The Drinking Behavior of Caffeinated Alcoholic Beverages among Taiwanese Manual Workers: A Qualitative Study

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Background: Many studies showed that caffeinated alcoholic beverage (CAB) consumption is prevalent among college students in Western societies, and has been found to increase alcohol-related medical risks. Drinking behaviors of CAB in various populations may lead to different medical risks. But how CAB is consumed in Taiwan has rarely been studied. Methods: We conducted in-depth individual interviews with 25 Taiwanese manual workers and 3 worksite supervisors to explore their CAB consumption behaviors and perceived medical risks. Results: Study participants reported that in Taiwanese manual workers, CAB drinkers typically consumed pre-mixed CAB at the workplace every work day, 2 to 5 times a day, and a total amount of 12 to 96 g of pure alcohol per day. CABs were consumed in an attempt to boost energy, to socialize, and to promote health. CAB drinkers in Taiwan were mostly concerned of the risks of chronic liver diseases and alcohol dependence. Conclusion: The CAB drinking pattern among Taiwanese manual workers caused several medical concerns. More research are needed to confirm acute and chronic medical consequences of CAB consumption. The government officers should take more aggressive management measures to avoid inappropriate use of CABs.

Key words: alcohol, caffeine, energy drinks, behavior


Introduction

The surge in caffeinated energy drink consumption has raised public health concerns in the United States of America and European countries [1, 2]. Caffeinated alcoholic beverage (CAB) consumption is common among college students and party-goers in Western countries as a mean to stay awake for a longer time and to drink more alcohol [3, 4]. Possible CAB side effects include risky behaviors, traffic accidents, and alcohol dependence [5-8]. Those concerns have made the US Food and Drug Administration in 2010 to announce “caffeine is an unsafe food additive to alcoholic beverages,” and to make several “premixed” alcoholic beverages illegal.
energy drinks prohibited for sale [2]. Debates have not been settled if CAB users present more medical risks than alcohol consumers [9, 10]. But various CAB consumption behaviors have been found to be lumped together and decontextualized. Therefore, CAB drinking has been reduced to a small group of people with high risk-taking propensity, and this strategy confounds the true relationship between CAB consumption and health consequences.

The medical effects of substances differ according to who uses them and how they are used. Take alcohol for example, alcohol-related mortality and morbidity are moderated by the factor of socioeconomic status [11-13], and they change over time [14]. Medical effects of alcohol are determined not only by the amount, as implicated by the famous “J” curve [15], but also drinking patterns and quality of alcohol [16]. Furthermore, acute and chronic medical consequences are unequally associated with different aspects of drinking behavior [16]. CAB has been found to be consumed in various ways, including self-mixed or premixed, and dozens of alcohol and caffeinated products are used for mixing [17]. Premixed CAB causes higher medical risks than self-mixed one [17].

In Taiwan, CAB was introduced to the market in the late 1960s. Two best-sellers of CABs now are Whisbi® and Paolyta B®, and more CAB products are to be introduced on the market soon. In both of them, a bottle contains 300 mg of caffeine and 48 g of alcohol (10%) per bottle of 600 mL. Two CAB-manufacturing companies sold 150 million bottles totally in Taiwan in 2001 [18]. According to a nationwide survey of the working population conducted by the Ministry of Labor of Taiwan in 2007, 6% of Taiwanese male workers drank CAB more than one bottle per week [19]. The prevalence of CAB drinking is relatively high in manual workers, such as constructors (21.9%), movers, packers (17.8%) and fishermen and farmers (14.4%) [19]. CABs in Taiwan have been poorly managed by Taiwan Food and Drug Administration (FDA). Recent regulations with questionable enforcement include alcohol content labeling, advertisement content restriction, and sale location restriction to pharmacies [18].

CAB consumption in Asia has rarely been reported. CABs are popular among Taiwanese manual workers, but only a few papers have been published in studying their drinking behavior and health risks. To reach the specific population, we did in-depth interviews to typical Taiwanese premixed-CAB drinkers, i.e. manual workers and their workplace supervisors, to understand their drinking behaviors and health risks. Participatory observations were performed to examine their drinking contexts.

**Methods**

Study participants were manual workers older than 18 years old who drank CAB at the time of the study or previously. We also invited workplace supervisors who gave information more correctly with more objective views about CAB drinking behaviors. We recruited study participants with convenient sampling and “snow-balling” sampling, starting with informers introduced by researchers’ friends. Purposive sampling was adopted as the analysis progressed to maximize variation [20]. The sampling procedure continued until saturation. The final study participants were 25 manual workers and 3 worksite supervisors. This study was approved by the institutional review board of the National Taiwan University, with the need of obtaining informed consent signatures.

