RESEARCH

TEA CONSUMPTION PATTERNS OF 13-25 YEAR OLDS IN THE VAAL TRIANGLE, SOUTH AFRICA

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ABSTRACT

This study formed part of a larger project in which food and beverage fortification as a way to address specific micronutrient deficiencies was evaluated in selected subjects in the Vaal Triangle. The objective of this study was to examine the suitability of the habit of tea drinking as a vehicle for fortification. This was achieved through a survey which sought information about the amount of tea consumed, the type of tea mostly consumed, additions to the tea, when tea is consumed, the reasons for tea consumption and preference for tea or other beverages.

The study was conducted in a randomly selected sample of 500 male and female Africans, aged 13 to 25 years in the Vaal Triangle, South Africa. A combination of qualitative and quantitative research methods were used simultaneously and sequentially to collect data. Questionnaires were designed in which open questions addressing the objectives of the research were validated and sent out to collect the information.

The results showed that most respondents (92.9 %) consumed at least one cup of tea daily, with *rooibos* tea selected as the most popular in this study (50 % of tea consumed). Sugar (40.4 %) and milk (37.0 %) are added most often to the tea. Respondents indicated that the preferred times for tea consumption are at breakfast, early morning and evening. According to the preference scales of these respondents, tea was the third most consumed beverage in summer and the first most consumed beverage in winter.

Key words: *fortification, micronutrient deficiencies, tea consumption.*

INTRODUCTION

Vitamins and minerals are micronutrients making headlines globally as evidence grows that they are not only necessary for normal growth, development and essential functions, but also assist in reducing the risk of heart disease, cancer and other chronic illnesses. Good nutrition is universally accepted as a basic human right, but it is estimated that more than 800 million people suffer from malnutrition globally and that in developing countries, more than 20 % of populations are hungry[1].

Worldwide, more than 250 million young children and many of their mothers are vitamin A deficient, increasing the severity of common illnesses and their risk of death. Vitamin A is a powerful "child survival tool", reducing child mortality by 23-34 % [2]. In children, three micronutrient deficiencies, namely vitamin A, iron and iodine, are considered to be a major health problem in developing countries.

Communities that are affected most are those in situations where poverty, unemployment, civil unrest, war and exploitation remain endemic [3,4]. Growth retardation, brain damage, diminished cognitive function and diminished

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working capacity in children and adults, as well as increased susceptibility and severity of infections, and mortality are the collective results of these micronutrient deficiencies [3,4].

There are many reasons why nearly two billion people fail to consume adequate micronutrients in their diets [2]. Vitamin A and iron are found in certain fruits, vegetables, and animal products that may be too expensive or seasonal. The food preparation method may further reduce their bioavailability. Cultural taboos often exclude micronutrient-rich foods and may also contribute to the deficiencies [3].

Micronutrient deficiencies can be addressed through supplementation, nutrition education or fortification programmes [5]. Food supplementation is the provision of the micronutrient in capsule, tablet or elixir form. Dietary modification refers to either improving the amount of food ingested or its bio-availability. Food fortification is the adding of vitamins or minerals to food to increase its content of the added nutrients [5].

Food fortification cannot reach all populations deficient in essential micronutrients due to limited access to commercially or centrally processed foods. This can be a result of geography, poverty or cultural preference, public health and welfare approaches to deliver supplements or dietary education. For the large and expanding population that do, however, regularly purchase and consume commercially processed foods, fortification can make a difference. The micronutrients added to food are diluted into the matrix of the macro-molecule that gives food its structure and is thus theoretically invisible [6]. Fortification of food commodities or products already consumed by a large number of people is a growth industry for micronutrient programmes. Food fortification can be targeted to specific age groups or people in specific localities. For a country to succeed in food fortification, it needs food processing capacity and regulatory enforcement, and effective methods for monitoring the quality and safety of the food [3]. When imposed on existing food patterns, fortification may not necessitate changes in the customary diet of the population, and does not call for individual compliance. It can often be dovetailed into existing food production and distribution systems, and thus implemented to yield results quickly. It can also be sustained over a long period of time [3,6].

Food fortification has many strategic advantages. Among these are that it engages new resources, requires only a modest investment, is relatively cost-effective, builds on simple and familiar technology, results in globalisation of the food industry, demographic trends are capitalised, assists with other public health strategies and it is sustainable [6].

