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Determination of knowledge, attitude and practice towards tea adulteration

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Abstract
Adulteration, the act of mixing of an inferior and sometimes harmful material with food or drink usually renders it unfit for human consumption thereby leading to serious health injury. Tea is one of the most preferred beverages worldwide. Unfortunately, it is being adulterated both intentionally as well as unintentionally with certain harmful chemicals like artificial colour, azo dyes, coal tar dye and many more. The present study was carried out to access the consumer knowledge on tea adulteration. 150 housewives residing in Kolkata were selected and a survey was performed using a Knowledge, Attitude and Practice (KAP) questionnaire. The results obtained from the survey represented the present knowledge of people about food adulteration including tea and their practice and attitude towards it. The overall study indicated that people, in general displayed a lack of knowledge about tea adulteration. Moreover, they were less enthusiastic to prevent tea adulteration by creating awareness among common people. The current study therefore attempts to access the level of knowledge, attitude and practice towards adulteration in addition to generating awareness about the same.

Keywords: adulteration, consumer survey, KAP, tea

1. Introduction
An adulterant is a chemical substance which should not be contained within other substances (e.g. food, beverages, and fuels) for legal or other reasons [1]. The addition of adulterants is called adulteration. Food is declared adulterated if a substance is added which depreciates or injuriously affects it or any cheaper or inferior substances are substituted wholly or in part. Food is also considered adulterated if any valuable or necessary constituent has been wholly or in part abstracted or if it is imitational, coloured or otherwise treated to improve its appearance. Adulterated food may also contain added substances which may be injurious to health [2]. Foods can be adulterated by different ways which include intentional adulteration, unintentional adulteration and natural adulteration. Intentional adulteration takes place when something is added intentionally with knowledge to earn profit. Accidental food adulteration occurs accidentally in nature, without knowledge [3]. Natural adulteration occurs due to the presence of certain chemicals, organic compounds or radicals naturally occurring in foods which are injurious to health and are not added to the foods intentionally or unintentionally [4]. Consumption of adulterated food can cause severe health problems in the human body which include digestive system disorders, stomach infections, liver disorders, cancer of stomach, disorders of blood, lung cancer, epidemic dropsy, glaucoma, cardiac arrest, lathyrism, diarrhoea, carcinogenesis, stomach disorders, food poisoning etc [5].

Tea is an ancient beverage steeped in history and loved by many. Tea is the most commonly consumed beverage in the world after water. All varieties of tea are derived from *Camellia sinensis*. Tea can be classified according to procedure, quality and preparation methods. There are four types of tea, according to the method of processing which include black tea, green tea, oolong tea and herbal tea [6,7]. One of the most commonly used adulterant present in tea is colour. Tea leaves which were damaged during manufacturing process or are of inferior quality are being treated with various colouring agents to improve their appearance and are sold at a higher price [8]. According to previous reports, tea has been found to be adulterated with different types of azo dyes such as sunset yellow, tartrazine, carmosine, brilliant blue and indigo carmine. Other than colouring materials teas are also being adulterated with starch, sand, china clay, french chalk, iron fillings, chicory, lather flakes, caffeine, used tea leaves etc to make profit by the seller or owner [9]. Furthermore, previous studies have shown that 10.48% of tea available in the market is adulterated and adulteration is more common in loose tea with comparison to the branded and packaged tea [10].

Today tea adulteration is a common practice in the market since tea is the most commonly consumed beverage in the world. The present study was done to check the knowledge, practice, attitude of the general population toward the adulteration of tea in Kolkata, India.

2. Materials and methods
2.1 Selection of place
The survey was conducted in Kolkata. For the purpose of survey, 150 housewives (25-50 yrs old) belonging to middle income group residing in different parts of the city were randomly selected from different areas of Kolkata.

2.2 Selection of sample
The purpose of the survey was to investigate the knowledge,

attitude and practice related to tea adulteration among the housewives who lived in Kolkata. In most of the families of Kolkata, the housewives are generally engaged in tea selection, purchase and preparation. The inclusion and exclusion criteria for sample selection were as follows:

Inclusion criteria

- Housewives who make tea or deal with tea in their house.
- Housewives who are present at the time of data collection.
- Housewives who are educated.
- Housewives who are willing to participate in the study

Exclusion criteria

- Housewives who are not present at the time of data collection.
- Housewives who are illiterate or uneducated.