Data were gathered by semi-structured face-to-face interviews by the first author (W.J.C.) at
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the participants’ worksites or houses or public spaces. The interviews were tape-recorded to facilitate further analysis. We gathered demographic data, including information of age, ethnicity, education, income, and marital status. Using open questions, the interviewer explored six main aspects of CAB consumption: (A) who drinks CAB; (B) when do they drink (drinking frequency, regularity, and drinking time in a day); (C) what do they drink (ingredients of premixed CAB product, or self-mixed beverages); (D) how do they drink CAB (drinking amount per episode, served size); (E) where do they drink (place); and (F) why they drink. At last, health risks related with CAB consumption in these drinking patterns were explored. The interviews took place between September 2013 and June 2014.

Two informers provided us chances to directly observe their drinking occasions before individual interviews. Two participatory observations were recorded by hand-written notes retrospectively and the results were incorporated into in-depth interview data. One of the observations took place at a construction site with a group of welders, and the other took place at a vehicle repair shop with a group of farmers.

We adopted many examinations of the interview records according to procedures recommended by Miles and Huberman [20]. First, we sorted narratives according to each of the six interview aspects. Second, themes identified within each topic were developed in more detail. In the third reading, two complementary strategies were used to reveal the rôle of CAB to workers: a “consensus” view across interviewees and a “variability” perspective across responses for a given topic. We did a descriptive analysis to examine the mean age of participants, and the distribution of marital status, educational attainment, and drinking frequency.

Results

Sample description

The mean age of study participants was 46.89 ± 14.6 years old. Among them, 18 (64.3%) drank CAB more than 3 times a week, 2 (7.14%) drank 1 to 2 days per week, 3 (10.71%) drank less than once per week, and 5 (17.86%) had quitted CAB at the time of interview. Seventeen participants (60.71%) were married, 5 (17.86%) single, 4 (14.29%) divorced, and 2 (7.14%) widowers. About 25 (89.29%) of the participants finished secondary school education, and the rest 3 of them finished elementary school education only. Three interviewees were workplace supervisors, and the other interviewees worked as welders, painters, electric/plumbing workers, framework workers, odd-job workers, baking assistants, plasterers, foreman, iron-workers, farmers, carpenters, drivers, and fire prevention technicians.

Drinking population

Construction workers are the most well-known persons who drink CAB in Taiwan. The interviewees revealed that CABs were most popular among manual workers, and those who were aboriginal in origin. Manual workers drank most CAB in their 30s and 40s of age. Most drinkers were men, but women who worked with their husband, called “minor workers,” also drank CABs. Older interviewees recalled that CABs were sold as herb tonic and postpartum care for women who gave birth to children before the 1970s. CABs were regarded as a valuable nutrient. Through promotion by CAB makers, manual workers learned CABs through television advertisement and on-site retailing, but people no more drank CABs for postpartum care. Foreign workers, mostly from Thailand and other Southeast
Asian countries, worked with Taiwanese construction workers, and they learned to drink CABs with local domestic laborious workers.

Interviewees recognized CAB as a beverage only for people with low socioeconomic status. They said, “College graduates, white collars, office workers don’t drink CAB.” One interviewee stressed that he did not like to drink it (but actually he drank CAB regularly), “People from lower class drink CAB..., lazy people like to drink CAB... I’ve seen a lot of people, and I socialize with upper class people who don’t drink alcohol” (Case no. 9).

**When do they drink**

Manual workers drank CABs right before or at work, and they rarely consumed CAB after work. Most of them worked six days a week. They drank 2 to 5 times a day on average while taking breaks or having lunch with other workers. Most drinkers consumed CABs every work day and did not drink during off-days. As one interviewee described, “When I went to a new worksite, I looked for betel nut stands on my way to get there, I bought CABs from betel nut stands, and drank for the first time when I had finished preparing work materials for the day. I drank several times later when I felt like to take a break” (Case no.1, a painter). Some workers consumed CAB only when they worked with other manual workers, and this kind of drinking behavior was associated with its function of socializing (to be described later). For the same reason, worksite supervisors drank irregularly and only when they socialize with workers. But some workers who had unstable job, drank CAB during duty-free days.

**What and how do they drink**

All interviewed manual workers consumed premixed CABs and none of them drank self-mixed CABs. The CAB drinking amount at work was usually measured by 150 mL plastic cups provided with CAB by retailers. A bottle of 600 mL CAB has 4 cups and drinkers usually mix it with non-alcoholic beverages or rice liquor. The reasons for mixing with non-alcoholic drinks or water were to improve the taste, and/or to dilute the alcohol concentration for less intensity of being drunk induced by CABs. But some alcohol lovers mixed CAB with other alcohol to increase alcohol effects. Betel nut retailers usually sell CAB with popular soda as a package with favorable prices. Hence, a bottle of CAB contains 8 cups of diluted CAB, often shared by 2 to 4 people in a drinking episode. Each person often consumed half to two packages a day, which equals to 2 to 8 drinks of pure alcohol. They often consumed betel nuts and cigarettes with CAB.

