

# An Ethno Botanical Study of Medicinal Plants Used for Respiratory Tract Disorders in Northern Parts of Palestine

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## Research Article

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# Abstract

**Background:** There are many medicinal applications of natural plant remedies. Several illnesses are still being treated by Palestinian people using medicinal plants. This research was intended to study the use of natural plants to treat different types of Respiratory tract disorders.

**Method:** In the Northern part of Palestine, an ethno-pharmacological study of medicinal plants used to treat respiratory diseases has been carried out. A questionnaire was circulated to 120 informants. The details gathered included the names of the plants, the parts used, the diseases for which the products were used, as well as the method of preparation. To evaluate results: percentages (%), Fic (factor of informant consensus) and FL (fidelity-level) was calculated.

**Results:** A total of 120 participants were included in the final analysis. The highest percentage of herbal use was reported for flu (103 participants) followed by cough, while the lowest percentages of users were in bronchitis management. The study showed that 31 plant species of 19 families were used for respiratory disorders. 6 species are from *Lamiaceae* family, while 3 species from *Apiaceae* family, two species are from *Amaryllidaceae*, *Fabaceae*, *Myrtaceae*, *Rutaceae* and *Zingiberaceae*, while the rest of the families only one species was mentioned by the participants, The pieces used most commonly were leaves and fruits. Decoction was the technique of preparation and was taken as a hot drink.

Chamomile, mint, sage, lemon and ginger all were in treatment of all of the five respiratory diseases.

**Conclusions:** The information provided on medicinal plants, with maximum percents & FL values can serve as basic data for further research to identify the active biological ingredients in these plants., and to develop new drug preparations for the treatment of disorders of the respiratory system.

## Background

Natural plant extracts play an important role in the field of new drugs research and development. Recent studies have also approved the success of using plants in the treatment or prevention of a wide variety of hard diseases such, cardiovascular diseases (Khosravi-Boroujeni et al., 2012; Khosravi-Boroujeni et al., 2013), atherosclerosis (Madihi et al., 2013; Setorki et al., 2013), diabetes (Akbari et al., 2013; Nasri & RAFIEIAN, 2014) and cancer (Azadmehr et al., 2011; Shahrani & Rafieian-Kopaei, 2009).

Several types of herbal remedies are used world wide in chronic diseases treatment (Owusu et al., 2020). In Asian countries including Thailand, Vietnam and Cambodia, the prevalence of herbal medicine users was 76.7%, while Gender, racem educational level, family income, having comorbidities all are associated factors of being herbal medicine users among adults Americans (Huo & Qian, 2018).

Several studies explored the factors associated with using herbal medicine in several communities for different indications (Mekuria et al., 2017; Rashrash, Schommer, & Brown, 2017; Welz, Emberger-Klein, & Menrad, 2018). Rashrah et al (2017) reported that using herbal supplement was associated with older age (above 70), higher educational level and having comorbidities (Rashrash et al., 2017), while in a study conducted among German adults, using herbal medicine was associated with dissatisfaction with conventional treatment, past good experiences, positive aspects associated with herbal medicine, as well as family traditions (Welz et al., 2018). In Ethiopia, using herbal medicine was associated with rural residency area, illiteracy and average income. (Mekuria et al., 2017)

Approximately 70–95% populations of developing countries use herbal plants for basic health care (Singh et al., 2010), according to World Health Organization (WHO) their is about 65–80% of the world's population depends mainly on herbals to cure several illnesses, may be due to lack of access to modern medical facilities or because herbals have been considered as a safe source of health promotion. (Calixto, 2005)

Herbal remedies are common for the treatment of respiratory disorders in many parts of the world. It has been recognized for the past 20 years in some developing countries, plants are the main medicinal sources used for the treatment of infectious diseases (Aguilar Contreras & Camacho, 1994), such as Asia (Prasad, Shyma, & Raghavendra, 2013) and Africa (Teklehaymanot, 2009).

The most common respiratory system diseases are: asthma, allergy, bronchitis, common cold, cough and whooping cough (Reddy, Reddy, & Trimurthulu, 2006), therefore, most of these disorders are selected for evaluation in this study.

Drugs development on the basis of natural products had an extensive history in the US, almost most of the drugs with maximum sale were natural products or their derivatives. Upon time, the challenge on plant research is increasing day by day and stronger evidences are gathered that proved the extensive use of medicinal plants in Transcendental Meditation (TM), Approximately 13,000 plants are evaluated in the last 5 years (Karou et al., 2007). Herbal medicinal plants regained their popularity, for the treatment of asthma, with their efficacy and safety aspects being supported by controlled clinical studies (Huntley & Ernst, 2000), In a specific study; 84 plants known in Eastern Ghats of Andhra Pradesh in India, were studied that could offer some active ingredients for respiratory problems mentioned above. (Reddy et al., 2006)

Palestine, as a holy land characterizes by great ethnic variability, thus creates great biological multiversity. Such variability particularly in tradition, herbal foods and medicine, has enriched its culture. (Jaradat, Al-Ramahi, Zaid, Ayesh, & Eid, 2016)

More than 2600 plant species cover the hills and mountains of Palestine, of which more than 700 are known to be used as medicinal herbs or as botanical pesticides. (M. Ali-Shtayeh & Abu Ghdeib, 1999). A recent ethnopharmacological survey of 120 informants living in Palestine found that at least 63 reliable plant species are still in use for the treatment of skin, urinary system, gastric system, prostate disease, cancer and other diseases. (M. S. Ali-Shtayeh, Yaniv, & Mahajna, 2000)

The present study aimed at documenting the traditional uses of medicinal plants used to treat different respiratory disorders in Palestine and to evaluate the efficacy of plant species based on the review of literature.

