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Determination of Nutrient Contents of Some Medicinal Plants Sold by Herbalists in Bingöl

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Abstract

Objective: In this study, the nutritional parameters such as moisture, ash, crude fiber, crude protein, crude fat, carbohydrate and nutritive value of sage (*Salvia officinalis*), linden (*Tilia platyphyllos*), thyme (*Thymus vulgaris*), daisy (*Matricaria chamomilla*) and ginger (*Zingiber officinale*) plants sold in Bingol herbalists and widely used for treatment among the public were determined by analysis.

Methods: In 2019, 5 different medicinal plant samples were obtained from 3 different herbalists in Bingöl. Afterwards, the nutritional contents of these plants were analyzed using official Association of Official Analytical Chemists (AOAC) methods and different biochemical methods.

Results: Moisture, ash, crude protein, crude fat, crude fiber, carbohydrate percentages and nutritional values (kcal/100g) of the studied plant samples (0.10 %- 5.67, 4.67 - 11.89, 6.59 - 18.22, 2.12 - 6.80, 16.65 - 29.16, 40.18 - 63.68 %and 245.66kcal - 347.49kcal), respectively. The moisture contents of sage, linden and daisy samples were determined as 0.85 % to 4.84 % and they were found safe for consumption according to the Herbal Tea Standard of the TS 12933 Turkish Standards Institute,but ash levels exceeding the limit level of thyme samples (10.78-11.89 %) were found to be unsuitable. The moisture content of the thyme and ginger samples (0.10 - 5.67 %) (maximum 12 % for both), as well as the ash content of the thyme samples (maximum 14 %) and ginger (maximum 12 %) all fall within the Turkish Food Codex limit values.While statistically significant differences were observed in moisture, ash, crude fiber, carbohydrate and nutritional value groups ($p<0.05$), no difference was observed in crude protein and crude fat groups ($p>0.05$). The crude protein content of daisy (D2,D3) and linden (L1,L2) samples, the crude fiber content of daisy (D2,D3) and thyme (T1,T2,T3) samples, the carbohydrate content of ginger (G1,G2,G3) and sage (S1,S3) samples were all found to be high.

Conclusion: Plants such as *Salvia officinalis* and *Zingiber officinale*, which are rich in carbohydrates, crude protein and crude fiber content, are used for medicinal purposes. In addition, plants with high nutritional value can be added to the herbal combination content of individuals following a vegetarian or vegan diet.

Key Words: Nutrient, Medicinal Plant, Herbalist, Bingol

Bingöl'deki Aktarlarda Satılan Bazı Tıbbi Bitkilerin Besin Madde İçeriklerinin Belirlenmesi

Özet

Amaç: Bu çalışmada, Bingöl aktarlarında satılan ve halk arasında yaygın olarak tedavi amacıyla kullanılan adaçayı (*Salvia officinalis*), ıhlamur (*Tilia platyphyllos*), kekik (*Thymus vulgaris*), papatya (*Matricaria chamomilla*) vezencefil (*Zingiber officinale*) bitkilerinin nem, kül, ham lif, ham protein, ham yağ, karbonhidrat ve besin değeri gibi parametreleri tespit edilmiştir.

Metod: 2019 yılında Bingöldeki 3 farklı aktardan 5 farklı tıbbi bitki örnekleri temin edilmiş. Sonrasında bu bitkilerin besin içerikleri resmi AOAC yöntemler ile farklı biyokimyasal yöntemler kullanılarak analiz edilmiştir.

