, Ramallah, Qalqilya, Salfeit, Toulkarem, Tubas, Jenin, Jerusalem, and Nablus between March and June 2023.

Ethical Consideration

An-Najah National University Institutional Review Board (IRB) approved the research methodology (IRB code Ph.T Jan.2023.7) and consent forms. Participants were provided written informed consent to participate in the research following the Declarations of Helsinki (World Medical Association, 2008), the current Good Clinical Practice (GCP) Guidelines (EMA, 1997), and the International Conference on Harmonization (ICH) Guidelines (1996).

To preserve the interests of phyto-remedies healers, the researchers provided them with comprehensive information about the goal of the present study, did not provide any incentives, and allowed them to withdraw at any moment.

Data Collection and Participants

The knowledge and skills of herbalists are crucial in systematically collecting data on herbal medicines. These practitioners have expertise in botanical sciences, traditional healing traditions, and holistic health approaches. They possess expertise in identifying and comprehending therapeutic plants, including their botanical categorizations and chemical constituents. Herbalists use traditional knowledge, including the historical applications of plants across many cultures and generations. This amassed information not only acts as a basis for herbal practices but also offers insights into the intricacies of herbal medicines (18).

A questionnaire-based cross-sectional ethnopharmacological survey on herbs utilized to cure voice problems was conducted by researchers. Personal contact discussions were used to administer questionnaires through interview sessions with 100 healers (N = 100) who used phyto-remedies to cure various illnesses in the West Bank/ Palestine. The herbal practitioners consulted were well-known practitioners from various Palestinian societies. Table 1 present the respondent's social and demographic factors.

Table 1
Respondent's social and demographic factors

Variable	Number of traditional healers and herbalists (N = 100)
Gender	
Female	5
Male	95
Level of education	
Graduate (higher education)	10
Undergraduate	43
High secondary school	4
Secondary school	8
Elementary	10
Uneducated	25
Residency	
Tulkarm	10
Tubas	3
Salfit	3
Ramallah	18
Qalqilya	6
Nablus	19
Jerusalem	8
Jericho	4
Jenin	12
Hebron	12
Bethlehem	5
Age (mean $\pm$ SD) years	50 (13.46)
Experience (mean $\pm$ SD) years	32 (10.6)

Table 1 to be inserted here.

Table 1: Respondent's social and demographic factors

When there was a difference in the Arabic names among the different districts, the researcher and informants had to have a personal discussion to agree on the exact name.

This strategy has shown to be a highly successful and manageable data gathering data-gathering questionnaire was anonymous, and it was pretested by a pilot study with 10% of the sample for reliability, validity, and clarity (19).

Practitioners of herbal medicines provided data on phyto-remedies utilized to cure voice problems, describing the plants' names, their parts used, and methods and modes of preparation. About 45 visits were done involving one hundred herbal medicine healers, with interviews spanning from 10 to 30 minutes, with most interviewees receiving more than one visit. The interviews were held in the participants' native language (Arabic) and herbs names were initially given in Arabic before being translated into English and Latin utilizing reference books (20–24).

In order to gain the interview subjects' trust, interviews typically begin as casual conversations. The pharmacognosy and herbal products laboratory at An-Najah National University has special glassware and frames where the plant samples collected from these informants are kept. Under the direction of a specialist in pharmacognosy, a group of teaching assistants and technicians later identified the plants, and the voucher specimens were stored and deposited for all of the plants that had been collected at the Pharmacy Department, Faculty of Medicine and Health Sciences, An-Najah National University. All of the herbs' Latin names were checked with www.theplantlist.org on July 15, 2023. Utilizing images from reference books and live herbarium specimens, all twenty herbs species indicated by the informants were recognized and validated (21, 22, 25).

Data analysis

Within the field of traditional medicine, the choice of particular methods for analyzing data is based on the need to accurately capture the complex dynamics and cultural importance associated with the use of medicinal plants. In this framework, fidelity level (FL), use-value (UV), and choice value (CV) have become important indicators. Researchers and practitioners in traditional medicine use these measures to quantify and analyze the complex relationships between communities and their medicinal plants. This helps to achieve a thorough understanding of the cultural, ecological, and therapeutic aspects involved in traditional healing practices (26).

The ratio of informants who independently suggested using a species to treat voice loss to all informants is known as the FL, which quantifies the significance of a species for a given purpose (27). FL was calculated using the following Eq. (28):

$$FL = \frac{Np}{N} \times 100$$

Where:

Np is the informants' numbers that reported the use of a plant species to treat voice problems.

N is the number of all informants.