## Methodology And Study Instruments

The study utilized a cross sectional design to determine the percentage of medical plants users for selected respiratory diseases among Palestinian adults in Northern part of Palestine. The study conducted from August to November 2018.

The random sample procedure was used to recruited 120 participants using Cochran's (1963) equation for prevalence studies. The prevalence of medicinal plants use among Palestinian conducted by Shawahna and colleagues (2017) (Shawahna & Jaradat, 2017), they found the percentage of medicinal plants user was 54.5 %. Sample size=  $n = (Z a/2)^2 p (1 - p) / D^2$ , D Assumed to be 10 %. Considering 10% drop out the required sample size was 115 participants, then the number was rounded to 120 participants. The inclusion criteria was Palestinian adults

residing in the Northern part of Palestine; (Jenin, Tulkarm, Nablus and Qalqilia) and agreed to join the study. Participants with missing data were excluded from the final analysis.

### **Structure interview and validation of the questionnaire**

The questionnaire was developed based on through literature review pertaining to herbal use in respiratory tract diseases from different communities, in addition the studies that reported medicinal plants used among Palestinians were also reviewed. The newly developed questionnaire consisted of three sections; section one; socio demographic data included age, area of living, marital status, educational level, work status and economic status. The section included two questions, the first asked about the source of information about the medicinal plants uses; wither the participants usually ask Doctors, Pharmacist, Attarine or refer to books or social media. The second item asked about the source of purchasing or having the medicinal plants; from pharmacies, Attarin, wild fields or other. The third section: consisted of 5 groups of questions for the five respiratory disorders. Each five items asked about 1 respiratory disease, the items included: use of medicinal plants in this disease specifically, the name of the medicinal plants used, the part of the plant, the method of taking it wither it hot drink, eating, topical or inhalation, in addition to the duration of taking the medicinal plants. The content validity was done for the questionnaire by sending it to three experts in the field . Few items were amended based on the experts' comments and suggestions. The reliability test was done using Chronbach alpha test for the third section ( medicinal plant use); the reliability was 0.67.

### **Statistical Analysis**

The Statistical package for the social Sciences SPSS, version 21 was used to analyze the collected data. The categorical data were described by numbers and percentages, it is a quantitative method that can be used in order to prove the relative importance of species known locally. The percentage is calculated as in the following equation:

$$\% \text{ plant} = \frac{\sum U}{N} \times 100\%$$

U is the number of citations per species; N is the number of informants.

Chi Square test was employed to examine the association between the categorical variables (users and non- users) and the nominal levels , with significance level 0.05.

The factor of informant's consensus (Fic) was employed to indicate the homogeneity of the information. In fact, its main use is to select the disease categories where there is consensus on the use of plants among the informants. The Fic value is close to 0 if plants are randomly choosed or if informants do not exchange information about their use. High values of Fic (close to 1) occur when there is a well-defined selection criterion in the community and/or if information is frequently exchanged between informants (Gazzaneo, De Lucena, & de Albuquerque, 2005) . The Fic is calculated as in the following equation:

$$\text{Fic} = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

Where Nur is the number of use citations in each category and Nt is the number of taxa used.

Fidelity level (FL) was defined as the ratio between the number of informants who independently suggested the use of a species for the same major purpose and the total number of informants who mentioned the plant for any use.

FL is of equal importance to Fic and it can be calculated according to the following equation: (Alexiades, 1996; Kidane, Van der Maesen, van Andel, Asfaw, & Sosef, 2014)

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

Where Np is the number of informants that reported a use of a plant species to treat a particular disease and N is the number of informants that used the plants as a medicine to treat any given disease.

## Results

A total of 120 participants completed the data sheet, participants characteristics are presented in Table 1, the majority of the participants are married (68.3%), live in villages (65.8%), have university degree (64.2%) and not working (58.2%), from different age groups and economic status.

The study revealed that the participants usually refer to Attarine (59.2%) for their source of information about the medicinal plants, followed by social media (32.5), while less than 5% refer to health care workers or books.

In regard to the source of the medicinal plants, 54.2% of participants reported that they purchase the herbs from Attarine, while 19.2% from pharmacies and 21.7% they collect them from the wild field, as shown in Table2.

The number and percentages of medicinal plants users and nonusers according to respiratory diseases (flu, allergy, cough, congestion and bronchitis) are presented in Figure 1. The results revealed that flu is the most common symptoms that was treated by herbs (103 participants), followed by cough (100 participants) and sore throat (94), while bronchitis was the less common disease that the herbs were used in its management, these results are supported with the Fic values; Flu with 0.882 and it is the highest followed by cough with 0.848 then sore throat with 0.838 (table 4).

Figure 2. presented the families and the species for the used medicinal plants by the participants, a total of 31 species distributed in 19 families were reported; 6 species are from *Lamiaceae* family, while 3 species from *Apiaceae* family, two species are from *Amaryllidaceae*, *Fabaceae*, *Myrtaceae*, *Rutaceae* and *Zingiberaceae*, while the rest of the families only one species was mentioned by the participants

Table 3 showed the percentages of users for medicinal plants according to the respiratory diseases. The results showed the 31 medicinal plants or herbs that have been used by the participants for five respiratory disorders. Chamomile, mint, sage, lemon and ginger all were in treatment of all of the five respiratory diseases. Among the least mentioned herbs; parsley and basil. In addition the highest percent of plant used was for lemon with (35%, FL= 62.7) and chamomile with (20.8%, FL= 32) for treating flu, thyme with (34.2%, FL= 62.12) and Guava with (16.7%, FL= 55.6) for cough, ginger with (23.3%, FL= 45.16) for sore throat and finally for bronchitis thyme was used with (15.8%, FL = 28.8), all results of FL values was shown in (table 5)

