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A study of focus group on the Korean high school girls' experiences of energy drink consumption

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Abstract

This study has recently demonstrated that the energy drink consumption is increasing among the adolescents, and the female high school students in particular are vulnerable to the energy drink consumption due to academic stress, lack of sleep, and peer influence. Hence, this study sought to explore the experiences and perceptions of energy drink consumption among the Korean female high school students. The qualitative focus group interview (FGI) approach was used as the research method, and the data were analyzed by using the phenomenological method of Kolachi. The semi-structured interviews were conducted with 15 female high school students who had experience consuming energy drinks, divided into five groups. The results of the analysis revealed four major themes and eight subthemes regarding the energy drink consumption. Conclusion: The Korean female high school students mainly consume energy drinks due to academic stress and social influence, and they lack the awareness of long-term health problems. They have difficulty stopping consumption due to the psychological dependence even after experiencing side effects, and educational interventions and regulatory policies are needed to address such. Future studies require the development of preventive programs targeting the adolescents.

Keywords: High school girls', Experiences, Energy drink, Consumption

Introduction

In recent years, the energy drinks (ED) containing high doses of caffeine have been consumed more frequently among the adolescents, and the amount is increasing worldwide. In Korea, the energy drinks such as Red Bull and Hot Six began to be sold in 2010, and energy drinks are consumed by various age grops, but are consumed more widely among the adolescents[1].

Among foreign countries, in Canada, 62% of the adolescents aged 15 years on average have consumed energy drinks at least once a year. Of which, 20% consumed them at least once a month[2]. Furthermore, a study conducted by the European Food Safety Authority (EFSA) on the energy drink consumption across 16 European countries reported that approximately 68% of the adolescents aged 10 to 18 consumed energy drinks[1,26].

These energy drinks contain such large amounts of taurine, caffeine, sugar, etc., and are sold with the emphasis on their effects such as awakening, improved athletic ability, and increased concentration. A can of energy drink contains 50-500 mg of caffeine and 40-50 g of sugar depending on the product [3]. Caffeine (1, 3, 7-trimethylxanthine) is contained in various foods such as coffee, tea, cola, and chocolate that are widely consumed around the world. Caffeine has the properties of increasing basal metabolic rate, stimulating the central nervous system and myocardium, and relaxing muscles, which helps relieve fatigue and drowsiness and improve concentration[4]. Furthermore, it has other effects on the body, such as increasing blood pressure and decreasing heart rate[5-6]. It has also been reported that systolic and diastolic blood pressure increased for up to 3 hours after consuming coffee containing caffeine in hypertensive and normal blood pressure groups, and it has been reported that caffeine consumption reduces cerebral blood flow by about 15%[7-8].

Generally, high school girls are a vulnerable group when it comes to the energy drink consumption. They often face academic pressure, lack of sleep, and busy lifestyles. In particular, high school students may experience additional stressors related to body image, social expectations, and hormonal changes, and these unique factors may make them more vulnerable to energy drink addiction, so it is essential to study their experiences in detail.

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Many domestic studies on the high caffeine have revealed that the main motivation for high school students to consume high-caffeine beverages is closely related to academic achievement[9-10]. A study by the Korea Consumer Agency also found that students increase the frequency of drinking high-caffeine beverages to prevent drowsiness during specific times, such as exam periods, and foreign studies have also reported that students consume high-caffeine energy drinks when they need more energy, such as when studying for important courses or exams or driving long distances[10,25]. As academic stress increases, the consumption of caffeinated beverages increases, but academic achievement, grades, show a negative correlation with caffeinated beverage consumption[11], which suggests that high-caffeinated beverage consumption may be a habitual and unconscious psychological defense system that acts to relieve academic stress and test anxiety rather than actually increasing academic achievement by increasing concentration and alertness in school[12-13]. Furthermore, since there is a correlation between coping strategies and psychological symptoms such as anxiety or depression[12-13], if the behavior of consuming high-caffeinated beverages during the exam period is viewed from the perspective of a coping strategy for stress, it is presumed to be more closely related to avoidance-focused coping than problem-focused coping to do well on the exam itself. However, if high school girls frequently drink high-caffeinated beverages, it can interfere with normal heartbeat and cause mental problems such as attention deficit or hyperactivity disorder. If they habitually consume large amounts in a short period of time during school or when they are tired, it can cause health problems that can lead to death in severe cases, so they ought to be careful about their consumption[14].

First, it is important to assess the level of awareness and knowledge that high school girls have about the potential health risks associated with energy drink consumption. Focus groups are needed to provide a more holistic approach to energy drink addiction research that takes into account not only physical health aspects but also psychological, social, and cultural aspects that contribute to these problems among high school girls.

In conclusion, it is essential to conduct focus group research on energy drink addiction among high school girls to comprehensively understand the phenomenon of energy drink addiction among high school girls. This could contribute to the evidence-based interventions, improved public health policies, and improved support systems customized to the needs of vulnerable groups.