A quantitative approach that can be employed to demonstrate the relative importance of locally recognized plants species is the UV method. The following equation was used to compute it:

$$UV = \frac{\sum U}{N}$$

Where UV is the use value of a species; *U* is the number of citations per species; *N* is the number of informants (10, 29)

The CV system is considered an important assessment tool to measure relative plant species for the treatment of voice disorders (30). The CV is calculated as in the following equation:

$$CV_{species} = \frac{Pcs}{Sc}$$

Pcs: percent of informants that cited Species 1 for treatment of certain diseases; *Sc*: is the species of the herb total number mentioned for the treatment of disease by all informants. CV are ranked from 0-100 with 100 indicating complete preference and/or fewer alternatives.

Where higher FL values indicate a strong consensus among informants regarding the significance of a plant species for a given purpose. Higher UV values indicate greater overall importance or frequency of citation for a particular plant species. Higher CV values suggest a strong preference for a species in treating a specific disease. It reflects the community's choice among available alternatives.

Results

Table 1 presented the social and demographic factors of the participants, which indicated that most of them were males (95%). Regarding the education level, the highest percentage of the participants had an undergraduate education level (43%), followed by uneducated persons (25%). In addition, the highest percentage of participants were from Nablus and Ramallah governorates, representing 19 and 18%, respectively. Moreover, the age value of the participant was 50 ± 13.46 years and the experience value was 32 ± 10.6 years.

The collected data from participants in the current study are presented in Table 2, which shows that the leaves were the most abundant plant part, representing 35% of the total, followed by fruits (25%). At the same time, the Lamiaceae and Apiaceae families were the most commonly used herb families for the treatment of voice disorders in the current study and represented 25 and 15%, respectively. Actually, the decoction-preparing method was the most used, followed by infusion and oil, representing 65, 30, and 5%, respectively. Moreover, interviewees described that the route of administration for all preparation methods was intended for oral use.

Table 2
Herbs utilized for the treatment of voice disorders in Palestine

Latin names	English common names	Arabic names	Family	Parts used	Voucher specimen numbers	Mode of preparation and administration	Number of herbalists who suggested this herbal treatment	Preparation methods	FL	UV	CV
<i>Rhus coriaria</i> L.	Sicilian sumac		Anacardiaceae	Fruits	Pharm-PCT-2037	Steep about 20 gr of the fruits in 200 ml water for three h. This infusion is to be given three times daily.	56	Infusion	56	0.56	2.8
<i>Cuminum cyminum</i> L.	Cumin		Apiaceae	Fruits	Pharm-PCT-2776	Boil 500 gr from the ground fruits in 5000 ml water for 30 min. 100 ml of this decoction is to be given three times daily.	68	Decoction	68	0.68	3.4
<i>Pimpinella anisum</i> L.	Anise		Apiaceae	Fruits	Pharm-PCT-2768	Boil 200 gr from the fruits in 2000 ml water for 60 min. 50 ml of this decoction is to be given three times daily.	88	Decoction	88	0.88	4.4
<i>Anthemis cotula</i> L.	Chamomile		Compositae	Flowers	Pharm-PCT-178	Boil 50 gr from the flowers in 50 ml water for 30 min. 10 ml of this decoction is to be given five times daily.	96	Decoction	96	0.96	4.8
<i>Cinnamomum verum</i> J.Presl	Cinnamon		Lauraceae	Bark	Pharm-PCT-2707	Boil about 100 gr of ground bark in 200 ml water for about 10 min. 30 ml of this decoction is to be given 6 times daily.	68	Decoction	68	0.68	3.4
<i>Cocos nucifera</i> L.	Coconut		Arecaceae	Seeds	Pharm-PCT-2764	Boil about 50 gr of the fruits in 500 ml water for 20 min. This decoction is to be given five times a day.	52	Decoction	52	0.52	2.6
<i>Zingiber officinale</i> Roscoe	Ginger		Zingiberaceae	Roots	Pharm-PCT-2724	Boil 100 gr of ground rhizomes in 100 ml water for 10 min. 5 ml of the decoction is to be given four times daily.	88	Decoction	88	0.88	4.4

