



Prevalence of Using Aromatic and Medicinal Plants in the Treatment of Gastrointestinal Tract Diseases in Al-Taif City, Kingdom of Saudi Arabia

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: In recent years, there has been growing interest in the use of herbal drugs to treat Gastrointestinal Tract Diseases (GIT) diseases which widely spread in Saudi Arabia due to their efficacy and minimal side effect. Therefore, it is reasonable and timely to assess the validity of phytotherapeutics products as an adjuvant treatment for GIT problems.

Objectives: The current study aims to estimate the frequency of using aromatic and medicinal plants and identify the commonly used plants in the treatment of some GIT diseases in Al-Taif city, Kingdom of Saudi Arabia(KSA).

Methods: A cross-sectional study carried out among 655 citizens and residents of people who live in Al-Taif city from different age groups and educational levels. The data will be collected using the self-questionnaire paper and analyzed using SPSS software.

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Results: The study included 655 participants, (48.7%) of them aged from 20-29, (54.6%) were female and (92.8%) were Saudi. Most of the participants (74.6%) used aromatic and medicinal plants. Plants were effective in treating gastrointestinal diseases (97.3%) of the participants by consulting their friends and family or through social media. Diarrhea, constipation, vomiting, nausea, abdominal bloating and irritable bowel syndrome were the most common gastrointestinal diseases among the population of Al-Taif city. Cinnamon, fennel, senna, and turmeric were the most used plants and had positive results in treatment and minor side effects.

Conclusion: This study showed that the use of aromatic and medicinal plants in the treatment of gastrointestinal diseases is widespread in Al-Taif city and had a positive effect on the treatment of GIT diseases. The source of information is gained from friends, kindred and social media. Therefore, the media should have a great role in the interest and dissemination of correct and accurate information about medicinal plants.

Keywords: Aromatic and medicinal plants; GIT diseases; diarrhea; constipation; irritable bowel syndrome.

1. INTRODUCTION

The digestive system is a complex and vital part of our body, and it spans from the mouth to the rectum. It helps our body absorb various essential nutrients and facilitates the excretion of waste [1].

Gastrointestinal disorders account for minor, everyday complaints as well as major health problems. Dietary measures can improve symptoms that are caused, for example, by poor eating habits, but, if these are not successful, phytomedicines are also useful. Natural products are still the most commonly used remedies in cases of constipation, diarrhea, and flatulence, etc. Plants and their derivatives also offer a useful alternative treatment for other problems such as irritable bowel syndrome, motion sickness and dyspepsia [2].

Some common herbal medicines used in the treatment of digestive problems include:

Diarrhea: Many herbal drugs are used to treat diarrhea. Starch is used for rehydration purposes and derived from rice (*Oryza sativa* L.), maize (*Zea mays* L.) or potato (*Solanum tuberosum* L.). Giving starch-based foods (like gruels) is therapeutically beneficial and is the first-line treatment in minor self-limiting cases. Also, tannins are astringent, polymeric polyphenols found widely in plants. The most important plants used in the treatment of diarrhea are Pomegranate bark (*Punica granatum* L.), Black Catechu (*Acacia catechu* Willd.), and Oak bark (*Quercus robur* L.) [2]. It is also reported that German Chamomile (*Matricaria recutita* L.) is widely used in traditional medicine for the treatment of gastrointestinal disorders as

diarrhea. The decoction extract of chamomile flowers is rich in phenolic compounds including flavonoids, caffeic acid and tannins [3]. Myrtle (*Myrtus communis* L.) is rich in tannins and flavonoids. The infusion from the leaves and young branches and a decoction from the fruits of this plant were considered to be a health remedy for diarrhea [4]. An apple pectin-chamomile extract may help shorten the course of diarrhea in children, as well as relieve symptoms associated with the condition [5]. Other plant preparations including berberine (*Berberis aristata*), tormentil root (*Potentilla tormentilla*), baobaosan (from the baohuahua herb), carob (*Ceratonia siliqua*), pectin (*Malus domestica*), wood creosote (Creosote bush), guava (*Psidium guajava* L.), belladonna (*Atropa belladonna*), white bean (*Phaseolus vulgaris*), and wheat (*Triticum aestivum*) were identified as effective antidiarrheal herbs [6].

Constipation: A diet insufficient in fiber and/or inadequate fluid intake, lack of exercise, and poor bowel habits can contribute to constipation [7]. An example of herbs used in the treatment of constipation includes; Linseed (Flax), (*Linum usitatissimum*) are taking a whole, the inner layer of the test is only partially digested in the gastrointestinal tract and they will be excreted in the entire form [2]. Psyllium (*Plantago ovate*, *P. psyllium*, *P. arenaria* L.) is a dietary fiber used as emollients and bulk laxatives which help in maintaining a regular bowel movement. Its mucilage absorbs excess water while stimulating normal bowel elimination. Psyllium seed husks are indigestible and are used to relieve constipation, Irritable bowel syndrome (IBS) and diarrhea [2,8]. Osmotic laxatives such as lactulose or lactose, which are dimeric sugars derived from milk used in the treatment of long-