Bulgular: Çalışılan bitki örneklerine ait nem, kül, ham protein, ham yağ, ham lif, karbonhidrat yüzde oranları ve besin değerleri sırasıyla (% 0,10 - 5,67, 4,67 - 11,89, 6,59 - 18,22, 2,12 - 6,80, 16,65 - 29,16, 40,18 - %63,68 ve 245,66kkal - 347,49kkal) olarak belirlenmiştir. Çalışmada adaçayı, ıhlamur ve papatya örneklerinin nem içeriği % 0,85 ile 4,84 arasında, TS 12933 Türk Standartları Enstitüsü'nün Bitkisel Çay Standardı'na göre tüketim için güvenli bulunmuş, ancak kekik örneklerinde (% 10,78-11,89) limiti aşan kül seviyeleri tüketime uygun bulunmamıştır. Kekik ve zencefil numunelerinin nem içeriği (% 0,10 – 5,67) (her ikisi için en fazla % 12), kekik (en fazla % 14) ve zencefil (en fazla % 12) numunelerinin kül içeriğinin tümü, Türk Gıda Kodeksi sınır değerleri arasında bulunmuştur. Nem, kül, ham lif, karbonhidrat ve besin değeri gruplarında istatistiksel olarak anlamlı farklılıklar görülürken ($p<0,05$), ham protein ve ham yağ gruplarında farklılık görülmemiştir ($p> 0,05$). Papatya (D2,D3) ve ıhlamur (L1,L2) örneklerinin ham protein içeriği, papatya (D2,D3) ve kekik (T1,T2,T3) örneklerinin ham lif içeriği, zencefilin (G1, G2, G3) karbonhidrat içeriğizencefil (G1,G2,G3) ve adaçayı (S1,S3) örneklerinin karbonhidrat içeriği yüksek bulunmuştur.

Sonuç: Karbonhidrat, ham protein ve ham lif içeriği bakımından zengin olan *Salvia officinalis* ve *Zingiber officinale* gibi bitkiler tıbbi amaçlı kullanılmaktadır. Ayrıca vejeteryan veya vegan diyeti uygulayan bireylerin bitkisel kombinasyon içeriğine besin değeri yüksek bitkiler de eklenebilir.

Anahtar Kelimeler: Besin Maddesi, Tıbbi Bitki, Aktar, Bingöl

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INTRODUCTION

Natural resources, which have great potential for Turkey due to its rich plant diversity, are becoming increasingly important. It is estimated that Turkey has over 10,000 plant species, with approximately 30% of these species being aromatic plants with their own distinct smell and taste. The general public uses approximately 1,000 plant species grown in Turkey for medicinal purposes. For many years, medicinal and aromatic plants have been cultivated for use in the production of food, condiments, and medicines, and they now have a wide range of applications including food, food additives, medicine, cosmetics, perfumery, spice, beverage, paint, insecticide, antibiotic, and decorative (1, 2). More than 40% of drugs were of herbal origin at the beginning of the twentieth century, but by the mid-1970s, this rate had dropped to less than 5%. However, the emergence of new areas of use for medicinal and aromatic plants, as well as the increasing demand for natural products, has increased the use potential of these plants' day by day since the 1990s. (3).

According to ethnobotanical studies on medicinal plant species commonly used by the Turkish public, approximately 500 species are used for medicinal and aromatic purposes (4). According to reports, there are approximately 140 plant species registered in the codices, and approximately 300 medicinal plants are sold in herbalists (5). When subspecies are included, the number of plants traded internally and externally in Turkey is approximately 350, with approximately 140 of these sold abroad (6).

Each of the plants used in this research has medicinal properties. *Salvia officinalis* is the scientific name for sage, which belongs to the lamiaceae family. Sage (adaçayı in Turkish) has been known to increase appetite due to its bitter taste and to facilitate digestion and remove stomach gases, to reduce sweating and salivation and to clean the pores, to be used in rheumatic pains, and to be used as mouthwash in tonsils, teeth, mouth, throat inflammations, and angina due to its calming and germicidal properties (7,8). Linden (ıhlamur in Turkish), a member of the tiliaceae family with the scientific name *Tilia platyphyllos*, has been used to induce sweating, as a chest softener, as

