

Ethnobotany, phytochemicals screening and nutritional profile of *Pistachia khinjuk* fruits from the District Hernai, Balochistan, Pakistan

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Abstract- The main objective of the study was to record ethnobotany, phytochemical screening and nutritional profile of wild fruits of *Pistachia khinjuk* collected from District Henai, Balochistan, Pakistan during November, 2018. During the survey, ethnobotany was recorded and the fruits were screened for the presence of phytochemicals and nutritional components such as proximate and mineral analysis using standard techniques. The ethnobotanical information revealed that the wild fruit is eaten by the locals during winter season as source of energy and nutritional supplement and sold in the local market. The phytochemical screening depicted that solvents such as aqueous, acetone, n-hexane, petroleum ether and methanol showed the presence of alkaloids in fruit extract. Tannins and saponins were noticed only by an aqueous extract; while phenols were detected through four solvents such as aqueous, acetone, petroleum ether and ethyl acetate. Flavonoids were detected by acetone and petroleum ether. The dietary components revealed that fruit possesses with the highest percentage of dry matter (93%), followed by crude fat (45%), crude fibre (22%), carbohydrates (14%), crude protein (7%), moisture content (6.1%) and the total ash (2.9%). Similarly, the minerals composition showed that fruit possessed phosphorus in the highest amount (11.79%), followed by iron (4.12%), zinc (1.03%), copper (0.041%), manganese (0.813%), potassium (0.98%); whereas, sodium was found scarcely (0.09%). This study concludes that the studied fruit is rich in phytochemicals, nutritional and mineral components and can serve in mitigating human diseases and nutritional deficiencies that augments further research before its commercial production and also introduce in the market.

Index Terms- *Pistachia khinjuk* fruits, Solvent extracts, Phytochemical screening, Nutritional analysis, Mineral content.

I. INTRODUCTION

Plants are source of edible fruits but also essential in the field of medicines, fuel and fodder. They have provided the food and fulfill the nutrient competency of poor rural people. In fact, it is observed that usage of fruits can recover the health rate of humans according to [1]. Generally, the nutrients components like vitamins, minerals, polyphenols, antioxidant provided by fruit of plants [2]. In addition, the vegetables and fruits have a low number of calories, more quantity of fibres which are

essential for the health of human [3]. So, they maintained the weight of health and also decrease the persistent disease like diabetes, cancers, cardiovascular disorders [1].

Mostly the population of humans living in rural areas which are facing food scarcity, as a result caused malnutrition. The fruits which contain high contents of nutrients if available, affordable, accessible to a population could decrease the scarcity of food [4]. A certain time of period many crops food may with a limit quantity and if expensive in a particular season of planting and scarcity with the incomes of low earner. Many of the wild fruit have a better national value and cultivated these plants. Therefore, researchers have an interest for those wild plants that have high nutrients content. These nutrients help to treat diseases related to poor health and malnutrition. Therefore, researchers are looking to screen the edible wild fruits to balance the food scarcity [5]. The current study described the nutrition estimating, antioxidant potential and phytochemical of wild fruits of *Pistachia khinjuk*.

Pistachia khinjuk Stocks is a medium sized deciduous tree that belongs to Anacardiaceae family. It grows in dry rock mountains with an elevation above 900 to 2500 m above sea level. It is distributed in Iran, Iraq, Turkey, Egypt, Syria, Pakistan and Afghanistan. It is one of the most important species in Iran and known as pistachio. It is a native plant and the resin of this plant is used in toothache, indigestion, tonic and astringent in the field of medicines [6]. The compounds of plant like antioxidant have played an essential role for the protection issue of health [7]. Antioxidant is a key to remove the free radicals and prevent the cells for damaging. The compounds of antioxidants like the compounds of which are involve, phenolic acids, tannins, flavonoid and diterpenes scavenge of phenolic free radicals like lipid peroxyl, peroxide hydroperoxide. As a result, these compounds of antioxidant inhibit the oxidation and prevent our health from diseases [8, 9]. Some of the studies on the chemical composition of essential [10] and flavonoids [11] are well known from plants. This study was aimed at recording ethnobotany, phytochemical screening and nutritional profile of wild fruits of *Pistachia khinjuk* which is traditionally used as nutritional supplements by the natives of Balochistan, Pakistan.

