

Research Article

Study on Detection Technology of the Component of Additives for Sports Healthy Food

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Abstract: This study is based on the overview of the sports healthy food, which takes it as the breakthrough point, by analyzing the current situation of the additives of the sports healthy food, discussing the detection method of the additives in sports healthy food. With the aggravation of market competition, the operators neglected the law, there is an intensified trend in the healthy food to add chemicals. The kind of additive drugs is increasingly diverse, the adding techniques are increasingly covert.

Keywords: Adding techniques, additives, sports healthy food

INTRODUCTION

With the social pressure of competition and the growth of the aging trend, sports health food has got the rapid development, although the size of the market brought about the development of the economic benefits, at the same time, it may cause potential hazard of a series of safety problems, especially in the adulteration problem, which has been the most difficult and most concerned for our country's supervision and management departments. This will not only hurt the consumer's economic interests, but the more important thing is that it will seriously endanger the health of the consumers', which may delay the optimal period of curing the disease, prompting more complications, greatly doing harm to the operation and the development of the whole market of health products (Lu, 2011). Therefore, at present, it is urgent to set up an accurate, rapid and effective detection method of regulation for such potential chemical drugs in the health food, so as to prevent and supervise the occurrence of the adverse events in health food products after entering into the market and ensure its safety.

MATERIALS AND METHODS

The definition of sports health food: Sports health food has some general characters of the common food, but also it has the fiction of caring health, existing between the general foods and drugs, with the characteristics of both, which definition has no decision in the world with a variety of titles. Sports health food is known as Dietary supplements in the USA or Nutritional supplements, while in Japan, it is known as the Functional food, in German, it is known as Perform food. Although the names are different, in the food science circle, it is generally thought that this kind of

composition of food should be composed with natural nutrition and materials with special functions. In 1996, China, the implementation of Management Approach for Health Food clearly stipulated: the definition of health food refers to food with a specific function of caring health, which is suitable for the specific groups to take, with the function of regulating the body, without the purpose of treating the disease. This definition highlights the three major characteristics of sports health food: the feature of food, the feature of function and the feature of non-drug.

The difference between sports health food and medicine: Although the definition of sports health food is not entirely consistent among different countries, there is unified opinion on the issue how to distinguish between sports health food and medicine (Li, 2009). Health food and drug sport has a strict distinction. Unlike sports health food, drug is used for the prevention, treatment and diagnosis of human diseases, with the object of regulating human physiological functions, which is mainly used for the treatment of diseases with indications or functions, usage and dosage, but there are certain poisonous side effect, which can ensure the relative safety; while health food as a kind of food must guarantee the absolute safety.

The present situation of the additives of sports health food: In recent years, according to the condition of monitoring and literature investigation on sports health food product from the State Food and Drug Administration, at present, the situation of chemical drugs added in health has the following states:

- The original source of additives is unknown, the possible chemical drugs could be added including:
 - Prescription drugs, once this kind of material is added, it is unable to control the amount of usage,

it is easy to cause adverse reactions, which can even damage the function of consumers' liver and kidney, such as in the products of losing weight, it adds ephedrine products, which can make central nervous excited and enhance the speed of metabolism, so as to promote the function of losing weight, at the same time, it is one of the raw materials to manufacture methamphetamine, which belongs to the national controlling drugs, it is in a long-term use, it will affect the rate of heart, which can even endanger the life.