One of the most common problems in developing a food fortification programme is the selection of an appropriate technology [7].

The vehicle that is to be used for iron fortification should have the following characteristics:

- it should be a component of all meals
- it should not need prolonged storage (especially under hot and humid conditions),
- if the vehicle is darker in colour or has a stronger taste, one could use more reactive iron compounds and
- segregation of iron should not occur during storage [5],
- it should be made available to the target population through an effective distribution system,
- it must be acceptable, affordable and frequently consumed,
- it must be technologically and economically fortifiable,
- the fortification process should not influence taste, texture, appearance or colour and the vehicle itself must have a minimal negative effect on iron absorption [8].

Tea, a beverage brewed from the dried, processed leaves of *Camelia sinensis* is, apart from water, the most widely consumed drink worldwide [1]. Furthermore, the Transition and Health during Urbanisation in Southern Africa (THUSA) study in the North West Province of South Africa indicated that except for maize products, tea was the dietary item that was consumed in the largest quantities by the

population [9]. Given the criterion that a food fortification vehicle must be consumed regularly in relatively constant amounts, tea is a suitable vehicle for fortification. The processing factors, for example the stability and bio-availability of the added micronutrient, as well as no interactions to compromise absorption, must however also be taken into consideration. Unfortunately the tannins in tea binds with the added micronutrients resulting in low bio-availability of the fortificant.

A possible solution is to target "rooibos tea". Rooibos tea, South Africa's own indigenous herbal tea, could be used as an alternative for tea fortification as it is increasingly becoming more popular due to its alleged health benefits. Rooibos tea is, besides being enjoyed as a refreshing drink, claimed to assist in improving appetite and to cure insomnia, allergies and nervous reactions. It is also used in a natural Japanese medicinal product for its *in-vitro* anti-carcinogenic and anti-mutagenic properties. It is rich in minerals, and one cup (250 ml) of rooibos tea, without milk or sugar, will provide 0.07 mg iron, 7.12 mg potassium, 0.04 mg zinc, 0.04 mg manganese, 0.07 mg copper, 1.08 mg calcium, 6.18 mg sodium, 1.57 mg magnesium and 0.22 mg fluoride. The lower tannin levels (1% compared to 12 % in ordinary leaf tea) and average consumption of six cups per day by South Africans may add to the fact that rooibos tea may be a more suitable vehicle for fortification than ordinary leaf tea [10].

The main focus of this study was, therefore, to determine tea consumption patterns of 13 to 25 year-olds in the Vaal Triangle as this age group is often affected by micronutrient deficiency. The objective of this study was to examine the tea consumption patterns, especially when and how tea is consumed. The study aimed at determining the amount of tea consumed, the type of tea consumed, what is added to the tea (milk, sugar, lemon etc), when the tea is drunk, and whether people like tea or not (preference). An alternative to tea as fortification vehicle could be the sugar or milk consumed with the tea in order to increase vitamin A and iron intake in vulnerable groups. A second possible solution could be to target the habit of tea drinking by fortifying the additions (milk and sugar) to tea.

This study formed part of a larger study in which food and beverage fortification as a way to address specific micronutrient deficiencies is evaluated in selected subjects in the Vaal Triangle.

The study was concerned only with the type of tea consumed, the amount, how and when it was consumed. Seasonal differences were also investigated. Information was gathered from the participants in the sample population and their households, who were exclusively black Africans, and did not include other ethnic groups (Whites, Indians, Coloreds).

MATERIALS AND METHODS

Sample selection: Young black men and women in the Vaal Triangle were included in the research project. Five hundred high school pupils in the Vaal Triangle area and students at the Vaal Triangle Technikon formed part of the sample population. A sample of pupils was randomly selected from high schools and among those employed by the Vaal Triangle Technikon was drawn. The study focused on young black men and women aged 13 to 25 years.

Questionnaires: A combination of qualitative and quantitative research methods were used simultaneously and sequentially to collect data in the preliminary study.

The measuring instrument was a tea consumption questionnaire. The questionnaire sought to find out the most commonly consumed tea (type), how the tea was prepared, what was added to the tea and how often it was consumed. The respondents were also required to identify the beverages that they preferred most. A preference list of various beverages was also included.