In regard to the part of the medicinal plants used; the leaves are the most common part used for most respiratory disorders, followed by fruits. Even there are variety of the medicinal plants parts used according to disease as shown in Figure. 3

Figure 4. showed that most common way of consuming the medicinal plants was hot drinks and the least was the topical administration. In respect to the duration of medicinal plants used, the short duration for only 1 day was the

most common period of taking the herbs (as around 50% of the participants reported that they take the herbs for 1 day in most of the diseases, then for three days; around 20% of the participants reported that they use the medicinal plants for three days in all of the respiratory diseases, while for use more than three days the range was from 10% to 15% of the participants reported that they use the medicinal plant for period longer than three days. Figure 5

### **Traditional treatment of respiratory disorders using plants extracts**

Finally, it was seen that the respiratory system ailments, for which the folk medicinal plants were mostly used, were as follows: (flu, allergy, cough, congestion and bronchitis). Informant consensus of medicinal plant usage resulted in informant consensus factor (Fic) values between 0.825 and 0.882 per respiratory disorders category. The category that had the highest Fic value was flu (0.882) followed by cough (0.848). The lowest was allergy and bronchitis (Table 4).

It could be concluded that the plants with high Fic values will be transferred more and therefore could be utilised much better in treatment of certain illnesses (Teklehaymanot & Giday, 2007) The average Fic value for all respiratory disorder categories was 0.844, indicating a fairly high level of informant consensus compared with similar studies.

### **Differences between users and non-users of medicinal plants**

Further analysis was done to determine the association between medicinal plants uses in the five respiratory diseases with all of the socio demographic variables using univariate analysis (Chi Square test). The results revealed that being older than 40 years old was significantly associated with higher use of medicinal plants in treatment of flu and cough as compared to being younger than 40 years old ,  $p < 0.05$  using Chi square test. While the association was not significant between the age groups with the other respiratory diseases; allergy, sore throat and bronchitis. In regard to the marital status being married was significantly associated with higher use of medicinal plants only in flu treatment as compared to being single,  $p < 0.05$  using Chi Square test.

While the association was not significant between being users or non-users of medicinal plants in any of the respiratory diseases neither with the source of information about the medicinal plants nor with the place of purchasing the medicinal plants.

## **Discussion**

This study successfully determined the prevalence of herbal medicine users in five respiratory diseases, types of medicinal plants used in addition to the part of the plants used and the method of using, among representative sample of Palestinian adults and older adults from different residency areas. Up to our knowledge this study is the first study in Palestine that explored the use of medicinal plants in Respiratory diseases.

This study showed higher use of medicinal plants among participants aged 40 years and above, which is consistent with the findings from (Rashrash et al., 2017) who also found using herbal medicine is common among middle and older age. In addition using medicinal plants was associated with being married, which may be also explained due to age factor, because single participants are younger in age as compare to married. In study conducted by (Kelly et al., 2005) who reported age and gender difference in using medicinal plants in a sample of 8470 adults and older adults. These differences may be due to that older people believe in traditional medicine more than the modern and westernized medicine mainly in the term of safety and efficacy with less side effect (Welz et al., 2018).

Table 3 shows the natural herbal remedies used to treat respiratory tract disorders presented in user numbers and percentages, families of which these herbs belongs and part used. According to our findings, as stated in Table 3, there was 31 different plant species distributed in 19 families, the plants most frequently used were members of the *Lamiaceae* family with 6 species followed by *Apiaceae* family with 3 species, *Lamiaceae* also was first according to a study carried out in Middle Region of Oum Rb) (Fatiha et al., 2017). Leaves were the part used in *Lamiaceae* herbal products, so it has the highest percentage as used part according to Fig. 2 with 69% for treating cough followed by allergy with 39%, this could be explained as leaves are the photosynthetic organs containing the effective bioactive ingredients. (Younis et al., 2018), followed by fruits with 43 percent for treating flu. It has also been reported in different studies that Fruit is being commonly used by Americans also. (Sosnowska & Balslev, 2009). seeds were the part of the plant used in the family *Apiaceae* ranked third, other plant parts used including; flowers, stems and roots. According to (Fig. 4): decoction was the method of preparation, it means heating the herbs all or a specific part of it in water to boiling for few minutes and taken orally as a hot drink. Sometimes a mixture of more than one plant species of a family or more may be used to insure a better efficacy. Previous studies reported that decoction and infusion predominates in case of treating respiratory disorders. (Merzouki, Ed-Derfoufi, & Mesa, 2000)

As can be seen in (Fig. 1) The most prevalent respiratory tract condition treated with natural products was flu with (103 participants), a common result reported in west Iran were 23 medicinal plants used in Lorestan province for treating cold. (Delfan, Kazemeini, & Bahmani, 2015)

followed by cough (100 participants) and sore throat (94 ) (Fatiha et al., 2017), these results were proved by calculating Fic values (Table 4) where it was the highest 0.882 for flu followed by cough with 0.848 and sore throat 0.838. This may be due to the high common spread of these disorders among people in Palestine mainly in winter season, or could be related to the previous observations of the susceptibility of these disorders to medicinal herbs therapy. while bronchitis was the less common disease that treated by herbs because in case of more serious lung diseases like bronchitis; the population uses less herbals, and prefer using medical prescriptions by doctors.