- The structural analogues of the existing drugs, these compounds are based on the existing structure of drugs to have tiny modification, therefore, the basic structure of the framework is similar, there may be similar clinical effects. But because most of the structural analogues is without preclinical and clinical studies, there is a big security risk. There are many reports in the literature that the detection of the structural analogues PDE -5 belongs to this type of addition.
- The drugs evacuated from the market, such as fenfluramine, sibutramine, diethylpropion and some other drugs, because of the significant effect of reducing weight, once it has become the most fashionable medicine for a time, but they will produce adverse reaction for the cardiovascular system and central nervous system (Xie, 2009). Thus, the United States Food and Drug Administration, the European Union, the State Food and Drug Administration have recalled these drugs, but according to the literature survey and the report of the risk assessment for health food, the detection rate of sibutramine in a lot of slimming health food is still high.
- To add new drugs which have not been approved or leading compounds.
- Drugs with chemical synthesis, in order to reduce the cost, some drug ingredients are added in the form of raw materials, the impurities and the potential risk of the substances are unknown.
- The dosage of the illegal drugs is added at random, such as the detected amount of certain types of health food of different batches of caffeine is between 4~327 mg; at the same time, in order to avoid inspections, some manufacturers of the

products added illegally in the different batches.

- The feature of compatibility of adding illegal drugs not clear, there may have interactions between the illegally added drugs in health food with the formulations of health food, at the same time, there may have the interaction between the added drugs with the drugs that consumers are taking, all of which may have a threat to the health of consumers'.
- The compounded adding of the drugs, this kind of situation exists in many kinds of drugs as well as in adding multi-dose, because there are some drugs that are added at low concentration levels, therefore, even if it is detected, which may also be considered as pollution, reducing the degree of the punishment, with some covert features.

RESULTS AND DISCUSSION

The detection of method of additives in sports health food:

The existing standard is only for the legitimated components of sports health food, the illegal chemical components of sports health food cannot be detected So you want to detect illegal additives in accordance with the legal methods. Therefore, we must improve the means of detection so as to check out the illegal additives, therefore, many drug inspection offices, hospitals and colleges and universities carry out the technology researching and verification work for sports health food about illegally added chemical components, which is developed for the detection with many kinds of effective methods and the main methods are as follows (Fig. 1).

ELISA (Enzyme-Linked Immunosorbent Assay):

ELISA is based on the immune reaction of the antigen antibody, which is the colored reaction after using enzyme on the substrate, by means of the colorimetric or fluorescent reaction to make identification. By examining the antibody of the exogenous protein of the genetically modified crops as well as the combination of the exogenous protein in a sample, combined with enzyme-labeled antibody or anti enzyme-labeled antibody, by adding the substrate to form the colored material through the enzyme catalyzed reaction,

