

## **Survey of Plant Species of Medical Importance to Treat Digestive Tract Diseases in Tabuk Region, Saudi Arabia**

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**ABSTRACT:** Several plant species are known for their medical and traditional use. These plants distributed widely in Saudi Arabia and considered as an important natural resources for pharmaceutical products. In this study, a survey on medical plants was conducted in Tabuk region in the north-western part of Arabian Peninsula. Tabuk region is well known for its uniqueness in diversity of habitats such as mountains, sand dune, valleys and coastal line, thus result in high diversity of plant species. A total of 81 plant species belong to 30 families is described here for their traditional and medical use to treat the digestive tract diseases and parasites. The families of Fabaceae (9 species), Asteraceae (8 species), Plantagiaceae (8 species) and Zygophyllaceae (6 species) are reported for their high diversity in the species. Furthermore, the life forms, Traditional and Medical Use and Parts used were described for each species. This study is considered as the first effort to document the traditional and medical use of plant species in the Northern part of Saudi Arabia especially Tabuk region. Unfortunately, the floral diversity in this region is threatened by several human activities (e.g. woodcutting, grazing, urbanization and industrialization). It is recommended that a conservation program should be launched in this region to protect these natural resources with proper exploitation to develop the pharmaceutical industry in Saudi Arabia.

**Keywords:** Medical plants, Kingdom of Saudi Arabia, Tabuk, Flora, Digestive tract diseases.

### **I. Introduction**

The Kingdom of Saudi Arabia located over an area of 2,026,213 sq. km which comprised about two-thirds of the Arabian Peninsula. Because of this large area, Saudi Arabia ranked as the tenth largest country in the world constituting approximately 1.47 % of the globe and 5% of Asia continent. Interestingly, Saudi Arabia have about 2253 species belongs to 837 genera and 132

families. A 20% of the plant species recorded from Saudi Arabia is considered rare [1]. The Flora of Saudi Arabia have close similarity with those in East Africa, North Africa, the Mediterranean countries and the Irano-Turanian countries [2]. Unfortunately, the landscape and native vegetation have been significantly changed by rapid industrial development, agriculture activities, livestock overgrazing, wood cutting, introduction of exotic species and urbanisation [3].

It is well known that plants are important natural resources and can be useful to human being in way or another. For instance, the wild plants are being exploited for producing medicines, cosmetics and oils [4-7]. More importantly, some of the plant species are necessary in daily uses. For decades, the utilization of the plants in treating different diseases and parasites is well established. This will have promising future in develop various pharmaceutical industries in this region [8]. Unfortunately the unsustainable use of this region's resources, particularly through overgrazing and urban development has resulted in remarkable declining of the plant diversity. The extinction of various plant species is considered as the greatest challenging task for future conservation agenda [9].

About 319 species have been recorded in the past decades which have been widely used in Saudi traditional medicine. Various essential oils were extracted from species of Lamiaceae family. Species such as *Anastatica hierochuntica*, *Matricaria aurea*, *Lawsonia inermis*, *Mentha* spp. *Calligonum comosum*, *Teucrium polium*, *Withania somnifera*, *Anagyris foetida*, *Senna alexandrina* are considered as good sources for medicines for treating various diseases [5,10].

Al-Yahya [10] found the existence of linalool in *Lavandula pubescens* which is also contains tiny amount of camphor and high quantity of sesquiterpenes. There are several studies which aimed to investigate the antibacterial and antifungal activities of wild plants extracts [11-12].

A significant number of wild plants are remarkable for their variety and beauty. For example, *Gynandris sisyrinchium* (Iridaceae), *Pancreatium tortuosum*, *Crinum album*, *Scadoxus multiflorus* (Amaryllidaceae), *Anthemis deserti*, *Centaurothamnus maximus* (Asteraceae), *Delonix elata*, *Cadia purpurea* (Fabaceae)

and a number of other species belonging to *Aloe*, *Caralluma*, *Duvalia*, *Euphorbia* and *Klenia* are beautiful plants with colourful leaves or flowers [1]. According to Alfarhan et al. [13], as many as 98 wild species are edible. *Amaranthus viridis*, *Rumex vesicarius*, *Corchorus olitorius*, *Portulaca oleracea*, *Lactuca* spp., *Eruca sativa* and *Malva parviflora* are considered good examples of edible plants in which their fresh leaves have nice taste.

