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The Correlation between Cancer Incidence and Kava Consumption

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Background. A number of countries in the South Pacific have very low cancer incidence. In spite of a high percentage of the population habituated to tobacco, the cancer incidence in countries such as Vanuatu and Fiji experience age-standardized cancer incidence in the 70's. A number of studies have noted the low cancer incidence in these countries and have postulated that a dietary chemopreventive agent might be responsible.

Methods. The cancer incidence studies for the Pacific Islands were completed in the 1980's. During this time period accurate records allow for a calculation of local kava consumption. This study compares the cancer incidence for a number of Pacific Island Nations with local kava consumption.

Results/Conclusions. The data indicates that the more kava consumed by a population the lower the cancer incidence for that population. The data suggests there is a close inverse relationship between cancer incidence and kava consumption.

Introduction

Cancer prevention is now a well-established medical science. Chemoprevention has been described as the intervention with specific agents to prevent, inhibit or reverse carcinogenesis before malignancy. At this time there is a concerted effort to find effective chemopreventive agents for cancer and also to subject these agents to mechanistic studies to determine their mode of action.

The South Pacific Commission Cancer Registry was established in 1977. Many South Pacific Nations have significantly lower cancer incidence than other parts of the world. Table 1 lists the age-standardized cancer incidence rates for males and females in the Pacific Island Nations with Los Angeles Caucasians as a reference.

In 1985 Henderson et al published a paper on the cancer incidence in the islands of the Pacific. He noted the high rate of smoking among Fijians and postulated the low cancer incidence might be related to chemopreventive actions of certain vitamins and trace elements found in the diet.⁴ Paksoy et al studied the cancer incidence in Western Samoa and also summarized other cancer incidence studies for countries throughout the Pacific³. In conclusion Paksoy et al also proposed that dietary protective factors might be responsible for the low cancer rates found in some South Pacific Nations.

Table 1.— Age-standardized cancer incidence rates for all sites males and females per 100,000 population

Country	Incidence male	Incidence female
Vanuatu ¹ (1980-1986)	70.9	83.7
Fiji ² (1979-1982)	75.0	112.2
Western Samoa ³ (1980-1988)	90.2	93.7
Micronesia ⁴ (1980-1982)	132.9	97.0
New Caledonia ⁵ (1977-1981)	182.0	154.0
Hawaii/Hawaiians ⁶ (1978-1982)	311.9*	297.6*
New Zealand/Maoris ⁶ (1978-1982)	322.9*	297.6*
USA, Los Angeles ⁶ (1978-1982)	307.2*	276.2*

* all sites but 173 (other skin)

In 1995 Le Marchand et al published a study on diet and lung cancer in the South Pacific.⁷ This study was population-based case-controlled using data from Caucasian, Japanese Hawaiian, Filipino and Chinese groups to investigate the role of diet in explaining lung cancer incidence. He concluded much of the difference in lung cancer incidence was explained by smoking and the chemopreventive properties of lutein. He found that a very high number of Fijians smoked but they smoked fewer cigarettes. The number of cigarettes sold in Tahiti was used to confirm the data. In rural areas of the South Pacific tobacco is a cultivated crop and tobacco is commonly sold loose in local markets. It is possible the number of cigarettes consumed in Fiji is higher when local production and consumption of tobacco is calculated. However, when Le Marchand et al conducted the survey the amount of cigarettes consumed by Fijians was recorded and is assumed to be accurate. Le Marchand et al was unable to completely explain the low lung cancer incidence and proposed that the difference might be related to the chemopreventive actions of certain vitamins and trace elements in the diet.

Another possible explanation for the low cancer rates in Vanuatu, Fiji, Western Samoa, and Micronesia could be the consumption of kava.

Kava (*Piper methysticum*) is a plant indigenous to the Pacific Islands. All major Pacific Islands developed kava as a beverage and it is commonly consumed much like alcohol in western culture. However, western intervention has resulted in a significant reduction and sometimes the complete cessation of kava drinking in some

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South Pacific Islands. Kava is traditionally prepared from the root of the plant, which is worked in water to extract the active ingredients. The active ingredients have been identified to be a group of compounds known as kavalopyrones or kavalactones.

