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Phytochemical screening and quantitative estimation of metals in natural and marketed henna powder

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Abstract
Henna (*Lawsonia inermis*, *Lythraceae* family) is a shrub grown in India, Sri Lanka, North Africa and some regions of the Sultanate of Oman. The active color *lawsone* (2-hydroxy-1, 4-naphthoquinone) is found in henna (*Lawsonia inermis*, *Lythraceae family*). Henna dye is manufactured by powdering dried henna leaves and combining them with oil or water to create hair and body colors. Temporary henna tattoos are widely available all over the world, last for many weeks on the skin, and are a self-contained, practical alternative to permanent tattoos. According to a phytochemical analysis, crop leaves from the October-November season have higher quality henna than others. The existence of various phytonutrients in Henna powder was also examined using phytochemical screening. *Lawsone*, an active component of Henna leaves that is responsible for color synthesis, has also been measured in a range of plant species. In addition to the phytochemical screening, antimicrobial studies of the natural and market samples of Henna have shown remarkable zones of inhibition proving their medicinal importance.

Keywords: Phytochemical, physicochemical, metal, antimicrobial, analysis

Introduction
The *Lawsonia inermis* Henna plant is one of the world's oldest cosmetic, medicinal, and aromatic plants. *Lawsonia inermis*, also known as Henna or Mehandi, is well-known for its maquillage benefits as well as being a rich source of phytochemicals with enormous therapeutic and pharmacological potential. Hairs are body protecting appendages that persist on one or more parts of the body from birth to death. People with thick and shiny hair are considered young and beautiful. Because traditional techniques of hair coloring using natural or synthetic colorants have limitations, this research attempted to synthesize a hair dye using crude medicines with good coloring properties that is safe and ready to use.

Materials and Methods
Various Techniques were used to analyze the Henna powder samples. Colorimeter was used to determine composition of Iron, Flame emission spectrophotometer was used to determine the composition of Sodium & Potassium, UV-Visible spectrophotometer was used determined Calcium and finally Copper, Zinc and Nickel and Heavy metals (Pb, Cd & Hg) were determined by using Atomic Absorption Spectrophotometer.

Organoleptic Study of Powdered Henna
The powdered Henna samples were evaluated by its appearance, texture, odor, and flavor. Procedure given in Indian Pharmacopoeia was used to determine the different ash values such as total ash, acid insoluble ash and water-soluble ash. (Table-1 & 2)

Statistical analysis
Data for metal estimation have been tabulated and the results were analyzed statistically and expressed as mean ± SD. The percentage concentration of PPM in all studied Henna Samples was tabulated. (Table-3)

Phytonutrient screening of Henna
Standard chemical processes were employed to conduct a qualitative analysis of phytochemical components to detect the presence of proteins, terpenoids, alkaloids, flavonoids, phenols, saponins, tannins, and cardiac glycosides. (Table-4)

Antimicrobial studies
In addition to the above activities, the Anti-bacterial and Anti-fungal activities of turmeric were tested against *Staphylococcus aureus* and *Pseudomonas aeurignosa*. Antifungal activities were tested against *Aspergillus* and *Rhizopus* species. The activities were determined using both the well and disc diffusion methods (Table-5&6).

Results and Discussion
The collected samples were analyzed for physico-chemical characteristics, quantitative estimation of metals, phytochemical screening, and antimicrobial studies of henna.

Table 1: Organoleptic characteristics of powdered plant materials

	Type of Henna		
	Natural	**MS-1**	**MS-2**
Appearance	Powder	Powder	Powder
Colour	Light green	Brownish green	Bright green
Taste	Aromatic bitter	Aromatic bitter	Aromatic bitter
Odor	Characteristic	Characteristic	Characteristic

Table 2: Physicochemical screening of Henna

	Type of Henna		
	Natural	**MS-1**	**MS-2**
Total ash (%)	5.3	7.6	6.8
Acid soluble ash (%)	4.5	4.9	7.1
Water soluble ash (%)	2.83	1.5	3.0

Table 3: Metal composition of various Henna samples

Metal (ppm)	Type of Henna		
	Natural	MS-1	MS-2
Na	6.74	20.2	14.6
K	25.87	38.53	36.6
Ca	15.15	15.15	14.2
Cu	0.288	0.403	0.432
Zn	1.152	5.760	3.195
Ni	2.09	10.53	18.45
Fe	5.013	8.016	8.27
Pb	ND	ND	ND
Cd	ND	ND	ND
Hg	ND	ND	ND