II. MATERIALS & METHODS

Study Area: The district Harnai is located in the north-east of Balochistan province, Pakistan. It is situated at 30° 7 North

and 67° 35' East surrounded by mountains. This is one of the most beautiful Districts in Balochistan with a plenty of water availability in the streams. This district is producing plenty of fruits and fresh vegetables and supply clean water to whole province.

Climate

The study area is typically considered a dry temperate and in summer has an extreme warm weather; whereas, the weather is pleasant in winter. The month of July and August are extremely hot with a maximum temperature of 45°C. Overall the minimum and maximum temperature fall between 20°C to 48°C. The winter temperature of the area falls between -3°C to 22°C. Mostly rain fall occurs of moon soon time with an average annual rain fall is 148 mm [12].



Fig.1. *Pistacia khinjuk* in the study area.

Collection of plant materials

Pistacia khinjuk fruits were collected in various areas of District Hernai, Balochistan, during November, 2018 (Table 1). The species was identified by Dr. Rasool Bakhsh Tareen, Department of Botany, University of Balochistan, Quetta and also prepared the voucher specimens for record which were

deposited in the herbarium of Botany Department University of Baluchistan.

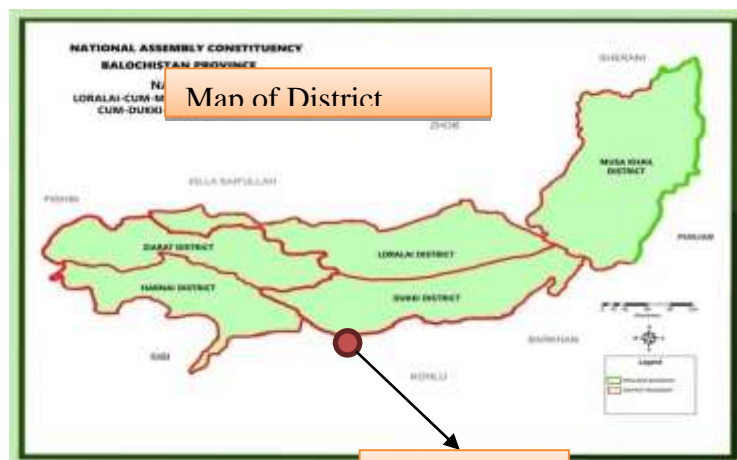


Fig. 2. Map of study area of plant materials.

Table No.1. Collection of plant specimens and fruits from various localities of Hernai District, Balochistan.

S. No	Location	Elevation (m)	Altitude (N)	Longitude (E)
1	Akhtari Area	1993	30°.25'	67°.35'
2	Nasaka Area	1756	30°.15'	67°.29'
3	Dumera Area	2200	30°.12'	67°.25'

Ethnobotanical investigation

Knowledge of traditional was recorded about *Pistacia khinjuk* by the standard methodology [13]. For this, field trips were arranged regularly for the collection of knowledge about vegetations.

Proximate and mineral analysis

By the help of sample of dried powdered the analysis of proximate was carried and used the standard method [14]. The samples of powdered were examined for fat, proteins, carbohydrates, ash and moisture. The method of Atomic Absorption Spectrophotometer was used for the analysis of mineral components (Technologies of Agilent Mod. No. 200 series) in the Department of Botany, Pir Mehr Ali Shah Arid Agriculture University Rawalpindi, Pakistan. The error of standard of statistical analysis was examined by the help of triplicate's readings.

Fruit extract analysis

The fruits that were collected in the field washed by tap water and dried under shade. Fine the powder (80 mesh) by using grinder (Model No. MX1100XT21CE) and then powdered. These were preserved in the bottle of airtight and take place in refrigerator. Soaked the powder by the help of 6 solvents such as aqueous, acetone, methanol, ethyl acetate, n-hexane and petroleum ether. These were placed in shaken for 24 h at 37 °C. Similarly, these were sieved by a Whatman filter paper (No. 1)

and after concentrated on reduced pressure at 40 °C by employing rotary evaporator [15]. Such extracts were applied for the phytochemicals screening.

Yield extracts determination

The crude extract yield percentage was determined by following the methods of Rahim et al. [15] and Dellavalle et al. [16].

