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A COMPARATIVE STUDY ON THE EFFECTS OF EXCESSIVE CONSUMPTION OF GINGER, CLOVE, RED PEPPER AND BLACK PEPPER ON THE HISTOLOGY OF THE HEART

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To the Editor:

Existing scientific evidence has shown that ginger has: (a) cardiovascular effects¹; (b) antiplatelet potentials that vary by form²⁻⁵, though clinical studies using raw, cooked or dried ginger do not show an effect on bleeding time, platelet aggregation or thromboxane production^{2,6}; (c) the potential to prevent the increase in cholesterol levels following intake of cholesterol-rich diet⁷; (d) positive inotropic and pressor effects⁸⁻⁹ which have been supported by clinical trials and neither adverse effects nor drug interactions have been reported^{1,10}; (e) potential to stimulate blood circulation¹¹ and the improved circulation is believed to increase cellular metabolic activity, thus contributing to the relief of cramps and tension⁹; (f) potential to reduce blood pressure and decrease cardiac workload¹²; as well as (g) antioxidant properties¹³⁻¹⁵.

On the other hand, there are evidence that black pepper is used traditionally in the treatment of many and varied conditions that includes heart complaints¹⁶ as well as evidence suggesting that capsaicin (the active principle of red pepper), has the potential to lower blood pressure and that it is almost certain that the benefits of eating peppers far outweigh any potential risk¹⁷.

In the United States (like several other countries), the increasing number of foods containing herbs has raised concerns prompting the need for evidence that food additives are safe, and manufacturers have been warned that the safety of herbal additives must be proven¹⁸. Indeed, consumers have little information to make decisions about safety, adverse effects, contraindications, interactions or effectiveness and must rely on manufacturers to provide ingredients that are accurately labeled¹⁹.

In recognition of this problem, Germany's ministry of health established a Commission comprising doctors, pharmacists, scientists and herbalists to evaluate the safety, quality and efficacy of herbs²⁰. Nevertheless, investigating the efficacy of herbal therapy is complex because many contain mixtures of compounds that exist in varied forms²¹.

In Nigeria however, there is an on going investigation on the effects of excessive consumption of *Yaji* -a complex Nigerian meat sauce²²⁻²⁴. *Yaji* is a mixture of groundnut powder, salt, maggi, ginger, clove, red pepper and black pepper²². The active principles of its spices are gingerol²⁵, eugenol²⁶, capsaicin²⁷⁻²⁸ and piperine²⁹ respectively. Of greater importance is the fact that *Yaji* is widely consumed as it serves as sauce for numerous food types, but mainly used as sauce for the meat delicacy called *Suya*^{22,23}.

Having determined the effect of excessive consumption these *Yaji*-spices on the histology of the liver and kidney, this study is similarly designed to determine the effect of excessive consumption of *Yaji*-spices on the histology of the heart.

A. Experimental Animals: twelve (12) adult rabbits bought from the animal house of the College of Medicine, Ambrose Alli University, Ekpoma, Edo, Nigeria, and moved to the experimental laboratory of Anthonio Research Center, Ekpoma, Edo, Nigeria, where used for this study after being allowed to acclimatize for 3 weeks. Feed was from Bendel Feeds and Flour Mills (BFFM), Ewu, Edo, Nigeria, with a daily supplementation of lemon grass procured from the immediate environment. Water was given ad libitum. The experimental animals were divided into six groups of two (2) rabbits each (A - F). Those in groups B, C, D, E and F, constituted the test groups whereas group A served as the control.

B. The Spices: for this experiment, the spices -ginger, clove, red pepper and black pepper, were used. They were procured from Aduwawa Market Benin City, Edo, Nigeria, where the local meat sauce -*Yaji*- containing these spices and other ingredients are produced. A hand-grinding machine was used to grind them into powdered form and then measured as appropriate.

C. Experimental Procedure: the rabbits were weighed just before the administration of the spices and just before they were sacrificed. The administration of the spices was performed via mixing with feed as follows:

1. Group A (Control) received only normal feed with lemon grass supplementation daily for 21 days.
2. Group B received a mixture 3g of Clove, 3g of ginger, 3g of Red pepper and 3g of Black pepper in feed with lemon grass supplementation daily for 21 days.
3. Group C received a mixture 3g of Ginger in feed with lemon grass supplementation daily for 21 days.
4. Group D received a mixture 3g of Clove, in feed with lemon grass supplementation daily for 21 days.
5. Group E received a mixture 3g of Red pepper in feed with lemon grass supplementation daily for 21 days.
6. Group F received a mixture 3g of Black pepper in feed with lemon grass supplementation daily for 21 days.

At the end of the 21st day, the animals were sacrificed and the organ -Heart, was obtained and immediately fixed in formaldehyde solution.

D. Tissue Processing: tissue sections of the organs were produced via normal histochemical methods of fixation, dehydration, impregnation, embedding, sectioning and staining (with haematoxylin and eosin).

Weight gain was observed in groups A (control), C (fed with ginger), D (fed with clove), and E (fed with red pepper) while there was weight loss in group B (fed with all the spices). The weight for the animals in group F (fed with black pepper) remained the same.

The result of this study show that the excessive consumption of ginger, red pepper and black pepper, under the study period, had no effect on the histology of the heart. These result is in contrast with the results obtained from similar studies on the liver²⁴ and on the kidney³⁰, under the same experimental condition, design and duration.

In the case of the liver, it was observed that except for clove, the excessive consumption of ginger, red pepper, and black pepper, especially in their combined state, as it is with *Yaji* (suya sauce) and replicated in the feeding design of group B, is capable of inducing hepatic necrosis²³.

On the kidney, the result implicated cloves and black pepper, suggesting that the excessive consumption of cloves and black pepper alone, or in combination with other spices are capable of inducing a duration dependent but progressive renal damage through a mechanism that may be associated with mast cell mobilization into the kidney, which then may trigger renal fibrosis³⁰.

These findings cumulatively suggests, that under the same condition and duration, the effects of excessive consumption of *Yaji* spices (ginger, cloves, red pepper and black pepper; in their single or combined states) on the liver, kidney and heart, are in the classified order of 'harmful', 'potentially harmful' and 'not harmful' respectively.

Also, judging from the fact that the use of herbs and herbal therapies is escalating³¹, with most practicing physicians having little knowledge of herbal treatments or adverse effects³²; and with a growing demand for soft drinks and foods with herbal additives which greatly expands public exposure³¹, the result of this study sheds some light on the effect of these spices on the microanatomy of the heart, especially as it relates to the fact that some herbal remedies may induce adverse cardiac effects including sympathomimetic activity, hypertension and arrhythmias³¹.

Finally, since there are existing scientific evidence to show that several herbs (including spices) offer potential for cardiovascular conditions such as venous insufficiency, intermittent claudication, hyperlipidemia, hypertension and congestive heart failure (CHF)³¹, and as varied mechanisms, including antioxidant, antiplatelet, fibrinolytic, antiatherosclerotic, antihyperlipidemic, antiarrhythmic and vasodilatory actions, have been ascribed to herbs³³, the result of this study suggests that the inclusion of these spices in herbal medications especially those used in the management of heart related conditions or in food sauces like *Yaji*, will not induce any significant alteration in the histology of the heart and so, are not 'harmful' to the heart tissue.

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