Table 4: Phytochemical components of various Henna samples

Phytochemical components	Natural	MS-1	MS-2
Flavonoids	-	+	-
Phenol	-	+	-
Tannins	+	+	+
Saponins	-	-	-
Phlobatannins	+	+	+
Alkaloids	-	+	-
Steroids	-	-	+
Terpenoids	+	+	+
Glyosides	+	+	+
Anthraquinones	+	+	+

Table 5(a): Anti-bacterial activity of Henna powder (well diffusion method)

Bacteria	*Staphylococcus aureus*				*Pseudomonas aeurignosa*			
Con.	Sample				Sample			
		Natural	MS-1	MS-2		Natural	MS-1	MS-2
	C	100 µl	100 µl	100 µl	C	100 µl	100 µl	100 µl
Methanol extraction	18 mm	34 mm	28 mm	36 mm	18 mm	28 mm	28 mm	24 mm
Aqueous extraction	19 mm	36 mm	34 mm	32 mm	18 mm	31 mm	26 mm	34 mm

Table 5(b): Anti-bacterial activity of Henna powder (Disc diffusion method)

Bacteria	*Staphylococcus aureus*				*Pseudomonas aeurignosa*			
Con.	Sample				Sample			
		Natural	MS-1	MS-2		Natural	MS-1	MS-2
	C	100 µl	100 µl	100 µl	C	100 µl	100 µl	100 µl
Methanol extraction	20 mm	20 mm	14 mm	12 mm	18 mm	18 mm	12 mm	10 mm
Aqueous extraction	19 mm	28 mm	15 mm	11 mm	18 mm	14 mm	11 mm	11 mm

Table 6: Anti-Fungal activity of Henna powder

Extraction	Zone of Inhibition							
	Rhizopus				*Penicillium*			
	Well diffusion				Well diffusion			
Con.	Sample				Sample			
		Natural	MS-1	MS-2		Natural	MS-1	MS-2
	C	100 µl	100 µl	100 µl	C	10 µl	50 µl	100 µl
Methanol extraction	21 mm	15 mm	12 mm	12 mm	0 mm	11 mm	12 mm	15 mm
Aqueous extraction	24 mm	14 mm	12 mm	10 mm	11mm	12 mm	10 mm	16 mm