Analysis of phytochemicals

Analysis of chemicals was carried about six different solvents on the basis of extracts of fruit of the *Pistacia khinjuk* by applied the standard protocols and to detected the phytochemicals according to Egwaikhide & Gimba [17].

Analysis for alkaloids

The extracts of fruit with (0.2 mg) and the concentration of sulphuric acid of 2% which is warmed for 2 min. After these filtrates was mixed in a few drops of Dragendorff's reagent. There is appearance of orange red precipitate that showed the presence of alkaloids described by Rahim et al. [15] and Egwaikhide & Gimba [17].

Tannins analysis

Fruit extracts with a small quantity dissolved in water and heated on water bath. After, it was filtered and mixed with some drops of ferric chloride. As a result, it was appeared dark green colour due to presence of tannins sample [17].

Saponins analysis

The extracts with a 0.2g wastaken in shaken in distilled water of 5 ml and then boiled. Thus, the appearance of bubble described the occurrence of saponins [17].

Flavonoids analysis

The extracts of fruit about 0.2 g was mixed with sodium hydroxide diluted and some hydrochloric acid drops were dispensed in it. The solution of these substances was firstly converted into yellow colour and then after a few minutes becomes colourless. It showed that flavonoids in the test sample [17].

Phenolic compounds analysis

Firstly, solvent extracts with a 50 mg of a single solvent was mixed with distilled water of 5 ml and for a minute shaken forcefully. Then, added a solution of ferric chloride with 5% of five drops. After this mixture result was appeared dark green colour known as ferric chloride test. Secondly, the solvent of each extracts of 50 mg and added with a 300 ml of distilled water and for a minute shaken forcefully. Then, added 3 ml of 10% lead acetate. Thus, the mixture appeared in white precipitates and its presence showed the phenolic compounds [18].

III. RESULTS

Ethnobotany of *Pistacia khinjuk*

The local people are used the fruit of *P. khinjuk* fruit in various ways of life. They are used in other ingredients after grinding and mixing such as fruit oil is used as frying oil by people and snack food. The fruit of *P. khinjuk* has been used by natives for different beneficial solutions of various diseases. For example, it

is used for stomach treatment, respiratory system, and heart disorder. Similarly, the gum resin of *P. khinjuk* is treated for stomach treatment, gastrointestinal disorders and for wound healing activity. The local communities collected the wild fruits and eat for fulfil the nutritional supplement and as well as iron purposes.

Extract yield

Solvent extract in a different based extract displayed extract yield range in a term of ratios and amount (Fig. 3). In the study, the methanol showed a maximum quantity of extract yield with a 18.71%, followed by petroleum ether 4.3%, n-hexane 0.61%, acetone 0.65%; whereas, ethyl acetate and water yielded showed less quantity (Fig. 3).

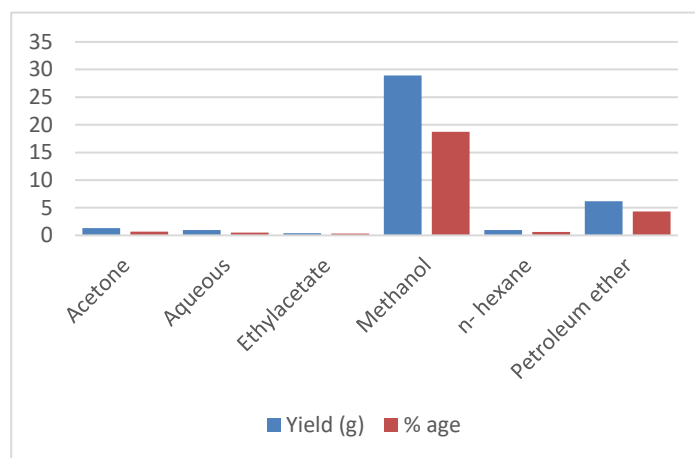


Fig. 3. Potential yielding of different solvent-based extracts from *Pistacia khinjuk*.