Research Method

1) Research design

This study is a qualitative content analysis study that applied the focus group interviews with a view to analyze the perception of high school girls on their experience of consuming the energy drinks.

2) Research subjects

The participants of this study were recruited mainly from students who are currently attending high school and have experience consuming energy drinks. In this study, 15 people were recruited, with 2-3 people per group. The number of groups was thought to be appropriate for group dynamics and to allow comparison of similarities and differences between groups. In this study, five groups were formed, with 2 groups of 2nd-year students and 3 groups of 3rd-year students, with 2-3 people per group. A total of 15 high school girls participated in the FGI.

To recruit the research participants for the FGI, snowball sampling was used in compliance with research ethics. To consider the ethical aspects of the participants, participation was voluntary, and it was explained to the participants that the data would not be used for any purpose other than the research, and that all interviews would be recorded and conducted. After explaining to the participants the confidentiality and anonymity and informing them that they can withdraw at any time during the process, and explaining that their participation is voluntary, a written consent was obtained. It was also explained that the research report would be written so that the personal information of the research participants would not be revealed.

3) Data collection method

The data collection period for this study ran from October 2023 to January 2024. The focus group was consisted of two teams, each with seven people, and

two interviews were conducted. The interview questions were drafted as a semi-structured questionnaire and reviewed by two professors with experience in qualitative research. The focus group interviews were conducted in a laboratory with a large table so that participants could freely talk about the topic in a quiet atmosphere. All interviews were recorded, and each interview took 60-80 minutes. The recorded content was transcribed by the researcher in the language expressed by the participants, and the content was reflected in the next interview plan after documenting it. The data collection process involved additional interviews based on the analysis results after the first interview, and interviews were conducted until the data reached saturation.

The specific questions were as follows.

• Opening question: We would like to take some time to introduce ourselves before the interview. Please introduce yourself briefly.

• Introductory question: What comes to mind when you think of energy drinks?

• Transition question: Can you tell us what you felt while drinking energy drinks?

• Main question: What was your experience while drinking the energy drinks?

• Closing question: Let us summarize what you have said to us.

4) Data analytical method

The data was analyzed by two researchers using Colaizzi's (1978) phenomenological method[15] to find clear meanings in the interview content of the subjects and accurately describe the phenomenon. During the first stage, the researchers repeatedly read the content described by the participants and selected meaningful sentences or phrases related to the research phenomenon to extract meaningful statements related to the participants' experiences.

During the second stage, they carefully looked at meaningful statements during the energy drink addiction experience, excluded redundant expressions, and re-stated them in a general and abstract form. During the third stage, meaningful statements were re-stated in a more general form. During the fourth stage, themes were identified from the 33 meanings constructed and theme clusters were categorized. During the fifth stage, the data analyzed so far were compared by theme for similarities and differences. The derived themes and thematic groups were read repeatedly and comprehensively compared with the described data. During the sixth stage, the common elements of the empirical phenomena identified in the previous step were integrated, and the results of the analysis were checked with two participants to see if they were contextually consistent, and the essential structure was stated while checking if meaningful statements were well reflected.

5) Securing of the research rigor

To increase the reliability and validity of the study, it was based on the four items suggested by Lincoln and Guba (1985): credibility, transferability, dependability, and conformability[16]. The credibility of the study was maintained by supplementing any incomprehensible parts during the research analysis through additional interviews. Transferability was confirmed by showing the participants whether the content described by the researchers and the analysis results were consistent with the participants' experiences. Dependability was increased by revising the research results through the discussion with the co-researchers. Objectivity was maintained during the interview so that the researcher's bias did not affect the participants' statements, and confirmability was maintained by continuously asking whether the data analysis results were biased by the researcher.

6) Ethical considerations

To consider the ethical aspects of the participants, we asked them to participate voluntarily, explained to the participants that they would not be used for any purpose other than the research, and explained that all interviews would be recorded.

After explaining confidentiality and anonymity to the participants and informing them that they could stop participating at any time, they received written consent after explaining that their participation was voluntary. They were also explained that the research report would be written so that the personal

information of the research participants would not be revealed.

Research Results

1) General characteristics of the research subjects

The subjects of this study were 15 high school girls, with 7 of them (%) being '16 years old' and 8 of them (%) being '17 years old.' The satisfaction level of school life was 'satisfied' for 12 of them (%) and 'dissatisfied' for 3 of them (%). The effect of energy drinks was 'several times' for 11 (%) and 'once or twice' for 1 (%). The daily intake was '1 bottle' for 12 (%) and '3 bottles' for 3 (%).

