

# **Ethnopharmacological survey of medicinal plants used by patients with gastrointestinal tract disorders in the Northern region of Palestine**

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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 gastrointestinal tract disorders (GITD).

**Method:** In the Northern part of Palestine ( Jenin, Tulkarm, Qalqilia and Nablus) , an ethno-pharmacological study of medicinal plants used to treat GITD 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: UV (used value), Fic (factor of informant consensus) and FL (fidelity-level) was calculated.

**Results:** This study showed that 40 plant species of 16 families were used for GITD. Labiatae (10 species) and Umbelliferae (8 species) were the most prevalent plant families. The pieces used most commonly were leaves and seeds. Decoction was the technique of preparation and was taken as a hot drink. Abdominal flatulence (0.88) was the highest Fic value, followed by constipation (0.80), The maximum FL were reported for *Cucumissativus* (100) and *Prunusamygdalus* (100) for heart burn, *Solanum tuberosum* (100) for vomiting and diarrhea, *Ficuscarica* (100) as laxatives.

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

**Key words:** Ethnopharmacology, Herbal plant, decoction, gastrointestinal disorders.

## 1. Background

The main cause of morbidity in developing countries is the gastrointestinal disorders “A new classification of functional gastrointestinal disorders (FGID) became available recently, based on consensus in expert committees (‘Rome III process’).”(1)

A study conducted in the US found that at least 1 FGID qualified for 23.1 % of children and adolescents in the US. (2) These findings indicate that gastrointestinal diseases rely on the community's social climate, access to water and food protection, mal-nutrition (3) , type of the food eaten and the disjunctively of the food constitution (4), Bacterial, fungal and parasitic agents causes Diarrhoea, stomach ache and gastric atrophy, depends on: rotavirus, Helicobacter pylori, Shigella, Escherichia coli and Salmonella. (4) Vibrio cholerae, Aeromonas, (5). Stress also directly provokes intestinal dysmotility and heightens hypersensitivity(6).

Although the pathophysiology of these disorders remains not fully understood, result from a complex interaction between biological, psychological and social factors that can be predisposing, precipitating and/or perpetuating(7).

Using medicinal plants for the treatment of (GITD) is a common practice among indigenous communities. It is estimated that about 34 % of medicinal plants are used to treat GITD (8). Medicinal products isolated from medicinal plants or artificially modified forms of natural products are healthy, environmentally friendly and regularly recommended by doctors(9).

It has been recognized for the past 20 years that in some developing countries, plants are the main medicinal sources used for the treatment of infectious diseases, such as Asia (8) and Africa (10). Ethnobotanical surveys and literature reviews have shown

that Guatemala uses 385 plants from 95 families to treat gastrointestinal disorders, The crude extracts of 26 medicinal plants exhibited antibacterial activity.(11)

The effectiveness of many medicinal plants for treating gastrointestinal disorders has been verified by clinical studies.(12, 13), even though their consumption habits vary from culture to culture.

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.(14).

More than 2600 plant species cover the hills and mountains of Palestine and the Golan Heights, of which more than 700 are known to be used as medicinal herbs or as botanical pesticides.(15-17). Furthermore, about 30% of the flora in Palestine are considered rare and many of them are endangered. 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.(18).

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

## **2. Methods**

The present study was performed at outpatient clinics in the northern regions of Palestine ( Jenin, Tulkarm, Qalqilia and Nablus) in a cross-sectional observational design during the period from August to November 2018. (Fig 1)



Fig 1: Map of west bank/ Palestine (Taken from internet/ARIJ)

The research was conducted in an interview with herbalists, traditional healers and herbal medicine practitioners. The inclusion criteria was Palestinian adults residing in the Northern part of Palestine and agreed to join the study without any informed consent, The random participants were given a complete information about the aim of the study, the participation was completely voluntary without any monetary or non-monetary incentives, and their identity was kept anonymous. The collected data was used only in this study.

## 2.1 Structure interview and validation of the questionnaire

The questionnaire was developed based on through literature review pertaining to herbal use in digestive tract diseases from different community, in addition the studies that reported medicinal plants used among Palestinians were also reviewed.