term constipation. Lactose splits in the GI tract into glucose and galactose, and galactose is not generally resorbed well. Consequently, the bacteria of the colon metabolize this sugar. The resulting acids, including lactic acid and acetic acid, have an osmotic effect, and the bacteria in the colon multiply more rapidly. This results in softening and increasing the number of feces, with a subsequent increase in GI peristalsis [2]. Stimulant laxatives such as senna which contains dianthrone glycosides (sennosides A - D), these compounds pass through the upper GI tract without any change; however, they are subsequently metabolized to rhein anthrone in the colon and caecum by the natural flora (mainly bacteria) of the GI tract. Anthranoid drugs act directly on the intestinal mucosa, increasing the peristalsis of the colon, reducing transit time and, consequently, the reabsorption of water from the colon. Senna is used to treating constipation and clear the bowel before some medical procedures [2,9]. Also, *Rhubarb* (*Rheum palmatum*) used for constipation because it contains anthraquinones [10]. *Dioscorea villosa* tincture of fresh root or trituration of resinoid dioscorein is used for constipation [8]. Slippery elm contains mucilage. It stimulates nerves in the gastrointestinal tract, which leads to mucus production and provides relief from constipation [9].

Irritable bowel syndrome: Irritable bowel syndrome (IBS) is a group of symptoms that occur together, including repeated pain in the abdomen and change in bowel movements which may be diarrhea, constipation, or both, abdominal pain and flatulence [7,11,12]. Some medicinal plants have been found effective in the treatment of irritable bowel syndrome. Artichoke is a spasmolytic plant used in IBS is associated with improving quality of life and improving bowel movement [13]. Volatile oil containing plants such as Peppermint oil, *Pinus sylvestris*, coriander oil, lemon balm, and tea tree are used for IBS due to their antibacterial effect [14].

Nausea and vomiting: Ginger has been used in the treatment of nausea and vomiting [15]. Also, *Artemisia absinthium*, *Camellia sinensis*, *Carum copticum*, *Cyperus rotundus*, *Cinnamomum zeylanicum*, *Foeniculum vulgare*, *Lycium barbarum*, and *Rosa indica* are used for the treatment [16].

Bloating or flatulence: Flatulence is the passage of excessive amounts of gas and the feeling of abdominal fullness and bloating, tightness, and movement of gas in the abdomen

is very uncomfortable condition [17]. Many medicinal plants are used traditionally in the treatment of bloating and flatulence. Clover dodder (*Cuscuta epithymum* L), and spearmin (*Mentha spicata* L) were recommended by Ibn-Sina for the treatment of flatulence [18]. Peppermint oil is also used in the treatment of flatulence [17]. Ginger (*Zingiber officinale*) has a laxative effect also used as a remedy against a variety of gastrointestinal disorders. Fennel and Anise have a carminative effect and are effective in improving the gastrointestinal tract. Caraway (*Carum carvi*) the carminative and antispasmodic properties of caraway are effective in the relieve bloating. Black seed or black cumin (*Nigella sativa*) has been used as a carminative to relieve bloating. It contains alkaloids and volatile oils. Cumin (cuminic aldehyde pinene and alpha-terpineol) improves gastrointestinal function and is effective in the removal of flatulence [19]. Artichoke, (*Cynara Scolymus* L.) the leaf extract can improve bloating and flatulence [2].

Dyspepsia: Functional dyspepsia (non-ulcer dyspepsia) is a motility disturbance characterized by postprandial sensations of fullness, non-acid eructation, dysphagia, nausea and vomiting, epigastric pain, heartburn and premature feelings of repleteness, without a discernible organic cause [20,21]. Some medicinal herbs are being used in the treatment of dyspepsia. Matricaria flower and lemon balm were found to be effective for the treatment of functional dyspepsia [22]. Red pepper is effective in decreasing the intensity of dyspeptic symptoms probably through the desensitization of gastric nociceptive C-fibres induced by its content of capsaicin [23,24]. Peppermint and caraway oil combined preparations are often used to treat functional dyspepsia [25]. Licorice enhances gastric mucus secretion has an antiulcer and anti-*H. pylori* effect. Cinnamon has been used for the treatment of patients with functional dyspepsia [22].

Peptic ulcer: Peptic ulcers are lesions caused by the instability of harmful and protective factors of the gastric and duodenal mucosa [26]. Many herbs are known to be effective in the treatment of peptic ulcers. Alginate or alginic acid is a polysaccharide distributed widely in brown algae including Laminaria, and *Ascophyllum nodosum*. Alginate binds with water to form a viscous gum and acts as a protective coating over the walls of the stomach and esophagus. Licorice, (*Glycyrrhiza glabra* L.) is used to relieve gastric inflammation, specifically in the case of peptic

ulcers and duodenal ulcers, but its use as a GI remedy is controversial because of its mineralocorticoid action. The most important bioactive secondary metabolite is glycyrrhizic acid (glycyrrhizin) which is a water-soluble pentacyclic triterpene saponin [2].

