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Original Research

Roast Natural Products for Gastrointestinal Disorders

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Abstract

The intensive heat treatment of roasting, a cooking method using hot air, has a major role in food industries. In Traditional Pharmacy of Iran, roasting was a common treatment for natural products. Therein, specific parts of medicinal plants and some minerals were necessarily roasted in order to obtain special characteristics. *Qarabadin Salehi* was searched to extract multi-component products which included roast ingredients. Effects and indications of each multi-ingredient, used part of ingredients, their proportion in formulation, and the percentage of roast part were mentioned. Thirty formulations which had at least one roast herbal or mineral component were found. They had been suggested for diarrhea, dysentery (*Zahir*), emesis, enteritis (*Sahj*), enteric ulcers, gastritis, gripe (*maghs*), hemorrhoid, and rectal hemorrhage. Other effects were carminative, digestive, liver tonic, stomachic, and tonic. Thirty cases of roast seeds, and ten cases of roast fruits were reported. Twenty-five compounds out of 30 improve abnormal fluid secretion into the small bowl and electrolyte imbalance symptoms. The formulations can be more effective in the case of liquid absorption. Generally, roasting has been a valuable treatment for processing natural products which are used in compounds for gastrointestinal disorders.

Keywords: Roasting, Traditional Persian Pharmacy, Gastrointestinal, Diarrhea

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Introduction

The intensive heat treatment of roasting, a cooking method using hot air, has a major role in food industries. Through enveloping materials in dry heat of about 150-300 ºC, chemical reactions, including Maillard browning, Strecker degradation, and pyrolysis which are the most important flavor-producing reactions occur [1]. Generally, nuts, seeds, and fruits undergo this heat process, through which their physicochemical properties change depending on both roasting time and temperature [2]. Oil and water absorption capacity, along with antioxidant properties of sweet chestnut have increased by microwave roasting. However, its viscoelastic behavior has decreased [3]. Roasting causes development of crunchy texture of nuts [4]. Hazelnuts, apricot kernel, and pumpkin are some instances [2,5-6]. Monitoring fatty acid profiles by gas chromatography has proved dramatic changes after roasting yellow and brown varieties of flaxseeds [7].

In Traditional Pharmacy of Iran, roasting was a common treatment for natural products. Therein, specific parts of medicinal plants and some minerals were necessarily roasted in order to obtain special characteristics. According to medieval books of pharmacy, three methods used to be utilized for roasting various materials. Wrapped inside fruits like apple and quince, or dough, then put under fire or hot ash, natural products underwent *Tashvieh*. For another technique, *Tahmis*, herbs or minerals used to be poured in a hot pan, while being stirred quickly and continuously to prevent from burning. Changing aroma and color shows the end of process. However, if a little amount of oil is applied for roasting, the method would be called *Taghlieh*, mostly ended with light browning, or the fruits bursting [8-9]. Reaching the balance of natural products' properties was mentioned the philosophy behind these processes. Intensifying the strength of efficacy, reducing severe purgation, and slaking stringency were some reasons for necessity of roasting process in pharmacy [9].

Numerous roast plants and minerals exist in traditional compounds prescribed for gastrointestinal diseases. The current study deals with collecting gastrointestinal-targeted compounds which include roast plant parts. Moreover, therapeutic effects related to roasting will be discussed.

Methods

In order to extract multi-component products including roast ingredients, *Qarabadin Salehi* was searched to find keywords with the meaning of roasting and roast like *Tashvieh*, *Mashvi*, *Tahmis*, *Mohammes*, *Taghlieh*, and *Maghlou*. The compounds were categorized based on disease groups for which they had been suggested. Gastrointestinal (GI) formulations were analyzed to explain whether there is a reasonable relationship between roast ingredients and the treatment of the diseases or not. Scientific names of the plants were authenticated using indices of *Kitab-al Saydana fi Tibb* (10th century), *Al-Aghraz al-Tibbia* (11th century), *Al-Mojiz fi-Tibb* (13th century), and *Useful Plants of Iran and Iraq* (1937) in addition to being checked in www.theplantlist.org [10-14]. GI chapter of

Tib Akbari (1701) was studied to obtain mechanisms of treatment [15].