Chamomial belong to *Asteraceae* family, mint and sage for *Lamiaceae* family, lemon belong to *Rutaceae* family and ginger belong to *Zingiberaceae* family all were agreed to be used in treatment of all of the fiver respiratory diseases. So these medicinal plants can be considered as an indication of their high healing potential against related diseases. Plants with high percentages and FL values were; lemon with (35%, FL= 62.7) and chamomile with (20.8%, FL= 32) for treating flu, thyme with (34.2%, FL= 62.12) and Guava with (16.7%, FL= 55.6) for cough, ginger with (23.3%, FL= 45.16) for sore throat and finally for bronchitis thyme was used with (15.8%, FL = 28.8). Many previous studies approved the efficacy of these plants as home remedies for the treatments of respiratory diseases; Cammomile have been reported for treating upper respiratory tract diseases, in the United States, chamomile is one of the most widely consumed tea. (Srivastava & Gupta, 2015).

Mint and sage are native to the Mediterranean region and have been used worldwide as flavoring spices as well as traditional herbal medicine for common respiratory disorders. (AYAT, SHOJAEI, Kobarfard, Mohammadzadeh, & Choudhary, 2009)

(Šmidling, MITIĆ-ĆULAFIĆ, VUKOVIĆ-GAČIĆ, Simić, & Knežević-Vukčević, 2008), findings of a local study showed that the essential oils isolated from lemon, *M. spicata* leaves and *C. sinensis* flowers enhanced athletic performance and lung function. (Jaradat, Al Zabadi, et al., 2016)., Ginger have been proven to relieve coughing. (Rouhi, Ganji, & Nasri, 2006)

Thyme extract was approved to help patients with chronic obstructive pulmonary disease.

(Nabissi et al., 2018)

Leaves of guava were mentioned as a remedy for cough during an ethnobotanical survey in Guerrero, México (del Carmen Juárez-Vázquez et al., 2013) in Malaysia, (Ong, Chua, & Milow, 2011) and in South Africa,(OTANG, GRIERSON, & Ndip, 2012)

Therefore these herbs should be analyzed for the bioactive components and this is the target in the future for the purpose of phytochemical analysis. Comprehensive information about both the collection and handling of each plant remedy needs to be recorded also.

## Conclusion

This study successfully determined the prevalence of herbal medicine users in five respiratory tract disorders, types of medicinal plants used in addition to the part of the plants used and the method of using, among representative sample of Palestinian adults and older adults. Up to our knowledge this study is the first study in Palestine that explored the use of medicinal plants in respiratory diseases.

It was found that the local population uses 31 plants from 19 separate families. Most of them grow in the wild, and some are cultivated, from these medicinal plants. (i.e. *mint, sage and thym*). People use these plants by drying, decoction or infusion during all seasons of the year. Chamomial belong to *Asteraceae* family, mint and sage for *Lamiaceae* family, lemon belong to *Rutaceae* family and ginger belong to *Zingiberaceae* family all were agreed to be used in treatment of all of the fiver respiratory diseases. The most commonly used sections of the plants were leaves and fruits. The quality of plant species fidelity and informant consensus factor values for plants have been developed. The Fic values were found to be fairly high (0.844). It may, therefore, be an indication that the data collected are accurate.

## Declarations

### **Ethical approval and consent to participate:**

The study protocol was approved by the Institutional Review Board (IRB) at An –najah national university, Ref.( Oth.Coll Feb. 2021/2). All methods were performed in accordance with the relevant guidelines and regulations. As this study depends on a questionnaire from adult participants (above 18 years old), informed consent was obtained from all subjects before filling the questionnaire. The informed consent is approved by the Institutional Review Board (IRB) at An –najah national university.

### **Availability of data and materials:**

Data are all contained with the article.

### **Competing interests:**

The author declare that there is no financial and nonfinancial competing interests.

### **Funding:**

None

## Consent to Publication:

Not applicable

## Authors contributions:

All authors gave the consent for publication of the manuscript and for NS to be the corresponding author. NS conceived, accomplished and designed the study; MB, HQ and FH carried out the data obtained and drafted this paper. All researchers collected the data from the informants, revised, read and approved the final manuscript.

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## Tables

Table 1  
 socio demographic characteristics of the participants presented in n (%)

	<b>Variable</b>	<b>Number</b>	<b>Percentage</b>
Age	18<30	37	30.8
	30- <40	16	13.3
	40<50	31	25.8
	50<60	28	23.3
	60 and above	8	6.7
Marital status	Single	36	30
	Married	82	68.3
	Other	2	1.7
Living area	City	41	34.2
	Village	79	65.8
Educational level	No formal education	4	3.3
	Primary education	13	10.8
	Secondary education	26	21.7
	University	77	64.2
Work status	Not working	71	59.2
	Office work	39	32.5
	Business	4	3.3
	Worker	6	5.0
Economic status (monthly income)	<2000	31	26.3
	2000-3000	35	29.7
	3000-5000	42	35.6
	5000 and above	10	8.5

Table 2  
Information about herbs and herbs sources

Variables		Number	percentage
Source of information about medicinal herbs	Health care workers ( doctors, pharmacists)	5	4.3
	Attarine	71	59.2
	Social media	39	32.5
	Others (books)	5	4.2
Source of herbs	Pharmacies	23	19.2
	Attarine	65	54.2
	Friends	6	5
	Wild field	26	21.7

Table 3

The herbal families and herb species use according to diseases presented in users number and percentages