**Where do they drink**

Most of the time workers drank at their worksites, or they drank right at the entrance or grocery stores near their worksites if it was prohibited to drink indoors or inside. But even if it was prohibited, some of them brought CABs into worksites in soft drink bottles. There were often vendors selling CAB right outside their workplaces. In earlier days and nowadays in rural areas, women salespersons carried CAB into construction sites. Workers called them “the little bees,” who sold CABs, other beverages, cigarettes, and betel nuts. In vendor areas in certain construction sites, CAB was available and allowed workers to drink inside their worksites. Occupational truck drivers and farm machine operators drank CAB in their vehicles, especially when they had worked for a long time to avoid getting asleep. Besides drinking inside the car, dump truck drivers used cell phones to contact each other and drank together by roadsides.
**Why they drink**

We identified three main motivations for CAB consumption: energy boosting, socializing, and health promoting. These motivations were not mutually exclusive and often co-existed. The primary reason for drinking CABs was to enhance physical strength and boost energy, which was promoted by CAB makers. The interviewees reported a stronger energy boosting effect of CABs than other non-alcohol energy drinks, canned coffee or wine. For the same reason, they did not drink CABs after work because it made them difficult to get asleep. Some interviewees whose work required physical strength heavily, e.g., framework workers, steel bar workers, or steel frame welders reported, “it is difficult to keep working without CABs.” Other interviewees found themselves easily being fatigued if they did not drink CAB at work, and they drank more after a hard day’s work or overtime work.

Drinking together was not seen as problem drinking in the worksite. A bottle of 600 mL CAB was suitable for sharing, which makes it different from canned beer or coffee. Workers were often invited by other workers to drink CAB together. The interviewees reported that they built up closer relationship on those drinking occasions. Drinkers paid for CABs in turn, or shared the cost each time. But in the case of construction industry, some employers gave workers money or directly provided CABs to workers. Interviewees noticed that CABs made workers talkative and sociable, “probably due to the effect of alcohol.” CABs could be given as a gift when special favors were asked for. For example, farmers brought CABs to harvest machine owners during harvest season. Electrical/plumbing workers gave CAB to crane operators and asked them to lift their materials for free. All three interviewed worksite supervisors drank CAB with workers “to get alone with them.” Furthermore, drinking CAB together meant social recognition. One of the interviewees who had a license for a skill once worked with four unskilled workers when he subcontracted works from an electricity power company. The four unskilled workers all consumed CAB, but the interviewee never drank with them. “Because there is no need to socialize with them; they are from the “lower class,” said he (Case no. 16, an iron worker).

Another reason for CAB consumption was health-promoting. A special characteristic of CAB was its herb content, and drinkers took it as herb tonic to promote health. There were instructions on CAB bottles and TV advertisements: “three times a day, each time 30 to 40 mL.” But the interviewees drank obviously more than the instructed amount and they said, “no one would drink like that.” They also believed “we sweat a lot so CAB can be metabolized and excreted.” “CAB is good for their health if we drink moderately since it contains Chinese herb, but drinking too much can lead to death.” When they were asked to estimate the alcohol strength of CAB, they mistook CAB (10%) as having lower alcohol strength than beer (4-8%).

Finally, there are several other reasons for CAB consumption. Twenty-four of the 28 interviewees were aware of the alcohol content of CAB and some drank it for alcohol effect or to reduce withdrawal symptoms. One interviewee (Case no. 7) who has been diagnosed with alcohol dependence stated, “I walk more steadily with CAB at height, because it reduces fear.” Still some interviewees did not feel any energy-boosting effect and they drank CAB simply to quench their thirst or for its taste.

**Perceived health risks**

Half of our interviewees believed drinking CABs increases the risk of injury at the work-
place, but only three of them have heard of injuries caused by CAB-related alcohol intoxication. Some interviewees found their own gaits unsteady after drinking and avoided drinking CAB while working at a high workplace. Injuries that were related with glass bottles of CABs were often mentioned, included cutting injury due to broken CAB bottles in the rice field and blunt injury induced by falling glass bottles from a high building at construction sites.