Several floral studies were conducted in Tabuk region.

For example, Alharbi [14] studied the floristic diversity in Al-Lawz Mountains in Tabuk region. A total of 188 plant species of 152 genera and 59 families were reported in Al-Lawz Mountains. This comprised almost 7.8% of the Saudi flora. The dominant plant families in Al-Lawz mountains were Asteraceae, Brassicaceae, Papilionaceae, Lamiaceae, Caryophyllaceae and Scrophulariaceae. The most diverse family of plants in Al-Lawz Mountains was Lamiaceae. Another study surveyed the plant species in Tabuk region was conducted by Rajasab [15] who studied the flora of Tabuk region in seven sites; Jordan Road, Madinah Road, Waadi Al-Dessah, Shrama including Al-Badah and Magna, Al-Arrah Mountains, Al-Lawz Mountains and Tabuk city. The total number of species found in this region was 198 species belonging to 52 families. In the recent study of Al-Mutairi et al. [3], reported 96 species belonging to 75 genera and 38 families from four sites in Tabuk namely; Sharma, Alqan, Al-Lwaz Mountains and Alzetah.

The present study aims to survey the plant species for traditional and medical use in Tabuk region for treatment of digestive tract diseases and intestinal parasites. Furthermore, the life forms, Traditional and Medical Use and Parts used of the plant

species were described according to available studies and literature.

## 2. Materials and Methods

### 2-1 Study Site:

Surveying of plant species was conducted in several sites and habitats in Tabuk region. Tabuk region (Figure 1) is located in the Northern part of Saudi Arabia and it has an area of 117000 km<sup>2</sup> between longitudes 37 and latitudes 28 N. The climate in this region is arid with mean annual rainfall of ~35 mm/year [3]. Although this area has unique diversity in the habitats such as mountains, oasis and coastal line, there are few studies concerning the plant diversity in this region. Furthermore, the flora in this region is threatened by several human activities including urbanization, grazing and woodcutting [9].

### 2-2 Surveying the plants

The plant species were surveyed in the several sites of Tabuk region (Tabuk City, Tayma, Haql, Duba, Alwajh and Umluj). Several habitats (sand dune, mountains, valleys and coastal area) and in this region were surveyed for the plant species. The nomenclature and identification of plants followed Chaudhary [16] and Collenette [1]. Identification the surveyed plant species for their traditional and medical use and application was carried out using several literature and references such as Al-Shanwani [6] and Rahman et al. [8].

## 3. Results

A total of 81 plant species belonging to 30 families is described here for their traditional and medical use to treat the digestive tract diseases and parasites. The families of Fabaceae (9 species), Asteraceae (8 species), Plantagiaceae (8 species) and Zygophyllaceae (6 species) are reported for their high diversity in the species. Almost 50% of the

collected species were herbs and 36% of the collected species were shrubs. Figure 2 presented the number of the plant species in each class of life form. The plant species surveyed are mostly perennial (69%) and only 31% of them were annual (Figure 3).

The contribution of each family to the total species richness was calculated as percentage to the total species collected and presented in Figure 4. The frequency of the plant parts used in treating digestive system diseases in Tabuk region is presented in Figure 5. A comprehensive list of plant species of medical importance to treat the digestive system diseases in Tabuk region is presented in Table 1.



Figure: (1) Map showing the location of Tabuk in the Arabian Peninsula.

**Table 1:** List of plant species and families collected from Tabuk region with their medical and traditional importance, Life Form and Parts used.