1.1 The Rationale of the Study

In recent years, there has been growing interest in the use of herbal drugs to treat GIT diseases which widely spread in Saudi Arabia due to their efficacy and minimal side effect. It is reasonable and timely to assess the validity of phytotherapeutics products as an adjuvant treatment for GIT problems. Therefore; the current study aims to estimate the frequency of using aromatic and medicinal plants and identify the commonly used plants in the treatment of some GIT diseases in Al-Taif city, KSA.

2. METHODOLOGY

A questionnaire of 22 questions was written carefully and directly used for this study and spaces were added for additional annotation, all the participants from Al-Taif city, KSA were asked to fill in these questions. Data were collected daily for two months period from the first of November to the end of December 2018. 700 questionnaires were distributed randomly to the research population and 655 questionnaires were received.

Analysis of data was carried out using descriptive analysis, and the main program (SPSS v22).

2.1 Pilot Study

A pilot study for the questionnaire was conducted before collecting the results of the sample. It was carried out to test the questionnaire using a small sample (40) compared to the planned sample size. It provides a trial run for the questionnaire, which involves testing the wordings of a question, identifying ambiguous questions, testing the techniques used to collect data, and measuring the effectiveness of standard invitation to respondents.

3. RESULTS

This study included 655 participants. The demographic data (Table 1, Chart 1) showed that (54.6%) of participants were female and (45.3%) were male. Most of the participants (48.7%) aged between 20-29 years, (23.9%) ranged from 30-40

years, (19.3%) under 20 years and the remaining (7.9%) were more than 40 years. The majority of participants (92.8%) were Saudi.

The most of GIT diseases were diarrhea, constipation, nausea and vomiting, flatulence and IBS (20.0%,19.0%,17.2%,14.6% and 14.0%, respectively) (Table 2, Chart 2).

Most of the participants (74.6%) used aromatic and medicinal plants for the treatment of GIT diseases, the majority used cinnamon (21.4%), followed by fennel (20.4%), senna (10.8%), turmeric (7.3%) (Table 3, Chart 3).

(79.1%) of participants had prescribed to use these plants from their kindred and friends, (13.9%) from social media while the lowest percentage of participants were advised from physician and pharmacist (3.4% and 2.2%, respectively) (Table 4, Chart 4).

Concerning the method of taking these plants, most of the participants (75.0%) take it as a drink after adding boiling water over the plant and (24.1%) of participants take it as a drink after being soaked in water. Only (20.0%) of participants used these plants regularly and (83.0%) used these plants when necessary (Table 4, Chart 4).

(78.3%) of participants did not tell their physicians' about the use of these plants and (78.5%) of them do not know the reason. While (21.6%) of participants told their physicians about their using of these plants and (83.0%) agreed the use of these plants, (16.0%) did not care and (0.9%) refused (Table 4, Chart 4).

Aromatic and medicinal plants revealed positive results (97.3%) in the treatment of the GIT diseases and only (6.9%) of participants suffer from side effects, such as colic (58.8%), vomiting (17.6%), constipation (14.7), sensitivity (5.8%) and major of participants did not tell their physician about these side effects (82.3%). While only (17.6%) of them tell him and response of physician as no comment (50%), use in little amount (16.6%), normal (16.6%), took when it is needed (16.6%) as shown in (Table 5, chart 5).

Other participants (25.3%) who did not take these plants in the treatment of GIT diseases preferred the use of medicines such as Buscopan® (24.0%), Simethicone (22.8%), Omeprazole (15.6%), Ranitidine (10.2%), Lactulose (9.6%), Antibiotics (6.6%) and Antihistamines (3.0%) (Table 5).

4. DISCUSSION

Most of the previous studies were talking about one type of plant or one type of disease compared with our present study. There was only one study conducted in Al- Taif City, KSA and it was reported that a high proportion of Al-Taif city population had been suffering from gastrointestinal diseases. They were used anise, chamomile, pomegranate, peppermint and ginger and the majority of patients noticed improvement after the use of herbs to overcome the problems of the GIT diseases and no side effects were recorded [27].

In the present study, the main objective was to estimate the prevalence of using aromatic and medicinal plants to treat GIT diseases, also, identify the commonly used plants to treat GIT diseases among people who live in Al-Taif City, KSA. In our study, 700 questionnaires were distributed to the research population and only six hundred and fifty-five completed the questionnaire, and the answers to these questions resulted in: In general, most of the participants complaining of GIT disease. diarrhea and a large proportion of them using both aromatic and medicinal plants such as cinnamon, fennel, and senna which are the most used, respectively, followed by turmeric, basil, linseed, liquorice and artemisia which are the least used, respectively. Also, the study revealed other GIT

diseases and other different plants used by the participants. The most important results were most of the participants have been experienced positive results which indicate the efficacy of using these plants, only a small proportion of the participants have been experienced minimal side effects of used plants. For the minor or specific results about participants behavior: A large proportion of them using plants sometimes when necessary, as a drink after adding boiling water over it, also the most important synthetic drugs were used in case of non-using any plants were buscopan, simethicone, omeprazole, ranitidine, lactulose, antibiotics, antihistamines, esomeprazole, metoclopramide, analgesics, and activated charcoal.