Family Latin name	Species name Latin	English name	Used parts	Respiratory diseases				
				Flu n(%)	Allergy n(%)	Cough n(%)	Sore throat n(%)	Bronchitis n(%)
Amaryllidaceae	Allium cepa	Onion	Fruits	-	-	1 (0.8)	1 (0.8)	-
	Allium sativum	Garlic	Fruits	-	1 (0.8)	1 (0.8)	5 (4.2)	-
Apiaceae	Pimpinella anisum	Anise seeds	Seeds	6 (5)	-	1 (0.8)	3 (2.5)	2 (1.7)
	Petroselinum crispum	Parsley	Seeds	-	1 (0.8)	-	-	-
	Cuminum cyminum	Cumin	Seeds	-	1 (0.8)	-	2 (1.7)	-
Asteraceae	Matricaria chamomilla	Chamomile	Flowers	25 (20.8)	15 (12.5)	10 (8.3)	12 (10)	16(13.3)
Bromeliaceae	Ananas comosus	Pinapple	Fruits	-	1 (0.8)	-	-	-
Fabaceae	Trigonella foenum-graecum	fenugreek	Seeds	-	1 (0.8)	-	-	-
	Ceratonia siliqua	Kharoub	Fruits	-	-	1 (0.8)	-	-
	Glycyrrhiza glabra	Licorice root	Stems	-	-	-	4 (3.3)	
Lamiaceae	Salvia rosmarinus	Rosemary	Leaves	1 (0.8)	-	-	1 (0.8)	-
	Ocimum basilicum	Basil	Leaves	1 (0.8)	-	-	-	-
	Thymus vulgaris	Thyme	Leaves	6 (5)	-	41 (34.2)	-	19 (15.8)
	Salvia officinalis	Sage	Leaves	2 (1.7)	11 (9.2)	3 (2.5)	4 (3.3)	1 (0.8)

Family Latin name	Species name Latin	English name	Used parts	Respiratory diseases				
				Flu n(%)	Allergy n(%)	Cough n(%)	Sore throat n(%)	Bronchitis n(%)
	<i>Mentha piperita</i>	Mint	Leaves	4 (3.3)	8 (6.7)	3 (2.5)	2 (1.7)	2 (1.7)
	<i>Origanum majorana</i>	Marjoram	Leaves	-	1 (0.8)	-	-	-
Lauraceae.	<i>Cinnamomum cassia</i>	Cinammon	Stem	-	-	1 (0.8)	2 (1.7)	1 (0.8)
Malvaceae	<i>Malva sylvestris</i>	Malva	Leaves	-	-	1 (0.8)	-	-
Musaceae	<i>Musa acuminata</i>	Banana	Fruits	-	-	1 (0.8)	-	-
Myrtaceae	<i>Psidium guajava</i>	Guava	Leaves	2 (1.7)	4 (3.3)	20 (16.7)	-	10 (8.3)
	<i>Syzygium aromaticum</i>	Clove buds	Flower	-	4 (3.3)	2 (1.7)	-	-
Oleaceae	<i>Olea europaea</i>	Olives leaves	Oil	-	2 (1.7)	2 (1.7)	1 (0.8)	4 (3.3)
Pedaliaceae	<i>Sesamum indicum</i>	Sesame	Seeds	-	-	-	1 (0.8)	-
Piperaceae	<i>Piper cubeba</i>	Pipper	Seeds	-	2 (1.7)	-	-	-
Ranunculaceae	<i>Nigella sativa</i>	Black seeds	Seeds	1 (0.8)	-	-	-	1 (0.8)
Rubiaceae	<i>Cinchona officinalis</i>	Kenya	Leaves	1 (0.8)	-	-	-	-
Rutaceae	<i>Citrus reticulata</i>	Orange	Fruits	1 (0.8)	-	-	1 (0.8)	-
	<i>Citrus limon</i>	Lemon	Fruits	42 (35)	12 (10)	4 (3.3)	8 (6.7)	1 (0.8)
Theaceae	<i>Camellia sinensis</i>	Tea	Leaves	-	3 (2.5)	-	2 (1.7)	-
Zingiberaceae	<i>Zingiber officinale</i>	Ginger	Roots	12 (10)	9 (7.5)	8 (6.7)	28 (23.3)	5 (4.2)

Family Latin name	Species name Latin	English name	Used parts	Respiratory diseases				
				Flu n(%)	Allergy n(%)	Cough n(%)	Sore throat n(%)	Bronchitis n(%)
	Curcuma longa	Tumeric	Roots	-	-	-	-	2 (1.7)

Table 4  
Factor of informant's consensus (Fic) for herbals, categorized by the types of respiratory treatment

Problem	Total	Plant no	FIC
Flu	103	13	0.882
Allergy	87	16	0.825
Cough	100	16	0.848
Sore throat	94	16	0.838
Bronchitis	65	12	0.828

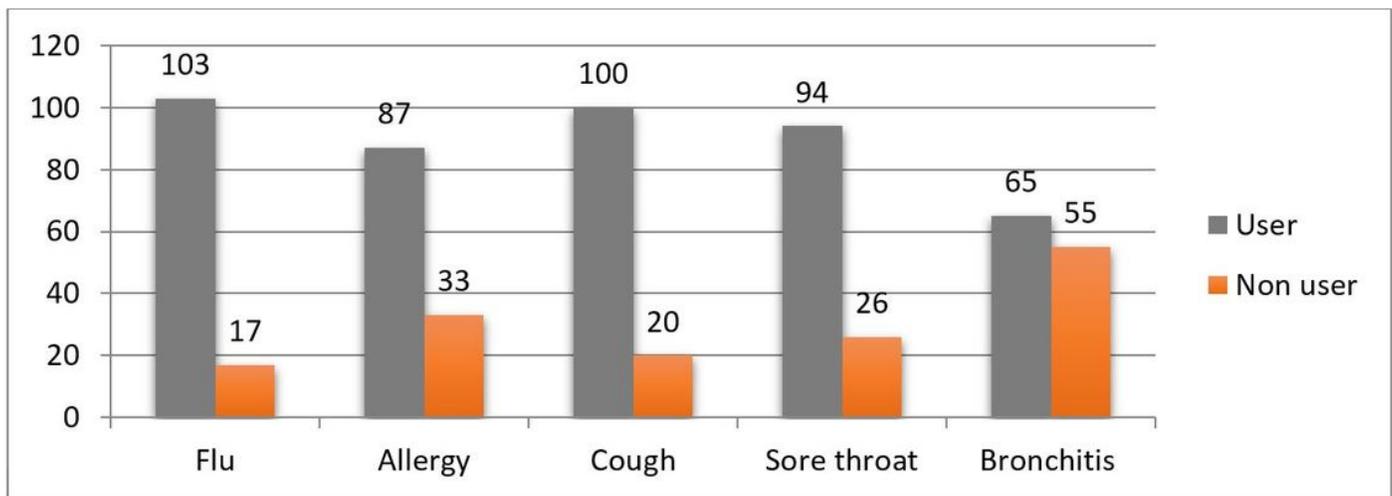
Table 5  
Plants used as home remedies for treatment of respiratory diseases in Palestine