Family/Species	Life Form	Traditional and Medical Use	Parts used
<b>Apiaceae</b>			
<i>Ferula ovina</i> Boiss.	Herb	Dysentery, anthelmintic and emetic	Latex (little amount-Poisonous)
<b>Apocynaceae</b>			
<i>Rhazya stricta</i> Decne.	shrub	Constipation and anthelmintic	Root-stem-leaf-flower (little amount-Poisonous)
<b>Arecaceae</b>			
<i>Phoenix dactylifera</i> L	tree	Diarrhea and anthelmintic	Fruit-Seed-Latex
<b>Asclepiadaceae</b>			
<i>Calotropis procera</i> Aiton.	shrub	Emetic, dysentery and purgative	Leaf-flower-latex (little amount-Poisonous)
<i>Pergularia tomentosa</i> L	shrub	Purgative	Leaf (little amount-Poisonous)
<b>Asteraceae</b>			
<i>Achillea fragrantissima</i> Forssk	herb	Anthelmintic, astringents and carminative	Whole plant
<i>Anvillea garcinii</i> DC.	shrub	To treat gastro-intestinal troubles	Leaf - seed
<i>Artemisia sieberi</i> Bsser	subshrub	Anthelmintic, carminative, colic, liver failure.	Whole plant
<i>Artemisia judaica</i> L	shrub	Anthelmintic, carminative	Leaf – flower
<i>Artemisia monosperma</i> Del.	shrub	Anthelmintic, Purgative	Whole plant
<i>Asteriscus graveolens</i> Forssk.	herb	To treat diarrhea and abdominal pain	Oil of leaf, stem and flower.
<i>Reichardia tingitana</i> L.	herb	To treat colic, constipation	Leaf
<i>Sonchus oleraceus</i> L	herb	Anthelmintic	Whole plant
<b>Avicenniaceae</b>			
<i>Avicennia marina</i> Forssk.	tree	Astringents	Bark
<b>Brassicaceae</b>			
<i>Anastatica hierochuntica</i> L	subshrub	Purgative	Whole plant
<i>Capsella bursa-pastoris</i> L	herb	To treat astringents , diarrhea and dropsy	Whole plant
<i>Brassica rapa</i> L	herb	Anthelmintic, to treat colic and hemorrhoids	Root - leaf – seed
<b>Capparaceae</b>			
<i>Capparis cartilaginea</i> Decne	shrub	Purgative.	Root – leaf
<i>Capparis deciduas</i> Forssk	shrub	To treat constipation and astringents.	Whole plant
<i>Capparis spinose</i> L	shrub	Anthelmintic, carminative, ulcers and dropsy.	Whole plant
<b>Cleomaceae</b>			
<i>Cleome amblyocarpa</i> Barratte&Murb	herb	To treat nausea, gastralgia, vomiting and colic.	Leaf
<i>Cleome arabica</i> Wall	herb	To treat constipation and aperitif.	Leaf

