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Alcoholic Beverages in Bangladesh-How Much We Know?

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Abstract

Objectives: This study was aimed to determine the names and alcohol content or strength of different alcoholic beverages used in different parts of Bangladesh and also to determine contamination with heavy metals and bacteria in some samples.

Methods: Eight different types of alcoholic beverages consumed in different parts of Bangladesh were collected and studied in the laboratory of Bangladesh Council of Scientific and Industrial Research (BCSIR). Before sending to the laboratory, samples were stored in a refrigerator at temperature 4-8 degree Celsius. In all samples, strength of ethanol content was studied. Among the samples, Dochuani and Tari was tested for heavy metal, Chubichi and Pochani studied for total viable micro-bacterial contamination.

Results: In this study one sample was from Khagrachari (Hilly area) not been reported as manufacture site by the Department of narcotics control of Bangladesh before. Out of eight samples, one was of a Brand company (Keru & Co) and others homemade. Highest concentration, 81.56% was observed in Spirit followed by 37.7% in Dochuani and lowest 2.2% in Tari. Insignificant amount of heavy metal detected in Dochuani and Tari. There was no viable micro-bacterial contamination in samples tested.

Conclusions: Without knowing the strength, people are using different types of homemade alcoholic beverages as such in a risk of health hazards as well as death. A national survey need to be conducted to obtain how many types of alcoholic beverages being manufactured, their strength and true picture of alcohol use so that strategy plan can be developed of its healthy use if needed at all.

Keywords: Alcohol; Beverages; contamination; Heavy metals

Introduction

Drinks containing ethanol are commonly known as alcoholic beverages. These are legally consumed in most countries, and over 100 countries have laws regulating their production, sale, and consumption [1]. Nearly all research on alcoholic beverages has been performed in developed countries, but the majority of the global burden of disease attributable to alcohol is in developing countries where 80% of the world's population lives [2]. There are diverse types of alcoholic beverages in developing countries, including commercial and homemade that vary by region and area [3,4]. Documentation of heavy drinking patterns in such countries [2] is available, but only a few reports summarizing the different types of alcoholic beverages and their ethanol content. Studies have provided ethanol concentrations of homemade liquors in different parts of India, including illicit and legal non-commercial region-specific beverages [3,5]. A few reports document methods by which the estimated % ABV (Alcohol by volume) was ascertained [6].

In Bangladesh the production, sale, and consumption of alcoholic beverages are regulated by laws and consumption is strictly prohibited by Islam. The intake of these beverages appears not to be well controlled, as many different homemade alcoholic beverages were seized in different parts of Bangladesh by the department of narcotics control of Bangladesh [7]. There are some death reports from alcohol use, raising the possibility that alcohol abuse might be quite common in Bangladesh [8]. Kasimuddin documented a few local names of some homemade alcoholic beverages such as Cholai, Bangla mad and Tari. Local alcoholic beverages are made usually by fermentation of boiled rice, sugar-cane, juice of date tree, molasses, and fruit juice (pineapple and jackfruits) etc [9].

To our knowledge, the names of all locally made alcoholic beverages and their alcohol content have not yet been documented in Bangladesh. As there is no supervision on production, consumption, selling and use of containers, a possibility of contamination may be a health issue. In the light of this finding, we decided to conduct a study to determine the ethanol content in series of samples. We looked for viable microbacterial contamination and heavy metals in some alcoholic beverages, to find whether these samples contain dangerous levels of these contaminants.

Materials and Methods

Sample collection

We collected information on different types of alcoholic beverages produced and consumed in different parts of Bangladesh from a variety of sources including police personnel, tribal people, and some known people who consume alcohol occasionally or regularly. As alcohol consumption is legally restricted in Bangladesh, sample collection is not possible without source. Therefore, we explained them our study purpose and requested them to assist us in collecting the samples. During six months we were able to collect a sample of commercial alcoholic beverage FINE BRANDY made by Keru & Co Bangladesh, as well as seven types of local homemade beverages form different parts of Bangladesh. The samples sent to the Bangladesh Council of Scientific and Industrial Research (BCSIR) laboratory for evaluation within a couple of days. Before sending to the laboratory, samples were preserved in a refrigerator at a temperature of 4-8 degrees Celsius.

Alcoholic beverage made by Keru & Co in Bangladesh

This legal company produces seven different brands of alcoholic beverages and according to them, all contain the same strength (42.8%) of ethanol. Out of these, we studied FINE BRANDY. The reason of studying only one brand sample was to get opportunity to compare the strength of different homemade samples.

Homemade alcoholic beverages

Samples of region-specific homemade liquors were collected to test for ethanol concentration. There was an apprehension of contamination as sale and resale of alcoholic beverages' occur in backdoor way, for dispense seller use previously used bottles or locally made containers. In a developing country, including hygiene and lack of supervision might be a reason of contamination. Furthermore, additions of underground water with the products may be a practice of the persons related with this business with an intention of more profit (as mentioned by the users). Out of seven collected samples, two samples (Dochuani and Tari) were studied for heavy metal contamination. Dochuani is mostly produced in hilly area of the country and used mostly by the tribes, on the other hand Tari, produced and available in the most of the rural area of plain land of Bangladesh. Arsenic poisoning is common in many rural areas and was the consideration for testing heavy metals. Fund constrains was other reason for selecting only two samples in this study.