The commonly accepted actions of kava, which are referenced in the literature, are as an anti-anxiety agent⁸, antidepressant⁹, euphoriant¹⁰, muscle relaxant¹¹, analgesic¹², and anti-convulsant¹³. Kava has become popular in the west as an anti-anxiety agent. No side effects have been identified when used on a daily basis in moderate amounts.¹⁴

Materials and Methods

The cancer incidence studies for the Pacific Islands were compiled in the 1980's (TABLE 1). During this time period we also have the most accurate records of local kava consumption. Vanuatu recognized the potential of kava as an export crop and conducted a study in 1984 to count the plants growing in that country.¹⁵ With the exception of Vanuatu, prior to the 1990's, all production of kava can be considered to be for local consumption. The kava production for Fiji, Western Samoa and Micronesia is primarily for local consumption at least until the early 1990's.¹⁶ In the 1990's kava became a significant export crop for Vanuatu and Fiji.¹⁶ During the mid 1990's there was a significant increase in plantings of kava and also sporadic harvesting of kava due to price fluctuations. For these reasons the data presented is from the 1980's in an effort to produce the most accurate figures on the amount of kava consumed in the various Pacific Island Nations.

In the 1980's Vanuatu was the primary exporter of kava. It is estimated that 20% of the production was exported outside the Pacific. The remaining 80% of Vanuatu's kava production is considered to be consumed locally. Irrespective of the figures used to calculate the kava consumption in Vanuatu, it is obvious that this country's kava consumption per person far exceeds any other country.

Reliable estimates are available for the number of plants being cultivated in Vanuatu, Fiji, Western Samoa, Tonga and Micronesia.¹⁶ In 1984 Vanuatu counted the number of plants being cultivated, which totaled 2,605,635 plants.¹⁵ The number of hectares of kava plants being cultivated totaled 4,200 hectares in Fiji, 800 hectares in Western Samoa, 800 hectares in Tonga and 300 hectares in Micronesia.¹⁶ New Caledonia does not cultivate kava but imports approximately 100 tons of kava each year. Each hectare of cultivation is estimated to hold 1000 plants.¹⁵ On average kava plants are harvested after four years and replaced.¹⁵ The average plant when harvested yields ten kilograms of fresh rootstock.¹⁵ When fresh rootstock is dried it retains 20% of its original weight.¹⁵ Therefore, Kava plants on average are harvested after four years. Each plant produces an average of 10 kilograms of fresh rootstock, which, when dried yields 2 kilograms dried rootstock. The following formula provides us with the amount of kilograms of dried kava root consumed each year.

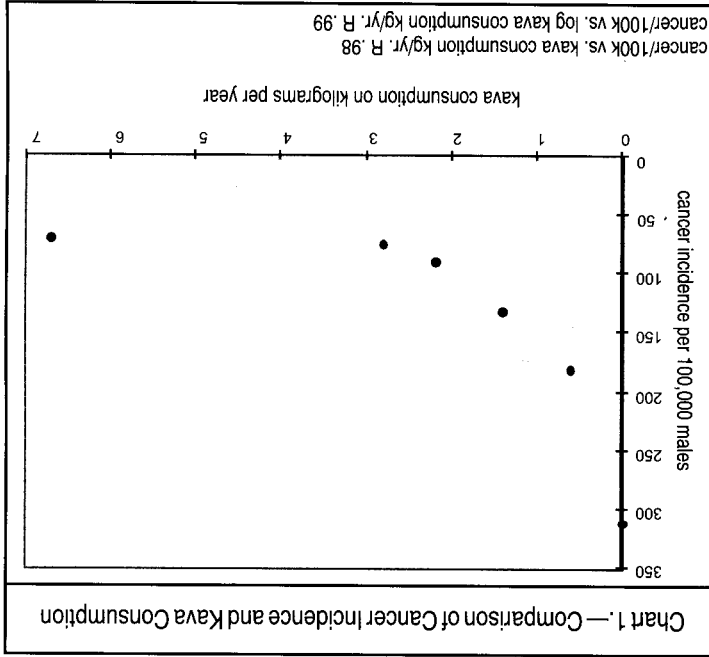
$$\frac{\text{Number of plants}}{4} \times \frac{2 \text{ kg dry kava root}}{\text{plant}} = \text{kg consumed per year}$$

