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Pharmacognostic and Phytochemical Study of Hair Dyes Henna in Libyan Market

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Abstract – Henna adulteration is getting to rise in the world as the cosmetic desire increased. The study aimed to authentification of the pharmacognostic and phytochemicals profile of three different colors of royal henna hair dyes collected from the Libyan market in comparison to standard (Lawsonia inermis L). The current study carried out to investigate microscopical characters, preliminary phytochemical screening and Thin layer chromatography (TCL) profile of collected royal henna samples to differentiate the authentic henna feature from any adulterants. Such investigation may provide a basis for authentication, standardization, and characterization of a real sample. The study found varied results between the standard and commercial samples. Surprisingly, the red henna showed the existence of plant parts related to the microscopical structure of senna. The brown henna showed the presence of some parts of the real henna plant coupled with a strange plant parts carrying dyes unrelated to the flora of henna, while the black sample was demonstrating few plant structure and the sample was rich with fibrous parts and unknown black particles. To emphasize the microscopic results, the samples were subjected to chemical analysis using TLC. The results provide a clear picture of mixing the royal henna with natural and/or synthetic materials. As the phytochemical profile of red, brown and black henna were showed foreign substance not mentioned in the product label. In conclusion, it important to identified and quantify the foreign substance which might put the consumer health to risk.

Keywords – Pharmacognostic, Libya, Henna, Dye, *Lawsonia Inermis*.

I. INTRODUCTION

Natural herbal products are becoming more popular across the world. People tend to use natural produced substances are increased due to their psychological feeling that natural product is safer [1]. Although, many problems related to herb phytochemical or its adulteration by synthetic substance [2]. The literature reviewed problems which put the people health issue in the risk of adverse effect ([3], [4], [5], [6]) and toxicity ([7], [8]). The natural produced substances start to use widely for medicinal and cosmetic purposes. The henna (*Lawsonia inermis L)* is one of these natural substances as it has therapeutic and cosmetic benefits. The literature indicates that henna played an important role in the life of ancient and modern cultures, particularly; people from Asia and North Africa [8]. Even though henna conducted for much pharmacological activity as antimicrobial ([9], [10]) anti-inflammatory, analgesic, and antipyretic activity [11]. It is considered as the most common natural dye for tattooing dye and hair pigmentation in many traditional cultures [12]. The Libyan market rich by different brands of henna in different

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preparations form. Hence this study designed to investigate the constituents of royal hair henna.

II. Method And Materials:

2.1 Collection of samples

Three colors of royal hair henna (red, brown, black) were collected from the Libyan market. Henna authentic sample was used as standard after it's authenticated by the taxonomy unit of the department of botany.

2.2 Microscopical study

Each sample of royal henna subjected to a cold maceration method with methanol. Weight of 50 mg of samples was placed in a separated conical flask, and 100 ml of methanol was poured to each sample. The same procedure is repeated for standard henna than all prepared samples and standard left for 48 hr at room temperature. All the extracts were filtered and poured in a porcelain dish which left to dry under the hood.

2.3 Thin layer chromatography TLC

The Methanolic extract of samples and standard were performed on thin-layer chromatographic (TLC) plates, composed of Silica gel 60 GF 254. The plate was developed in the chamber was previously saturated by the mobile phase. The mobile phase was hexane/ ethyl acetate (90: 10). After drying, the plate was investigated; visually and under UV 254/366 waves.

2.4 Preliminary Phytochemical screening

The preliminary phytochemical screening was carried out to investigate the constituent of the marketing sample in correlation to an authentic sample of *Lawsonia inermis L.* The samples and standard were screened for the presence of secondary metabolites of henna as Glycosides, flavonoids, anthraquinones, alkaloids, tannins, and phenolic compounds by using standard procedure.