The results of this study showed the importance of aromatic and medicinal plants in the treatment of GIT diseases as 74.6% of participants used them. The high percentage of positive results confirmed the effectiveness of natural drugs for the treatment of GIT diseases. The data proved the importance of cinnamon, fennel and senna are the most commonly used herbal drugs and the side effects were minor 6.9% such as colic 58.8% and vomiting 17.6%. The obtained results showed that most of the participants were college students 72.5%, they took advice from kindred and friends 79.1% and social media rather than physician and pharmacist which reflected the effect of media.

Table 1. Demographic characteristics of the participants

Question	Category	Total	Frequency	Percent
Gender	Female	655	358	54.6%
	Male		297	45.3%
Age	Less than 20 years	655	127	19.3%
	From 20 -29 years		319	48.7%
	From 30 -40 years		157	23.9%
	More than 40 years		52	7.9%
Nationality	Saudi	655	608	92.8%
	Non-Saudi		47	7.1%
Place of residence	City	655	520	79.3%
	Village		135	20.6%
Educational level	Uneducated	655	5	0.7%
	Primary school students		3	0.4%
	Intermediate school students		54	8.2%
	High school students		90	13.7%
	College students		475	72.5%
	Postgraduate students		28	4.2%

1. Gender

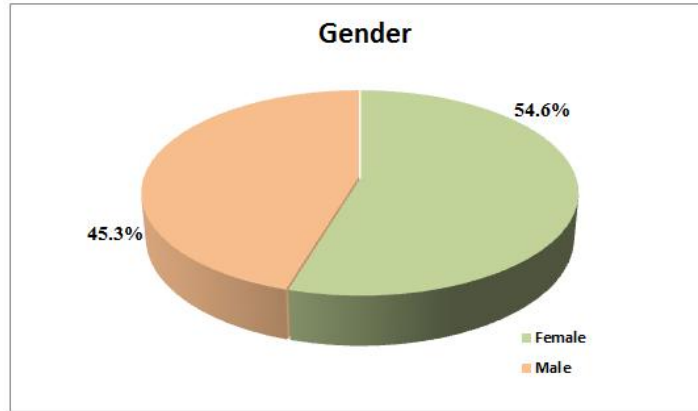


Chart (1.a)

2. Age

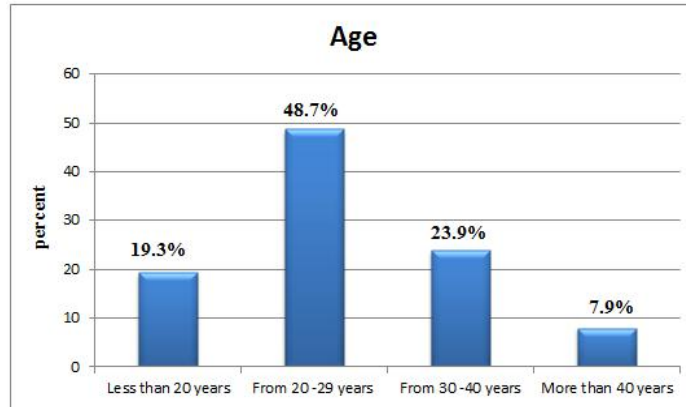


Chart (1.b)

3. Nationality

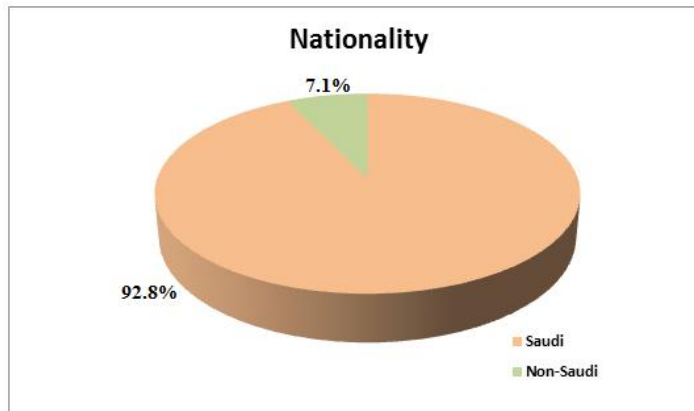


Chart (1.c)

4. Place of Residence

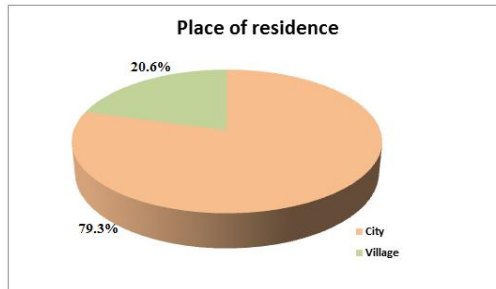


Chart (1.d)