a sedative and calming agent, to strengthen the heart muscles and nerves, to work and clean the kidneys, to treat epilepsy and migraine, and to have antipyretic, anti-fatigue, and bile-digesting properties (5, 8, 9). *Thymus vulgaris*, also known as thyme or kekik in Turkish, is a plant in the lamiaceae family that has been used to treat a variety of ailments, including headaches, stomachaches, intestinal gas, diuretics, nervous diseases, muscle relaxants, nervous facial pain, typhoid, diarrhea, rheumatism, cough, bronchitis, epilepsy, and other conditions (7,9). *Matricaria chamomilla*, also known as daisy or papatya in Turkish, is a plant in the asteraceae family that has been reported as a diuretic, appetite stimulant, nerve sedative, antipyretic, diarrhea and carminative, wound healing, gallstones, hemorrhoids, and inflamed wounds, as well as for rheumatism, insomnia, flu, anemia, dizziness, eczema (8, 10). *Zingiber officinale*, also known as ginger (zencefil in Turkish), is a member of the zingiberaceae family and is a sedative, antispasmodic, appetizing, anti-nausea, expectorant, reliever of abdominal pain, intestinal irritations, and indigestion. It is also reported to strengthen heart muscles and regulate circulation, lower cholesterol in the liver and blood, have a blood coagulation and blood thinning effect (9).

Polat et al. reported that 15 of 50 medicinal plant species belonging to 25 families were collected from the region in herbalists in the Bingol region. In the study, it was stated that plants such as *Matricaria chamomilla L*. (May Chamomile), *Salvia tomentosa Miller* (sage), *Thymus* sp. (linden), *Tilia* sp. (thyme) and *Zingiber officinale Roscoe* (ginger) were used for infusion by local herbalists (11). Akbulut and Özkan reported in their study that *Thymbra spicata, Tilia tomentosa, Salvia absconditiflorae, Zingiber officinale, Cota altissima* are among the most sold medicinal and aromatic plants in herbalists in Kahramanmaraş (12).

The majority of the nutrients needed by humans for survival are provided by plants. It is a good source of minerals, vitamins, lipids, carbohydrates, and protein. In addition to fulfilling the nutritional requirements of plants, it is crucial in the pharmaceutical industry, food, chemical, cosmetics, and agricultural control industries (13). These plants are frequently employed in the culinary, spice, and tea industries. To create herbal tea, a variety of herbs can be used, such as sage, linden, mint, fennel, chamomile, echinacea, rosehip, apple, mountain tea, lemon balm, rosemary, cassia, thyme, nettle, tarragon, raspberry, basil, and anise (14, 15).

There is no information in the literature about the nutritional composition of medicinal plants in Bingol. The purpose of this study is to determine the nutrient contents, such as

moisture, ash, crude protein, crude fat, crude fiber, carbohydrate and nutritive value in sage, linden, thyme, daisy and ginger plant samples obtained from local herbalists

MATERIALS and METHODS

Herbal Materials

Between the 10th and 11th months of 2019, five different plant species used for therapeutic purposes, such as antipyretic, sedative, muscle relaxant, and tranquilizer, were obtained from three herbalists (H1, H2, H3) in Bingol. Plant species were taxonomically identified by Alpaslan Koçak in a member of Department of Biology, Faculty of Science, Bingol University according to Flora of Turkey and the East Aegean Islands (16, 17). The scientific names, family names, English names, Turkish names, and intended uses of these plants are all listed in Table 1.

Determination of Moisture

Approximately 3 grams of sample were weighed and placed in a 105°C oven (Memmert 100-800) for 6 hours, after which the weight loss was calculated as percentage of moisture content (%)(18).

Determination of Ash

The samples were weighed and recorded in a desiccator at room temperature after being dried in an oven at 105°C for 3-5 hours. To assess ash content, 3 grams of dried sample were burned for 3-4 hours at 550°C in a muffle furnace (Carbolite ELF11/6b) until they turned white or light gray in color (18), and the percentage of ash content (%) was determined over the dry matter (19).

Table 1. Scientific, family, English andTurkish names of medicinal plant used different parts different parts

Scienctific name	Family name	English name	Turkish name	Plant part used
Salvia officinalis	*Lamiaceae*	Sage (S)	Adaçayı	leafy and flowering branches
Tilia platyphyllos	*Tiliaceae*	Linden (L)	Ihlamur	flower and buds
Thymus vulgaris	*Lamiaceae*	Thyme (T)	Kekik	leafy and flowering branches
Matricaria chamomilla	*Asteraceae*	Daisy (D)	Papatya	f lowers
Zingiber officinale	*Zingiberaceae*	Ginger (G)	Zencefil	roots and rhizomes

Determination of Crude Protein

Before being transferred to the device's (Gerhardt Dumatherm) incineration unit, 50 mg of dried plant sample was weighed and placed in a tin foil sample carrier. After sampling at 1200°C with O_2 burning, compounds that pass into the gas phase are kept in filters. The nitrogen content of N_2 carried by He was determined using a thermal conductivity detector (18). The Dumas technique was used to compute the percentage of protein content (%) using the nitrogen protein conversion factor (6.25) (20).