Testing of samples

All samples were tested in the BCSIR laboratory to determine ethanol concentration. For contamination with bacteria and with heavy metals some samples were also studied in same laboratory. The Conway micro diffusion method was applied to determine ethanol content. For total viable count of microorganisms, the guidelines of Bacteriological Analytical Manual, 2001was followed. At first, a slide was prepared for direct microscopy from the original product followed by microbiological culture done from the samples. All heavy metal were estimated by Flame Atomic Absorption Spectrometric method (Thermo-Scientific iCE 3000 series, Atomic Absorption Spectrometer) and vapor hydride generation system used in case of Arsenic estimation [10].

Results

In this study, alcoholic beverages produced in Dhaka, Mymenshingh, Jessore (Khulna) and Khagrachari (Chittagong) were studied.

Alcoholic beverage categories

The names of different alcoholic beverages are summarized in Table 1.

Categories	Origin
Raw Cholai	Savar (Dhaka)
Fine Brandy of Keru & Co	Dhaka
Spirit	Savar (Dhaka)
Mixture Cholai	Savar (Dhaka)
Dochuani	Khagrachhari (Chittagong)
Tari	Jessore (Khulna)
Chubichi	Mymensingh
Pochani	Mymensingh

Table 1: Alcoholic Beverage Categories

Alcohol content of different beverages

The alcohol content or its strength in a drink is expressed as % alcohol. For example 5% means 5 ml ethanol (alcohol) in 100 ml. Alcohol contents in different beverages are shown in table 2. Apart of Fine Brandy the highest concentration of alcohol was found in Dochuani (37.7%) and the lowest 2.2% in Tari.

The alcohol content in each beverage is summarized in Table 2.

Alcoholic Beverages	Alcohol (%)
Raw Cholai	14.5
Fine Brandy	40.60
Spirit	81.56
Mixture Cholai	5.8
Dochuani	37.7
Tari	2.9
Chubichi	4.35
Pochani	13.05

Table 2: Alcohol % of each beverage

Determination of heavy metal and bacterial contamination

For heavy metal contamination, among samples Dochuani and Tari were analyzed. For micro-bacterial contamination Chubichi and Pochani, were studied. The results of heavy metal and bacterial contamination are shown in the Table 3 and 4 respectively.

Test Parameters	Sample name	
	Dochuani	Tari
Cadmium (mg/100ml)*	Not detected	Not detected
Chromium (mg/100ml)*	Not detected	Not detected
Tin (mg/100ml)*	Not detected	Not detected
Lead (mg/100ml)*	0.11	Not detected
Mercury (mcg/100ml)*	Not detected	Not detected
Arsenic (mcg/100ml)*	Not detected	0.4
*Measured by Atomic Absorption Spectrophotometer		

Table 3: Heavy metal contents of samples tested

Test Parameters	Sample Name		Methodology
	Chubichi	Pochani	
Total Viable Count, cfu/ml	<10*	<10*	Bacteriological Analytical Manual (BAM), 2001
<10* indicates the absence of organisms in all dilutions cultured			

Table 4: Determination of viable micro-bacterial contamination in samples tested

Discussion

In this study, we have documented the name of some alcoholic beverages available in different parts of Bangladesh. The ethanol content, heavy metal and viable micro-bacterial contamination were studied. In this study, samples of alcoholic beverages were collected both from areas of the country where consumption in the community bared and not bared by Govt. Till date, people of different tribal community in Bangladesh are legally allowed to produce and can use alcoholic beverages in their community and family but not the plain land peoples. The homemade alcoholic beverages producers used the fermentation and collection of the vapor part during boiling (distilled alcohol) and collection only after fermentation procedure. Another one is to dilute commercially available spirit with water [9]. In case of Tari, a date juice based beverage, after collection from tree, usually left it in sunlight for couple of days before consumption. All of these indicate that alcoholic beverages are produced in different parts of Bangladesh, which are yet to be explored and reported. In the sample of Keru & Company brand alcohol, the ethanol content was 40.6% whereas the company claimed the ethanol content of 42.8%. A minor difference may be due to methodological difference of estimation.

The production and use of alcohol guided by law from the very beginning (department of narcotics) in Bangladesh. There are also social and religious barriers of alcohol production, sale and consumption. Owing to this, people who produce, sell as well as drink these alcoholic beverages especially the homemade products try to hide this in the family as well as in the community. The beverages Bangla mod and Tari are well known in different age groups of Bangladeshi people but other names are mostly and/or only known by subjects who sell and drink them. Chubichi and Dochuani are well known in tribal subjects as they are taken in family festivities (permitted by law). The general people consider spirit as an agent used in medical practice and used as drink by crazy drinkers. As the use and marketing of these agents are underground, the seller and the drinkers apply different code names for the same or related alcoholic beverages in different parts of Bangladesh to avoid law related hassles and social defaming. As nobody checks the quality, alcohol content in the beverages, sellers may take the opportunity to dilute the original beverage for big profit and as such may label them with a different name. Names of beverages and history of consumption only get widely known in case of disasters like death or mass sickness after consumption and seized by police or narcotic department [7].