5. Educational Level

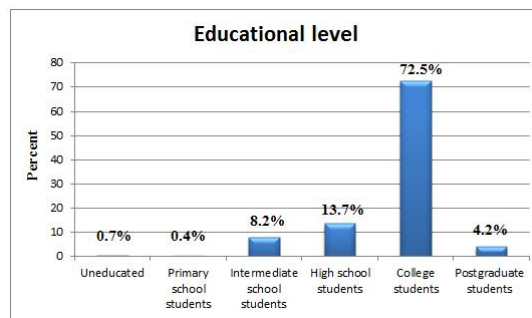


Chart (1.e)

Chart 1. Demographic characteristics of participants

Table 2. GIT diseases

Question	Category	Total	Frequency	Percent
Have you ever experienced any of these diseases? can be selected more than one answer.	Irritable bowel syndrome	655	92	14.0%
	Diarrhea		131	20.0%
	Constipation		125	19.0%
	Flatulence		96	14.6%
	Functional dyspepsia		66	10.0%
	Gallstones		13	1.9%
	Peptic ulcer		17	2.5%
	Nausea and vomiting		113	17.2%
	Other: colic, Jaundice		2	0.3%

Have you ever experienced any of these diseases? can be selected more than one answer.

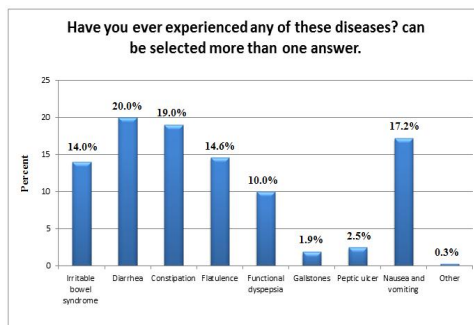


Chart 2. GIT diseases

Table 3. Aromatic, medicinal plant used

Question	Category	Total	Frequency	Percent
Do you use any aromatic or medicinal plants to treat gastrointestinal diseases?	Yes	655	489	74.6%
	No		166	25.3%
If yes, any of these plants were used? can be selected more than one plant.	Senna	489	53	10.8%
	Liquorice		26	5.3%
	Turmeric		36	7.3%
	Fennel		100	20.4%
	Artenisia		9	1.8%
	Cinnamon		105	21.4%
	Basil		35	7.1%
	Linseed		34	6.9%
	Other aromatic plants:(anise, peppermint, ginger, cumin, blackseed, chamomile, clove, coriander, parsley, marjoram, thyme, salvia, garlic, and lemon)		52	10.6%
	Other medicinal plants: (Pomegranate peel, barley, hibiscus, argel, Seed of pumpkin, arnica, Green tea, and fenugreek)		39	7.9%

Do you use any aromatic or medicinal plants to treat gastrointestinal diseases?

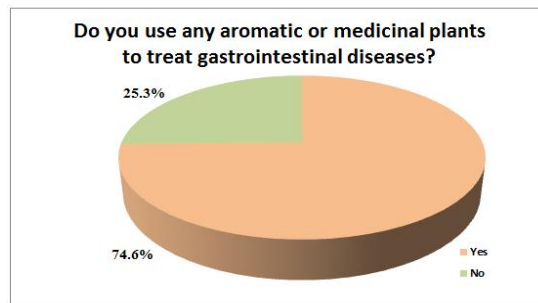


Chart (3.a)

If yes, any of these plants were used? can be selected more than one plant.

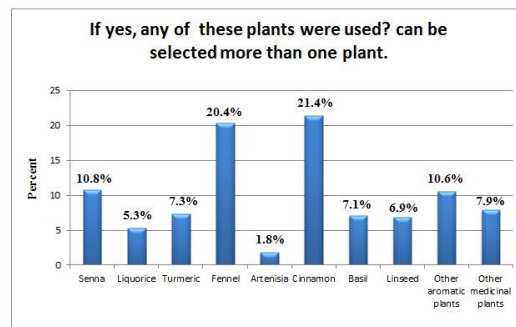


Chart (3.b)

Chart 3. The most aromatic and medicinal plants used

Table 4. Prescribers and the behavior of participants and physicians

Question	Category	total	Frequency	Percent
Who prescribed them for you?	Physician	489	17	3.4%
	Pharmacist		11	2.2%
	kindred and friends		387	79.1%
	Social media		68	13.9%
	Others: from books.		6	1.2%
How do you take them?	As a drink after adding boiling water over it	489	367	75.0%
	As a drink after being soaked in water		118	24.1%
	Other methods: taken as a powder		4	0.8%
Do you use them regularly, as medicines?	Yes	489	98	20.0%
	No		391	79.9%
How often do you take them?	Sometimes when necessary	489	406	83.0%
	Once a day		55	11.2%
	Two times daily		21	4.2%
	Three times daily		2	0.4%
	More than three-time daily		5	1.0%
Did you tell your physician about using them?	Yes	489	106	21.6%
	No		383	78.3%
If yes, what was his opinion?	Did not agree to use them	106	1	0.9%
	Agreed to use them		88	83.0%
	Did not care		17	16.0%
If no, why did not you tell him about your using of these plants?	To not upset the physician	383	11	2.8%
	Fear of physician rejection		71	18.5%
	Do not know the reason		301	78.5%