The new design questionnaire consisted of two parts; a copy was attached. The first part provides information about patients: educational status, marital status, age, monthly household income, accommodation, form of treatment used. These are listed in Table (1). In the second section, patients answered open-ended questions regarding the name of the medicinal plant used, the explanations for the usage of these medicinal plants and the infographics, preparation methods and sources of these plants. . The random sample procedure was used to recruited 120 participants using Cochran's (1963) equation for prevalence studies. Sample size =  $n = (Z \alpha/2)^2 p (1 -$

p)/  $\Delta 2$ ,  $\Delta$  Assumed to be 10 %. Considering 10% drop out the required sample size was 115 participants, then the number was rounded to 120 participants.

Table 1: the study population characteristics (N= 120)

<b>Variable</b>	<b>N (%)</b>
<b>Age (year)</b>	
16 – 20	37 (30.8)
30 – 39	16 (13.3)
40 – 49	31 (25.8)
50 – 59	28 (23.3)
≥ 60	8 (6.7)
<b>Education</b>	
Illiterate level	4 (3.3)
Elementary or preparatory level	13 ( 10.8)
Secondary level	26 (21.7)
University level	77 (64.2)
<b>Income</b>	
Low	31(25.8)
Medium	77 (64.2)
High	10 (8.3)
<b>Material status</b>	
Single	36 (30)
Married	82 (68.3)
Others (divorced or widow)	2 (1.7)
<b>Place of residence</b>	
City	41 (34.2)
Village	76 (63.3)
Refugee camp	3 (2.5)
<b>Job</b>	
House wife	54 (37.5)
Employee	39 (32.5)
Worker	6 (5)
Dealer	4 (3.3)
Unemployed	26 (21.7)
<b>Knowledge of natural products</b>	
Media ( TV, radio, journal, etc)	23 (19.2)
Relatives & friends	57 (47.5)
Herbalists	14 (11.7)
Pharmacy	1 (8)
Internet	16 (13.3)
Other sources	5 (4.2)

How can you have herbals	
Herbalists	65 (54.2)
Pharmacy	23 (19.2)
Friends	6 (5)
Wild	26 (21.7)

## 2.2 Data analysis

The Statistical Package for Social Sciences (SPSSversion17.0) was used to perform Statistical analyses. 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 chosen 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 (19). The Fic is calculated as in the following equation:

$$\text{Fic} = \frac{Nur - Nt}{Nur - 1}$$

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:(20, 21)

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

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.

The use-value (UV) is a quantitative method that can be used in order to prove the relative importance of species known locally. It can be calculated according to the following equation: (20)

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

Where UV is the use value of a species; U is the number of citations per species; N is the number of informants. Results of calculated UV, FL, and Fic are shown in Tables 2, 3, 4 .

### 3. Results

Table 1 summarises the socio-demographic characteristics of our sample of 120 people included in the study. Respondents to all age groups but mostly (30.8%) were 16 – 29 years of age. They are from various educational backgrounds with most (64.2%) being from university-educated backgrounds, whilst the minority (3.3%), were from an elementary level of education or illiterate. We also sampled across income (64.2% were of medium income) and marital status (68.3% married, 30% single and 1.7% were divorced or widowed). Place of residence: (63.3%) in a village while (2.5%) in a refugee camp. (37.5%) of the sample was housewives. Knowledge of natural products was also investigated; most of them obtained their information from relatives and friends (47.5%), herbalists (11.7%) and the internet (13.3%). Most (54.2%) obtained the natural products they used from herbalists (“Attarine”), and 21.7% from the wild.

#### 3.1 Phytodiversity of plants

The main reason for the existence of rich traditional medicines are the cultural diversity and rich flora. (22)

The present study reported 40 plants belonging to 16 families commonly used to cure various digestive diseases by the local community. (Fig 2) shows that the largest families of gastrointestinal plants were Labiatae and Umbelliferae (10 species and 8 species respectively), with three species for Compositae, Zingiberaceae and Leguminaceae . only 1–2 species reported for the 11 remaining families. However, the calculated UV values for the *Salvia officinalis* plant that belongs to the Labiateae family are the highest with 0.275, *Cucumissativus* plants belong to the Cucurbitaceae family have the second highest UV value of 0.233 for treating heart burn, *Cuminumcyminum* belong to Umbelliferae has the same UV value for abdominal flatulence.

All parts of different plants are used in the traditional remedies for various gastrointestinal disorders. However, the most frequently used parts are leaves with

41% followed by seeds with 36% percent. (Fig 3) shows the result of analysis on medicinal plant parts used to treat gastrointestinal disorders.

