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Adulteration of crude drugs available in the local market of Karachi

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Abstract: Medicinal flora and their isolated constituents have long been consumed for the maintenance of health and management of diverse ailments. In the trade and commerce of herbal medicines the major problem is adulteration. It may be due the lack of knowledge and sometimes intentional for the profit enrichment. In the present study the sample of twenty crude drugs including *Terminalia chebula, Nigella sativa, Onosma bracteatum, Cucumis melo, Cassia senna, Vitex negundo, Piper nigrum, Sesamum indicum, Lallemantia royleana, Foenicum vulgare, Wrightia tinctoria, Sphaeranthus indicus, Trigonella foenum-graecum, Coriandrum sativum, Althea officinalis, Peganum harmala, Datura stramonium, Emblica officinalis, Pimpenella anisum* and *Viola odorata*were procured from local market and tested for adulteration according to the test of foreign matters in British Pharmacopeia 2019. Out of twenty crude drugs five crude drugs including *Cassia senna*, *Wrightia tinctoria*, *Althea officinalis*, *Pimpenella anisum* and *Viola odorata* have shown 2.257%, 3.6%, 7.2%, 14.27% and 4.356% adulteration respectively. The present study indicated 20% of specimen is adulterated which shows that adulteration existed in the crude drugs available in local market. There is a need of awareness and control methods to curtail such practice.

Keywords: Adulteration, foreign matters, crude drugs,

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INTRODUCTION

The use of plants and its isolated constituents with medicinal values have been in medicinal practice historically. They have been widely utilized for the prophylaxis and cure for diverse health problems. According to estimation approximately 25% of prescribed drugs and 121 active components used globally are derivatives of plants. Out of 252 drugs included in essential medicine list of World Health organization, 11% are derived from plants. About 80% population of Asia and Africa rely on natural medicines for health management [1].

Medicinal plants are considered as an efficient source of conventional and complementary medicinal system including Ayurvedic, Chinese, Homeopathy and Unani system. The recent era is said to be an era of healthy life style which flourishes the culture of natural healing and substantially increases the utilization of herbal drugs among people [2].

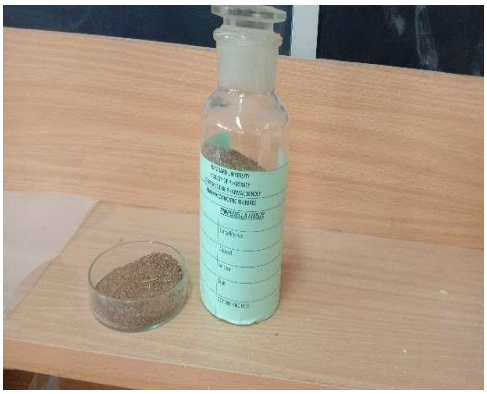
Table 1: percentages of foreign matters in crude drugs.

S.No.	Crude drugs	Total Amount (g)	Foreign Matters (g)	Percentage of Foreign Matters (%)
1.	*Terminalia chebula*Retz.	100	1.14	1.14
2.	*Nigella sativa.*	100	0.194	0.194
3.	*Onosma bracteatum*	100	0.610	0.610
4.	*Cucumis melo*L.	100	1.64	1.64
5.	*Cassia senna*	100	2.257	2.257
6.	*Vitex negundo*L.	100	0.964	0.964
7.	*Piper nigrum* L.	100	0.936	0.936
8.	*Sesamum indicum*L.	100	0.23	0.23
9.	*Lallemantia royleana*L.	100	0.092	0.092
10.	*Foenicum vulgare*	100	0.209	0.209
11.	*Wrightia tinctoria*	100	3.60	3.60
12.	*Sphaeranthus indicus*L.	100	0.911	0.911
13.	*Trigonella foenum-graecum*	100	0.708	0.708
14.	*Coriandrum sativum*L.	100	0.784	0.784
15.	*Althea officinalis*L.	100	7.20	7.20
16.	*Peganum harmala*	100	0.411	0.411
17.	*Datura stramonium*	100	0.609	0.609
18.	*Emblicaofficinalis*	100	1.70	1.70
19.	*Pimpenella anisum*	100	14.27	14.27
20.	*Viola odorata*	100	4.356	4.356

Adulteration of herbal medicine can be described as deceitful practices in which herbal medicine is either partly or entirely substituted with impure, extraneous, improper or inferior materials. Contamination of Herbal medicine is the undesired addition of impurities of a chemical or microbiological nature, or of foreign matter, at stating stage, intermediate product or finished herbal product during sampling, manufacturing, packaging, storage or transport. Adulteration and contamination of herbal medicine is an illegal practice which does not comply the regulations of most countries [3].

