

DETERMINATION OF HEAVY METALS (Cu, Cd, Zn, Pb, Ni, Fe, Mn & Al) IN *Caralluma tuberculata* PLANTS IN VARIOUS AREAS OF BALOCHISTAN

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ABSTRACT: The purpose of this paper is to present the determination of the concentration of heavy metals in plants of *Caralluma Tuberculata* (local name Marmoot). The samples were analyzed in the laboratory. The samples were collected in different areas of Baluchistan for the concentration determination of metals, Cd, Cu, Mn, Ni, Pb, Fe and Zn. In all these metals, the amount of copper was found higher in all plants samples of *Caralluma tuberculata* and was followed by order, Al < Fe < Ni < Pb < Zn < Cd < Cu. It is concluded that the concentration of metals in *Caralluma tuberculata* plants increases with the concentration-response growth and that copper metal has the highest accumulations. Furthermore, the sample information collected plants *Caralluma tuberculata* have a very high concentration of metals accumulation as compared to reports by WHO. Micro propagation protocol can be used successfully for the high scale multiplication and preservation of germplasm of these treatment plants for diseases. In addition, the antioxidant (molecule that inhibits the oxidation of other molecules) behavior of these plants describes the significance of these plants as diet and medicine.

Keywords: Atomic Absorption Spectroscopy, Metals contamination, *Caralluma Tuberculata*, Medicinal plants.

INTRODUCTION

Since ancient times, men have used plants to preserve ailments and boost physical suffering. This basic understanding of herbal medicines has been very innovative. The criticism from the earliest usually limited it to the medicine, knowledge of the source and indeed the different parts of medicinal plants to be inherited through the generations. Several countries in the developing world have a well-organized and well-defined traditional system of medicine. Pakistan, particularly Baluchistan as shown in Figer-1 has vast natural resources of medicinal plants

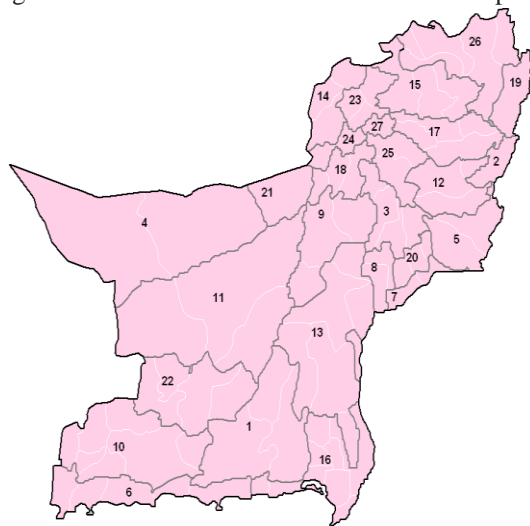


Figure-1. Map shows districts of Balochistan

The indigenous system of medicine i.e., Ayurveda, Svdda, and Unane existence have been for several times. In traditional medicine, the species of *Carraluma tuberculata* plants are used regularly over a thousand plants that are collected mainly wild. In yoga and naturopathic medicines respectively several unlike parts of the plants are used for the cure of specific illnesses. The use of medicinal plants is

common in women due to diverse digestive disorders. Intestine problems and many other diseases, in particular issues related to childbirth in Balochistan. Women have a lot of information on the use of folk medicine in the light of age that comes from ancient times. Systematically in the field of ethno medicine studies, the field structure is required to be performed. There are about 61 species of therapeutic plants belonging to 34 families and 56 genera usually used as a medicine for women in Balochistan [1]. In Pakistan, *Caralluma tuberculata* is in Koh-e-Suleiman traffic areas, ranging from Balochistan to Punjab and Khyber Pakhtunkhwa province, in the lower region of the Hindu Kush.

Studies show that gender has *Caralluma* variables presence pregnane glycosides, i.e., russelioside A-D [2-3]. Russelioside E-9; Carumbelósidos I and II [4]; Carumbelósidos III, IV and V [5]; flavone glycosides and glycoside Megastigmane 3:04 [6]. These phytochemicals are anticarcinogenic [7], platelet aggregation [[8-9], antifungals [A], digital receptors [10]; and protect the gastric mucosa and have anti-ulcer properties [11].