A good personal contact and research reputation helped us in getting the samples from different parts of Bangladesh. Discussions with individuals from different sources helped in getting to know the names of beverages and to get some idea about the production process. Use of such information may have considerable value for alcohol research as reported by Greenfield and Kerr [11]. From our observation, newspaper reports and from reports of narcotic dept. in Bangladesh, it appears that alcoholic beverages are available in almost all parts of the country. Our documented names are known in most of the plain land as well as in the hilly areas in the east of the country where tribes live. There are certainly more names in some parts of Bangladesh, which could be revealed by more systematic research, covering all areas.

In our study alcohol content of Dochuani/Bangla mod or cholai (distilled alcohol) is near to the standard brand alcoholic beverages. Variations in strength in other reported types of beverages in Bangladesh may be due to production variability or the adding of water in different proportions.

In Tanzania, homemade traditional but commercially available alcoholic beverages were found to be contaminated by heavy metals including zinc and manganese. The amount of zinc estimated was double the World Health Organization recommended maximum for drinking water (5 mg/litre). One brewed beverage contained a toxic amount of manganese (12.8 mg/litre) suggesting that impurities and contaminants of homemade alcoholic beverages can be associated with severe health risks [12]. In our study, we analyzed Dochuani and Tari for heavy metal contamination including cadmium, chromium, lead, tin, mercury and arsenic. We found lead 0.11mg/100ml Dochuani and arsenic 0.4mcg/100ml. No other heavy metals were detected in samples we analyzed. We also analyzed Chubichi and Pochani for viable microbacterial determination. Interestingly, we found no bacteria in the samples analyzed. This may be due to the fact that samples we studied were collected directly from the place of production. We cannot exclude that by subsequent trading can become contaminated as these beverages are carried in different containers such as oil jerkin, water bottle, mud pot etc. This needs further evaluation.

The present findings suggest specific recommendations for future research in alcohol use in developing countries like Bangladesh. First, it is critical to assess for area specific alcoholic beverages. Chemical and/or other analyses of samples of such beverages should be conducted to establish ethanol concentration where feasible. Variations in beverage-specific drink sizes, including volume (vessel and pour size) information, should also be assessed. This is particularly important to establish the amount of alcohol use in our country.

Finally, the use of respondent-defined drink sizes will help better estimate each individual's volume of consumption and identify problematic drinking. This appears particularly important for those beverages that are poured into glasses and not consumed directly from standard containers (unlike a 330-ml bottle of beer). Although the overall use of alcohol at the population level is relatively low, with high abstention rate, drinking patterns among those who do drink are often hazardous. The consumption of alcohol is heavily gendered and is characterized by a high proportion of hazardous drinking among men. Hazardous drinkers do not only consume large amounts of alcohol, but also do so in high-risk patterns, such as drinking alone and bingeing. Hazardous drinking is associated with depressive and anxiety disorders as well as suicide and domestic violence. The limited evidence base suggests that moderate or casual drinking is not associated with social or health hazards; any likely benefits of moderate drinking for mental health have not been studied in developing countries [13].Although alcohol use may have a beneficial effect on pain in rheumatoid arthritis, it is unlikely that this plays a role in BanglaDesh [14]. Currently, in developing countries alcohol-related problems commonly result from trauma, violence, organ system damage, various cancers, unsafe sexual practices, injuries to the brain of the developing foetus and general poor nutritional status of families with a heavy drinking parent/parents [15,16]. Effects of alcohol are more devastating on developing countries. There are 1.3 billion people in developing countries living on less than US$1 a day. In these countries, which are already faced with other more urgent basic needs and problems, such as malnutrition, infectious diseases, and drought, losses and burdens due to alcohol are a criminal waste and will further stretch the already limited resources. Resources for the assessment of the alcohol problem, its prevention, and treatment are simply non-existent. Consuming alcohol will make them even poorer [17].

The present study has several limitations. While both rural and urban areas of diverse parts of Bangladesh were included, five sites in a country cannot yield data that can be generalized to the entire country. There was a time gap of about one week between sample reception and test. Meanwhile fermentation process could influence alcohol content. Despite these limitations, the study represents an effort to determine alcohol content of different alcoholic beverages which are common in different parts of Bangladesh. In future studies it is recommended to perform tests for microbiological purity also in some low alcoholic drinks (Tari and Mixture Cholai) We recommend a nationwide systematic survey for documentation, strength determination, contamination assessment, awareness evaluation and serving sizes of alcoholic beverages are needed to enrich our literature.

Acknowledgement

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