Species name Latin	English name	Respiratory diseases				
		Flu n(%)	Allergy n(%)	Cough n(%)	Sore throat n(%)	Bronchitis n(%)
Allium cepa FL	Onion	-	-	1 (0.8) 50	1 (0.8) 50	-
Allium sativum FL	Garlic	-	1 (0.8) 14.29	1 (0.8) 14.29	5 (4.2) 71.43	-
Pimpinella anisum FL	Anise seeds	6 (5) 50	-	1 (0.8) 8.33	3 (2.5) 25	2 (1.7) 16.67
Petroselinum crispum FL	Parsley	-	1 (0.8) 100	-	-	-
Cuminum cyminum FL	Cumin	-	1 (0.8) 33.33	-	2 (1.7) 66.67	-
Matricaria chamomilla FL	Chamomile	25 (20.8) 32.10	15 (12.5) 23.10	10 (8.3) 12.82	12 (10) 15.39	16(13.3) 20.51
Ananas comosus FL	Pinapple	-	1 (0.8) 100	-	-	-
Trigonella foenum-graecum FL	fenugreek	-	1 (0.8) 100	-	-	-
Ceratonia silique FL	Kharoub	-	-	1 (0.8) 100	-	-
Glycyrrhiza glabra FL	Licorice root	-	-	-	4 (3.3) 100	-
Salvia Rosmarinus FL	Rosemary	1 (0.8) 50	-	-	1 (0.8) 50	-
Ocimum basilicum FL	Basil	1 (0.8) 100	-	-	-	-
Thymus vulgaris FL	Thyme	6 (5) 9.09	-	41 (34.2) 62.12	-	19 (15.8) 28.78
Salvia officinalis FL	Sage	2 (1.7) 9.50	11 (9.2) 50	3 (2.5) 13.64	4 (3.3) 15.38	1 (0.8) 4.54

Species name Latin	English name	Respiratory diseases				
		Flu	Allergy	Cough	Sore throat	Bronchitis
		n(%)	n(%)	n(%)	n(%)	n(%)
Mentha piperita FL	Mint	4 (3.3) 21.05	8 (6.7) 42.10	3 (2.5) 15.79	2 (1.7) 10.53	2 (1.7) 10.53
Origanum majorana FL	Marjoram	-	1 (0.8) 100	-	-	-
Cinnamomum cassia FL	Cinammon	-	-	1 (0.8) 25	2 (1.7) 50	1 (0.8) 25
Malva sylvestris FL	Malva	-	-	1 (0.8) 100	-	-
Musa acuminata FL	Banana	-	-	1 (0.8) 100	-	-
Psidium guajava FL	Guava	2 (1.7) 5.56	4 (3.3) 11.11	20 (16.7) 55.56	-	10 (8.3) 27.78
Syzygium aromaticum FL	Clove buds	-	4 (3.3) 66.67	2 (1.7) 33.33	-	-
Olea europaea FL	Olives leaves	-	2 (1.7) 22.22	2 (1.7) 22.22	1 (0.8) 11.11	4 (3.3) 44.44
Sesamum indicum FL	Sesame	-	-	-	1 (0.8) 100	-
Piper cubeba FL	Pipper	-	2 (1.7) 100	-	-	-
Nigella sativa FL	Black seeds	1 (0.8) 50	-	-	-	1 (0.8) 50
Cinchona officinalis FL	Kenya	1 (0.8) 100	-	-	-	-
Citrus reticulata FL	Orange	1 (0.8) 50	-	-	1 (0.8) 50	-
Citrus limon FL	Lemon	42 (35) 62.69	12 (10) 17.91	4 (3.3) 5.97	8 (6.7) 11.94	1 (0.8) 1.49