The questionnaires were pre-tested by having ten students at the Technikon complete one questionnaire each week for four weeks and comparing the answers. Additionally, ten different respondents completed the questionnaire verbally and in writing. Based on the results, the questionnaire proved to be

reliable and valid as in both these tests, a correlation of 80% was found.

Data collection: Trained field workers circulated 250 of the questionnaires at randomly selected high schools in the Vaal Triangle. The remaining 250 questionnaires were circulated in randomly selected classes in two departments by lecturers at the Vaal Triangle Technikon. Completed questionnaires circulated by the field workers were collected and sent to the researcher. Completed questionnaires from the Technikon were sent to the Department of Hospitality and Tourism for collection by the researchers.

Analysis of data: Data analysis of the questionnaires was done using the SPSS for windows (version 8.0) program. Descriptive statistics (frequencies, means, standard deviations, and confidence intervals) were determined.

RESULTS

Sample description: The sample comprised of 500 participants, 236 male (47.2 %) and 264 female (52.8 %). The sex and age of the participants are given in Table 1.

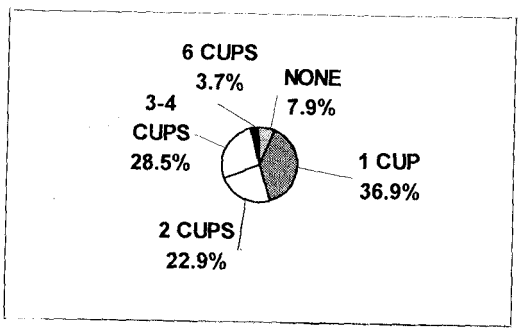

Figure 1: *Quantity of daily tea consumption*

Tea consumption habits: As shown in figure 1, according to the results of the questionnaires presented to respondents aged 13 – 25 years, the majority of respondents (28.5 %) consumed 3-4 cups (1 cup = 250mls) of tea per day, and a total of 55.1 % consumed more than two cups of tea per day. Tea was always consumed hot.

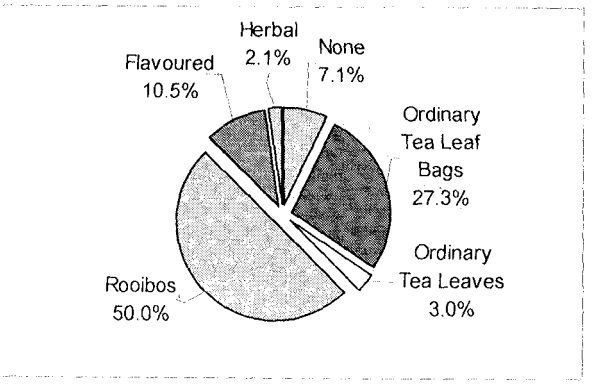

Figure 2: *Type of tea consumed*

The results from the question on the preferred types of teas are shown in figure 2. Most respondents (50%) preferred rooibos tea, while a total of 30.3 % consumed ordinary tea.

Figure 3 indicates the additions which are made to tea. These are as follows: among 40.4 % of the respondents sugar is added, 37% milk is added and 13.5% the tea is taken black.

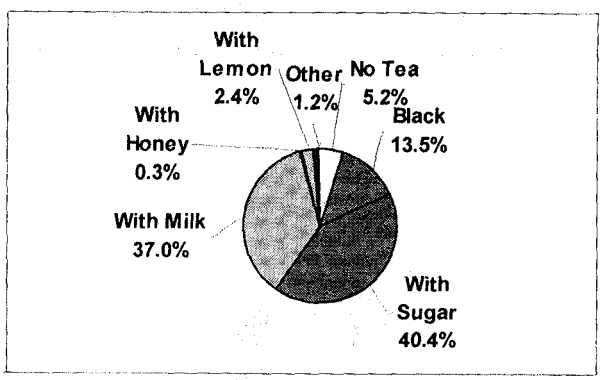

Figure 3: *The way in which tea is mostly consumed*

The most popular times of tea consumption are displayed in figure 4. In response to the question on when the respondents prefer to drink their tea, it was indicated that the most popular times of consumption are breakfast (26.3%), early morning (23.3%) and evening (21.4%).

One of the questions asked on the questionnaire was the reason as to why respondents consume a specific beverage.