In this study, most herbal remedies were found to be prepared by decoction and administered mainly orally, which agreed with other studies concerning neighbouring areas, where it was seen that decoction is the method mostly used for preparation of folk medicine (23) (24). In most cases people use other ingredients such as sugar and honey to prepare remedies. Some plants are also used as food-vegetable plants (such as *Cucumis sativus*, *Prunus amygdalus*, *Petroselinum crispum*, *Ficus arica*, and *Punica granatum*) that are eaten raw.

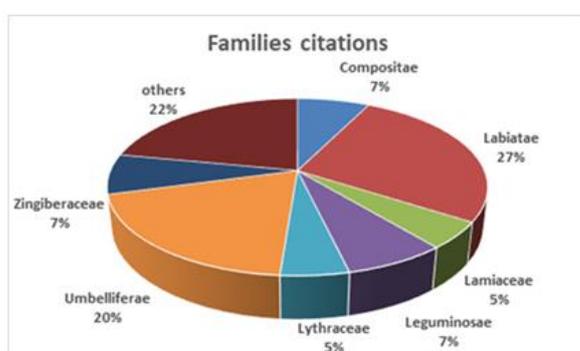


Fig 2: Families citations of GI disorders

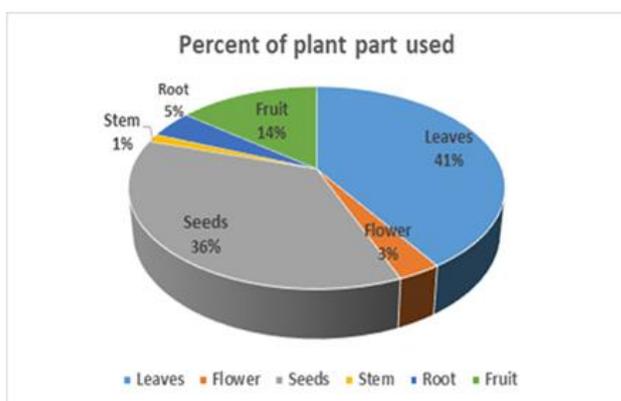


Fig 3: Percent of plant parts used for GI disorders

### 3.2 Traditional treatment of gastrointestinal disorders using plants extracts

Finally, it was seen that gastrointestinal system ailments, for which the folk medicinal plants were mostly used, were as follows: heart burn, indigestion, vomiting and diarrhoea, constipation, abdominal flatulence and irritable bowel syndrome. Informant consensus of medicinal plant usage resulted in informant consensus factor (Fic) values between 0.71 and 0.88 per gastrointestinal disorders category. The category

that had the highest Fic value was abdominal flatulence (0.88) followed by constipation (0.80). The lowest was indigestion (0.71) (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 (25) . The average Fic value for all gastrointestinal disorder categories was 0.77, indicating a fairly high level of informant consensus compared with similar studies (26) .