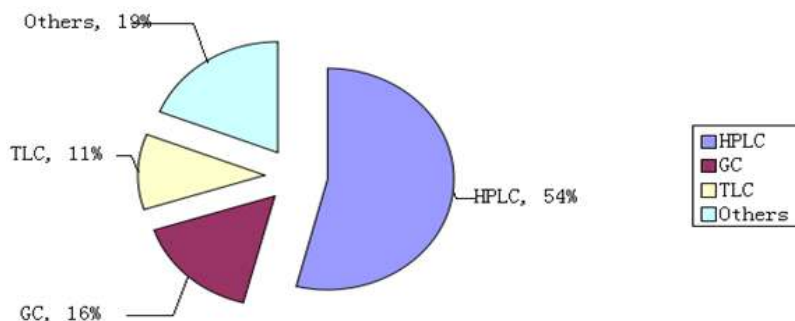


Fig. 1: The proportion of the various analyzing methods

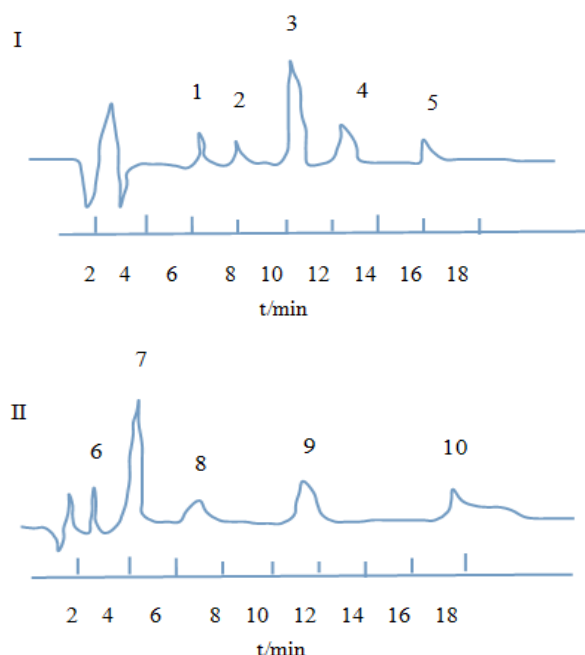


Fig. 2: The HPLC chromatogram of hybrid control solution under the condition of mobile phase I and mobile phase II

1: Phenylpropanolamine; 2: Ephedrine hydrochloride; 3: Hydrochlorothiazide; 4: Caffeine; 5: Phenformin hydrochloride; 6: Metformin hydrochloride; 7: Phenolphthalein; 8: Fenfluramine hydrochloride; 9: Gemfibrozil; 10: Sibutramine

according to the depth of the color or the detection result of the ELISA instrument detection to judge when it is positive or not. Qin Hongmei with her staff used enzyme linked immunosorbent assay to have the detection on xanthan gum as well as the other hydrosol of the health food, this method is simple, economic, which also can reduce the complex matrix interference effect on the food analysis method.

HPLC (HPLC High Performance Liquid Chromatography): The detection method for checking the prohibited drugs in sports health food mainly uses the method of high performance liquid chromatography. Because the gas chromatograph can only be used for the qualitative and quantitative analysis of the volatile components with low boiling point, in the actual analysis for many compounds, it is limited in some degree. While high performance liquid chromatography has the feature of high separation efficiency, fast analyzing speed, good adaptability, high detection sensitivity, high boiling point without the characteristics of gasification, with the feature of unstable thermal material, which has been widely used. At present, we can use the method of HPLC to test materials in the prohibited drugs of health food, there

are some reports in domestic literatures, but the controlling features must rely on the standard of its qualitative and each components in health food must achieve better separation (EU, 2012). While the illegal manufacturers add more and more illicit drugs with sophisticated means, such as adding structural analogues, reducing the content, etc. High performance liquid chromatography may have possible false positive results, therefore, if it is possible, it should adopt more powerful detection technology (Fig. 2).

TLC (Thin Layer Chromatography): Thin layer chromatography is putting the sample and control sample in the same thin layer plate, after the agent is spread out and dried, the spots can be detected out with using the ultraviolet lamp, which can compare with the spot size, color, shape and the containing ingredients of the criterion of Rf samples. Inspection personnel can prepare the thin layer plate and expansion agent, etc. in advance, carrying them to the site of the needed detection and have rapid detection. Zhang Qiming with his staff used TLC to have test on the traditional Chinese medicine to see whether it is added sildenafil citrate illegally, it is detected that it is with constitutive rafters of sildenafil citrate. TLC can be used as the initial screening method to identify whether the traditional Chinese medicines and health products added chemical drugs illegally, with the advantages of fast, economic and simple, etc.

CE (Capillary Electrophoresis): Some literatures have reported the detection method of capillary electrophoresis for the detection of the prohibited drugs in sports health food (Chen, 2003). However, the qualitative feature of the capillary electrophoresis is also relied on the comparison of the standard, which is limited to the certain restrictions and now this kind of apparatus of capillary electrophoresis is not yet completely universal. Therefore, this detection method has not been fully and widely applied, yet.

CONCLUSION

In summary, TLC method has the advantages of simple operation, low cost, suitable for screening the suspicious samples initially; GC can identify accurately, which can be used as a powerful identifying tool; HPLC can separate the samples with two pipes array detector to determine whether the sample is contained a chemical composition. Mastering the characteristics of various detection methods, choosing the appropriate detection method for the targeted detection, is conducive to have a rapid and accurate detection on illegal additives, so as to ensure the safety of sports health caring medicine.

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