III. Results

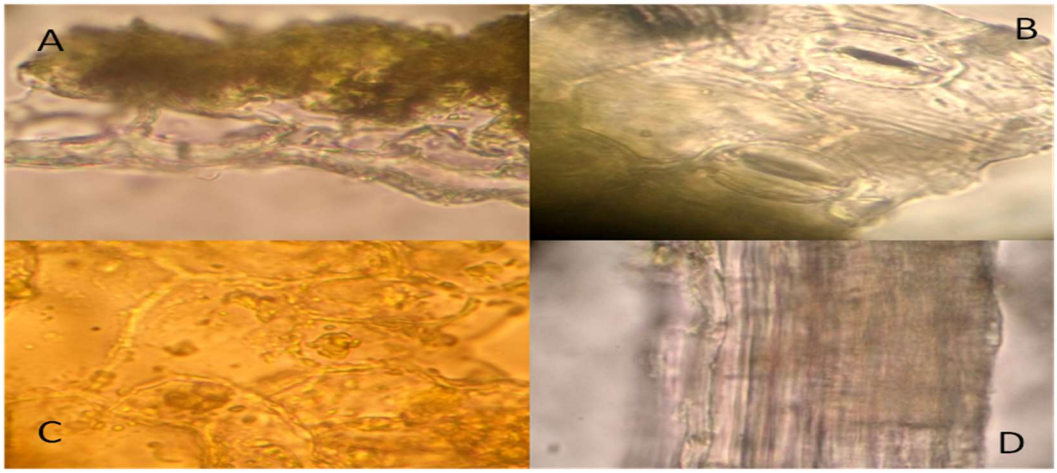

Figure1. Authentic sample of *Lawsonia inermis* leafs shows fragment of parenchymatous cell (A), epidermal layer with stomata (B), rosette crystal of calcium oxalate (C), group of fibers(D).

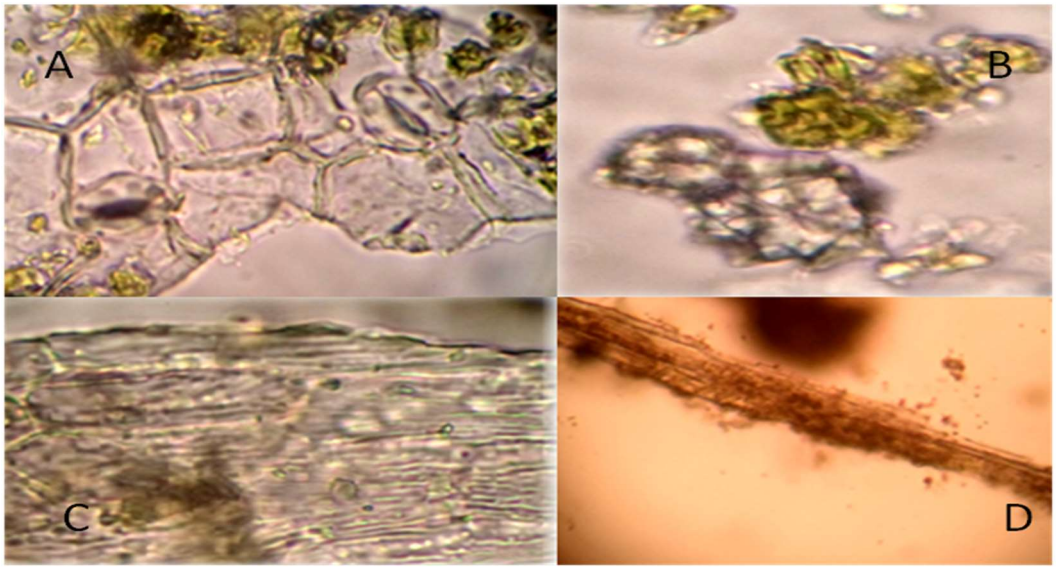

Figure 2: Brown henna sample shows, Anomocytic stomata (A), cluster of calcium oxalate crystal (B), parenchyma tissue (C), fibers (D).