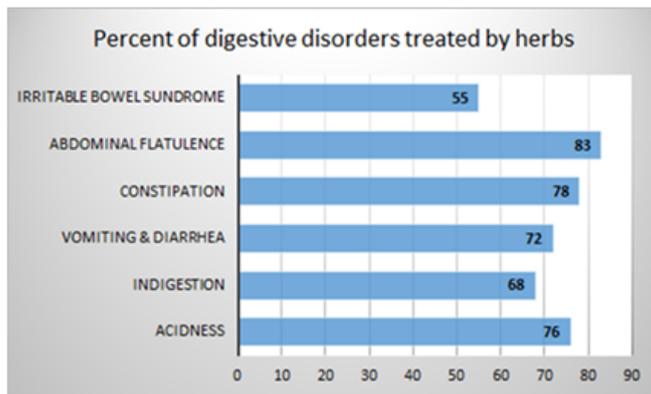


Fig 4: Percent of digestive disorders treated by herbs

Table 2: plants used in the treatment of gastrointestinal disorders in Palestine

Scientific name	Family	GIT Problems	Part used and mode of preparation	Method of preparation	# of informants 120	UV
<i>Teucrium capitatum</i>	Lamiaceae	Acidness	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, cool then drink a cup after meal	Decoction	2	.017
<i>Cucumis sativus</i>	Cucurbitaceae	Acidness	Fruit/ eat raw	Eat raw	28	0.233
<i>Punica granatum</i>	Lythraceae	Acidness	Fruit/ eat raw	Eat raw	2	.017
<i>Ocimum basilicum</i>	Lamiaceae	Acidness	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, cool then drink a cup after meal	Decoction	3	.025
<i>Thymus vulgaris</i>	Labiatae	Acidness	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, cool then drink a cup after meal	Decoction	3	.025
<i>Sesamum indicum</i>	Pedaliaceae	Acidness	Seeds/ eat raw	Eat raw	4	.033
<i>Mentha piperita</i>	Labiatae	Acidness	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, cool then drink a cup after meal	Decoction	3	.025
<i>Linum usitatissimum</i>	Linaceae	Acidness	Seeds/ eat raw	Eat raw	2	.017
<i>Prunus amygdalus</i>	Rosaceae	Acidness	Seeds/ eat raw	Eat raw	25	.208
<i>Salvia officinalis</i>	Labiatae	Acidness	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, cool then drink a cup after meal	Decoction	3	.025

<i>Rosmarinus officinalis</i>	Labiatae	Indigestion	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, then drink hot after meal	Decoction	3	.025
<i>Matricaria chamomilla</i>	Compositae	Indigestion	Flower /boil about 100 ml of plant in 100 ml water, given orally	Decoction	5	.042
<i>Petroselinum crispum</i>	Umbelliferae	Indigestion	Leaves/ eat raw	Eaten raw	2	.017
<i>Zingiber officinalis</i>	Zingiberaceae	Indigestion	roots /boil about 100 ml of plant in 100 ml water, given orally	Decoction	3	.025
<i>Cuminum cyminum</i>	Umbelliferae	Indigestion	Seeds/ boil a spoon of seeds in a cup of water, drink it hot	Decoction	3	.025
<i>Salvia officinalis</i>	Labiatae	Indigestion	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, drink hot	Decoction	8	.067
<i>Mentha piperita</i>	Labiatae	Indigestion	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, drink hot	Decoction	25	.208
<i>Pimpinella anisum</i>	Umbelliferae	Indigestion	Seeds/ boil a spoon of seeds in a cup of water, drink it hot	Decoction	14	.117
<i>Oryza sativa</i>	Graminae	Vomiting & diarrhea	Seeds/ boil a cup of seeds in two cups of water, eat cooked	Eat cooked	2	.017
<i>Solanum tuberosum</i>	Solanaceae	Vomiting & diarrhea	Root/ eat cooked	Eat cooked	10	.083
<i>Punica granatum</i>	Lythraceae	Vomiting & diarrhea	Fruit/eat raw	Eat raw	8	.067
<i>Allium sativum</i>	Alliaceae	Vomiting & diarrhea	Root/ eat raw	Eat raw	3	.025
<i>Zingiber officinalis</i>	Zingiberaceae	Vomiting & diarrhea	roots /boil about 100 ml of plant in 100 ml water, given orally	Decoction	5	.042
<i>Salvia officinalis</i>	Labiatae	Vomiting & diarrhea	leaves /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	33	.275

<i>Elettaria cardamomum</i>	Zingiberaceae	Vomiting & diarrhea	seeds /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	2	.017
<i>Matricaria chamomilla</i>	Compositae	Constipation	flowers /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	4	.033
<i>Ficus carica</i>	Ficeae	Constipation	Fruit	Eat raw	5	.042
<i>Trigonella foenum graecum</i>	Leguminosae	Constipation	seeds /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	9	.075
<i>Ricinus communis</i>	Acalyphoidae	Constipation	Fruit/squeeze the fruit and extract the oil/ drink one spoon of oil before meal	Drink cold	11	.092
<i>Cassia angustifolia</i>	Leguminosae	Constipation	leaves /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	12	.010
<i>Cassia acutifolia</i>	Leguminosae	Constipation	leaves /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	3	.025
<i>Pimpinella anisum</i>	Umbelliferae	Constipation	seeds /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	20	.167
<i>Rosmarinus officinalis</i>	Labiatae	Constipation	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, then drink hot after meal	Decoction	16	.133
<i>Petroselinum crispum</i>	Umbelliferae	Constipation	Whole plant	Eat raw	3	.025
<i>Rosmarinus officinalis</i>	Labiatae	Abdominal flatulence	Leaves/ boil a cup of water then dunk the leaves in boiled water for 5 min, then drink hot after meal	Decoction	4	.033
<i>Matricaria chamomilla</i>	Compositae	Abdominal flatulence	Flower /boil about 100 ml of plant in 100 ml water, given orally	Decoction	3	.025
<i>Cassia angustifolia</i>	Leguminosae	Abdominal flatulence	leaves /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	1	.008
<i>Trigonella foenum graecum</i>	Leguminosae	Abdominal flatulence	seeds /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	2	.0166