Any multi-component formulation with a roast animal part was excluded. Effects and indications of each multi-ingredient were extracted. The used part of ingredients, their proportion in formulation, and the percentage of roast part were mentioned.

Results

Thirty-two formulations which had at least one roast component were extracted from *Qarabadin Salehi*. Two multi-ingredients with roast animal part were excluded. As table 1 presents, dosage forms included two *javareshs*,one *hab*, one *dava*, thirteen *safoufs*, and thirteen types of *qors*. They had been suggested for diarrhea, dysentery (*Zahir*), emesis, enteritis (*Sahj*), enteric ulcers, gastritis, gripe (*maghs*), hemorrhoid, and rectal hemorrhage. Other effects were carminative, digestive, liver tonic, stomachic, and tonic. The least and the highest number of ingredients in formulations were three and twelve. Nine formulations included fifty percent or more roast ingredients. Out of 30 compounds, just one had a roast mineral (Terra armeniaca). However, the rest had one or more roast herbal parts. In Table 2, roast natural products, their used parts in each formulation, and the percentage of roasting part are listed. The total number of reports for each effect or indication is demonstrated in Figure 1.

Table 1. Gastrointestinal formulations with roast components, their effects, indications, ingredients, and their used parts, proportion, and percentage of roast parts [8].

Roast ingredients are underlined. In the last column, numbers in parenthesis show the sum of roast parts.

Effects are shown with -. Indications are presented with =.

Abbreviations for used parts are as below: ba: bark, bu: bud, ex: exudate (gum, gumresin, latex, oleogumresin, resin), fl: flower, fr: fruit, g: gall, le: leave, m: mineral, p: peel, r: root, rh: rhizome, s: seed, sm: stem, st: stigma.

	Compound	- Effects/ = Indications	Ingredients	Used part	Proportion	rost %
1	Javaresh (Bozouri)	- Carminative - Digestive - Stomachic	1.*Apium graveolens* L. 2.*Cinnamomum cassia* Blume. 3.*Juniperus sabina L.* 4.*Languas officinarum* Burkill. 5.*Lepidium sativum* L. 6.*Pistacia lentiscus* L. 7.*Syzygium aromaticum* L. 8.*Trachyspermum ammi* (L.) Sprague.	fr ba fr rh s ex bu fr	2 3 5 3 21 3 3 2	50
2	Javaresh (Khoozi)	- Stomachic	1.*Commiphora africana* (A.Rich.) Engl. 2.Fe_3O_4 (in vinegar) 3.*Lepidium sativum* L. 4.*Terminalia chebula* Retz. 5.*Trachyspermum ammi* (L.) Sprague. 6.*Zataria multiflora* Boiss.	ex m s fr fr le	10 10 5 10 2 3	13