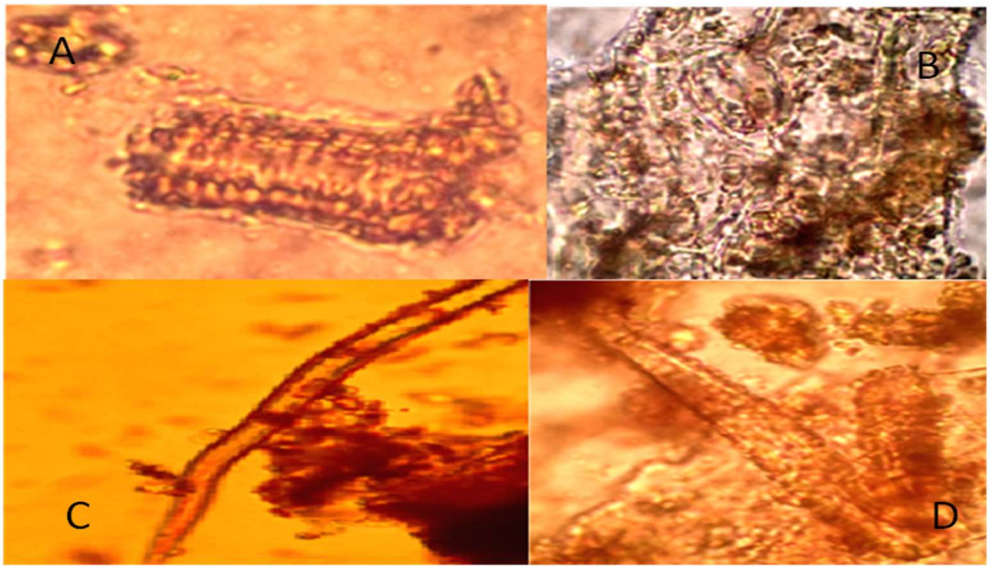

Figure 3: Red henna sample shows, prismatic calcium oxalate sheath (A), diacytic stomata (B), fibers (C) unicellular warty hairs (D).

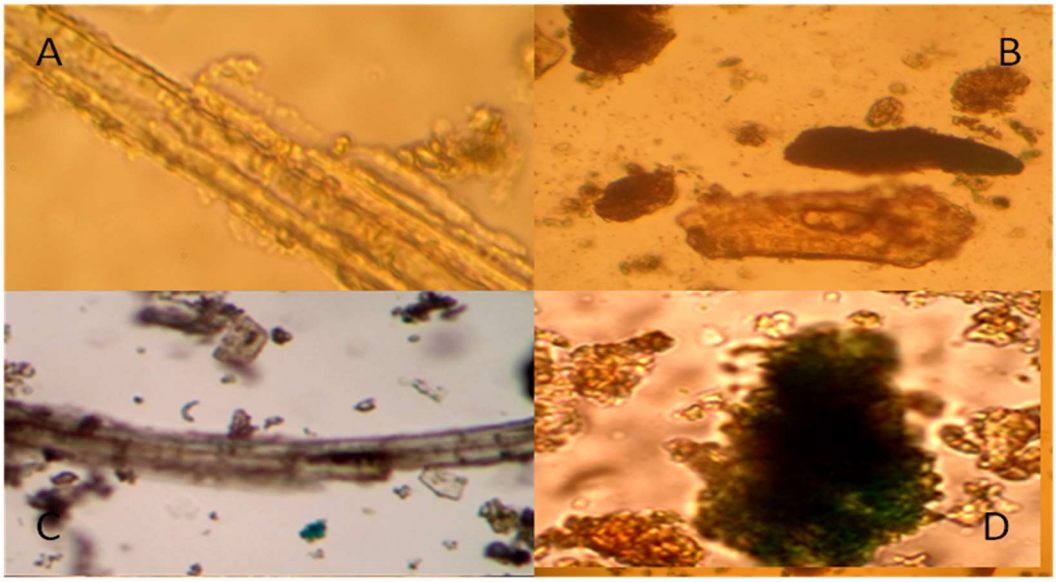

Figure 4: black henna sample illustrate, fibers content and dark unidentified dark particles.