<i>Crocus sativus</i>	Iridaceae	Abdominal flatulence	Flower /boil about 100 ml of plant in 100 ml water, given orally	Decoction	1	.008
<i>Zingiber officinalis</i>	Zingiberaceae	Abdominal flatulence	roots /boil about 100 ml of plant in 100 ml water, given orally	Decoction	4	.033
<i>Foeniculum vulgare</i>	Umbelliferae	Abdominal flatulence	Roots	Eat raw	5	.042
<i>Cuminum cyminum</i>	Umbelliferae	Abdominal flatulence	Seeds/ boil a spoon of seeds in a cup of water, drink it hot	Decoction	28	.233
<i>Citrus lemon</i>	Rutaceae	Abdominal flatulence	Fruit	Juice	1	.008
<i>Salvia officinalis</i>	Labiatae	Abdominal flatulence	leaves /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	13	.108
<i>Mentha piperita</i>	Labiatae	Abdominal flatulence	leaves /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	23	.19
<i>Pimpinella anisum</i>	Umbelliferae	Abdominal flatulence	Seeds/ boil a spoon of seeds in a cup of water, drink it hot	Decoction	19	.158
<i>Matricaria chamomilla</i>	Compositae	Irritable bowel syndrome	flowers /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	4	.033
<i>Foeniculum vulgare</i>	Umbelliferae	Irritable bowel syndrome	Roots	Eat raw	4	.033
<i>Carum carvi</i>	Umbelliferae	Irritable bowel syndrome	seeds /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	3	.025
<i>Cuminum cyminum</i>	Umbelliferae	Irritable bowel syndrome	seeds /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	6	.05
<i>Salvia officinalis</i>	Labiatae	Irritable bowel syndrome	leaves /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	4	.033
<i>Mentha piperita</i>	Labiatae	Irritable bowel syndrome	leaves /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	16	.133

<i>Pimpinella anisum</i>	Umbellifer ae	Irritable bowel syndrome	seeds /boil about 100 ml of plant in 100 ml water, drink hot	Decoction	9	.075
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Table 3: Plants used as home remedies for treatment of gastrointestinal disorders in Palestine

Plant name	Acidness	Indigestion	Vomiting & diarrhea	Constipation	Abdominal flatulence	Irritable bowel sundrome
بابونج Chamomile FL	1 5.88	5 29.4	-	4 23.5	3 17.6	4 23.5
زنجبيل Ginger FL	1 6.25	3 18.75	5 31.25	1 6.25	4 25	2 12.5
سمسم Sesame FL	4 80	-	-	-	-	1 20
شمر Schumer FL	1 9.09	-	-	1 9.09	5 45.45	4 36.4
لكمون Latency FL	1 2.56	3 7.7	-	1 2.56	28 71.8	6 15.38
ميرمية Sage FL	3 4.8	8 12.9	33 53.2	1 1.61	13 20.9	4 6.45
نعنع Mint FL	3 4.1	25 34.24	4 5.47	2 2.74	23 31.5	16 21.9
اكليل الجبل Rosemary FL	-	3 10.34	-	14 48.27	3 10.34	9 31.03
يانسون Anise FL	-	14 21.53	4 6.15	20 30.77	18 27.7	9 13.85
كراوية Spherical FL	-	1 25	-	-	-	3 75
عدس Lentil FL	1 100	-	-	-	-	-
جزر Carrots FL	1 100	-	-	-	-	-
جعدة Crumple FL	2 40	1 20	2 40	-	-	-
خس Lettuce FL	1 33.3	1 33.3	-	1 33.3	-	-
خيار Cucumber FL	28 100	-	-	-	-	-
رمان Pomegranate رمان	3	-	9	-	-	-