There is no information on what percentage of males and females drink kava in the countries being studied. Men will often stop at the kava bar after work and enjoy bowls of kava with friends. While women often drink kava the majority of kava consumption is by men. We have no information on what percentage of people drink kava or what percentage of men or women drink kava. Because kava consumption is believed to vary significantly for women in each culture the cancer rate for males was used for comparison. As discussed earlier the most accurate numbers for cancer rates and kava consumption is from data gathered in the 1980's. Therefore the population figures that were used to calculate the kava consumption per person is based on figures from 1989.¹⁷

Results/Discussion

Table 2 lists the cancer incidence and kilograms of kava consumed in each country. In every country the greater the amount of kava consumption the lower the cancer incidence. The data from table 2 is displayed in chart 1. The Kingdom of Tonga is not charted due to the author's inability to determine the cancer incidence for this country. There is a close inverse relationship between cancer incidence and kava consumption.

Country	Population 1989	Kilograms consumed	Cancer rate/ 100,000 males	kilograms/person
Vanuatu	155,000	1,042,252	70.9	6.7
Tonga	100,000	400,000	unknown	4.0
Fiji	749,000	2,100,000	75.0	2.8
Western Samoa	180,000	400,000	90.2	2.2
Micronesia	108,000	150,000	132.9	1.4
New Caledonia	161,000	100,000	182.0	0.6
Hawaiians	208,476	0	311.9	0.0



The results indicate a close correlation between kava consumption and a reduction in cancer incidence. However, if kava does reduce the incidence of cancer it is improbable that kava consumption is solely responsible for the low cancer rate. It is possible that the rate of cancer reporting has some effect due to the difficulty of documenting all cancer cases in these remote islands. It is the author's belief that kava consumption reduces the amount of tobacco consumed by smokers. If drinking kava reduces the amount of tobacco consumed less cancer would be reflected in the kava consumption data.

Age-standardized cancer incidence for kava drinking countries is one-fourth to one-third the cancer incidence found in non kava drinking countries and non kava drinking Polynesians. If kava was solely responsible for the reduced cancer incidence it would be expected that from 66% to 75% of the population drinks kava and kava has the ability to completely prevent cancer. While there is no data on the percentage of people that consumes kava it is considered to be lower than 75% of the population. It is also unrealistic to consider that kava could be 100 percent effective as a cancer chemopreventive agent.

However, other factors support the conclusion that kava does play a role in reducing cancer incidence. Men consume considerably more kava than women. Out of approximately 150 cancer incidence reporting locations in the world only approximately 10 report less cancer for men than women. The three countries with the highest kava consumption rates (Vanuatu, Fiji and Western Samoa) have a lower incidence of cancer for males than females. In countries with a lower rate of kava consumption (Micronesia and New Caledonia) a more customary relationship of cancer incidence for males and females is found.

Other than Vanuatu, there appears to be a direct correlation between kava consumption and reduced cancer incidence. The situation in Vanuatu might be explained by a number of factors. The most obvious would be that if kava has a chemopreventive effect it would be dose related. It would be understandable that after a certain amount of kava consumption no further benefit is derived. Another obvious factor is the number of people who do not drink kava. These individuals would be expected to have normal cancer rates and prevent the overall cancer incidence from dropping below a fixed level.

Another indication that kava may play a part in reducing the incidence of cancer is the normal rates of cancer found in the indigenous people in New Zealand, French Polynesia and Hawaii. In New Zealand the climate prohibits the cultivation of kava and in French Polynesia and Hawaii western influence has eradicated the kava culture. Normal cancer rates are found in the Pacific where kava consumption is not common.

The data indicates a close inverse relationship between cancer incidence and kava consumption. While the results of this study suggests kava may be an effective cancer chemoprotective agent no other conclusions can be made until further research is completed.

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