2.3 Construction of questionnaire

The questionnaire was prepared using KAP format which is generally used to determine population knowledge, attitude and practice of that particular area. Keeping in mind the objective of the present study and to assess the knowledge, attitude and practice of housewives towards tea adulteration the questionnaire was prepared. The questionnaire was divided into three sections. The first section contained six questions to access the knowledge of the samples towards adulteration. The second part contained questions to determine the attitude of the respondents towards tea adulteration. The third part contained questions to analyze the practice of tea among the selected people including their practice towards tea adulteration.

2.4 Duration of study

The time period of the survey was 60 days.

2.5 Analysis of collected data

Frequency and percentage distribution was used to analyze the data. Results collected from the survey was calculated and then converted to percentage. Then the data was represented using bar graphs.

3. Results and discussion

3.1 Knowledge about tea adulteration

This part of the KAP questionnaire contained six questions to analyze an individual's knowledge about food adulteration as well as adulteration of tea. The results obtained about knowledge related to tea adulteration are represented in figure 1. Graph A shows that among 150 people, 87.33% had knowledge about food adulteration. They knew about the fact that food was being adulterated by some retailers and distributors to add more profit to their property. However, 12.66% did not possess any knowledge about food adulteration. Many people fool themselves into believing that the food they eat is healthy and safe by buying food products manufactured by reputed companies and brands or believing the food to be safe due to perfect packaging as well as labeling. Results of graph B represents that 77.33% were aware of the harmful effects of food adulteration. They were familiar with the fact that adulterants could have adverse health consequences including digestive disorders, stomach infections, liver disorders, epidemic dropsy, glaucoma, lathyrism, diarrhea, skin infection, renal failure, heart diseases as well as carcinogenesis. On the other hand, 22.66% were uninformed about the harmful effects of the above. Graph C indicates that 52% had idea about adulteration of tea. Some of them had also found adulterants like pieces of wood, sand, used tea leaves and colored tea leaves. Additionally, they had read about tea adulteration in the newspaper. Nonetheless, 48% did not have any idea about tea adulteration. Graph D shows that 44.66% of the population was aware that adulterants could be present in both local tea and packet tea, whereas 55.33% did not have this knowledge. Graph E displays that 47.33% of the population knew about different types of adulterants normally present in tea and 52.66% had no awareness regarding the same. Results of graph F shows that kind of tea purchase was affected by price for 64.66% of the population. Since majority of the population studied consumed tea more than twice or thrice a day, they often selected a low or medium priced variety of tea in order to limit their budget. Therefore upon analyzing all the results collected from the survey, it may be concluded that most people had limited knowledge about food adulteration especially adulteration of tea and their adverse effects on health.

3.2 Attitude towards tea adulteration

This section of KAP questionnaire contained questions aimed to analyze an individual's attitude related to tea consumption, purchase, preference of tea characteristics as well as adulteration (figure 2). Graph A indicates that 71.33% of the population preferred tea since they found the aroma of the tea to be extremely refreshing and energizing. However, 20 % preferred coffee and 8.66% preferred both tea and coffee. Graph B represents that 58% preferred packaged tea because of its easily availability and transportability. Moreover, some varieties of the above were also economical. Importantly, packaged tea labels contained the manufacturing as well as the expiry date thereby helping the consumers in their usage. On the other hand, 24% preferred local tea and 18% preferred both local and packaged tea. Graph C shows that 36.66% preferred aroma of tea, whereas 21.33% preferred color of the tea and 42% preferred both color and aroma. Therefore, these characteristics effected the selection and purchase of tea for these consumers. Graph D shows that 63.33% of the population preferred purchasing tea from supermarket. According to the response received, supermarkets were generally preferred by the population since a wide variety of consumables were made available under a common roof with sufficient stock as well as options. This made it easier to compare the prices of products of different brands. However, 36.66% preferred tea from local market mainly due to the vicinity of the shops near their residents apart from the developed trust as well as good will towards the shop keeper. Figure 2E and 2F represents the population's attitude toward tea adulteration and its prevention. The results of graphs E and F indicated that only 33.31% people were enthusiastic enough to prevent tea adulteration as well as food adulteration by creating awareness among general population and by reporting to consumer forum, whereas 66.68% people were not interested to do so because of lack of knowledge regarding prevention strategies and consumer forum.

