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RESEARCH ARTICLE

ANALYSIS OF SUSPECTED ADULTERANT IN HERBAL (SLIMMING) PRODUCTS

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ABSTRACT

In this research paper 10 herbal slimming products were purchased from herbal medical stores and e-shopping were analyzed for the purpose of detection of adulterants. The branded and famous or non famous samples were selected for the study to determine the presence of sibutramine and fenfluramine and their analogs. After the examination it was found that out of the 10 samples, S3 (ketamine), S4 (methamphetamine), S5 (Methoxyetamine), S6 (Methoxyetamine), S7 (25I-NBOMe) and S8 (2CT-7) contained suspected adulterant, whereas S1, S2, S9 and S10 are free from any adulterants. The herbal slimming products contain adulterants which may be hazardous to human health. This type of formulation faults are important concern of medico-legal issues because people consuming it, may suffer fatalities due to the adulterations.

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INTRODUCTION

Medicinal plants have very significant role in world health. People are using the medicinal plants for health care problems traditionally. Herbal medicines as labeled the herbal products that contain the active constituent of plant parts (aerial or underground). Substance derived from the plant parts use for a large proportion of chemical medications used for the treatment of many diseases. Herbal medicines have been classified into four categories based on origin, evolution and their use. In current scenario everyone wants to look best. Herbal products have a vast world. The are divided into a broad category like fairer skin products, slim body shape or slimming product, gain weight and shape muscles, tall height or height promoters, healthy and long hair, healthy blood sugar, joint care, eye care, sugar tablets, blood pressure products etc. All these products may be synthesized allopathic, homeopathic or herbal components. Most of the people are moving towards the herbal products because of reliability and least or no side effect. These categories have sufficient distinguishing feature for a constructive examination of the way in which safety, efficiency and quality can be determined and improved (Bele and Khale, 2011). The herbal products are made by using the plants which have medicinal value. From ancient time the saints used plants to cure injury and for betterment of human being. Overweight and obesity are major risk factors for several chronic diseases and have been recognized by the World Health Organization as an increasing public health issue affecting millions of individuals, especially in Western developed countries. Additionally, for health reasons today's society strongly promotes having a normal weight and a slim figure. The loss of weight or the maintenance of an ideal weight is both commonly associated with diet and exercise, often requiring significant changes in eating behavior and lifestyle. In the search for alternatives to a quicker weight loss and to simultaneously avoid lifestyle changes, people are increasingly resorting to the so-called quick slimming agents. Robert *et al.* (2003) also reported the prevalence of herbal drugs and clinical patients who used prescribed medication or about risk of adverse drug events. Due to increase in crime cases, especially in medical field needs for forensic analysis of the herbal (slimming) products has become must for the identification of the herbal products. Some of the slimming pills contain such chemicals which are hazardous to human health. This has become evident by the number of information on cases of toxicity, major chemical adulterants in herbal medicinal products, and current analytical techniques used for their detection. For this purpose the topic entitled "Analysis of Suspected Adulterants in Herbal (slimming) Products" has been carried out with following objective.

MATERIALS AND METHODS

Ten herbal slimming samples were purchased from the market or e-shopping. The analogs of sibutramine were investigated by chemical test and TLC.

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Extraction method

1 g of herbal sample (pill) was taken and grinds it with the help of mortar and pestle. Then the sample was rinsed with distilled water and a pinch of MgO was added in it. MgO act as adsorbent which was used to decolorize the sample solution. Then the sample was centrifuged at 8000 rpm for 2-3 minutes. The supernatant was discarded and taken to perform various chemical tests.

Chemical Examination

Two reagents are used for chemical analysis

1. Marquis Reagent
2. Mandelin Reagent

The reagents were used to analyze the presence of alkaloids or pharma products as an adulterant in the entire 10 sample during chemical examination. Xia *et al*. (2002) also performed chemical analysis of Radix Astragali to detect the chemical constituents present in Radix.

numbered 1, 2, 3....S1, S2, S3....etc. Each sample was individually analyzed by chemical test and TLC respectively. The following result was obtained.