Proximate and mineral composition

The analysis of proximate of the wild fruits of *Pistacia khinjuk* is provided in Table 2. According to results, it showed that the fruit possesses exhibited with the highest percentage of dry matter (93%), followed by crude fat (45%), crude fibre (22%), carbohydrates 14%, crude protein 7%, moisture content 6.1% and the proportion of total ash was slightest 2.9% in the study area. This is described that the fruit has a beneficial element with a substantial quantity. Similarly, the minerals composition of the studied fruit has highest amount of Phosphorus 11.79% and Iron 4.12%, followed by zinc 1.03%, copper 0.041%, manganese 0.813%, potassium 0.98%, whereas lesser amount was found in the sodium 0.09%. The Na/K ratio was found as 0.048 in the fruit (Table 3).

Table 2. Nutritional analysis of wild fruit of *Pistacia khinjuk*.

Nutritional Constituents	Contents
Dry matter	93%
Moisture content	6.1%
Crude fat	45%
Crude fibre	22%
Crude protein	7%
Carbohydrates	14%
Total ash	2.9%

Table 3. Mineral content in wild fruit of *Pistacia khinjuk*.

Analyte	Concentration (ppm)
Cu	0.04%
Mn	0.813%
Fe	4.12%
Zn	1.03%
P	11.79%
Na	0.09%
K	0.98%

Phytochemical screening

The fruit extracts of *Pistacia khinjuk* were screened for the determination of some selected compounds and results are provided in Fig. 4. The maximum compounds of phytochemical were noticed via aqueous extract (4), followed by acetone and petroleum ether (3 each); whereas, solvents of rest compounds only noticed a single. The five solvents such as aqueous, acetone, n-hexane, petroleum ether and methanol were showed by alkaloids. Tannins and saponins were noticed only by an aqueous extract, while phenols were detected through four solvents such as aqueous, acetone, petroleum ether and ethyl acetate. In the case of acetone, petroleum ether and flavonoids were positively for its separation.

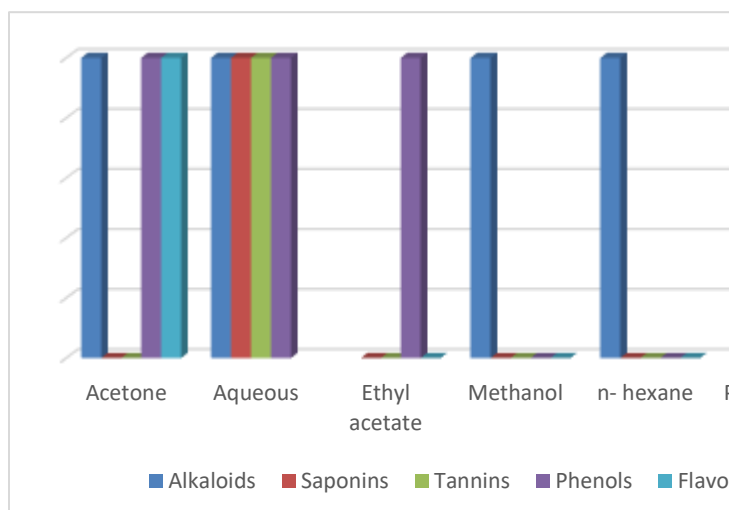


Fig.4. Analysis of phytochemical of *Pistacia khinjuk* by using various solvent extracts.

IV. DISCUSSION

The local people used the wild fruits in different ways of life especially used in case of food nutrition and in medicine. Being a developing country Pakistan has been facing the problems of food insecurity therefore, wild fruits improve the nutrition deficiency of the native. For such issues, the current studied was described the compositional of nutrition and phytochemical screening of wild fruit of *Pistacia khinjuk*.

The analysis of minerals was recorded by the methodology of the Association of Official Analytical Chemists [14]. This is described that the fruit holds a sustainable number of essential elements and nutrition. In the present study, fruit possesses exhibited with the highest percentage of dry matter 93%, followed by crude fat 45%, crude fibre 22%, carbohydrates 14%, crude protein 7%, moisture content 6.1% and the proportion of total ash was slightest 2.9% in the study area. Protein is one of the essential diets and its deficient cause different disease. Pearson [19] reported that the foods contain with 12% calorific values of protein has been measured a well source of vegetations. The present described wild fruits of *Pistacia khinjuk* showed a remarkable quantity of protein. This plant species contains higher values than the species reported by Abbasi [20] like in case of *Grewia optiva*, *Prunus domestica*, *Morus nigra*, *Juglans regia*, etc. Similarly, the fruit of *Pistacia khinjuk* possessed crude fat with an amount of 45% from that could be considered a well source of lipids. Moreover, in the fruits of *Pistacia khinjuk* contains a remarkable amount of crude fibres about 22%. The fibres of crude regularly can be decreasing the disease of cardiovascular and also diabetes, breast cancer and hypertension described by Ishida et al. [21].