Latin names	English common names	Arabic names	Family	Parts used	Voucher specimen numbers	Mode of preparation and administration	Number of herbalists who suggested this herbal treatment	Preparation methods	FL	UV	CV
<i>Origanum jordanicum</i> Danin & Kunne	Sweet marjorum		Lamiaceae	Leaves	Pharm-PCT-1729	Steep 15 gr of the dried leaves in 100 ml water for 3 h. About 15 ml of this infusion is to be given 5 times a day.	60	Infusion	60	0.6	3
<i>Ocimum basilicum</i> L.	Sweet basil		Lamiaceae	Leaves	Pharm-PCT-2717	Steep 15 gr of the dried leaves in 100 ml water for 3 h. About 15 ml of this infusion is to be given 4 times a day.	64	Infusion	64	0.64	3.2
<i>Trigonella foenum-graecum</i> L.	Fenugreek		Leguminosae	Seeds	Pharm-PCT-2778	Boil about 50 gr of the powdered seeds in 50 ml water, 3 ml of this decoct is to be given three times daily.	68	Decoction	68	0.68	3.4
<i>Glycyrrhiza glabra</i> L.	Licorice		Leguminosae	Roots	Pharm-PCT-1128	Steep 100 gr of ground roots in 150 ml water for 24 h. 15 ml of the infusion is to be given four times daily.	72	Decoction	72	0.72	3.6
<i>Syzygium aromaticum</i> (L.) Merr. & L.M.Perry	Clove		Myrtaceae	Flowers	Pharm-PCT-2767	Boil about 30 gr of the grounded plant in 300 ml water, 10 ml of this decoct is to be given four times daily	56	Decoction	56	0.56	2.8
<i>Clinopodium serpyllifolium</i> (M.Bieb.) Kuntze	White micromeria		Lamiaceae	Leaves	Pharm-PCT-1575	Boil about 20 gr of dried leaves with 100 ml water. 30 ml of this decoction is to be given before meals 4–6 times a day.	84	Decoction	84	0.84	4.2
<i>Petroselinum crispum</i> (Mill.) Fuss	Parsley		Apiaceae	Leaves	Pharm-PCT-2739	Boil about 50 gr of the grounded fruits in 200 ml water, 50 ml of this decoct is to be given four times daily .	52	Infusion	52	0.52	2.6

Latin names	English common names	Arabic names	Family	Parts used	Voucher specimen numbers	Mode of preparation and administration	Number of herbalists who suggested this herbal treatment	Preparation methods	FL	UV	CV
<i>Sesamum indicum</i> L.	Sesame		Pedaliaceae	Seeds	Pharm-PCT-2722	Boil about 50 gr in 200 ml water. About 20 ml of this preparation is to be given 5–6 times daily	60	Oil	60	0.6	3
<i>Mentha spicata</i> L.	Spearmint		Lamiaceae	Leaves	Pharm-PCT-2774	Steep 60 gr of the dried leaves in 200 ml water for 12 h. 50 ml of the infusion is to be given three times daily.	76	Infusion	76	0.76	3.8
<i>Styrax officinalis</i> L.	Storax		Styracaceae	Leaves	Pharm-PCT-2365	Steep 40 gr in 500 ml water for one night. About 10 ml of the infusion is to be given 4–5 times daily.	32	Decoction	32	0.32	1.6
<i>Aegle marmelos</i> (L.) Corrêa	Bael		Rutaceae	Fruits	Pharm-PCT-2702	Boil about 50 gr of fruits in 200 ml water for 10 min. 30 ml from this decoction is to be given 6 times daily	44	Decoction	44	0.44	2.2
<i>Rosmarinus officinalis</i> L.	Rosemary		Lamiaceae	Leaves	Pharm-PCT-2732	500 gr from fresh leaves boiled in 500 ml water. 150 ml of this decoction is to be given three times daily	68	Infusion	68	0.68	3.4
<i>Carum carvi</i> L.	Caraway		Apiaceae	Fruits	Pharm-PCT-2786	Boil about 250 gr of the fruits in 500 ml water for 30 min. 50 ml from this decoction is to be given 6 times daily	60	Decoction	60	0.6	3

Data collected obtained from the current investigation from the West Bank region of Palestine utilized for the treatment of voice problems revealed 20 herbs belonging to 13 families. The results highlight a remarkable consensus among informants regarding the significance of *Anthemis cotula* (FL: 96), underlining its cultural importance in treating voice problems. *Pimpinella anisum* stands out with the highest overall importance (UV: 0.88), emphasizing its frequent citation for various uses within the community. Additionally, both *Anthemis cotula* and *Zingiber officinale* exhibit strong community preference (CV: 4.8 and 4.4, respectively) in treating voice disorders, illustrating their prominence as preferred choices for this specific purpose. *Clinopodium serpyllifolium* also demonstrated substantial importance across FL, UV, and CV measures, reinforcing its role in traditional healing practices for voice-related ailments (FL: 84, UV: 0.84, CV: 4.2).

Table 2 to be inserted here.

Table 2: Herbs utilized for the treatment of voice disorders in Palestine

Discussion

Our study successfully addresses the scarcity of data on botanicals for voice disorders in the West Bank region of Palestine. The results, revealing 20 herbs across 13 families, highlight *Anthemis cotula*'s cultural significance, and *Pimpinella anisum*'s widespread use. *Anthemis cotula* and *Zingiber officinale* demonstrate strong community preference, emphasizing their prominence for treating voice disorders.