<b>Chenopodiaceae</b>			
<i>Atriplex halimus</i> L	shrub	To treat diabetes	Leaf
<i>Atriplex leucoclada</i> Boiss.	shrub	Decrease stomach acidity	Leaf
<i>Chenopodium album</i> L.	herb	Anthelmintic, Purgative, enlarged spleen. intestinal ulceration	Leaf - seed
<i>Bassia muricata</i> L.	herb	To treat Sore throat	Leaf - stem – flower – oil of seed.
<i>Cornulaca monacantha</i> Delile.	shrub	Purgative.	Leaf
<i>Haloxylon salicornicum</i> Mog	shrub	Stomach pain.	Whole plant
<i>Traganum nudatum</i> Delile.	shrub	For gastric problems	Leaf – stem
<b>Convolvulaceae</b>			
<i>Convolvulus arvensis</i> L	herb	Purgative and diarrheic	Whole plant
<b>Cucurbitaceae</b>			
<i>Citrullus colocynthis</i> L.	herb	To treat ulcers, enlargement of the spleen, dyspepsia and constipation.	Root – seed (little amount-Poisonous)
<b>Cynomoriaceae</b>			
<i>Cynomorium coccineum</i> L.	parasite	Astringents, constipation and colic	Whole plant
<b>Euphorbiaceae</b>			
<i>Chrozophora tinctoria</i> L.	herb	Emetic	Leaf
<b>Fabaceae</b>			
<i>Acacia tortilis</i> Forssk.	tree	Anthelmintic and antidiarrheal	Leaf
<i>Alhagi graecorum</i> Boiss.	shrub	Purgative	Whole plant
<i>Astragalus spinosus</i> Forssk.	shrub	Purgative	Leaf
<i>Astragalus tribuloides</i> Del.	shrub	To treat irritation of the stomach and colon.	Seed
<i>Melilotus indica</i> L.	herb	To treat bowel complaints and infantile diarrhea	Whole plant
<i>Cassia holosericea</i> Fres.	shrub	Purgative.	Leaf – fruit
<i>Cassia italic</i> (Mill) Lam	shrub	Purgative.	Leaf – fruit
<i>Retama raetam</i> Forssk.	shrub	To treat anthelmintic and purgative	Leaf (little amount)
<i>Trigonella stellata</i> Forssk.	herb	To treat abdominal pain, diarrhea and dysentery	Whole plant
<b>Fumariaceae</b>			
<i>Fumaria parviflora</i> Lam.	herb	Anthelmintic, Purgative and to treat constipation and dyspepsia.	Whole plant
<b>Lamiaceae</b>			
<i>Lavandula pubescens</i> Decne	herb	Carminative	New buds and stems
<i>Mentha longifolia</i> L	herb	Carminative	Seeds
<i>Salvia lanigera</i> Poir	herb	Carminative, and to treat indigestion.	Whole plant
<i>Teucrium polium</i> L.	shrub	Anthelmintic, to treat stomach and intestinal troubles.	Leaf
<i>Thymus vulgaris</i> L.	shrub	To treat abdominal pain, anthelmintic, and carminative	Whole plant

<b>Liliaceae</b>			
<i>Colchicum ritchii</i> R.Br.	herb	To treat abdominal colic's, emetic and Purgative.	Leaf
<b>Malvaceae</b>			
<i>Malva parviflora</i> L.	herb	anthelmintic (tape worms) and astringents	Seeds
<b>Moraceae</b>			
<i>Ficus cordata</i> L.	tree	Indigestion	Flower – fruit
<i>Ficus palmate</i> Forssk.	tree	Purgative	Fruit
<b>Orobanchaceae</b>			
<i>Cistanche phelypaea</i> L.	parasite	To treat diarrhea and intestinal troubles	Whole plant
<b>Plantaginaceae</b>			
<i>Plantago amplexicaulis</i> Cav.	herb	To treat dysentery and astringents.	Seed
<i>Plantago afra</i> L.	herb	To treat gastro-intestinal tract disorder including duodenal ulcer and dysentery ulcerative colitis	Seed
<i>Plantago boissieri</i> Hausskn & Bornm.	herb	To treat diarrhea.	Leaf
<i>Plantago ciliata</i> Desf.	herb	To treat dysentery, chronic constipation and duodenum ulcer	Leaf
<i>Plantago coronopus</i> L.	herb	Purgative.	Leaf
<i>Plantago major</i> L.	herb	To treat stomach pain and dysentery.	Whole plant
<i>Plantago lanceolata</i> L.	herb	Astringents, purgative, gastritis and enteritis, anthelmintic.	Leaf - seed
<i>Plantago ovata</i> Forssk.	herb	To treat constipation, chronic diarrhea, dysentery and to treat intestinal irritations	Seed (Little amount)
<b>Poaceae</b>			
<i>Cynodon dactylon</i> L.	grass	To treat vomiting, dropsy, astringents.	Whole plant (Little amount)
<i>Phragmites australis</i> Cav.	grass	To treat emetic.	Root
<b>Polygonaceae</b>			
<i>Calligonum comosum</i> L.	shrub	Purgative, to treat ulcer, gastric problems.	Leaf
<i>Emex spinosus</i> L,	herb	Purgative , to treat dyspepsia, stomach disorders and to relieve colic, stimulate appetite	Whole plant
<i>Rumex vesicarius</i> L.	herb	Carminative, Purgative, astringents, to treat dysentery, promote appetite, spleen, dyspepsia, vomiting and liver diseases.	Whole plant
<b>Portulacaceae</b>			
<i>Portulaca oleracea</i> L.	herb	Astringents, to treat dysentery.	Whole plant
<b>Resedaceae</b>			
<i>Ochradenus baccatus</i> Del.	Shrub	Anthelmintic.	Stem - leaf - flower
<i>Oligomeris linifolia</i> Vahl	Herb	To treat diarrhea.	Plant extract