3	Hab (Moghl)	= Rectal hemor-rhage	1.*Commiphora mukul* Engl. 2.*Pinites succinifer* 3.*Terminalia citrina* Roxb.	ex ex fr	5 1 3	33
4	Dava (Fars)	- Stomachic	1.Fe_3O_4 2.*Lepidium sativum* L. 3.*Terminalia chebula* Retz. 4.*Trachyspermum ammi* (L.) Sprague. 5.*Zataria multiflora* Boiss.	m s fr fr le	10 5 10 3 3	(48)
5	Safouf	= Diarrhea	1.*Acacia arabica* Willd. 2.*Ceratonia siliqua* L. 3.*Myrtus communis* L. 4.*Punica granatum* L. 5.*Punica granatum* L. 6.*Rhus coriaria* L.	ex fr fr fl s f	2 15 5 2 5 10	13
6	Safouf	= Diarrhea	1.*Acacia arabica* Willd. 2.*Castanea sativa* Mill. 3.*Ceratonia siliqua* L. 4.*Myrtus communis* L. 5.*Papaver somniferum* L.	ex fr fr fr s	1 2 2 2 2	22
7	Safouf (Jouz)	= Diarrhea	1.*Boswellia carterii* Bird. 2.*Juglans regia* L. 3.*Trachyspermum ammi* (L.) Sprague.	ex fr fr	1 6 1	75
8	Safouf (Zereshk)	= Diarrhea - Liver tonic - Stomachic	1.*Berberis vulgaris* L. 2.*Punica granatum* L. 3.*Rhus coriaria* L. 4.Sugar 5.*Trachyspermum ammi* (L.) Sprague. 6.*Zingiber officinale* Rosc. 7.*Ziziphus spina-christi* L.	fr s fr - fr rh fr	1 1 1 10 1 1 1	6
9	Safouf (Somagh)	= Diarrhea	1.*Acacia arabica* Willd. 2.*Anagyris foetida* L. 3.*Myrtus communis* L. 4.*Punica granatum* L. 5.*Punica granatum* L. 6.*Rhus coriaria* L.	ex fr fr fl s fr	2 15 5 2 5 1	17
10	Safouf (Tin)	= Diarrhea = Enteritis	1.*Acacia arabica* Willd. 2.*Ocimum basilicum* L. 3.*Plantago psyllium* L. 4.Starch 5.Terra armeniaca 6.*Teucrium marum* L.	ex s s - m s	1 1 1 1 1 1	(33)

11	Safouf (Tin)	= Dysentery = Enteric ulcers	1.*Acacia arabica* Willd.	ex	5	(78)
			2.*Lepidium sativum* L.	s	7	
			3.*Ocimum basilicum* L	s	7	
			4.*Plantago psyllium* L.	s	7	
			5.*Portulaca oleracea* L.	s	7	
			6.*Rumex acetosa* L.	s	7	
			7.Terra armeniaca	m	5	
12	Safouf (Moghliatha)	= Enteritis = Gripe = Hemorrhoid	1.*Allium porrum* L.	s	3	(93)
			2.*Carum carvi* L.	fr	2	
			3.*Lepidium sativum* L.	s	30	
			4.*Linum* spp.	s	2	
			5.*Pistacia lentiscus* L.	ex	3	
			6.*Terminalia citrina* Roxb.	fr	7	
13	Safouf (Moghliatha)	= Dysentery = Hemorrhoid	1.*Allium porrum* L.	s	2	(88)
			2.*Cuminum cyminum* L.	fr	5	
			3.*Lepidium sativum* L.	s	20	
			4.Linum spp.	s	2	
			5.*Taxus baccata* L.	l	2	
			6.*Terminalia citrina* Roxb.	fr	2	
14	Safouf (Moghliatha)	= Dysentery = Hemorrhoid	1.*Acacia arabica* Willd.	ex	5	(74)
			2.*Apium graveolens* L.	fr	2	
			3.*Lepidium sativum* L.	s	3	
			4.*Linum* spp.	s	3	
			5.*Plantago psyllium* L.	s	3	
			6.Terra armeniaca	m	3	
15	Safouf (Moghliatha)	= Diarrhea - Tonic	1.*Allium schoenoprasum* L.	s	10	(60)
			2.*Commiphora mukul* Engl.	ex	6	
			3.*Cuminum cyminum* L.	fr	10	
			4.*Lepidium sativum* L.	s	3	
			5.*Terminalia chebula* Retz.	fr	6	
			6.*Terminalia citrina* Roxb.	fr	6	
16	Safouf (Neshasteh)	= Diarrhea = Enteritis	1.*Acacia arabica* Willd.	ex	1	(100)
			2.*Berberis vulgaris* L.	fr	1	
			3.*Ocimum minimum* L.	s	1	
			4.*Salvia spinosa* L.	s	1	
			5.Starch	-	1	
17	Safouf (Yahya Masouye)	= Dysentery = Enteritis = Gripe	1.*Acacia arabica* Willd.	ex	2	27
			2.*Althaea officinalis* L.	s	2	
			3.*Malva rotundifolia* L.	s	2	
			4.Starch	-	3	
			5.Terra armeniaca	m	2	