FL	25		75			
ريحان Basil	3	-	-	-	-	-
FL	100					
زعرور Thyme	3	-	-	-	-	-
FL	100					
زيتون Olive	4	-	-	1	-	-
FL	80			20		
عرقسوس Liquorice	1	-	-	-	-	-
س						
FL	100					
فستق Pistachio	1	-	-	-	-	-
FL	100					
كتان Linen	2	-	-	-	-	-
FL	100					
كر كديه Roselle	1	-	-	-	-	-
FL	100					
لوز Almond	25	-	-	-	-	-
FL	100					
ملفوف Cabbage	1	1	-	-	-	-
FL	50	50				
صبار Cactus	-	1	-	-	-	1
FL		50				50
بردفوش Marjoram	-	1	-	-	1	-
FL		50			50	
بقونس Parsley	-	2	-	3	-	-
FL		40		60		
تفاح Apple	-	2	-	1	-	-
FL		66.6		33.3		
تمر Dates	-	1	-	1	-	-
FL		50		50		
Fenugreek pills	-	1	1	9	1	1
حلبة						
FL		7.7	7.7	69.2	7.7	7.7
خروع Castor	-	1	-	11	-	-
FL		8.3		91.6		
Rashad beans	-	1	-	-	-	-
حبوب الرشاد						
FL		100				

شاي Tea FL	-	2 33.3	3 50	-	1 16.6	-
عشوق ( ) سنامكي FL	-	1 5	-	16 80	-	3 15
Saussureacostus قسط هندي FL	-	1 50	-	-	-	1 50
كركم Curcumin FL	-	1 100	-	-	-	-
أرز Rice FL	-	-	2 66.6	1 33.3	-	-
الحبة Black bean السوداء FL	-	-	1 100	-	-	-
بطاطا Potatoe FL	-	-	11 100	-	-	-
ثوم Garlic FL	-	1 33.3	2 66.6	-	-	-
Seedling شتيلة grain FL	-	-	1 100	-	-	-
قرفة Cinnamon FL	-	-	2 66.6	-	-	1 33.3
قهوة Coffee FL	-	-	1 100	-	-	-
الليمون Lemon FL	-	-	4 100	-	-	-
موز Banana FL	-	-	1 100	-	-	-
تين Fig FL	-	-	-	5 100	-	-
زعفران Saffron FL	-	-	-	1 100	-	-
جنسج Ginseng FL	-	-	-	-	-	1 100

Table 4: Factor of informant's consensus (Fic) for herbals, categorised by the types of gastric treatment

Problem	Total	Plant no	FIC
Acidness	91	24	0.74
Indigestion	81	24	0.71
Vomiting & diarrhea	86	20	0.78
Constipation	94	20	0.8
Abdominal flatulence	100	13	0.88
Irritable bowel syndrome	66	18	0.74

#### **4. Discussion**

Several studies have shown that in developing countries, about 80% of rural communities consider herbal remedies to be relevant and important. (27) (28)

According to Table 1, Most informants are of the highest education with most of them (64.2 %) graduating from university, with the same percentage for medium-sized income. The table also showed that respondents (54.2%) typically get their natural products from "Attarines". Unlike (19.2 %) only from pharmacists, who are believed to be the community of experts with the requisite expertise and educational history on the protection and effectiveness of these products and are thus the most deserving to be trusted ,this outcome indicates that these natural herbals and their products are considered healthy because of their long-standing use.

In Palestine, cosmetic products and natural nutrients are marketed and sold in herbal stores most of the time and to a lesser extent in pharmacies, and they are often prepared locally. Table 2 shows the natural herbal remedies used to treat gastrointestinal disorders, preparation method and use value. According to our findings, as stated in Table 2, the plants most frequently used were members of the Labiatae and Umbelliferae families, Labiatae family was also effective for treatment of FGITD in Urmia, Iran. (29), it is known with its anti – inflammatory effect which could be helpful in some gastrointestinal infectious disease. (30) Leaves were the part used in Labiatae herbal products, while seeds were the part of the plant used in the family Umbelliferae,. It was concluded from similar studies on plants used for medicinal purposes that most used parts of the plants are leaves with 54% in China and Thailand (31), 44% leaves and 29% root in Ethiopia (32). Leaves are the main photosynthetic organ in plants and are considered to be the most effective component for the synthesis of many pharmacologically active preparations against certain diseases.(33)

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, it may be sweetened by the addition of sugar or honey.