Determination of Crude Fat

The dried sample, weighing roughly 3 grams, was then inserted in the filter paper. After that, cotton was used to cushion the filter papers inside the cartridges before they were

placed in the soxhlet extractor (Velp Scizentifica Ser 148). The balloon weight was recorded and the percentage of fat content (%) was estimated after placing the samples in an oven at 105°C to recover some of the hexane that could not be extracted by this technique (18).

Determination of Crude Fiber

The fat-free samples were weighed 3 grams and placed in a beaker with 50 ml of 5% H_2SO_4 and 150 ml of water. And a magnetic stirrer was used to stir it for 30 minutes. After this, the samples were filtered through filter paper and washed with hot water until the residue was acid-free. 50 ml of 5% NaOH was added to the residue and stirred for another 30 minutes. The residue was then washed with hot water until it was alkali-free. After transferring the total residue to a crucible, it was dried in a hot air oven at 105 °C and weighed. The residue was incinerated for 5 hours in a muffle furnace at 550 °C before being allowed to cool and reweighed. The weight loss due to ignition was used to calculate the crude fiber percentage % (18).

Determination of Carbohydrate

The percentage of carbohydrate content (%) was calculated on the basis of the dry weight using the following formula: Carbohydrate (%) = [100- (% Protein) + % Fat + Fiber + % Ash + % Moisture)] (21).

Determination of Nutritive Value

Nutritional value of plants calculated according to the following formula. Nutritive value (kcal/100 g) = [4x(% Carbohydrate) + 4x(% Protein) + 9x (% Fat)] (22).

Statistical Analysis

The data were calculated as the mean standard deviation of three replicates, and the means were subjected to one way analysis of variance (ANOVA) using the IBM SPSS Statistics 28.0 software program. While the Duncan multiple comparison test was used to determine mean differences at the $p<0.05$ significance level, Pearson correlation analysis was used to determine the relationships between the variables.

RESULTS

The percentages (%) of moisture, ash, crude protein, crude fat, crude fiber, carbohydrate, and nutritional value in medicinal plants are shown in Tables 2 and 3. The moisture, ash, crude fiber, carbohydrate, and nutritive value groups ($p<0.05$), showed statistically significant differences, whereas the crude protein and crude fat groups did not ($p> 0.05$) (Table 2 and 3). According to the tables, the crude protein content of daisy (D2, D3) and linden (L1, L2) samples, the crude fiber content of daisy (D2, D3) and thyme (T1, T2, T3) samples, the carbohydrate content of ginger (G1, G2, G3) and sage (S1, S3) samples were all found to be high. The correlation coefficients between the nutritional parameters

of medicinal plants are shown in Table 4.There was no significant correlation coefficient between the crude protein and crude fat groups, nor between these two groups and the others.

Table 2. Percentages (%) of moisture, ash, crude protein and crude fat (dry weight) in of medicinal plants