18	Qors (Vard)	= Diarrhea	1.*Acacia arabica* Willd.	ex	5	(10)
			2.*Aquilaria agallocha* Roxb.	ex	3	
			3.*Bambusa arundinacea* Willd.	sm	5	
			4.*Berberis vulgaris* L.	fr	3	
			5.*Crocus sativus* L.	st	3	
			6.*Ficus laccifera* Roxb.	ex	5	
			7.*Rheum officinale* Baill.	r	4	
			8.*Rosa* × *damascena* Herrm	fl	5	
			9.*Rumex acetosa* L.	s	6	
			10.Terra armeniaca	m	7	
			11.*Valeriana jatamansi* Jones.	r/rh	3	
19	Qors (Vard)	= Dysentery = Enteritis	1.*Acacia arabica* Willd.	ex	1	(37)
			2.*Coriandrum sativum* L.	s	1	
			3.*Rosa* × *damascena* Herrm	fl	3	
			4.*Rumex acetosa* L.	s	2	
			5.Starch	-	1	
20	Qors (Gol)	= Gastritis	1.*Glycyrrhiza glabra* L.	rh	4	13
			2.*Rosa* × *damascena* Herrm	fl	6	
			3.Starch	-	2	
			4.*Valeriana jatamansi* Jones.	r/rh	4	
21	Qors (Gol)	= Diarrhea	1.*Acacia arabica* Willd.	ex	5	(20)
			2.*Aquilaria agallocha* Roxb.	ex	3	
			3.*Bambusa arundinacea* Willd.	sm	5	
			4.*Berberis vulgaris* L.	fr	2	
			5.*Crocus sativus* L.	st	3	
			6.*Ficus laccifera* Roxb.	ex	5	
			7.*Lilium canditum* L.	r	3	
			8.*Rheum officinale* Baill.	r	5	
			9.*Rosa* × *damascena* Herrm	fl	5	
			10.*Pinites succinifer*	ex	5	
			11.*Portulaca oleracea* L.	s	6	
			12.Terra armeniaca	m	7	
22	Qors (Hab-ol-aas)	= Diarrhea	1.*Myrtus communis* L.	fr	1	17
			2.*Quercus persic*a Jaub. & Spach	fr	1	
			3.*Rhus coriaria* L.	fr	1	
			4.Starch	-	1	
			5.*Tamarix gallica* L.	fr	1	
			6.Terra armeniaca	m	1	