Table 1. Phytochemicals present in henna dyes samples and authentic sample

Tests	Authentic Henna	Investigated samples of henna dyed		
		Black Henna	Brown Henna	Red Henna
Alkaloids	-	-	-	-
Glycoside	+	-	-	+
Phenols	+	-	-	+
Tannins	+	-	+	+
Flavonoids	+	+	+	+
Anthraquinone	+	+	+	+

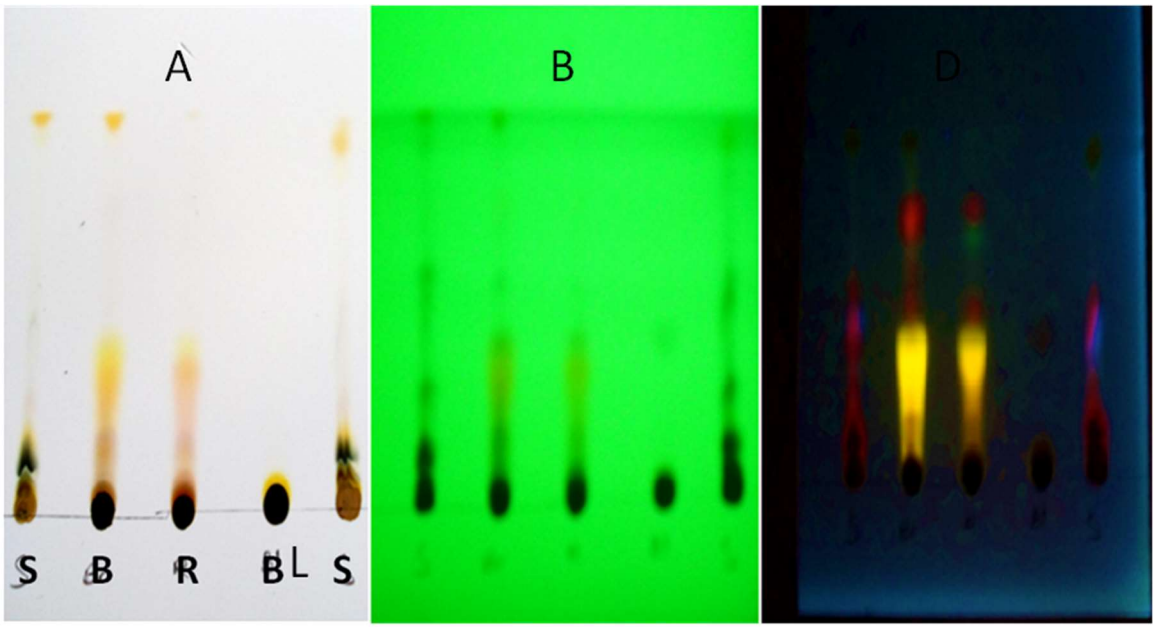

Figure 5: Thin layer profile of authentic sample (S) and henna hair dyes sample (Brown, Red, Black color), detection by visual (A) , UV 254 (B) and UV366 nm (D).

IV. Discussion

The pharmacognostic, phytochemical and TLC evaluation for herbal preparation as henna samples is very important for the detection of adulteration and monitoring the quality of the product. The results illustrate the difference in microscopical, phytochemical preliminary, and TLC profiles between the samples from the side and the authentic sample from the other side. The phytochemical screening demonstrates the similarity between the authentic sample and red henna, on the other hand, it was completely different in black henna (Table1). Moreover, The TLC profile of red and brown henna records the same yellow fluorescence band under UV. Also, the chemical profile of the black henna is neither to standard and nor to other samples. The senna features were observed under the microscope as diacytic stomata, unicellular warty hairs trichomes (figure 3), which never mentioned on the henna package. While senna is known in neutral henna in some Asian countries as part of their natural dyes [11]. Observing of dark particles in a black henna sample (figure 4), might indication of the presence of foreign substance as Paraphenyldiamine (PPD). It was reported that (PPD) added to many henna formulations to darken the color of henna [13], especially; that PPD is considered as a major constituent of permanent hair dye [12]. Recently, many cases of (PPD) adverse effect and toxicity as dermatitis and renal failure were reported ([2], [3], and [14])

V. Conclusion

It could be concluding that the results of the samples of royal hair dye henna contain plants and chemicals which were not included in the product information. A sign of adulteration was recorded and further study needs to take place to identify the foreign substances.

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