Volatile oils and other derivatives, such as cinnamaldehyde, cinnamic acid, and cinnamate have been reported as chemical constituents of cinnamon, while volatile compounds, flavonoids, phenolic compounds, fatty acids, and amino acids are chemical constituents of fennel. These constituents are responsible for these observed significant effects of these plants in the treatment of GIT diseases. Cinnamon has prebiotic like activity by enhance the growth of beneficial

bacteria and inhibit the growth of pathogenic bacteria. the major constituents were characterized antioxidant effect measuring by using colorimetrically their enhancement of gastrointestinal health [28]. Peppermint oil contains active principle menthol –contains a cyclic monoterpene has anti-spasmodic properties act by block calcium channel of intestinal smooth muscles. These effect relieving the symptoms of IBS as diarrhea [29].

Who prescribed them for you?

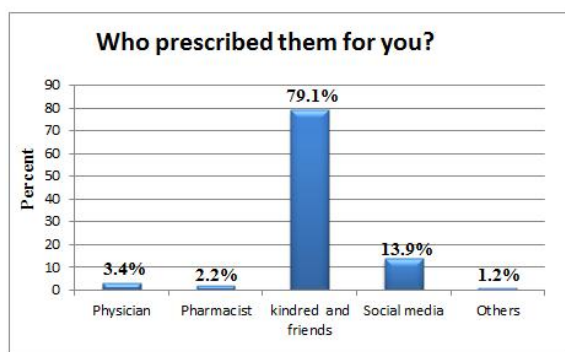


Chart (4.a)

How do you take them?

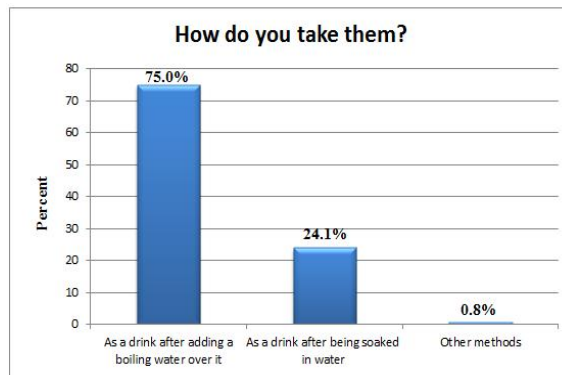


Chart (4.b)

Do you use them regularly, as medicines?

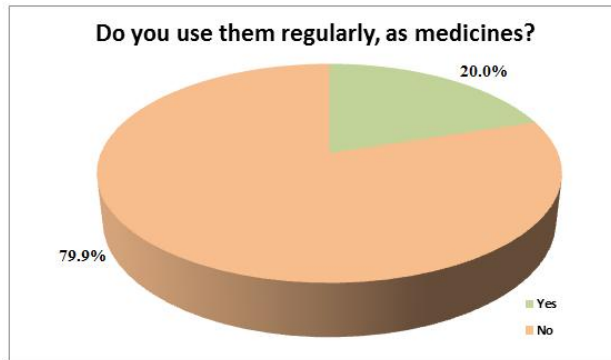


Chart (4.c)

How often do you take them?

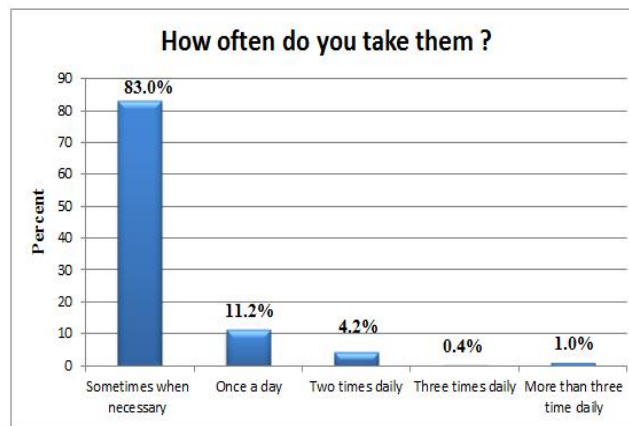


Chart (4.d)

Did you tell your physician about using them?

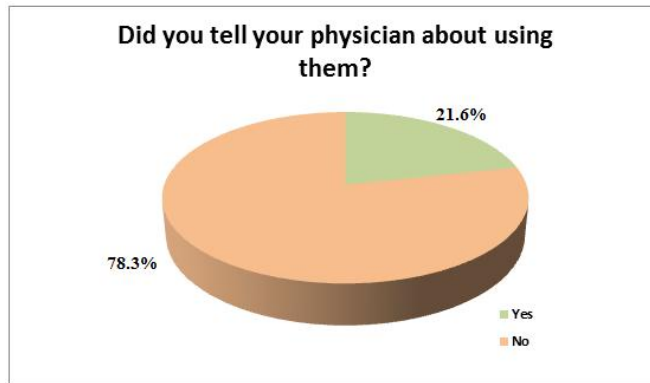


Chart (4.e)

If yes, what was his opinion?