	Plant samples	Moisture %	Ash %	Crude protein %	Crude fat %
Herbalist 1 (H1)	S1	2.26±0.10^{bc}	6.39±0.46^{bc}	6.59±0.15^{NS}	4.87±0.22^{NS}
	L1	3.23±0.09^{bc}	9.39±0.35^{bc}	10.38±0.03^{NS}	2.40±0.43^{NS}
	T1	5.24±0.26^{bc}	11.40±0.55^{bc}	9.95±0.10^{NS}	3.94±0.03^{NS}
	D1	1.17±0.02^{a}	8.05±0.33^{d}	9.40±0.23^{NS}	2.80±0.17^{NS}
	G1	0.32±0.01^{bd}	5.75±0.03^{bd}	9.33±0.04^{NS}	4.79±0.22^{NS}
Herbalist 2 (H2)	S2	4.84±0.04^{a}	10.56±0.04^{c}	8.52±0.04^{NS}	5.09±0.03^{NS}
	L2	4.24±0.03^{ad}	8.00±0.04^{ad}	12.16±0.72^{NS}	3.24±0.02^{NS}
	T2	5.67±0.32^{a}	10.78±0.13^{d}	9.28±0.11^{NS}	6.80±0.30^{NS}
	D2	1.78±0.11^{b}	10.00±0.22^{c}	11.11±0.01^{NS}	2.44±0.20^{NS}
	G2	0.17±0.01^{ac}	4.67±0.03^{ac}	10.72±0.02^{NS}	6.69±0.10^{NS}
Herbalist 3 (H3)	S3	3.19±0.03^{bc}	4.96±0.02^{c}	8.83±0.40^{NS}	3.32±0.01^{NS}
	L3	3.11±0.17^{bc}	8.11±0.22^{d}	9.34±0.03^{NS}	2.12±0.00^{NS}
	T3	3.03±0.12^{b}	11.89±0.11^{c}	7.30±0.10^{NS}	4.68±0.03^{NS}
	D3	0.85±0.05^{a}	10.87±0.15^{d}	18.22±0.50^{NS}	3.60±0.01^{NS}
	G3	0.10±0.00^{b}	5.66±0.04^{d}	8.54±0.03^{NS}	4.03±0.05^{NS}

Statistical analyzes were performed using the analysis of variance (ANOVA) and Duncan test. Values were given as mean ± standard deviation of triplicate (n=3) determinations, According to Duncan, the means within each column that are followed by the same letters are not significantly different, NS: Non-significant

Table 3. Percentages (%) of crude fiber, carbohydrate (dry weight) and nutritive value in medicinal plants

	Plant samples	Crude fiber %	Carbohydrate %	Nutritive value (kcals/100g)
Herbalist 1 (H1)	S1	21.23±0.80^{f}	58.66±2.52^{g}	304.83±3.54^{i}
	L1	27.56±0.70^{bce}	47.04±1.06^{h}	251.28±4.20^{j}
	T1	26.81±0.65^{bce}	42.66±1.06^{hj}	245.66±4.10^{hj}
	D1	24.97±0.30^{bce}	53.61±2.17^{gi}	277.24±4.60^{gi}
	G1	19.04±0.30^{f}	60.77±2.09^{g}	323.51±5.40^{i}
Herbalist 2 (H2)	S2	20.05±0.50^{acf}	50.94±2.08^{h}	283.65±5.22^{i}
	L2	23.27±1.09^{e}	49.09±0.66^{h}	274.16±3.14^{j}
	T2	27.00±1.33^{adeh}	40.47±0.15^{adeh}	260.27±3.00^{i}
	D2	28.24±0.09^{e}	46.43±0.20^{hj}	252.12±4.53^{hj}
	G2	16.65±0.10^{fg}	61.10±2.10^{fg}	347.49±5.28^{i}
	S3	17.67±0.10^{bcf}	62.03±2.50^{g}	313.32±5.00^{i}
Herbalist 3 (H3)	L3	25.42±0.10^{e}	51.90±0.75^{g}	264.04±4.53^{j}
	T3	29.16±0.60^{e}	43.94±0.90^{h}	247.17±4.76^{j}
	D3	26.28±0.80^{e}	40.18±0.60^{hj}	262.00±3.31^{hj}
	G3	17.99±0.60^{f}	63.68±2.30^{g}	321.15±5.00^{i}

Statistical analyzes were performed using the analysis of variance (ANOVA) and Duncan test. Values were given as mean ± standard deviation of triplicate (n=3) determinations, According to Duncan, the means within each column that are followed by the same letters are not significantly different

Abbreviations for plants in tables are as follows:

S1, S2, S3: Sage (*Salvia officinalis)* samples obtained respectively from the first, second and third herbalists

L1, L2, L3: Linden (*Tilia platyphyllos)*samples obtained respectively from the first, second and third herbalists