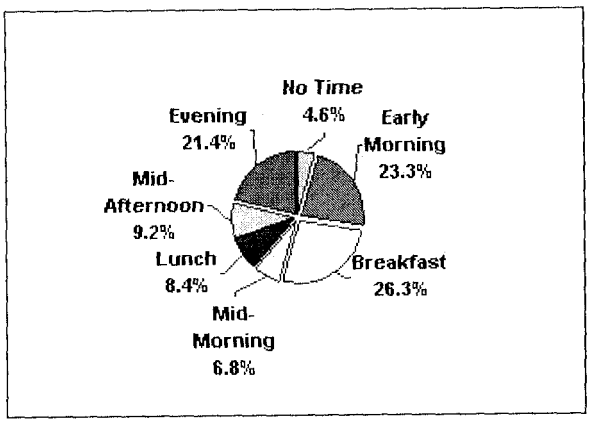

Figure 4: *Time that tea is mostly consumed*

Respondents who selected tea as their favourite beverage did so for various reasons. These included: the taste of tea was preferable to other beverages, tea was a healthy drink, in winter it made the respondent feel warm, and to quench thirst.

A preference scale was included in the questionnaire to determine exactly how popular or unpopular tea was amongst this specific age group and cultural group. Preferences were determined for both summer and winter seasons.

Figure 5 indicates that warm beverages are consumed more in winter and cold beverages in summer. Tea, however, is a popular beverage both in summer and winter. In winter most of the subjects consumed tea as a first choice (41.1 %) and in summer as a third choice (10.7 %) following water (55.1 %) and fruit juice (12.6 %). Of all the warm beverages, tea was the first choice beverage in summer.

DISCUSSION

The preliminary study was conducted to determine tea consumption patterns. To achieve this, a quantitative and qualitative questionnaire was given to the respondents in the sample population to complete. The questionnaire was then statistically analysed.

Considering the results that showed that tea is the second most consumed beverage in summer and the most consumed beverage in winter, with the majority of the sample population consuming more than two cups of tea daily, a large group of people can be reached within the fortification target population if tea is used as the fortification vehicle. Considering the rate of consumption of tea amongst the respondents, prolonged storage should not be necessary. Tea is also

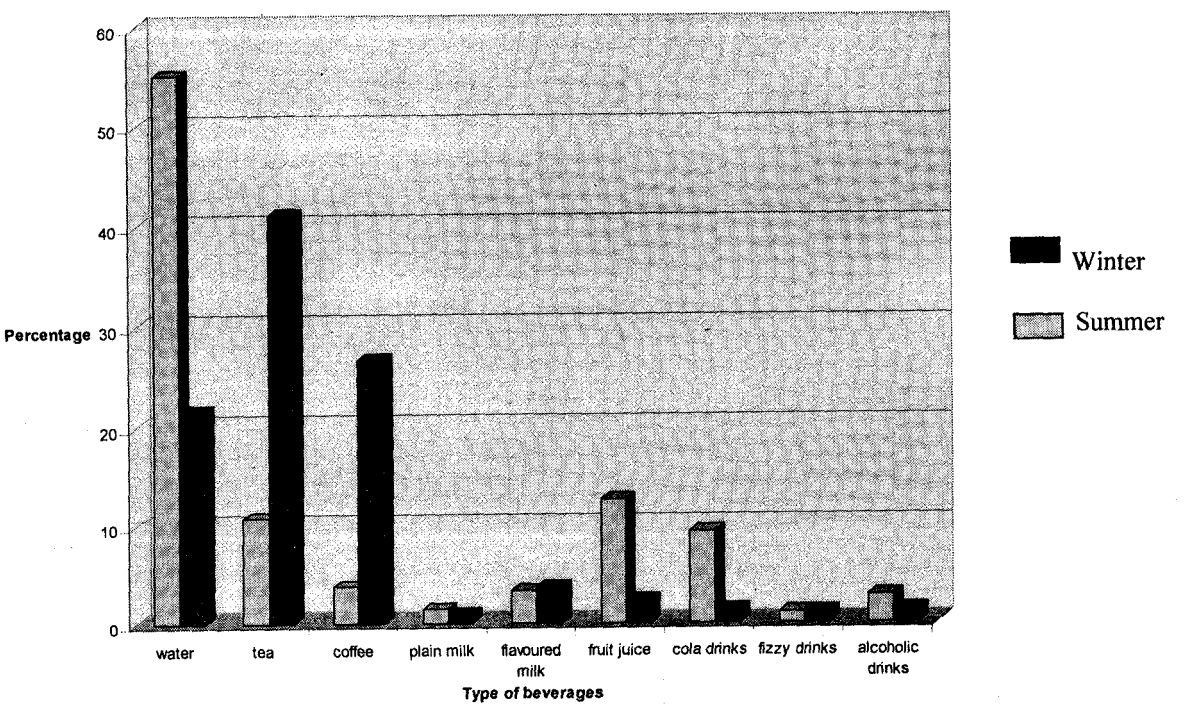

Figure 5: *Seasonal Beverage Consumption*

readily and easily available to the majority of the population.