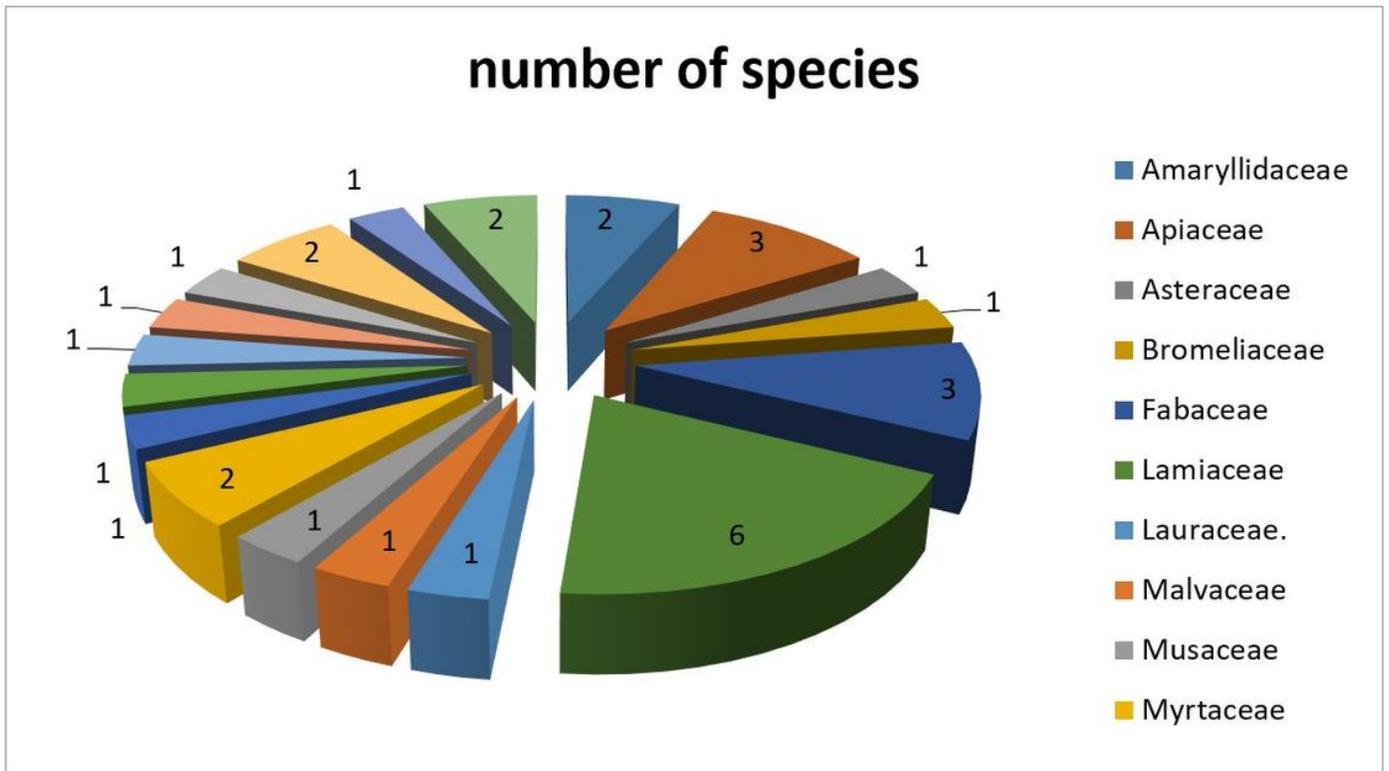
Species name Latin	English name	Respiratory diseases				
		Flu	Allergy	Cough	Sore throat	Bronchitis
		n(%)	n(%)	n(%)	n(%)	n(%)
Camellia sinensis FL	Tea	-	3 (2.5) 60	-	2 (1.7) 40	-
Zingiber officinale FL	Ginger	12 (10) 19.35	9 (7.5) 14.51	8 (6.7) 12.90	28 (23.3) 45.16	5 (4.2) 8.06
Curcuma longa FL	Tumeric	-	-	-	-	2 (1.7) 100

## Figures



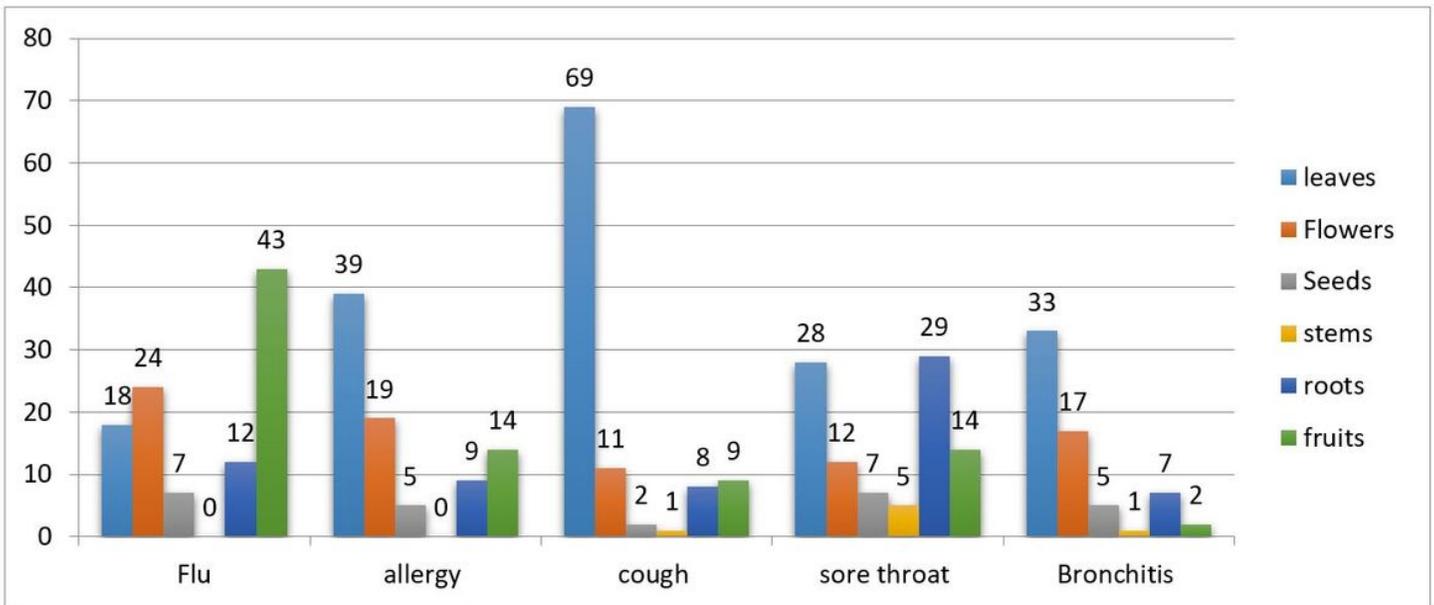
**Figure 1**

Number of herbs users and non-users in respiratory tract diseases.