T1, T2, T3: Thyme (*Thymus vulgaris)*samples obtained respectively from the first, second and third herbalists

D1, D2, D3: Daisy (*Matricaria chamomilla)* samples obtained respectively from the first, second and third herbalists
G1, G2, G3: Ginger *(Zingiberofficinale)* samples obtained respectively from the first, second and third herbalists

Table 4. Pearson Correlation relationship of nutritional parameters of medicinal plants

Parametres	Correlation coefficient	p – value
Moisture & Ash	-0.571	(>0.05)
Moisture & protein	-1.99	(>0.05)
Moisture & Fat	0,067	(>0.05)
Moisture & Fiber	0.399	(>0.05)
Moisture & Carbohydrates	-0.557*	(>0.05)
Moisture & Nutritive value	-0.564*	(>0.05)
Ash & Protein	0.231	(>0.05)
Ash & Fat	-0.084	(>0.05)
Ash & Fiber	0.845**	(<0.001)
Ash & Carbohydrates	-0,938	(<0.001)
Ash & Nutritive value	-0.901**	(<0.001)
Protein & Fat	0.445	(>0.05)
Protein & Fiber	0.437	(>0.05)
Protein & Carbohydrate	-0.429	(>0.05)
Protein & Nutritive value	-0.210	(>0.05)
Fat & Fiber	-0.353	(>0.05)
Fat & Carbohydrate	0.089	(>0.05)
Fat & Nutritive value	0.423	(>0.05)
Fiber & Carbohydrate	-0.881**	(<0.001)

Bivariate correlation coefficient was calculated using by using the average of the measurements repeated three times, *Significant at the 0.05 level (2-tailed), ** Significant at the 0.01 level (2-tailed)

DISCUSSION

Moisture content in plants is a potential source of water and is required because it is estimated that food moisture accounts for 20% of total water consumption. Ash content, which is the byproduct of burning, is a measure of a food's overall mineral composition. The amount and composition of ash left over after burning plant material varies greatly depending on plant age, time, and organ to organ (23,24,25). Moisture and ash contents in different samples of sage plants in the range of 8.14 - 9.83% and 11.91 - 12.67%, respectively were found by Amr and Dordevic(26). Moisture and ash contents in sage and thyme (6.4%, 9.1% and 6%, 2.2%, respectively) by Khalil et al.; (3.95%, 4.95%) in white ginger and (4.63%, 7.45%) in yellow ginger by Ajayi et al.; (10.78%, 4.65%) in linden by Farid et al. (2017); (9.75%, 6.77%) in daisy by Farid et al.; (6.32%, 6.57%) in ginger by Ogbuewu et al.; (6.77%, 9.60%) and (8.71%, 8.44%) in sage and thyme by Tomescu et al.; (9.97% and 8.56%, respectively) in daisy (chamomile) by El- Zainy et al. were found (27-33).

When compared to herbalists (H1, H2, H3), linden, thyme and chamomile species are H2>H1>H3 in terms of moisture content; linden and ginger types can be listed as H1>H3>H2 from the largest to the smallest in terms of ash content. According to the chemical properties of herbal teas, which are included in the TS 12933 Herbal Tea Standard of Turkish Standards Institute, the amount of moisture contained in the teas should be at most 10% and the total amount of ash should be at most 9% (34). In the study, it was determined that the moisture content of herbal tea samples such as sage, linden and daisy between 0.85 - 4.84% was found to be safe for consumption, whereas ash levels surpassing of ash exceeding the limit level of sage and daisy

samples (10.56, 10.87) were found to be unsuitable. The moisture content of thyme and ginger samples (0.10% - 5.67) (maximum 12% for both), ash amounts of thyme (maximum 14%) and ginger (maximum 12%) samples, are all within the Turkish Food Codex limit values (35) (Table 2).