3.3 Practices related to tea adulteration

This segment of KAP questionnaire contained six questions to analyze the general practice of the population towards tea including tea consumption, purchase as well as steps taken to eliminate adulteration (figure 3). The data represented in graph A shows that 54.66% of the population preferred black tea because it is easily availability, cost effectiveness, taste, aroma as well as colour. 40.66% preferred green tea since it contains antioxidants and portrays various health benefits. 2% preferred white tea and 2.66% preferred herbal tea. Graph B indicates that 58% of the population bought tea once a month as it was easy for them to maintain their budget, whereas 26.66% of the population bought tea twice or thrice a month. Moreover, 9.33% purchased tea every week and 6% population bought tea once in six months according to their convenience. Results of graph C shows the frequency of consumption of tea amongst the population. It was observed that 11.33% preferred tea once a day, 47.33% preferred tea twice a day, 34% preferred tea thrice a day and 7.33% preferred tea more than thrice a day. Graph D indicates that 12.66% of the population procured 100gm of tea per month, 78.66% bought 500gm in a month while 8.66% purchased 1kg of tea per month. Results of graph E and F shows that although 44.66% of the population had found adulterants in tea including artificial colour, sand, powder and pieces of wood; yet only 33.33% had taken adequate steps for its elimination. Therefore, in spite of the fact that the studied individuals were regular consumers of tea, they were in general not enthusiastic enough to prevent and eliminate adulteration even after observing the above in their tea samples. Hence, it is essential to generate awareness about tea adulteration and the importance of its elimination and prevention amongst the population at large.

4. Conclusion

After the study, it may be concluded that most of the individuals did not have knowledge about food adulteration and as well as its consequences. They were also unaware of the fact that food is being adulterated and this consumption could lead to serious health injury. Moreover, they also displayed a lack of knowledge about tea adulteration. In Kolkata, most of the people preferred tea as a drink and some of them preferred it even twice or thrice a day. Earlier reports suggested that adulterants like artificial colour, sand, iron fillings were found in the tea samples and they are being sold in market by seller to gain more profit. Due to limited awareness about adulteration, people often preferred tea available at low cost. This can be further understood from the survey result which shows that the price of tea affects an individual's purchase. Furthermore, it was observed that those who could detect adulteration were not enthusiastic enough to create awareness among common people as well as take steps to prevent adulteration of food. They were less interested in reporting adulteration to the consumer forum or creating awareness among general people. The practice of adulteration can be prevented only when the population at large takes a step forward. Moreover, public, in general, also needs to be more conscious about the quality of product that is been served. Regular and routine analysis of different tea samples would help in generating awareness about tea adulteration.