In this study it was found that 40.4 % of the sample population consumed tea with sugar. When comparing consumption figures globally, it is clear that sugar is an important energy source for many people globally. It is produced in more than 100 countries, and its production is increasing. Sugar processing and refining are carried out at only a few mills in sugar producing countries, while sugar refining is done in some sugar importing countries. Fortifying sugar with micronutrients is thus both practical and feasible, Sugar is also consumed by a vast majority of people regularly, although consumption levels may vary. Fortification of sugar is thus an effective means to provide nutrients that are deficient in a population. In a study done in Bolivia in the early 1990s, the acceptability and consumption of vitamin A fortified sugar were measured by the National Secretariat of Health [11].

At the International Vitamin A Consultative Group (IVACG) meeting in 1996, it was reported that an average of 100 grams (g) of sugar per person per day is consumed in South Africa. This contributes 15 % of the daily energy intake [12]. The THUSA study reported an average sugar intake of 35-60 grams per adult per day [9]. Guatemala was one the first countries to implement a sugar fortification programme to ensure adequate intake of vitamin A by the population with satisfactory results [11]. The Philippines reported on a stability trial of fortified sugar at the XIX IVACG meeting in 1999. Of the vitamin A added to highly refined sugar at 15 µg RE/ g sugar, 70 % was retained after six months storage at room temperature, compared to 50 % in less refined sugar. When used in drinks, a good retention rate was experienced, namely 96 % in hot coffee and citrus juice, and 84 % retention in a cake. No changes in colour and taste of the fortified sugar were reported [13].

Guatemala reported a better retention of vitamin A in refined sugar compared to an almost 0 % retention in unrefined sugar. These findings raise the issue that Vitamin A retention is affected by the way the product is processed [13].

National survey results from Guatemala and Honduras are among the first data on the effectiveness of large-scale vitamin A fortification programmes. These surveys reported large reductions in the proportion of children with low or deficient serum retinol concentrations. In 1966 the prevalence of children with low or deficient vitamin A levels ranged between 27 and 40 % (pre-fortification) compared to 14 to 16 % in 1996 (post-fortification). The question arises if this was due to the consumption of vitamin A fortified sugar. Evidence from Guatemala showing higher average plasma retinol concentrations in the sugar consuming population groups (26 µg/dl) compared with the non-sugar consumers (17 µg/dl) of similar socio-economic status supports the hypothesis that part of the improved vitamin A status was due to the sugar fortification programme. The researchers also reported that at least 50 % of the RDA for vitamin A was met by sugar fortification, despite the retinol losses in many of the tested sugar samples [13].

Hendricks [14] reported at the IVACG meeting held in 1999 that the sugar industry in South Africa is both geographically and economically concentrated and it is thus an attractive fortification vehicle from a monitoring perspective. Six of the seven sugar refining mills in South Africa are found in Kwazulu Natal, where 90 % of the total amount of sugar is produced nationally. The other sugar mill is found in the Mpumalanga Province.

CONCLUSION

Based on the above-mentioned facts, it can be concluded that sugar may be a suitable vehicle for vitamin A fortification. The results of this study could be used in determining whether tea is a suitable vehicle for vitamin A fortification in South Africa.

Table 1

Sex and Age of Participants

Age(years)	Male	% of total sample	Female	% of total sample
13	17	3.4	17	3.4
14	18	3.6	19	3.8
15	19	3.8	20	4.0
16	18	3.6	23	4.6
17	17	3.4	15	3.0
18	16	3.2	19	3.8
19	15	3.0	19	3.8
20	16	3.2	19	3.8
21	21	4.2	20	4.0
22	25	5.0	23	4.6
23	18	3.6	26	5.2
24	20	4.0	25	5.0
25	16	3.2	19	3.8
	236	47.2	264	52.8

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