Plants contribute to meeting human needs for energy and nutrition. Plants contain carbohydrates, proteins, and fats as nutrients (36). Plants with a high crude protein value may be used as a source of protein in some food formulations. Malnutrition of protein-calories has been identified as a major contributor to nutritional pathology. Food derived from a plant that contains more than 12% of its energy value from protein is a good source of protein. The daily total protein intake is determined by an individual's need for growth and desired weight. According to the World Health Organization (WHO), the protein Recommended Daily Allowances (RDAs) for children, adults, and women are 28g, 63g, and 50g, respectively (37-39). A diet that provides 1-2% of its caloric energy as fat is considered sufficient for humans, as excessive fat consumption causes diseases such as cardiovascular disorders, atherosclerosis, aging, and cancer (40). Fiber in the diet lowers serum cholesterol levels, as well as the risk of cardiovascular disease, colon and breast cancer, and hypertension. A high fiber diet can cause intestinal irritation, decreased digestibility, difficult absorption of minerals found in plants, and decreased nutrient utilization overall according to the American Dietetic Association, 20-30 grams of fiber per day are required for digestion and effective waste elimination (41, 42). Carbohydrate is the primary and necessary source of energy. According to the RDA for carbohydrates is 130g (43). Plants are a good source of energy because they contain a lot of sugar. Adult men's energy requirements ranged from 2300-2900 kcal/day, while adult women's requirements ranged from 1900-2200 kcal/day (44).

When compared to herbalists, linden and ginger types are H2> H1 > H3 in terms of both crude protein and crude fat contents, sage and daisy types in terms of crude protein content; linden and ginger types can be listed in terms of crude fiber content, sage and thyme types can be listed from largest to smallest in terms of carbohydrate content as H3> H1 > H2 (Table 2 and 3).

Moisture and carbohydrate (-0.557), nutritive value (-0.564); crude fiber with ash (0.845), nutritive value (-0.901); crude fiber and carbohydrate (-0.881), nutritive value (-0.951); carbohydrate and nutritive value (0.899) were all found to be statistically significant. There is a significant correlation between carbohydrate and nutritive value groups, with a correlation value of 0.899 (Table 4).

When comparing the results found in the literature with this study, crude protein and carbohydrate contents in sage (6.77%, 67.89%), crude protein and crude fat contents in thyme (7.54%, 5.85%) by Tomescu et al. (32); the crude protein, crude fat and carbohydrate contents in daisy (chamomile) (18.34%, 3.71%, 59.40%) by Al- Zainy et al. (33); crude protein, crude fat and crude fiber contents in linden (15.93%, 2.98%, 28.89%) by Farid et al. (29); crude protein and carbohydrate contents in yellow ginger (11.65%, 58.21%) by Ajayi et al. (28) were found to be close to results of this study. The nutritive values were found lower than those found in the literature for sage (1320 -1735 kj = 315.28 - 414.4 kcals per 100g), thyme (1155 kj = 275.87 kcal/100g), daisy (chamomile) (343.866 kcal/100g) and ginger (375.94 - 396.05 kcal/ 100g)(33, 45, 46).

According to this study, which analyzed at the nutritional content of medicinal plants, sage has a high carbohydrate content, thyme has a high crude fiber content, ginger has a high carbohydrate and crude fat content, and daisy has a high crude protein level. Additionally, the thyme samples effectively satisfy the recommended dietary allowance (RDA) for fiber, while the sage and ginger samples largely satisfy the RDA for carbohydrates (47).

CONCLUSION

In the study, while the moisture contents of herbal teas such as sage, linden and daisy were found to be safe for consumption, the ash levels of thyme samples were not found suitable for consumption. The nutritional values of *Salvia officinalis* and *Zingiber officinale* samples, which have higher carbohydrate percentages than other plants, were also found to be higher. It can be inferred that these samples are carbohydrate-rich based on the statistical significance of the correlation coefficients between carbohydrate and nutritional value.

This study may suggest that plants can be included in various food products to make them more nutritious in terms of important compounds that affect nutritional value, such as crude protein, carbohydrate and crude fiber. These plants can be used in food supplements and animal feed preparation because they contain sufficient crude protein and crude fiber are rich in carbohydrates, and have a high nutritional value. In addition, the nutritional composition data of medicinal plants will be useful for both locals who use these plants for healthy nutrition and local herbalists who promote plant species.

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