5. Figures

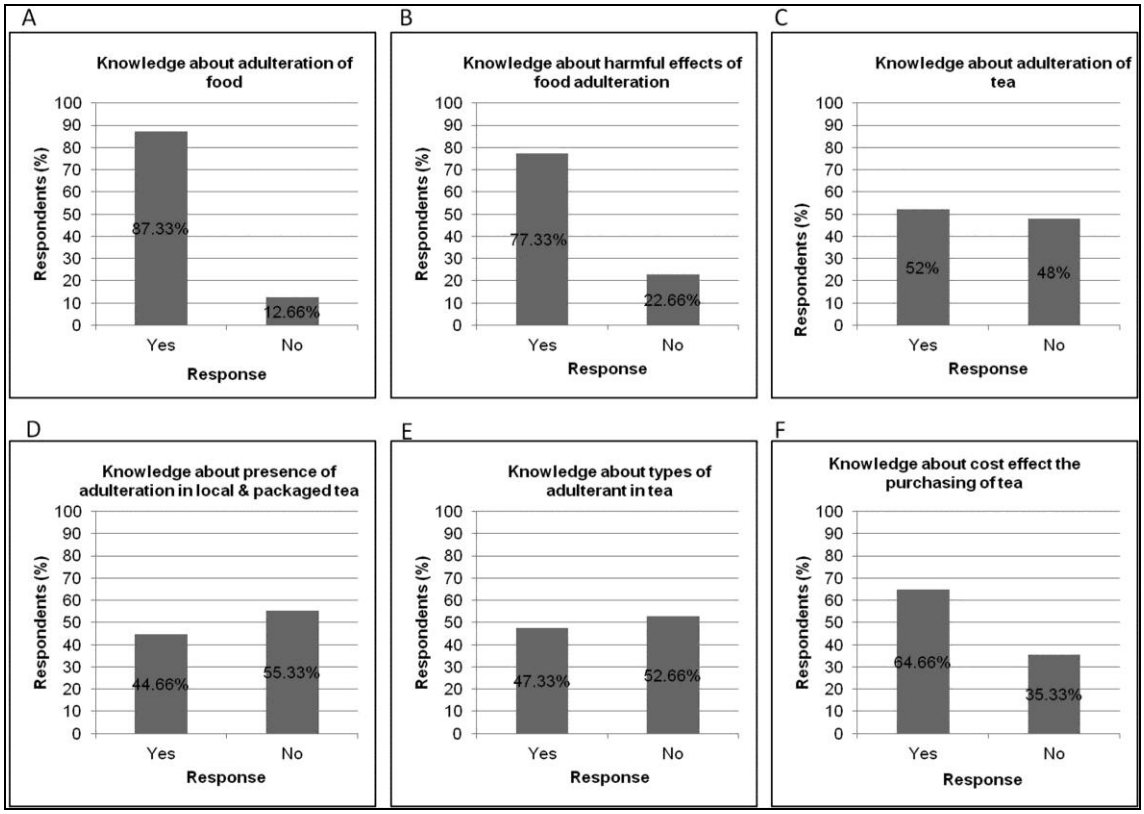

Fig 1: Knowledge about tea adulteration

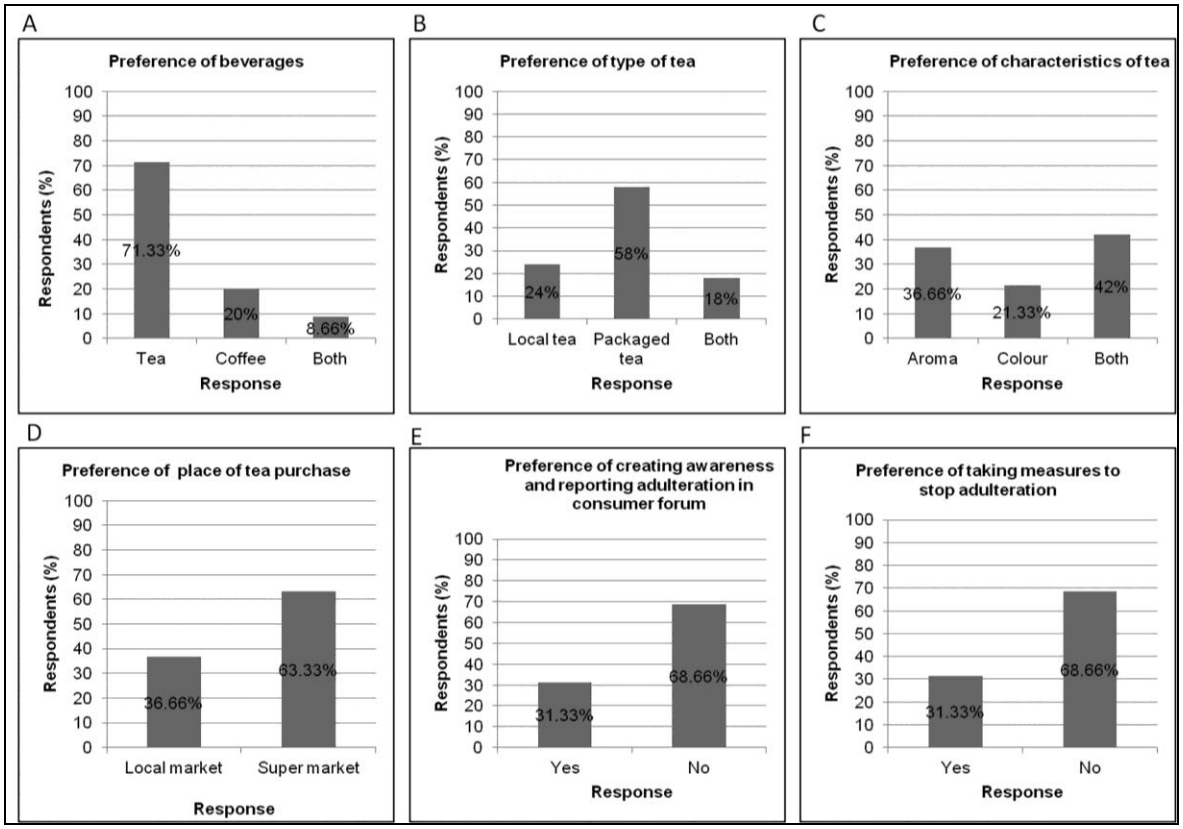

Fig 2: Attitude towards tea adulteration