23	Qors (Hab-ol-aas)	= Diarrhea = Dysentery = Emesis	1.*Commiphora africana* (A.Rich.) Engl.	ex	2	
			2.*Myrtus communis* L.	fr	10	
			3.*Punica granatum* L.	p	5	
			4.*Quercus* spp.	g	5	
			5.Rhus coriaria L.	fr	10	
			6.Starch	-	10	14
			7.*Tamarix gallica* L.	fr	10	
			8.Terra armeniaca	m	10	
			9.*Quercus persic*a Jaub. & Spach	fr	10	
24	Qors (Mourd)	= Diarrhea = Emesis	1.*Commiphora africana* (A.Rich.) Engl.	ex	2	
			2.*Myrtus communis* L.	fr	2	
			3.*Punica granatum* L.	p	1	
			4.*Quercus persica* Jaub. & Spach	fr	2	
			5.*Quercus* spp.	g	1	
			6.*Rhus coriaria* L.	fr	2	
			7.Starch	-	2	13
			8.*Tamarix gallica* Vahl.	fr	2	
			9.Terra armeniaca	m	2	
25	Qors (Tabashir)	= Diarrhea = Tonic	1.*Acacia arabica* Willd.	ex	6	
			2.*Bambusa arundinacea* Willd.	sm	6	
			3.*Berberis vulgaris* L.	fr	6	
			4.*Crocus sativus* L.	st	1	
			5.*Myrtus communis* L.	fr	6	
			6.*Rosa* × *damascena* Herrm	fl	20	
			7.*Rumex acetosa* L.	s	6	
			8.Starch	-	6	11
26	Qors (Tabashir)	= Diarrhea	1.*Acacia arabica* Willd.	ex	10	
			2.*Bambusa arundinacea* Willd.	sm	10	
			3.*Rosa* × *damascena* Herrm	fl	8	(50)
			4.*Rumex acetosa* L.	s	10	
			5.Starch	-	8	
			6.Terra armeniaca	m	10	
27	Qors (Tabashir)	= Diarrhea	1.*Acacia arabica* Willd.	ex	4	
			2.*Bambusa arundinacea* Willd.	sm	7	
			3.*Rosa* × *damascena* Herrm	fl	7	
			4.*Rumex acetosa* L.	s	4	
			5.Starch	-	2	7
			6.Terra armeniaca	m	4	

28	Qors (Tabashir)	= Diarrhea	1.*Acacia arabica* Willd.	ex	6	
			2.*Bambusa arundinacea* Willd.	sm	10	
			3.*Berberis vulgaris* L.	fr	6	
			4.*Crocus sativus* L.	st	1	
			5.*Ocimum minimum* L.	s	20	
			6.*Portulaca oleracea* L.	s	6	7
			7.*Punica granatum* L.	fl	6	
			8.*Rosa* × *damascena* Herrm	fl	14	
			9.*Rumex acetosa* L.	s	6	
			10.*Santalum album* L.	sm	4	
			11.Starch	-	6	
			12.Terra armeniaca	m	6	
29	Qors (Tabashir)	= Diarrhea - Tonic	1.*Acacia arabica* Willd.	ex	2	
			2.*Bambusa arundinacea* Willd.	sm	3	
			3.*Corallium rubrum* Lam.	r	2	
			4.*Cynomorium coccineum* L.	rh	2	
			5.*Papaver somniferum* L.	s	5	24
			6.pearl	m	3	
			7.*Pinites succinifer*	ex	2	
			8.*Rumex acetosa* L.	s	2	
30	Qors (Kafour)	= Diarrhea	1.*Acacia arabica* Willd.	ex	20	
			2.*Bambusa arundinacea* Willd.	sm	20	
			3.*Cinnamomum camphora* L.	ex	1	
			4.*Myrtus communis* L.	fr	20	
			5.*Rosa* × *damascena* Herrm	fl	20	
			6.*Rumex acetosa* L.	s	20	17
			7.Terra sigillata	m	20	

Table 2. Roast herbal or mineral components applied in thirty gastrointestinal formulations of *Qarabadin Salehi* and their percentage in each formulation.

Roast natural product	Family	Used part	Formulations	Percentage
Acacia arabica Willd.	Leguminosae	exudate	14.Safouf (Moghliatha)	31
			16.Safouf (Neshasteh)	20
			18.Qors (Vard)	10
			21.Qors (Gol)	9
			26.Qors (Tabashir)	18
Allium porrum L.	Alliaceae	seed	12.Safouf (Moghliatha)	6
Berberis vulgaris L.	Berberidaceae	fruit	16.Safouf (Neshasteh)	20
Carum carvi L.	Apiaceae	fruit	12.Safouf (Moghliatha)	4
Cuminum cyminum L.	Apiaceae	fruit	13.Safouf (Moghliatha)	15
			15.Safouf (Moghliatha)	24
Juglans regia L.	Juglandaceae	fruit	7.Safouf (Jouz)	75