Caralluma species are edible. Medicinal System of Ayurveda is usually & traditionally prescribed for the treatment of diabetes. Plants also contain antioxidant leprosy, rheumatism inflammatory and antipyretic [12]. Furthermore, the *Caralluma* species are used as an appetite suppressant; Treat fever pain; And stimulate the central nervous system [13].

Plants deliver the body with an additional antioxidants source that is required to fight the war against free radicals. Free radicals can tip to a heart attack, stroke; inflammation; visualization problems; Parkinson's disease; Alzheimer's and also different forms of tumor diseases. Antioxidants protect against these diseases and delay the effects of aging. Phytochemistry production in plants is affected by environmental and physiological conditions, while the chemical complex due to the stereo chemical properties of natural compounds [14]



Figure-2. Image of the plant of *Caralluma tuberculata*.

The toxic metals are generally collective term usually used for metals and elements such as Cd, Cr, Cu, Hg, Ni, Pb and Zn that accumulate environmental pollution and the problem of toxicity. An alternate (and theoretically more acceptable) different name of this set of elements is "trace metals", but it is not commonly used. Unlike many organic contaminants, such as organic halides, metals are found naturally in the formation of mineral rocks and are, therefore, normal concentrations vary from the bottom range of these elements in soils, sediments, water and living organisms. Contamination results in abnormally high concentration of metals in relation to the normal background levels; Therefore, the presence of metal is insufficient evidence for contamination of the relative concentrations.

Similarly, for instance, zinc is a necessary constituent of as a minimum 150 enzymes, copper is vital for the regular function of cytochrome oxidase; iron is a portion of hemoglobin in the red blood cells; boron is needed only to [15] plant systems. As Pakistan is a developing country where metal contamination is usually linked with human activities such as traffic, emissions from motor vehicles and agriculture, etc. [16-17]. Since metals are not biodegradable and thus becomes more serious for the environment and the contamination can cause serious pollution effects on plants *Caralluma Tuberculata* because the concentration of metals can be proved more effective and very toxic. Thus, these chemicals can be tested danger to the reference room to plants, vegetables and food. Therefore, measuring the toxicity is essential to evaluate the effect on the ecosystem. The fate of toxic substances in the water system tool has been generally used as a tool to detect organisms appropriate to bio indicators and to grow water quality values for chemicals. Therefore, there are different methods to measure the toxicity of toxic metals to the endpoint which can cause death or

destruction of several lives and living organisms [18-19]. Therefore, research on the toxicity of metals contamination on the side of the *Caralluma tuberculata* especially using as bio indicators remains safe. Thus, it is essential to carry out studies with local agents that can be used to obtain information on the toxicity of metals, investigate the indifference of the body and maintain the light standard limit WHO in Pakistan.

Furthermore, the purpose of this research is to study the severe toxic eight metals (Cu, Cd, Fe, Mn, Pb, Ni, Al and Zn) in *Caralluma tuberculata* systems that will be referenced for researchers/students in the future.

MATERIALS AND METHODS

The analysis of metals in *Caralluma tuberculata* plants were performed by Atomic Absorption Spectrophotometer flame or furnace (AAS-Perkinm Elmer Model 800 Analysts, Massachusetts and USA) depending on the concentration. Samples were collected from Danasar (Zohb), New Mekhter (Lorali), Mangocher (Kalat) and Surab (Khuzdar) areas of Balochistan. Samples of *Caralluma Tuberculata* systems for the analysis of metals are taken earlier and directly after each rebirth of the solution acidified with "10% aristar nitric acid (65%) (BDH VWR International Inc. Ltch, England)", Standard solutions were selected for eight metals copper, cadmium, nickel, zinc, iron, aluminum, manganese and lead. The rules for the analysis of atomic absorption of these metals have been performed after preparing from the stock sample (SpectrosoL BDH, UK) for suitable dilution with nitric acid (0.5 N).