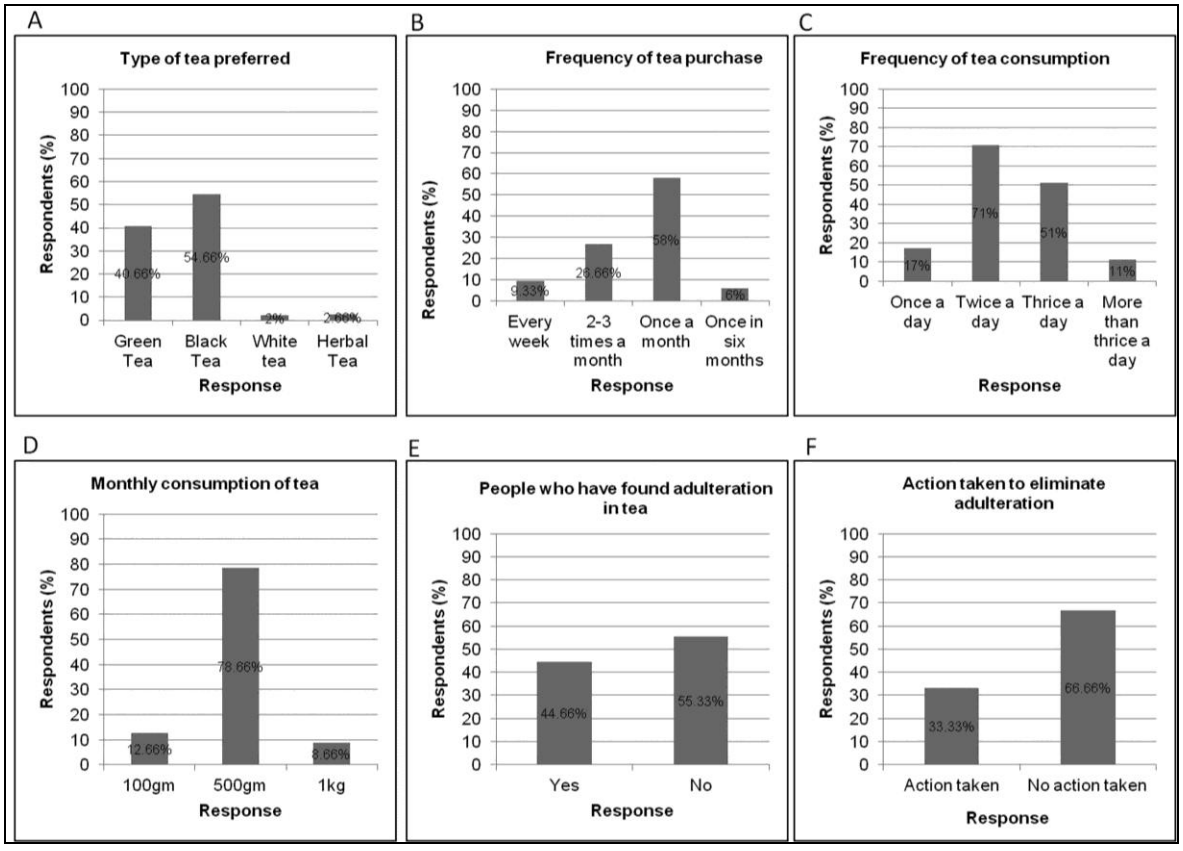

Fig 3: Practices related to tea adulteration

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