Our results resemble the results of other studies where *Anthemis cotula* is one of the world's oldest, most commonly used, and well-documented medicinal herbs, and it has been suggested for a range of medical purposes (31). Its flowers contain many types of natural compounds that contribute to its therapeutic properties, such as essential oils, flavonoids, and terpenoids. Numerous human illnesses are often treated using chamomile medicines, such as upper respiratory system disorders, hemorrhoids, rheumatic pain, gastrointestinal disorders, wounds, ulcers, menstrual disorders, insomnia, inflammation, muscle spasms, and hay fever (31–33).

A study conducted by Somrat et al. investigated the efficacy of lubricating the endotracheal tube cuff with chamomile extract before intubation on postoperative hoarseness and sore throat in a double-blind, randomized trial (34).

P. anisum fruits are used as a natural medicine to treat respiratory problems. However, nothing is known regarding its impact on respiratory tissues during inflammation. A study conducted by Iannarelli et al. found that its essential oil had a substantial anti-inflammatory impact on bronchial and tracheal epithelial cells, as well as mucus hypersecretion (35).

In fact, *P. anisum* is a traditional tea component used to preserve the mucous layer in the hypopharynx tract as well as provide secretolytic, antibacterial, and antispasmodic properties (36).

Z. officinale is widely utilized in many cultures as a medicinal herb in traditional medicines (37). *Z. officinale* rhizomes contain gingerols, essential oils, and non-volatile pungent compounds. The volatile oil components in ginger consist mainly of sesquiterpene hydrocarbons, predominantly zingiberene, farnesene, and curcumin (38). *Z. officinale* volatile oil has bronchodilator effects in modern medicine, which confirm its folk uses for the treatment of upper respiratory system disorders (39).

The usage of *M. spicata* is well documented in numerous cultures and has been used for centuries to treat a variety of ailments such as diabetes, digestive and respiratory problems, throat ailments, and skin disease (40). *M. spicata* extract and essential oil are considered valuable sources of phytochemicals, including phenols, carvone, carvacrol, and trans-carveol (41).

To the best of the authors' knowledge, this investigation sets an unparalleled standard on a global scale as the first-ever endeavor to collect data exclusively on botanicals utilized in the treatment of vocal disorders and revealing previously unexplored facets of botanical remedies. A representative sample is ensured by the exhaustive ethnopharmacological survey, which encompasses various regions in West Bank. Moreover, the participation of one hundred renowned herbal practitioners and traditional physicians enriches and deepens the collected data. Additionally, by employing fidelity levels, choice values, and use values, the significance of identified botanicals can be quantitatively evaluated. On the other hand, it is imperative to acknowledge certain limitations. The research is predominately dependent on data provided by botanical practitioners themselves, potentially introducing a subjective bias. The exclusive emphasis on the West Bank region may restrict the generalizability of results to other areas such as Gaza or Eastern Jerusalem. Furthermore, the research did not investigate the particular molecular mechanisms or active chemicals found in the plants, leaving unanswered questions concerning the pharmacological foundation of their effectiveness.

Therefore, there is a necessity for future research endeavors in this field. Gaining insights into the potential adverse effects and synergies among herbal remedies can contribute to a more nuanced understanding. Furthermore, practical applications such as educational initiatives, integrating traditional herbal treatments into contemporary healthcare practices, and fostering collaboration between traditional healers and healthcare professionals to formulate evidence-based recommendations are essential. Ultimately, documenting herbal treatments and preserving indigenous knowledge to safeguard traditional practices will ensure tangible benefits for both practitioners and individuals seeking alternative remedies for voice disorders.

Conclusion

Folkloric herbal medicine is important for improving community healthcare awareness, drug development, and discovering new medications. In the current investigation, 20 herbs were documented to be utilized as phyto-remedies for the treatment of voice disorders in the West Bank of Palestine. *Anthemis cotula*, *Pimpinella anisum*, *Zingiber officinale*, and *Mentha spicata* were the most cited species for the treatment of voice disorders. Further studies are needed to confirm these herbs' effects in vivo, isolate their bioactive molecules, and understand their mechanisms of action.

Declarations

Ethics approval and consent to participate:

All methods were carried out in accordance with relevant guidelines and regulations (declarations of Helsinki). All the methods/study were approved by the research Institutional Review Board (IRB) at the Faculty of Medicine and Health Sciences- An-Najah National University with serial number (Ph.T Jan.2023.7).

Consent for publication

Not applicable

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Conflicts of interest

The authors declare that they have no conflict of interest.

Data availability

The data sets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Author contribution

H.A and M.A contributed to the conception, acquisition, analysis, and interpretation of data. H.A, M.A, and F.A drafted the work and substantively revised it. All authors have approved the submitted version. All authors have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

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