Making of trial solutions with each sample of the amount of 1 gram was break down with 10 ml of conc. nitric acid in a time of 1or 2 hours and at that time cooled to normal temperature. In addition, the content was broken down with 10 ml of a blend of nitric acid and perchloric acid in a ratio 3: 1 (v / v) until the mixture develops colorless. Then, the tester was thinned to bring it in the concentration variation of the correction curve affected metals standards. Similarly, standards, blanks and samples were in the same conditions the rules and regulations of the analysis.

For Atomic Absorption Analysis, the Model 800 Atomic Absorption Spectrophotometer Perkinm Elmer equipped with a burette eight lights with graphite furnace and autosampler is applied for the purpose of analysis, with the use of Avanta Sigma software.

RESULTS AND DISCUSSION

In this analysis, the plants *Caralluma tuberculata* (herbal) were examined by Atomic Absorption Spectroscopy. This is a very sophisticated technique to investigate the level of metals (ppm) or even with very low concentrations. The data produced by this procedure are shown in Tables 1-2 and Figures 4-5.

Table 1 Concentrations of unlike metal ions (ppm) in collected samples of plants *Caralluma tuberculata* in areas of Baluchistan in wet days of December 2015- January 2016.

| S.NO | Samples | Cu | Cd | Zn | Pb | Ni | Fe | Mn | Al |
|------|-------------------|-------|------|------|------|------|------|------|------|
| 1 | Mekhter (Lorlai) | 2.59 | 2.49 | 2.09 | 2.10 | 1.91 | 1.59 | 1.31 | 0.09 |
| 2 | Danaser (Zohb) | 9.89 | 8.49 | 7.89 | 7.81 | 7.61 | 7.49 | 6.98 | 6.91 |
| 3 | Mangochar (Kalat) | 5.59 | 5.11 | 4.98 | 4.89 | 4.49 | 4.31 | 4.00 | 0.00 |
| 4 | Sorab (Khuzdar) | 10.01 | 9.99 | 8.99 | 9.91 | 9.10 | 8.31 | 8.12 | 0.00 |

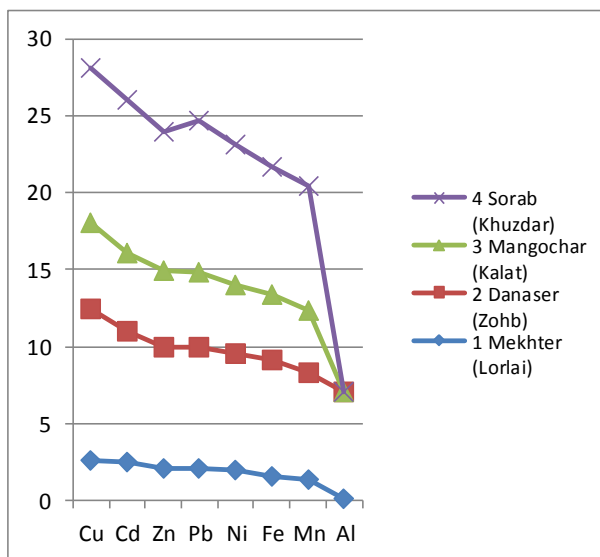


Figure-3. Concentrations of ions (ppm) in collected examples of "Caralluma tuberculata" floras from different areas of Baluchistan in wet days of December 2015- January 2016.

1 Concentration (ppm) of metals in plants *Caralluma tuberculata* harvested in the regions of Balochistan on rainy days in December 2015 to January 2016.

Metal concentrations were observed, as shown by data in Table 1, similar results [20]. Also reported, but the samples of plants *Caralluma tuberculata* accumulated from the

affected areas of Balochistan collected upper quantities of copper and zinc relative to additional metals. Others [21], reported that the copper, lead and cadmium has the highest concentration of metals in plants *Caralluma tuberculata*, and also varies depending on the seasons, particularly for copper was higher in periods of drought than the rainy seasons.

Louma [19] has reported that many influences that affect metals absorption rate disturb the extent of poisonousness of these metals. Our present study shows that the copper has the highest amount of accumulation in plants of *Caralluma tuberculata*. The Copper toxicity [22] it shows that the toxicity of copper carbonate and copper potential *Caralluma tuberculata* can enter as copper carbonate. Copper carbonate can be cleaved through chemical and biological reactions because the content can be available for the accumulation in the plant *Caralluma tuberculata*.