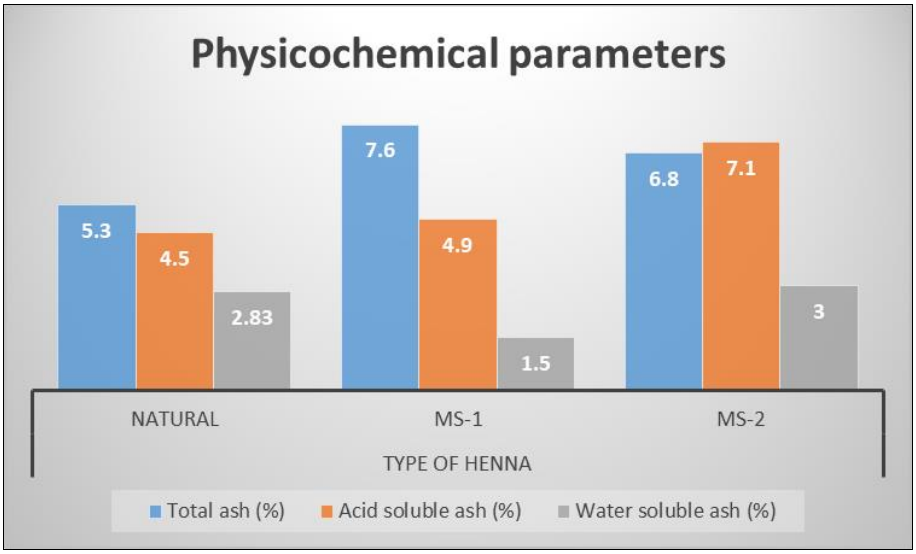

Fig 1: Physicochemical parameters of Henna

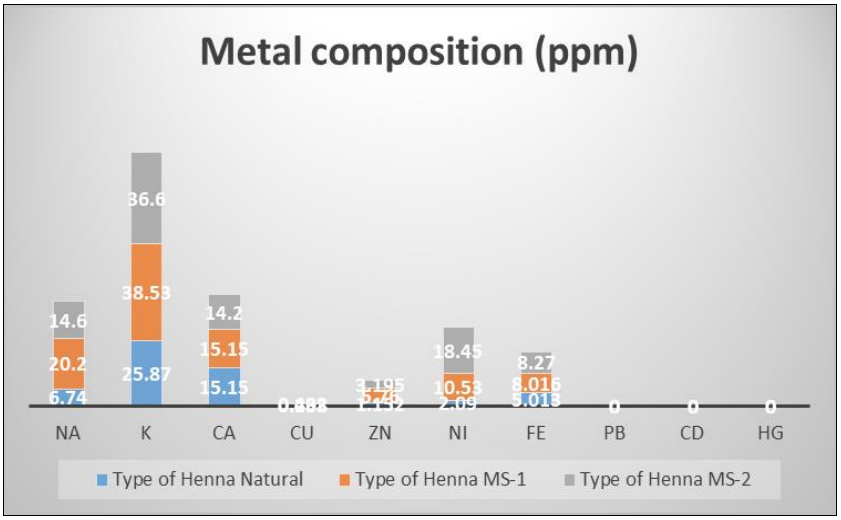

Fig 2: Metal composition of Henna

Observation and Results

The study revealed that some Henna powder samples contain alkaloids, flavonoids, tannins & phenolic compounds, glycosides, carbohydrate, saponin, sterols and protein which imparts benefits such as promotion of hair growth and prevention of hair greying while being safe and eco-friendly. Comparison of physicochemical properties of natural and marketed formulation both has similar texture. The antimicrobial studies, both antibacterial and antifungal were carried out by well and disc diffusion methods. 100 µl of the sample were transferred into wells dug on nutrient media from well diffusion and soaked discs of the henna sample were superficially placed on the nutrient media for disc diffusion and it was observed that at that concentration henna exhibited very good antibacterial and antifungal activity.

Conclusion

According to the findings of this study, natural henna is a good raw material for henna products due to more nutrients in comparison to WHO standard limits. Natural Henna powder had lower significant levels of Nickel, Copper, Zinc, as raw materials than marketed henna products, but more of these metals were added during the manufacturing process. National standard legislation for cosmetic products should be available to monitor the safety of these products before they are imported and reach consumers. Henna powered also possesses good antibacterial and antifungal activity which shows that it can act as a good medicinal agent. However, more research is needed to assess the metals concentrations in various types of cosmetics and body care products to protect consumer health. The results above imply that natural henna was effective and safe to use for hair coloring without causing erythema or irritation.

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References

1. Mallya R, Ravikumar P. Formulation and Evaluation of Natural Hair Colorants. Int J Pharm Pharm Sci. 2015;7(3):347-349.
2. Cowan MM. Plant Products as Antimicrobial Agents. Clin Microbiol Rev. 1999;12(4):564-582.
3. Takahashi T, Kamiya T, Yokoo Y. Proanthocyanidins from Grape Seeds Promote Proliferation of Mouse Hair Follicle Cells *in vitro* and Convert Hair Cycle *in vivo*. Acta Derm Venereol. 1998;78(6):428-432.
4. World Health Organization. Quality control methods for medicinal plant materials; c1998. Available from: https://apps.who.int/iris/handle/10665/41986.
5. Evans WC. Treas and Evans. Pharmacognocy. 15th ed. New-York: Saunders; c2004. p. 98-99.
6. Government of India Ministry of Health and Family Welfare. Indian Pharmacopeia. New Delhi: Controller of Publication; 1996;2:A-52-A-54.
7. Handa S, Khanuja SP, Longo G, Rakesh DD. Extraction Technologies for Medicinal and Aromatic Plants. United Nations Industrial Development Organization and the International Centre for Science and High Technology; c2008.p. 260.
8. Douros J, Suffness M. New Natural Products of Interest under Development at the National Cancer Institute. Cancer Chemother Pharmacol. 1978;1:91-100.
9. Sridhar N, Manikanta KA, Akshata K, Rohini K, Azeemuddin M, *et al*. Analytical Estimation of Secondary Metabolites in Lawsonia Inermis Leaves. Am J PharmTech Res. 2013;3:312-318.
10. Anuradha S, Arora S, Mehrotra S, Arora A, Kar P. Acute renal failure following para-phenylenediamine (PPD) poisoning: a case report and review. Ren Fail. 2004;26:329-332.