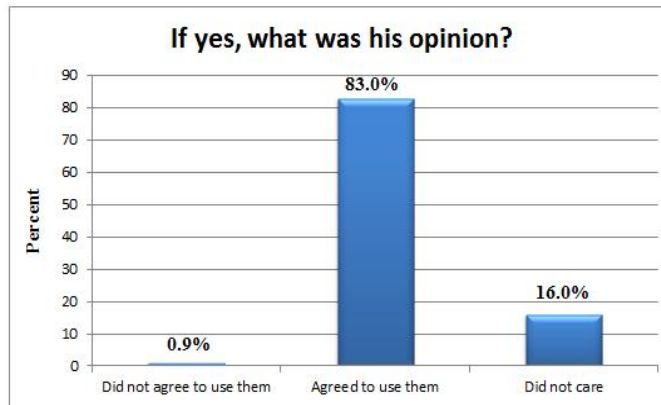


Chart (4.f)

If no, why did not you tell him about your using of these plants?

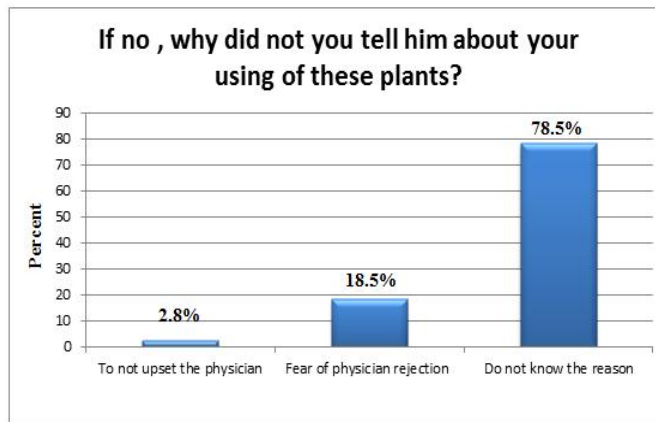


Chart (4.g)

Chart 4. Prescribers and the behavior of participants and physicians

Table 5. Participants comments

Question	Category	Total	Frequency	Percent
Did aromatic or medicinal plants give you positive results?	Yes	489	476	97.3%
	No		13	2.6%
Do you intend to use them again?	Yes	489	459	93.8%
	No		30	6.1%
Have you experienced any side effects as a result of using them?	Yes	489	34	6.9%
	No		455	93.0%
If yes, what do the side effects happen to you?	Colic	34	20	58.8%
	Constipation		5	14.7%
	Vomiting		6	17.6%
	Sensitivity		2	5.8%
	Others: dizziness, dyspepsia		1	2.9%
Did you tell your physician about these side effects?	Yes	34	6	17.6%
	No		28	82.3%
If yes, what was his response?	Use them in little amounts	6	1	16.6%
	No comment		3	50%
	Normal		1	16.6%
	Take them when needed		1	16.6%
In case of not using aromatic or medicinal plants, what medicines do you use?	Medicine name: Omeprazole	166	26	15.6%
	Antihistamines		5	3.0%
	Antibiotics		11	6.6%
	Ranitidine		17	10.2%
	Metoclopramide		1	0.6%
	Esomeprazole		2	1.2%
	Buscopan		40	24.0 %
	Lactulose		16	9.6%
	Simethicone		38	22.8%
	Names of other medicines: Analgesics Activated charcoal,		10	6.0%

Did aromatic or medicinal plants give you positive results?

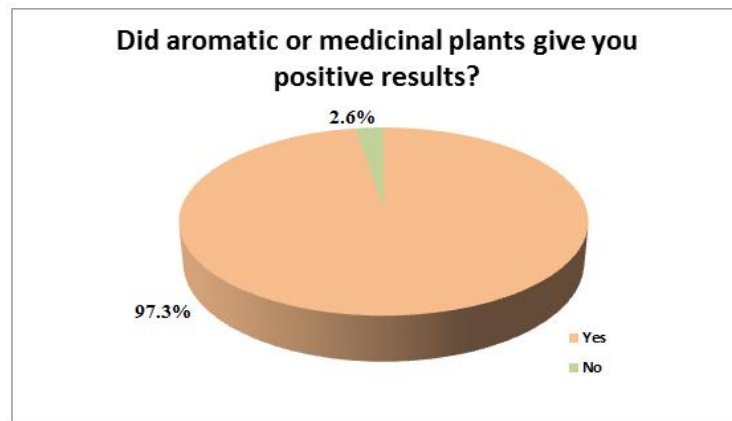


Chart (5.a)

Do you intend to use them again?