Lau [20] reported that *Caralluma Tuberculata* would be cheaper to monitor copper in the environment, since it has the ability to extend less number than 10% and as standard error it would be best for monitoring using *Caralluma tuberculata* because this capacity increase is nearly 35 times and its inaccuracy was about 15% of "*Caralluma tuberculata*" and is also recycled for the observing of arsenic too, as it has a noble ability to increase moderately irregular about 23%, but it is important and as observed in previous study [20] carried out in the field (long-standing contact), while the current learning was carried out in laboratories with temporary contact and variances in *Caralluma tuberculata* increase style plans may exist.

Table-2 Concentrations ions (ppm) in collected plants samples of *Caralluma tuberculata* in the area of Baluchistan close roadside in a dehydrated spell of October- November 2015.

| S.NO. | Samples | Cu | Cd | Zn | Pb | Ni | Fe | Mn | Al |
|-------|-------------------|-------|------|------|------|------|------|------|------|
| 1 | Mekhter (Loralai) | 2.84 | 2.70 | 2.15 | 2.79 | 1.92 | 1.90 | 1.32 | 0.10 |
| 2 | Danaser (Zohb) | 9.98 | 8.82 | 7.98 | 7.95 | 7.63 | 7.95 | 7.01 | 6.91 |
| 3 | Mangchar (Kalat) | 5.74 | 5.22 | 5.07 | 5.89 | 4.54 | 4.49 | 4.69 | 0.00 |
| 4 | Sorab (Khuzdar) | 10.04 | 9.49 | 9.06 | 9.07 | 8.57 | 8.58 | 8.14 | 0.00 |

In addition, as of the records, it was observed that samples were collected near the side of the road have higher concentrations than plants of *Caralluma tuberculata* samples in the rainy season, as shown in Table 1 -2 Figure 3-5.

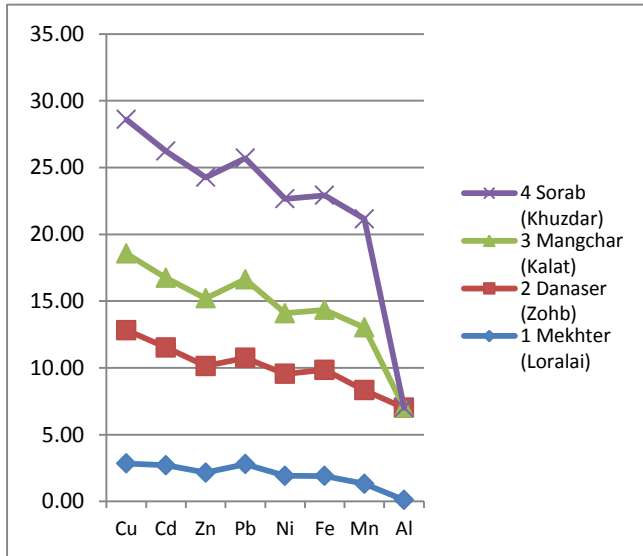


Figure-4. Concentration of meta ions (ppm) collected samples of the plants of *Caralluma tuberculata* from different areas of Balochistan near the roadside in the dry season of October-November 2015.

In addition, the plants of *Caralluma tuberculata* play a very important role in the case of patients of diabetes due to photo-features and also is considered a very effective medicinal plant for the treatment of diabetes disease. The history of *Caralluma tuberculata* is an old reform medical treatment as the era stuck between “4500-1600 BC.” Rig Veda and Ayurveda, 2500-600 BC”, which traces its beginning to the Greek medication which was implemented by the Arabs and at that time it was limited in India and Europe [23]. While the community of Balochistan exists in tribal villages and peasants are consuming native plants as treatments long age, for the reason that their information passed from primitive age to age bracket and is built on practice. Therefore, Balochistan is imparted with unique biodiversity, composed of many important natural areas for its healthy weather; Balochistan is rich enough of herbal medicines that are scattered in the vast area.