As can be seen in (Fig 4) The most prevalent gastrointestinal condition treated with natural products was abdominal flatulence, followed by constipation, heart burn, vomiting and diarrhoea, indigestion and irritable bowel syndrome was the least common disorder.

In this study the highest level is indicated of fleidility values for *Cucumissativus* (100), *Prunusamygdalus*(100) and *Sesamumindicum* (80) for heart burn; *Menthapiperita* (34.24) against indigestion; *Solanum tuberosum* (100), *Punicagranatum* (75) and *Salvia officinalis* (53.2) against vomiting and diarrhoea; *Ficuscarica* (100), *Ricinuscommunis* (91.6), *Cassia acutifolia* (80), *Rosmarinus officinalis* (48.24) and *PimpinellaAnisum* (30.7) as laxatives for constipation; *Cuminumcyminum* (71.8) and *Foeniculum vulgare*

(45.5) for abdominal flatulence; *Carumcarvi*(75), *Foeniculum vulgare* (36.5) and *Rosmarinus officinalis* (31) against irritable bowel syndrome. These medicinal plants can be considered as an indication of their high healing potential against related diseases. Plants with high FL values and can achieve a cure, the bioactive components are identified and targeted in the future for the purpose of phytochemical analysis... So the important medicinal plants for treating heart burn was *Curcumissativus*( UV = 0.233, FL = 100); for treating indigestion *Menthapiperita* (UV = 0.208, FL = 34.24); plant used for vomiting and diarrhoea is *Salvia officinalis* ( UV = 0.275, FL = 53.2); for constipation *Pimpinellaanisum* ( UV= 0.167, FL = 30.77);*Cuminumcyminum*(UV = 0.233 , FL = 71.8) for abdominal flatulence; finally *Menthapiperita*( UV = 0.133 , FL = 21.9) against irritable bowel syndrome.

Table 5 summarises published uses of these frequently used plants, the route of administration and safe dose.

This research will help conserve and enhance the understanding of herbal plants in Palestine for gastrointestinal disorders. In the present study ,*Prunusamygdalus*, *Matricariachamomilla*, *Ricinuscommunis*,*Zingiber officinalis*, *Salvia officinalis*, *Menthapiperita*, *Cuminumcyminum*and *Rosmarinus officinalis* were used mostly for treating digestive disorders at home.

## 5. Conclusion

This study successfully determined the prevalence of herbal medicine users in six gastrointestinal 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 GIT diseases.

It was found that the local population uses 40 plants from 16 separate families. Most of them grow in the wild, and some are cultivated, from these medicinal plants. (i.e. *Menthapiperita*, and *Ficuscarica*). People use these plants by drying, decoction or infusion during all seasons of the year. *Prunusamygdalus*, *Matricariachamomilla*, *Ricinuscommunis*, *Zingiber officinalis*, *Salvia officinalis*, *Cuminumcyminum*, *Menthapiperita* and *Rosmarinus officinalis* are the most commonly used plants. The most

commonly used sections of the plants were leaves and seeds. 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 (0.77). It may, therefore, be an indication that the data collected are accurate.

Table 5: Published medicinal uses of the most frequently used plants

<b>Plant species</b>	<b>Recorded literature sources defining similar usage</b>
<i>Mentha piperita</i>	(34) (35)
<i>Salvia officinalis</i>	(36) (37) (38)
<i>Cuminum cyminum</i>	(39) (40)
<i>Matricaria chamomilla</i>	(41) (42) (43)
<i>Zingiber officinalis</i>	(44) (45) (46)
<i>Ricinus communis</i>	(47) (48) (49)
<i>Pimpinella anisum</i>	(50)

	(51) (52)
<i>Prunus amygdalus</i>	(54 ,53) (55)
<i>Rosmarinus officinalis</i>	(56) (57) (58) (59)

**Declaration:**

**Ethical approval and consent to participate:**

The aims of this study, protocols and the informed consent were approved by the Institutional Review Board (IRB) at An –najah national university, as this study depends on a verbal questionnaire from adult participants ( above 18 years old) so there is no need for a written documented consent, and is approved by the ethics committee.

**Consent for publication:**

All authors gave the consent for publication of the manuscript and for NS to be the corresponding author.

**Availability of data and materials:**

Data are all contained with the article.

**Competing interests:**

The author declare that there is no financial competing interests.

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