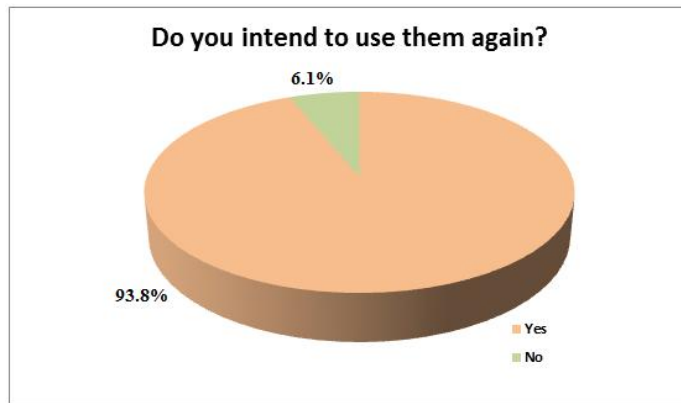


Chart (5.b)

Have you experienced any side effects as a result of using them?

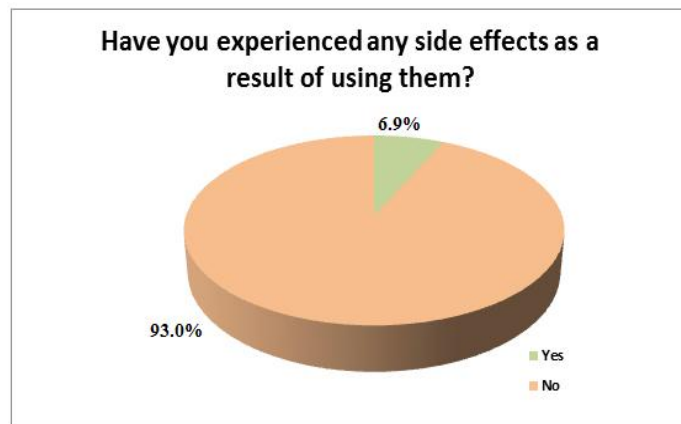


Chart (5.c)

If yes, what do the side effects that happen to you?

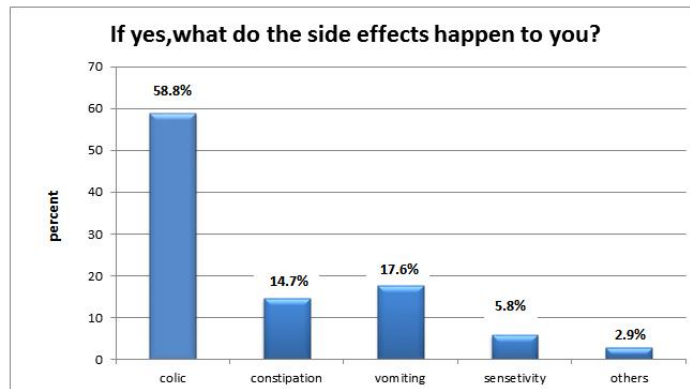


Chart (5.d)

Did you tell your physician about these side effects?

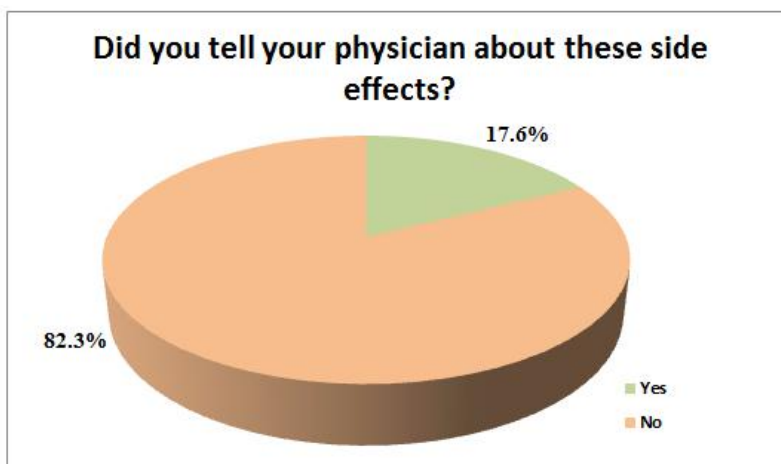


Chart (5.e)

Chart 5. Participants comments

In conclusion; The results showed that aromatic and medicinal plants are commonly used as an effective treatment for GIT diseases in Al-Taif City, KSA. The commonly used plants are cinnamon, fennel, senna, and turmeric. Most physicians agreed with the participants to use these plants. These plants are safe and cause minor side effects.

5. CONCLUSION

The results showed that aromatic and medicinal plants are commonly used as effective treatment for GIT diseases in Al-Taif City, KSA. The commonly used plants are cinnamon, fennel, senna and turmeric. Most physicians agreed with the participants to use these plants. These plants are safe and cause minor side effect. Only 6.9% of participants suffer from side effects according to the survey.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT AND ETHICAL APPROVAL

The study proposal has been approved by the ethical committee at Faculty of Pharmacy, Taif University and verbal consent has been taken from the participants who agreed to participate in the study.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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