Reference to *Caralluma tuberculata*, there are many remedial plants in Balochistan that are locally castoff by the residents of numerous diseases such as jaundice, icy cough, stomach ache, headache, diarrhea, gonorrhoea, dysentery, eye and skin infections, kidney discomfort, for the hair, joint aching, inflammation of the body, cleaning the blood, constipation, duodenal worms, cereals and many more diseases. Therefore, the Balochistan range has the prodigious potential for natural assets and, in particular, the role of women cannot be ignored because they do not have enough knowledge about the medicinal/herbal plants in Balochistan. Likewise, medicinal plants are consumed in raw form locally and conveyed to markets in Quetta and further parts of the country and even the local people have a great knowledge of preserving and

creating plants. Moreover, the local people have made a large number of drug evaluations because most of the medicinal and aromatic plants require chemical investigations. The confirmation mode of the active ingredients consumed for the cure of numerous diseases has been reported by the resident population. In addition, numbers of the species are in endangered and are being quickly exhausted due to overgrazing, drought, logging, deforestation, suburbanization, neglect and manipulation. But the restoration administration, noble authority and the preservation of these plants are immediately needed to control the depletion of serious genetic erosion of useful genotypes of the population.

Similarly, as *Caralluma tuberculata*, the abundance of medicinal herbs is a recognized system of medicine all over the world unlike the tribal community in Balochistan, particularly women very enjoy domestic issues, including agriculture, fuel and fodder collection of medicinal plants. It shows that popular knowledge is rapidly disappearing and current efforts will help to promote awareness of the history of folk medicine in Balochistan. So, there is an urgent need to document indigenous knowledge but according to the survey, the number of women having to know how medicinal plants are higher than men. Similarly in many areas of women's knowledge, is highly erodible, because they are able to complete account of much medicinal aromatic plants, with details of the parts consumed and management routines. Instead of massive information of homeopathic plants that was in this zone, very few efforts had been made to document the ethno botanical information in Balochistan. Though, previous studies [24] reflect the ethno botanical southern Balochistan with the special location to therapeutic plants relating the current uses of therapeutic plants with literature connected to other areas of Pakistan and Balochistan. It seems that these are numerous therapeutic uses for the cure of various illnesses rarely reported in the study zones prior to this study.

CONCLUSIONS

Finally, it is determined that the plants of *Caralluma tuberculata* are exactly sensitive to the adsorption of metal ions to the environment. The significant amount of copper was adsorbed in the plants of *Caralluma tuberculata* trailed by Al, Cd, Pb, Fe, Ni, Mn and Zn. In the light of the statistics, it was found that the concentrations of metal ions in *Caralluma tuberculata* revealed that amongst the considered eight metal ions Copper, lead and Zinc were accumulated in a higher amount than aluminum. *Caralluma tuberculata* plants are extensively dispersed in mountainous areas and are easily sampled for useful diabetes diseases. This learning demonstrates that *Caralluma tuberculata* could be used as bio-indicator of contamination by metals and Toxicity. In addition, this study also concluded that the plant extract of *Caralluma tuberculata* and cellulose have an antioxidant potential and can be good candidates for the isolation of the respective compounds to be used in the pharmaceutical industry. Therefore, it is an urgent need for the preservation of the development of system protocols for their multiplication with conventional methods and plant tissue culture to contributing to the local germplasm conservation and the natural diversity of the plants of *Caralluma*

tuberculata. Also, local merchants must gather the roots of the plants because the existence of *Caralluma tuberculata* is maintained. As the *Caralluma tuberculata* plant has a high potential for photochemical significance, therefore, the approach of biotechnology, in particular through the cultivation of plants *Caralluma tuberculata* tissues can be very easily preserved for the benefit of the public to the senses of the food and drugs.

RECOMMENDATIONS

- The investigated plants need to be cultivated on large scale as they are being used traditionally for the treatment of different diseases as little attention has been given so far to these plants.
- As the various chemical parameters either increased or decreased with growing age of plant and seasonal changes. It is therefore recommended that harvesting of these plants might be more beneficial at proper stage to get maximum medicinal benefits.
- The Government of Balochistan, particularly the Agriculture Department should take care of the preservation and cultivation of such like medicinal plants for establishing and developing of economy of Balochistan at the market level inside and outside of Pakistan.

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