<b>Rhamnaceae</b>			
<i>Ziziphus spina-christi</i> L.	Tree	To treat liver complaints, anthelmintic and diarrhea, astringents and purgative.	Leaf – bark
<b>Solanaceae</b>			
<i>Hyoscyamus muticus</i> L.	herb	To treat gastro-intestinal and gastric or duodenal ulcer.	Leaf – new flower (little amount)
<i>Lycium shawii</i> L.	shrub	Purgative.	Fruit
<i>Solanum nigrum</i> L.	herb	To treat dropsy, diarrhea, chronic enlargement of liver.	Leaf - stem - fruit
<b>Tamaricaceae</b>			
<i>Tamarix nilotica</i> Bge.	tree	To treat diarrhea and intestinal colic.	New stems and buds
<b>Typhaceae</b>			
<i>Typha domingensis</i> Pers.	herb	To treat dysentery and as astringents.	New stems and buds
<b>Zygophyllaceae</b>			
<i>Fagonia bruguieri</i> DC.	herb	Astringents, digestive, to treat diarrhea, dropsy, dysentery, dyspepsia, stomachache and stomatitis.	Whole plant
<i>Peganum harmala</i> L.	herb	Anthelmintic (tape worm), to treat colic and stomach problems.	Seeds (little amount-Poisonous)
<i>Tribulus terrestris</i> L.	herb	As astringents, to treat hepatitis, stomatitis.	Whole plant
<i>Zygophyllum album</i> L.	shrub	Purgative and anthelmintic.	Whole plant
<i>Zygophyllum coccineum</i> L.	shrub	Anthelmintic and to treat colic.	Leaf – seed
<i>Zygophyllum simplex</i> L.	herb	Purgative and anthelmintic (seeds).	Whole plant

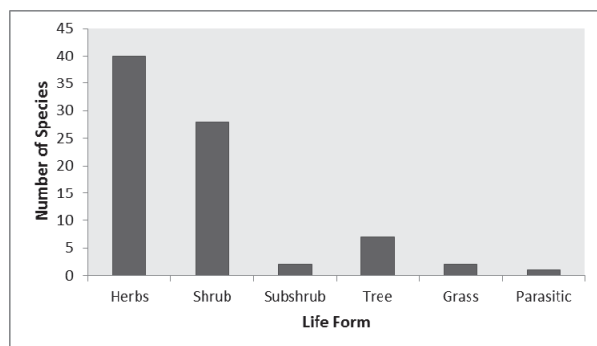


Figure: (2) The life forms of the plant species of medical importance collected from Tabuk region, Saudi Arabia.