Adulteration can be generally categorized into two types: Intentional adulteration and unintentional adulteration.

A: *Cassia senna* (Senna)



B:*Wrightia tinctoria*

C: *Althea officinalis* L.

D:*Pimpenella anisum*

E.:*Viola Odorata*

Figure 1 (A-E): Crude materials exceeding the limits of 2% foreign matter.

Intentional adulteration is the purposeful replacement of premium quality herbs to inferior or spoiled material in order to enhance profit. Unintentional adulteration is due to lack of knowledge or carelessness. As a result authentic drug is partially or entirely deprived of the active ingredients may enter the market.

Methods of adulteration include replacement with inferior, spoiled, deteriorated, synthetic or harmful substances, admixture and sophistication [4].

In herbal drugs adulteration may be present in the form of tainted ingredients, incursion of insects and microbial contamination. There is a provision of swap of herbs as an replacement as the substituted herb or drug may have more or less comparable pharmacological properties as the conventional drug to be used.

Adulteration can be checked by numerous means of appropriate assessment and analysis. Scientific methods are to be functional to drug adulteration and verification.

The authorized limit acceptable for adulteration is not more than 2% w/w. There are various methods for detection of adulteration including macroscopy, microscopy to study internal cells and tissues, chemical and instrumental method, titrimetric analysis, TLC/ HPTLC, UV-Visible spectroscopy, gas chromatography, HPLC and infra-red spectroscopy. Adulteration in oils can be evaluated by optical rotation, density, refraction, Gas chromatography-mass Spectroscopy. In crude drugs adulteration is generally in the form of or foreign substance. Foreign matters, insect and further animal contaminant. The extent of foreign matter should not be greater than the standard regulated for each product permitting to the pharmacopeia monograph limiting the extent of foreign matter is not greater than 2% w/w. Foreign substances are not derived from the analyzed plant source or other plant or have a mineral or synthetic origin [5].

MATERIALS AND METHODS

Terminalia chebula Retz. *Nigella sativa, Onosma bracteatum, Cucumis melo* L., *Cassia senna, Vitex negundo* L. ,*Piper nigrum* L., *Sesamum indicum* L., *Lallemantia royleana* L., *Foeniculum vulgare, Wrightia tinctoria. Sphaeranthus indicus*L., *Trigonella foenum-graecum, Coriandrum sativum* L., *Althea officinalis* L., *Peganum harmala, Datura sramonium, Emblica officinalis, Pimpenella anisum, Viola odorata.* Analytical balance. (Panther USA. Model: BM-320)

Method: 20 different crude drugs were bought from the local market. Test of foreign matter have been carried out as per *Ph Eur*. method 2.8.2, British Pharmacopeia 2019. Each crude material was weighed 100g and spread on a thin paper sheet. Foreign matters were separated via naked eye then collected and weighed. Foreign matter of each drug weighed separately and percentage of foreign matter of each drug was calculated. The percentages of foreign matters are

shown in Table 1.Whereas fig.1 demonstrates various crude materials exceeding the limits of 2 % foreign matter.

RESULTS AND DISCUSSION

Medicinal plants and their isolated chemical constituents have been widely utilized as a source of complementary system of medicine from ancient era to the modern time. It has diverse medicinal use including prevention, treatment and health management. In the commerce of herbal medicine, adulteration is the common problem encountered. In the present study 20 crude drugs named *Terminalia chebula, Nigella sativa, Onosma bracteatum, Cucumis melo, Cassia senna, Vitex negundo, Piper nigrum, Sesamum indicum, Lallemantia royleana, Foenicum vulgare, Wrightia tinctoria, Sphaeranthus indicus, Trigonella foenum-graecum, Coriandrum sativum, Althea officinalis, Peganum harmala, Datura stramonium, Emblica officinalis, Pimpenella anisum* and *Viola odorata* have been tested for the presence of adulteration in accordance to the test of foreign matters Ph Eur. method 2.8.2, British Pharmacopeia 2019 [5]. The result indicated that five crude drugs including *Cassia senna*, *Wrightia tinctoria*, *Althea officinalis, Pimpenella anisum* and *Viola odorata* exceeded the allowed limit of foreign matter by 2.257 %, 3.6 %, 7.2 %, 14.27 % and 4.356 % adulteration respectively. The result revealed the presence of adulteration in the crude drugs available in local market.

CONCLUSION

The present study indicated 20% of specimen is adulterated which shows that adulteration existed in the crude drugs available in local market. It is necessary to conduct the preliminary quality control test including macroscopic and microscopic studies for the evaluation of quality. There is a need of awareness and control methods to minimize such practice.

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