In the present study, the wild fruits clearly showed that it has sustainable amount of dietary fibres which could control the malnutrition of human. The moisture content of the study area was fairly low in the fruit that was tested which means the soil in a drier condition. The tree of *Pistacia khinjuk* is particularly growing in ever environmental conditions with poor in soil nutrition and low occurrence of moisture in the mountainous areas. In such climatic situations lead to retained the quantity of moisture. The present research work showed lower percentage of moisture content as compared to work which was reported by Abolaji et al. [22] from the *Xylopiya aethiopia* 16.04% and *Acalypha hispida* 11.91% which was described by Iniahe et al. [23]. From this observation it is cleared that with content of low moisture is beneficial in case of safeguard from spoilage after a long term. The contents of ash indicated the occurrence of minerals in the sample of plants according to Mammen et al. [24]. *Pistacia khinjuk* fruit contains ash content about 2.9%. The same result about ash content was reported by Abbasi [20] with a low value from the traditional fruits.

The current result of proximate analysis of the research fruits contain with a maximum quantity of nutrition that can be a best source of nutrition for usage. Comparing with the literature, it was come across that the present findings with reference to the proximate composition of wild fruits of *Pistacia khinjuk* was either at par or higher than the earlier research [25]. It may be differences appeared in values due to variations of soils, climate, nutrients uptake and seasonal collection. Similarly, the minerals composition of the studied fruit has highest amount of phosphorus 11.79% and Iron 4.12%, followed by zinc 1.03%, copper 0.041%, manganese 0.813%, potassium 0.98%, whereas lesser amount was found in the sodium 0.09%. The same balance data was reported by Gani et al. [26] in the difference essential fruits as like Cherry. The contents of minerals might be lesser due to change of cultivars selected for rapid growth, yields, herbivore resistance, pest resistance according to Davis et al.

[27]. They were also described that variations of climate and in types of soils can disturb the composition of nutrients in food plants.

The present study was also described the screening of impotence phytochemicals such as, flavonoids, alkaloids, phenols, tannins and saponins, on the basis of six solvent extracts polarity of wild fruits of *Pistacia khinjuk*. Alkaloids were noticed in all solvents, except in ethyl acetate. Overall phytochemicals are good appearance to have curative characteristics [28]. Out of them alkaloid was reported the main beneficial agent [29]. The group of flavonoids are the natural antioxidants that play an essential role in fighting the danger of weakening cells reported by Okwu & Okwu [30]. Such compounds produce by plants to inhibit the infection of microbial [31]. In the current study flavonoids showed in petroleum ether and acetone. It is one of the essential components of phytochemicals contains in various medicinal plants [32] that is decrease the development of carcinogenic, contain antimicrobial and anticancer [30] and anti-inflammatory happenings [33]. In the study, tannins and saponins were noticed only by aqueous extract. Such type of phytochemicals having anti-fungal, anti-diarrheal, anti-oxidant and anti-hemorrhoidal properties [34]. Other than, similar compounds contain unpleasant principle of foods and drinks [35]. In addition, these secondary metabolites grip anti-inflammatory effects [36]. These are also answerable for the coagulating of Red Blood Cells (RBCs) which comprise of foams in water solutions, cholesterol binding activity, haemolytic properties and unpleasantness [37].

V. CLUSION

The fruits of *Pistacia khinjuk* are locally consumed as nutritional and other different purpose. Keeping into consideration, this study was planned to carry out research on nutritional and phytochemical screening of the fruits. Based on results, it is concluded that the wild fruits of *Pistacia khinjuk* contain a appropriate amount of nutritional components like proteins, carbohydrates, fats, fibre coupled with minerals such as zinc, iron, manganese, potassium, copper and different phytochemicals. There is need to undertake further research prior to human consumption.

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