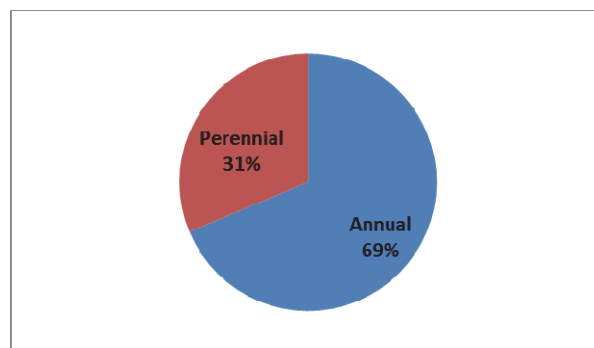
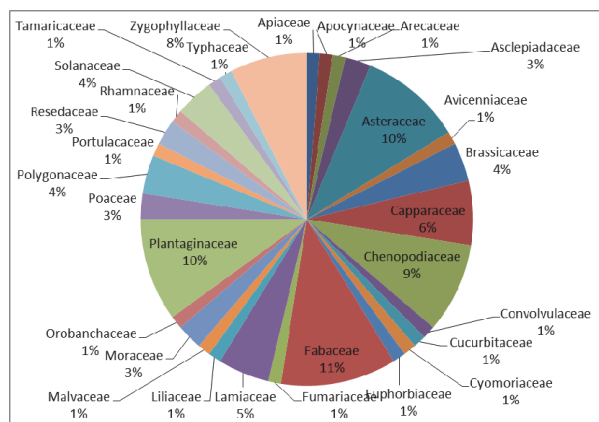
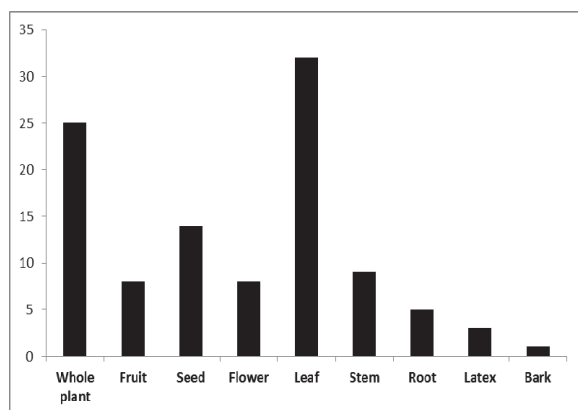


Figure: (3) Proportion of plant species in terms of life cycle. Perennial= 26 species, Annual= 55 species.



**Figure: (4) Proportion of species in each family presented as percentage to the total species collected.**



**Figure: (5) Proportion of plant parts used in treating the digestive systems diseases.**

#### 4. Discussion

The new pharmaceutical discoveries in drug production from plant resources provide an effective tool in fighting against various diseases [17]. Ethnobotanical knowledge is an important step that will enhance the drug discovery and lead to develop good medical product with good efficacy. This aspect (i.e. ethnobotanical knowledge) is still needed to be investigated and thoroughly examined [18].

The present study revealed that a total of 81 plant species belonging to 30 families are being used to treat digestive tract diseases in the Northern part of Saudi Arabia by local inhabitants. The families of Fabaceae (9 species), Asteraceae (8 species), Plantaginaceae (8 species) and Zygophyllaceae (6 species) are considered the most diverse in

species. Furthermore, the species of these families are commonly used for various diseases and pains connected with gastrointestinal problems, rheumatism inflammations, ulcers, respiratory, circulatory, urological and skin diseases, and somewhat fewer for toothache, diabetes, allergy and gynecology. The dominance of these families

The plant species of these families are widely reported in the literature of Saudi Arabia flora [13]. Furthermore, these species were described for their medical importance by other researchers [8, 19, 20]. For example, Rahman et al. [8] carried out a preliminary survey on the medicinal plant diversity in the flora of the Kingdom of Saudi Arabia with emphasis of seven families: *Amaranthaceae*, *Apocynaceae*, *Capparidaceae*, *Euphorbiaceae*, *Labiatae*, *Polygonaceae* and *Solanaceae* where the total number of medical plant species described were 86 species.

On the other hand, higher number of plant species was described from Sarawat Mountains in Taif as Al-Sodany et al. [7] reported about 261 species belonging to 55 families and 178 genera in Taif. The most dominate families were Asteraceae, Poaceae, Fabaceae, Lamiaceae, Chenopodiaceae, Boraginaceae, Brassicaceae, Asclepiadaceae and Zygophyllaceae. However, lesser number of medical plants was documented from Al-Rass province in Al-Qassim area where the medical and traditional use of 47 species belonging to 28 families was described [21].