Sample (S1)

In the chemical (color) test the Mandelin reagent gave bluish green color and Marquis reagent showed brown color which indicated the presence of amphetamines. To find the chemical composition. All the 10 samples were individually analyzed by Mandelin and Marquis Reagent during the chemical examination. The result of chemical examination was obtained given in the table. For the TLC of the suspected sample S1 was performed in the Methanol: Ethyl acetate: Ammonium hydroxide (18:10:5) as mobile phase, the suspected sample visualized after spray with 1% ninhydrin solution after it the peak which was observed under UV light and the R*f* value was calculated,0.92 which was not similar to the standard amphetamine (0.61). The TLC was performed for entire 10 samples indifferent mobile phase and it was visualized by spraying reagent and peak was observed under UV light.

Table 1. The Chemical Examination of the suspected Herbal Slimming Product Samples (S1-S10)

S. No.	Sample No.	Chemical Test Mandelin Reagent test(preliminary)	Chemical Test Marquis Reagent test(confirmatory)	Suspected Adulterant	Result
1.	S1	blue, green	brown	Amphetamine	Negative
2.	S2	olive	purple	Codeine	Negative
3.	S3	orange	Light pink.	Ketamine	Positive
4.	S4	dark yellow	Brown	Methamphetamine	Positive
5.	S5	strong yellow	slow pink	Methoxyetamine	Positive
6.	S6	strong yellow	slow pink	Methoxyetamine	Positive
7.	S7	red	orange	25I-NBOMe	Positive
8.	S8	orange	yellow	2CT-7	Positive
9.	S9	moderate green	Dark brown.	Acetaminophen	Negative
10.	S10	no change	No change.	_	Negative

Table 2. The TLC of the suspected Herbal Slimming Product Samples (S1-S10)

S.No.	Sample No.	Rf value	Suspected adulterant	Result
1.	S1	0.92	Amphetamine	Negative
2.	S2	1.22	Codeine	Negative
3.	S3	0.83	Ketamine	Positive
4.	S4	0.56	Methamphetamine	Positive
5.	S5	0.58	Methoxyetamine	Positive
6.	S6	0.58	Methoxyetamine	Positive
7.	S7	0.59	25I-NBOMe	Positive
8.	S8	0.41	2CT-7	Positive
9.	S9	1.12	Acetaminophen	Negative
10.	S10	_	_	Negative

Thin Layer Chromatography

1.5g of sample was dissolved in distilled water / methanol/ acetone. The prepared solution of suspected was putted on the TLC plate and the plate was dipped in ethyl acetate: methanol: ammonium hydroxide (18:10:5).The sample was allowed to run at least for half an hour to 1 hour, and then incubated at room temperature for 30-40 minute. 1% of Ninhydrin solution was sprayed to visualize the peak. Calculate the R*f* values. R*f* value= distance traveled by the solute / distance traveled by solvent. All the 10 samples were analyzed by using different mobile phase and different spray reagents for visualization of peak and R*f* value was calculated.

RESULTS

In this work 10 samples were collected from Herbal medical stores and by e-shopping for the analysis. The samples were

The result has been placed in Table 2. Similar finding have been reported by Mohammad *et al.* (2010) who contributed his work of thin layer chromatography for the analysis of herbal products.

Conclusion

The work entitled "Analysis of Suspected Adulterants in Herbal (Slimming) Products" was carried out. From this research paper it was concluded that color test followed by TLC through Rf value can be successfully for the determination of adulterants present in herbal slimming pills. After the examination of 10 samples it was concluded that S3, S4, S5, S6, S7 and S8 contained suspected adulterant as ketamine, methamphetamine, methoxyetamine, methoxyetamine, 25I-NBOMe and2CT-7 respectively but S1, S2, S9 and S10 gave positive result during Chemical

Examination and TLC so it can concluded that S1, S2, S9 and S10 are free from the adulterants as it was suspected to contain amphetamine, codeine and acetaminophen respectively. There is also an increased need for more effective control to detect possible adulterations and, in such cases, take enforcement measures to safeguard public health. Khazan *et al*. (2014) determined the presence of synthetic adulterants in common herbal weight loss supplements. Therefore, it was concluded that chemical examination and Chromatography are the reliable method for successful identification of adulterants from different pharmacological classes (including new/unknown analogs) is critically important to protect public health and ensure the quality of dietary supplements.

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