

Analysis of traditional food additive *kolakhar* for its physico-chemical parameters and antimicrobial activity

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Abstract:

Kolakhar had been prepared from banana plants and used by people of Assam since time immemorial. This work has investigated its physicochemical properties as well as its activity against pathogenic micro-organisms. This highly alkaline preparation is found to contain high amount of alkali elements and significant quantity of vanadium and zinc along with its inhibitory property against the tested strains. The bioactivity of kolakhar may be attributed to its very high pH due to its metal content. Thus, this traditional food additive has potential therapeutic applications along with providing the trace element like vanadium.

Key words: *Kolakhar, Musa balbisiana Colla*, atomic absorption spectroscopy, bioassay, physicochemical parameters.

Introduction

Kolakhar is a traditional ingredient and a popular food additive in Assam. This antacid is made by filtering water through the ashes of a banana tree (the name derived from the local term of Banana, “kol” or “kola”). It can be made from banana stem,

rhizome & peel. Amongst the available varieties of banana in North East region, khar made from *Musa balbisiana Colla* (a wild variety heavily seeded banana tree) has the best quality.

Along with its routine use as food additive in cooking, *kolakhar* has been used to treat various ailments. It is used to normalize digestive disorders of stomach and to prevent bacterial attacks on freshly cut injury to heal fast. Use of *kolakhar* as soaps and detergent for washing clothes and shampooing hair has been practiced in villages. It is also used by farmers to kill leaches and prevent their attack while working in leech infected fields. It also cures and prevents certain cattle diseases¹.

M. balbisiana (athiya kol/ bhim kol) is an indigenous variety of banana in Assam. Young banana pseudo-stem is cooked as vegetable (called *posola*) which is a very rich source of iron and fibers. Rhizomous stem exudates intake of this plant treat dysentery², pinworm infection² as well as sore throat. Ability of liquid exudates of banana trunk in treating infertility in males has also been reported. Banana plant has been found to possess insecticidal³, anthelmintic⁴, anti-ulcerogenic, anti microbial⁵, anti-venom, anti-allergic, anti-hyperlipidemic, antidiabetic⁶, anti-oxidant^{5,7,8} as well as anti cancer properties.

Banana and its pseudo-stem contain pathogenesis proteins possessing antimicrobial properties. However, bioactivity of *kolakhar* against micro-organisms has not been reported yet. Till date, only chemical investigation of *kolakhar* has been carried out¹.

Objective:

The current research focuses on the physicochemical parameters of the food additive as well as anti-microbial effect of *kolakhar* on various pathogenic micro-organisms.

Methodology

Sample preparation: *kolakhar* was prepared by traditional method. Briefly, pseudo-stem of a mature healthy tree of *M. balbisiana* was collected (from Kahilipara, Guwahati, Assam), cut into pieces and kept under sun drying for 10 days. After complete drying, the pieces were burned into ashes and sieved. 50gm of this ash was suspended in 100ml sterile deionized water and filtered through muslin cloth. This filtrate (50% aqueous extract) is referred to as *kolakhar* and it can be stored at RT for a year.

Physicochemical analysis: The *kolakhar* sample was tested for physicochemical characteristics namely pH, electrical conductivity (EC), Total solids (TS), Total alkalinity, Total hardness, Na⁺, K⁺ and Cl⁻ content. The reagents used were of AR grade and deionized water was used for reagent preparation.

Elemental analysis: The sample was analyzed for Zn, Pb, Cd, As and V using inductively coupled plasma atomic absorption spectroscopy (AAS). The analysis was carried out in SAIF (IIT, Bombay).

Bioassay: The activity of *kolakhar* on micro-organisms was checked by agar cup method. Nine pathogenic strains of micro-organisms were inoculated in MH agar (from Hi-Media) and 0.1ml sample was added to the wells of 10mm diameter. The plates were kept for pre-diffusion under refrigeration. After incubation at 37°C for 24 hours, the diameters of zone of inhibition were measured. Sterile distilled water was taken as control for experiment.

Result and discussions

The results for physicochemical, elemental and bioassay are presented in table 1, 2 and 3 respectively.

Table 1: Physicochemical parameter result of *kolakhar*

Parameters	Results
pH	pH 13.0
EC (mS/cm)	84.5
TS (ppm)	289700
Total alkalinity (ppm)	45500
Total hardness (ppm)	940
Chloride (ppm)	24850
Na ⁺ content (ppm)	16.5
K ⁺ content (ppm)	1740

Table 2: Elemental analysis of *kolakhar* by AAS

Elements	Concentration (ppm)
Zn (ppm)	0.027
Pb (ppm)	< 0.01
Cd (ppm)	< 0.01
V (ppm)	0.4
As (ppm)	< 0.01

Table 3: Result of bioassay of *kolakhar*

S.no.	Pathogens	Diameter of zone of inhibition (mm)
Control	Sterile Distilled water	10
1	<i>P. aeruginosa</i>	26
2	<i>K. pneumonia</i>	23
3	<i>S. typhi</i>	22
4	<i>Proteus vulgaris</i>	20
5	<i>C. diphtheria</i>	19
6	<i>E.coli</i>	19
7	<i>S. paratyphi A</i>	18
8	<i>S. paratyphi B</i>	17
9	<i>Shigella</i>	15

Kolakhar prepared from *M. balbisiana* was found to have very high pH (pH 13.0). Also, the sample was found to contain significant amount of vanadium and zinc. Banana plant is

accumulating the elements from soil and water and hence contributing to its high amount in the *Kolakhar*.

This bio-antacid was found to inhibit the growth of the pathogens used. The bioactivity of *Kolakhar* may be attributed to its high alkalinity which is mainly due to its alkali element such as potassium, sodium, calcium, carbonate, chloride etc. *P. aeruginosa* was found to be more sensitive towards *kolakhar* followed by others.

Hence, these results evaluate the use of this traditional food additive among the native people of Assam.

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