The present study revealed high diversity of plant species of medical importance in Tabuk region which constitute ample natural resources which can be exploited sustainably in the future. This finding in agreement with several previous studies which all emphasized on the importance of floral diversity in this region and its valuable contribution to the entire flora of Saudi Arabia. Alharbi [14] reported a total



number of 188 plant species from the high mountains of Al-Lawz in Tabuk region which contributed to almost 7.8% to the entire Saudi flora. Meanwhile, Al-Mutairi et al. [3] reported 96 plant species distributed in four sites of Tabuk region. They emphasized on the unique diversity of habitats in this region.

However, the application of plant species for traditional and medical purposes is threatened by two factors. Firstly, the ethnobotanical knowledge is merely practiced by old people and this knowledge was found to be hard to be transferred to the younger generations due to lack of interest and experience [4, 7]. Secondly, the plant species are considered as the main natural resources for medication among the local inhabitants. These natural resources are highly threatened by several anthropogenic activities including woodcutting, invasion of exotic species, urbanization, grazing and development of new infrastructure [9].

### 5. Conclusions

In conclusion, the present study described the application of several plant species in traditional and medical uses to treat digestive tract diseases and parasites. A total of 81 species were surveyed from various habitats of Tabuk region. This study provides baseline information for future medical and pharmaceutical studies to extend/examine the application of these plants extract in medicine. On the other hand, these natural resources should be preserved and therefore, conservation programs should be established to protect the natural diversity of the plant species in this region with sustainable environmental management. Future studies describing other medical importance plant species to treat other diseases (e.g. skin) and their antifungal and antibiotic activities are needed.

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## النباتات الطبية المستخدمة لعلاج أمراض الجهاز الهضمي في منطقة تبوك، المملكة العربية السعودية

نادي عواد الحربي

قسم الأحياء، الكلية الجامعية في تبوء ، جامعة تبوك، تبوك ص. ب. 741، تبوك، المملكة العربية السعودية  
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**الملخص:** من المعروف أن هناك عدد من الأنواع النباتية والتي يمكن استخدامها في استخدامات طبية وتقليدية. مثل هذه النباتات تنتشر بشكل واسع في المملكة العربية السعودية وتعتبر أحد أهم المصادر الطبيعية للمنتجات الدوائية والصيدلانية. في هذه الدراسة تم عمل استطلاع ووصف للنباتات الطبية في منطقة تبوك في الشمال الغربي من شبه الجزيرة العربية، تعتبر منطقة تبوك من المناطق المتميزة بتنوع البيئات النباتية فيها مثل البيئة الجبلية، البيئة الرملية، بيئة الأودية وكذلك بيئة الشريط الساحلي، ونتج عن هذا التنوع الفريد في البيئات النباتية تنوع متميز في الأنواع النباتية. في هذه الدراسة تم وصف 81 نوع نباتي تنتمي إلى 30 عائلة من حيث استخدامها الشعبي والطبي لمعالجة أمراض الجهاز الهضمي، العائلات النباتية التالية: البقولية ( 9 أنواع المركبة ( 8 أنواع )، الحمالية (8 أنواع) و الرطريطية ( 6 أنواع ) تميزت بتنوع الأنواع فيها. كذلك تم وصف أشكال الحياة للأنواع النباتية وكذلك تحديد الجزء المستخدم، تعتبر الدراسة الحالية هي الأولى والتي عنيت بتوثيق الاستخدام الشعبي والطبي للأنواع النباتية في الجزء الشمالي من المملكة العربية السعودية خصوصاً في منطقة تبوك. ومما يجدر ذكره أن تنوع الأنواع النباتية مهدد بشكل كبير بسبب النشاطات البشرية مثل الاحتطاب والرعي الجائر والتوسع العمراني والتطور الصناعي. لذلك فإن من أهم التوصيات في هذه الدراسة هي البدء ببرنامج محافظة على التنوع الأحيائي للنباتات في هذه المنطقة من أجل حماية هذه المصادر الطبيعية والتي يمكن أن يتم استغلالها بشكل منظم في تطوير الصناعات الدوائية في المملكة العربية السعودية.

**الكلمات المفتاحية:** النباتات الطبية، المملكة العربية السعودية، تبوك، فلورا، أمراض الجهاز الهضمي.