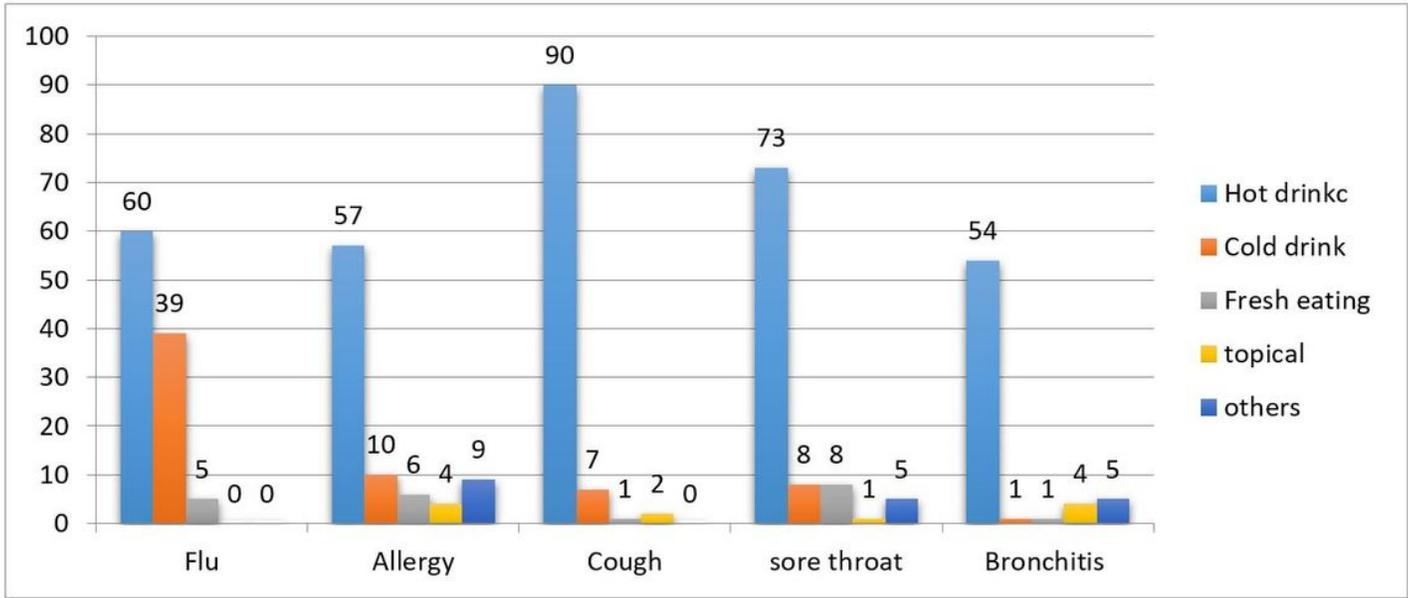
**Figure 2**

distribution of the medicinal plants families used by the participants



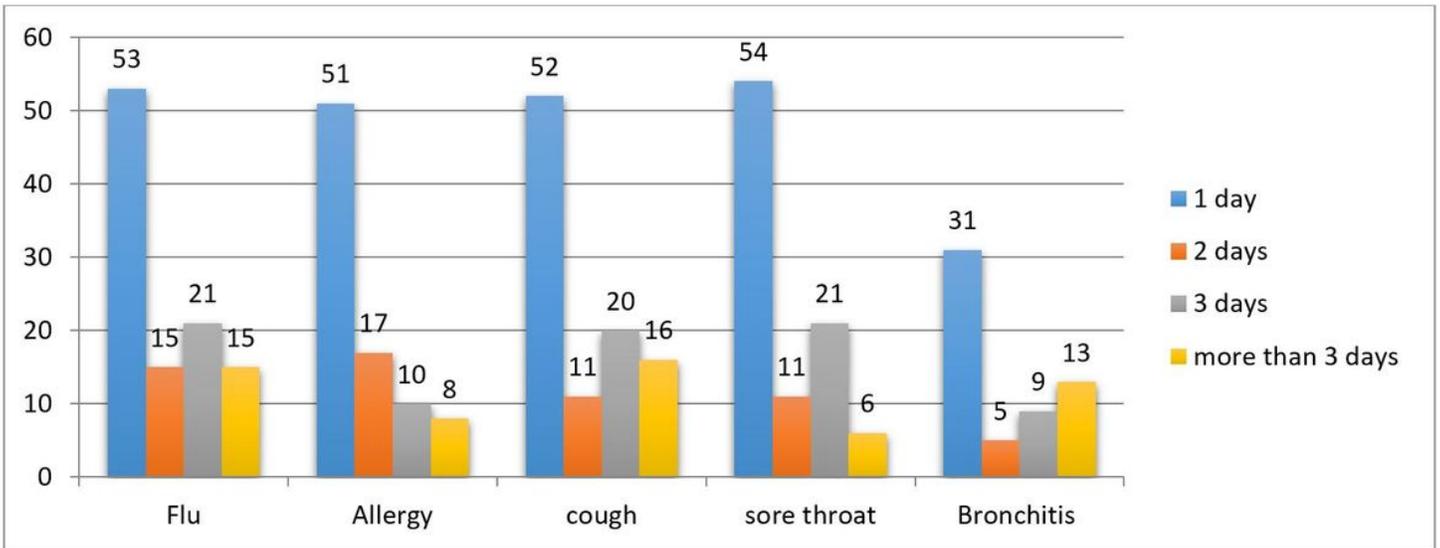
**Figure 3**

parts of the plant used according to diseases



**Figure 4**

the form of using the herbs in the treatment



**Figure 5**

Duration of the herbs use