Lepidium sativum L.	Brassicaceae	seed	1.Javaresh (Bozouri)	50
			2.Javaresh (Khoozi)	13
			4.Dava (Fars)	16
			11.Safouf (Tin)	15
			12.Safouf (Moghliatha)	63
			13.Safouf (Moghliatha)	60
			14.Safouf (Moghliatha)	19
			15.Safouf (Moghliatha)	7
Linum spp.	Linaceae	seed	12.Safouf (Moghliatha)	4
			13.Safouf (Moghliatha)	6
			14.Safouf (Moghliatha)	19
Ocimum basilicum L.	Lamiaceae	seed	11.Safouf (Tin)	15
Ocimum minimum L.	Lamiaceae	seed	16.Safouf (Neshasteh)	20
Papaver somniferum L.	Papaveraceae	seed	6.Safouf	22
			29.Qors (Tabashir)	24
Plantago psyllium L.	Plantaginaceae	seed	11.Safouf (Tin)	15
			14.Safouf (Moghliatha)	19
Portulaca oleracea L.	Portulacaceae	seed	11.Safouf (Tin)	15
			21.Qors (Gol)	11
			28.Qors (Tabashir)	7
Punica granatum L.	Lythraceae	seed	5.Safouf	13
			8.Safouf (Zereshk)	6
			9.Safouf (Somagh)	17
Rumex acetosa L.	Polygonaceae	seed	11.Safouf (Tin)	15
			18.Qors (Vard)	12
			19.Qors (Vard)	25
			26.Qors (Tabashir)	18
			30.Qors (Kafour)	17
Salvia spinosa L.	Lamiaceae	seed	16.Safouf (Neshasteh)	20
Starch	-	-	10.Safouf (Tin)	17
			16.Safouf (Neshasteh)	20
			17.Safouf (Yahya Masouye)	27
			19.Qors (Vard)	12
			20.Qors (Gol)	13
			22.Qors (Hab-ol-aas)	17
			23.Qors (Hab-ol-aas)	14
			24.Qors (Mourd)	13
			25.Qors (Tabashir)	11
			26.Qors (Tabashir)	14
			27.Qors (Tabashir)	7
*Taxus baccat*a L.	Taxaceae	leave	13.Safouf (Moghliatha)	6

Terminalia chebula Retz.	Combretaceae	fruit	4.Dava (Fars) 15.Safouf (Moghliatha)	32 15
Terminalia citrina Roxb	Combretaceae	fruit	3.Hab (Moghl) 12.Safouf (Moghliatha) 15.Safouf (Moghliatha)	33 15 15
Terra armeniaca	-	mineral	10.Safouf (Tin)	17