Chronic health consequences of CABs were their most important health concerns. Interviewees noticed that many of their friends who drank CABs regularly had liver cirrhosis, and who were addictive to CABs. It was said that, “drink moderately, you get a good liver; drink too much, you get a tomb.” The interviewees denied that they drank too much CABs and no adverse effects had happened. But heavy drinking in amount, alcohol tolerance, and physical problems including stroke, tooth loss, arthritis, depressive disorder, heart diseases, and liver diseases were reported or observed during the interviews. Fifteen of the 28 interviewees began regular drinking with CABs when they started to work as manual workers. Two interviewees were diagnosed with alcohol dependence, a welder and an iron worker, who shared a similar clinical pathway to alcohol dependence. Both of them had not drink alcohol regularly untill they became manual workers. CABs were the first alcohol they drank regularly and they drank it with other colleagues without any warnings of its alcohol content. They felt the alcohol effect but took it as an energy booster. Alcohol tolerance and withdrawal symptoms developed in one year, and gradually they stopped mixing CAB with non-alcoholic beverages and drank other alcoholic beverages at home. One of them (Case no. 7) was diagnosed with alcohol-induced psychotic disorder and many physical problems 10 years later; he lost his job and family, currently live in a half-way house with little social function. The other interviewee (Case no. 16) had difficulty maintaining his job due to alcohol-related inappropriate behaviors. He had been arrested for drunk driving and was imprisoned for four times. He mourned during the interview repetitively, “if it is not alcohol, I wouldn’t be like this.” He reported that many of his colleagues who had drunk CAB had fatty liver and elevated liver enzymes detected at annual physical examination.

Discussion

In this first descriptive study of CAB use behavior in Asia and Taiwan, we found that Taiwanese manual workers drank CAB with a high frequency but low amount per drinking episode. They drank CAB to boost energy, to socialize, and to improve health. The main perceived health risks of CAB consumption were workplace injuries and chronic liver diseases. The results are alarming in several aspects. First, the drinking frequency of CAB among Western drinkers is fewer than 5 days per month [21, 22]. Typically, university students in the United States consume 2 to 5 drinks of alcohol (each drink mixed with 125 mL energy drink) per drinking episode [23, 24], while patrons in the United States and Australia averagely use 2 to 12 CABs in one night, averagely 9 CABs [8, 25]. The high drinking frequency among Taiwanese CAB drinkers is in line with their perceived health risks, mainly chronic liver diseases and alcohol dependence. But the risk of acute alcohol-related injury, which is the most important concern among Western CAB drinkers, should not be overlooked. Experimental studies giving alcohol (0.6 to 1 g/kg body weight) and caffeine (80 to 400 mg) to healthy subjects [26-29], as the usual amount reported in CAB drinking episodes (2 to 5
drinks), showed deteriorating effects in cognitive and motor functions. If the drinking dose consumed by Taiwanese manual workers (about 12 g alcohol and 75 mg caffeine per episode) would cause similar psychophysiological effect is unknown. But a survey study has shown the association between CAB drinking and work-related injury or disease in Taiwanese manual workers [30].

The long-term effect of CAB consumption was inadequately studied. One longitudinal study found that caffeinated energy drink consumption is strongly associated with alcohol dependence [5]. While it remains unclear if CAB has stronger association with alcohol dependence than other alcohol, it has been found that early drinking is associated with future alcohol use [31]. Taiwanese manual workers consumed high cumulative amount of alcohol through daily consumption of CAB at work since their young ages. Although they drank other alcohol as well, especially when they had developed alcohol tolerance and withdrawal syndrome, the role of CAB in introducing workers with vulnerable genotypes and personalities to the pathway of alcohol dependence needs to be clarified. It has also been suggested in an earlier study that caffeinated energy drinks may serve as a gateway to other substances dependence [1].

The unintended consequences of CABs were complicated when drinkers believed that they drink for energy boosting. College students in Western societies consume CAB in bars and they drink for alcohol intoxication facilitation, which suggested that they intended to drink alcohol in these CAB drinking episodes. To Taiwanese manual workers, CAB drinking is a daily routine rather than special drinking occasions. It is more a “banalized” drinking type or “wet society” type, in which drinking is woven into the fabric of daily life [32, 33]. Drinking is a part of everyday life and drinkers develop tolerance to alcohol [33]. Within this context, more attention should be paid to chronic health consequences among Taiwanese drinkers, which has long been neglected by officers at Taiwan FDA and Ministry of Labor.

**Study limitations**

The readers are warned not to over-interpret the study findings because this study has three major limitations:

- The study participants were restricted to the population of manual workers in Taiwan. Therefore, CAB use among other social groups in Taiwan is unknown. Furthermore, if manual workers in other Asian countries or Asian populations in Western countries also use CAB during work, deserves attention.
- Instead of systemic sampling, the interviewees were recruited through available contacts with researcher’s friends. The most socially marginalized and isolated people would not be located and recruited into the study. Hence, CAB drinkers with the worst social and health outcome might have been omitted in our study.
- In this study, we did only qualitative analysis without any quantitative analysis of the collected data. A numerical description should be done in future studies to improve the validity of study data.

**Summary**

In this study, Taiwanese manual workers used CAB in a different context from young drinkers in Western societies. They used a lower episodic amount but a higher cumulative amount in long term with high frequency. The perceived health risks were acute injury, chronic liver diseases, and alcohol dependence. Whether CABs serve as a gateway to alcohol and other substances abuse needs more research.
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