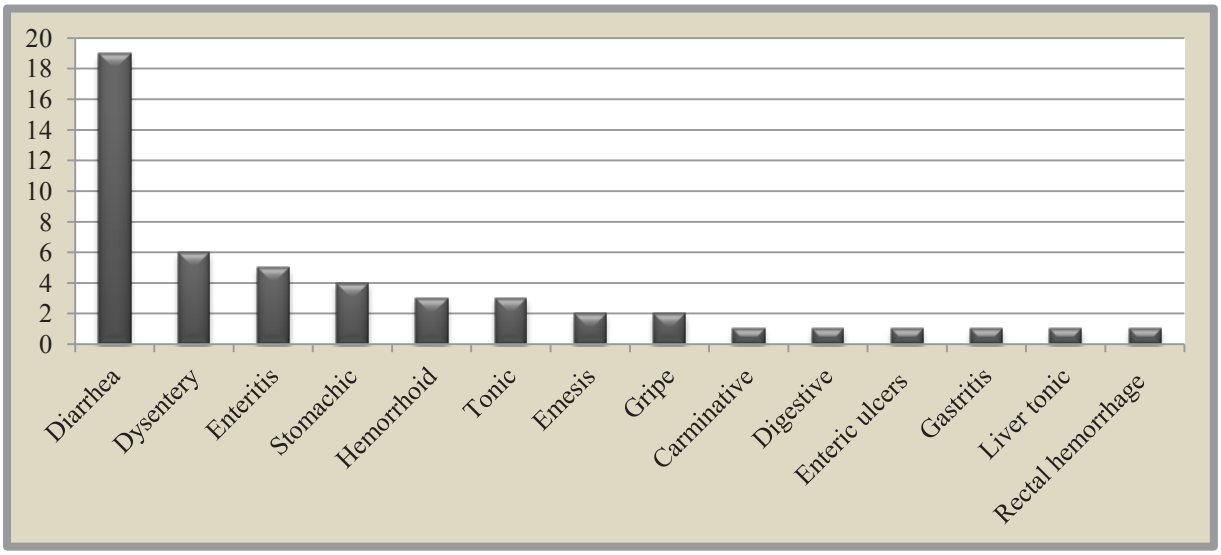

Figure 1. Number of compounds with roast ingredient suggested for each gastrointestinal indication (resulted from thirty formulations in Table 1)

Discussion

Roasting is a critical process for materia medica in Traditional Persian Pharmacy. However, no clear list could be found for natural products which needed to be roasted, and also, no clear reason has been mentioned for the necessity of this heat reaction for each case. Because the majority of compounds with roast ingredient(s) are allocated for gastrointestinal diseases, this study dealt with the role of roasting in such formulations. It is evident that roast ingredients were applied just in dry solid dosage forms, here mostly in *safouf* (13 cases out of 30 formulations) and qors (13 out of 30). *Safouf* is a powder dosage form, while *qors* is a combination of various powder bounded together applying a natural binder like quince seed mucilage, letting them become dried completely [8].

Except one case of roast mineral (Terra armeniaca) in formulation 10, the rest of cases was of herbal sources. Based on Table 2, thirty cases of roast seeds, and ten cases of roast fruits were reported. The only case of roast gum was *Acacia arabica* applied in five formulations. These numbers present the importance of roasting process for seeds mostly applied in gastrointestinal diseases. Among all materia medica in Table 2, roast seed of *Lepidium sativum* L. has been reported the most, besides its highest proportion in three compounds (63% and 60% in *safoufs Moghliatha*, 50% in *javaresh Bozouri*). Roast starch has been used in eleven formulations

with the proportion of around 10% - 25% in each formulation.

The roast part of seven formulations (no.7, 11, 12, 13, 14, 15, 16) was more than 50% of the whole ingredients. It proved that the highest proportions of roasting raw materials exist in completely dry dosage form of *safouf*. All components of *safouf Neshasteh* (no.16) which have been suggested for diarrhea and enteritis were roasted. Therefore, it is the unique formulation for GI disorders with 100% roast ingredients.

According to Figure 1, nineteen formulations and six ones are useful for diarrhea and dysentery, respectively. This means 25 out of 30 compounds improve abnormal fluid secretion into the small bowl and electrolyte imbalance symptoms. Because roasting process increases dryness degree and porosity of raw materials [8], the formulations can be more effective in the case of liquid absorption. Wet dystemperament due to diarrhea and dysentery are curable using multi-ingredient with dry temperament [15]. Eight multi-ingredient compounds act as tonic (4 stomachic, 3 tonic, 1 liver tonic).

Generally, roasting has been a valuable treatment for processing natural products used in compounds for gastrointestinal disorders. Although the effect of a multi-ingredient does not refer to one ingredient, each component has a share in presenting that property. Therefore, roast natural products in gastrointestinal compounds can affect the whole characteristics. It is suggested that physicochemical properties and clinical effects of roast natural products for gastrointestinal disorders, specifically diarrhea, be analyzed.

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Conflict of Interest

None.

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