The helpfulness of energy drinks was 'very helpful' for 6 (%), 'average' for 6 (%), and 'not helpful' for 3 (%). The search frequency for the effects of taking beverages was 'once or twice' for 8 people (%), 'never' for 6 people (%), and 'several times' for 1 person (%). The knowledge about the effects of taking beverages was obtained from 'friends' for 7 people (%), 'social media' for 6 people (%), and 'parents' for 2 people (%).

2) Research results

To explore the energy drink consumption experience of female high school students, the FGI was conducted with the female high school students enrolled in high school. As a result of the data analysis, a total of four themes were identified - 'motivation for energy drink consumption', 'changes after energy drink consumption', 'recognition of the problem of excessive energy drink consumption', 'control of energy drink consumption'. Eight subcategories were also identified - 'prevention of sleepiness', 'peer group behavior', 'positive change', 'negative change', 'recognition of physical change', 'recognition of the problem of excessive consumption', 'longing for energy drinks', and 'methods of coping with problems' <Table 1>.

Table 1. Energy drink consumption experiences

Topics	Categories	Subcategories
Changes after energy drink consumption	Positive changes	Improved concentration for longer than before taking it
		Feeling as if you are falling asleep
		Feeling less tired
		Recove r e d from fatigue
		Able to study steadily for a long time
		Energy is improved
	Negative changes	Abdominal pain, rapid heartbeat, dizziness, interfering with academic performance
		Head is tired, but cannot sleep even with eyes closed
		Stomach hurts and growls every time I eat
		Life patterns change due to day and night changes
		Heartbeat is rapid, sweating
		Feel sleepy during class the next day
		Feeling dazed rather than focused on academics late at night
		Facial expressions do not change, and it is difficult to finish speaking normally
		Feeling dazed and absent-minded
		Becoming irritable and irritable
		Having severe mood swings
		Showing dependent behaviors such as habitually looking for energy drinks
Recognition of issues of energy drink over-consumption	Recognition of physical body changes	Rather, concentration becomes worse and the mind becomes dazed
		A feeling of being awake but not being able to concentrate at all and only being awake
		A feeling of the body not circulating as well as before

		Frequently feeling dazed
		Headache, stomachache, increased heart rate, trembling hands, tooth decay
		Experiencing seech difficulty
		Feeling like the heart is going to burst, faces quickly flashing
		A phenomenon that seems to hear voices emerges
	Recognition of the problem of over-consumption	Came across the issue of overdose in the news and online articles
		Read articles on social media about energy drink overdose among teenagers
		Became aware of the negative influences through parents and teachers
		Felt negative physical changes via friends
Energy drink intake control	Attachments to energy drinks	The effects of other supplements are lower than energy drinks
		The psychological factor of experiencing the novel effects is significant
		No effort to control is made
		Missed the time to quit
		Feeling like caffeine addiction remains
		Unable to distinguish energy drinks from regular drinks
		Anxious, remembering the stimulating taste which makes me to keep looking for it
		If I don't drink it, I can't concentrate
		Feel like I'm losing energy
	How to deal with problems	Drinking cold iced water
		Taking drowsiness prevention gum, vitamins or supplements
		Washing face
		Eating sour candies
		Studying while standing at a standing desk
		Getting a good night's sleep and trying to focus when awake
		Establishing a healthy sleep pattern
		Taking a nap during breaks
		Meditating
		Stretching, acupressure
		Stopping energy drinks
		Maintaining an average of 7-8 hours of sleep

Topic 1: Changes after the consumption of energy drinks

The subjects said that they were able to focus on studying for a longer period after consuming the energy drinks, felt less tired, and felt like they were falling asleep. They perceived that consuming the energy drinks helped with their academic performance, and they also received direct and practical help after consuming energy drinks. However, as the number of times or amount consumed increased with repeated consumption, physical and mental changes emerged.

(1) Positive change

Energy drinks contain caffeine, guarana, taurine, ginseng, vitamins, etc., which are stimulating

substances that stimulate the sympathetic nervous system, and are consumed for the purpose of preventing academic stress and drowsiness, relieving fatigue, and improving concentration[17,24].

"After consuming energy drinks, I felt more focused and sleepy during the relatively long study time compared to before consuming them. I also felt less tired. I was happy that my fatigue disappeared and I was able to concentrate on my studies. I was able to study steadily for a long time."

(2) Negative change

As the frequency and amount of energy drinks consumed increases due to anxiety about the test, physical symptoms begin to appear as a result of the adverse effects, such as decreased cognitive ability and endurance, and energy drinks are a habitual and unconscious psychological defense system to relieve one's test anxiety or academic stress rather than actually increasing concentration or arousal for studies.

"As time passed after drinking energy drinks, the time spent concentrating on schoolwork decreased, and the feeling of being dazed and not being able to fall asleep until late at night had the opposite effect of making students sleepy during class the next day. Physical symptoms such as abdominal pain, rapid heartbeat, and dizziness occurred, which actually interfered with academic performance."

"It was found that when high-caffeine energy drinks were consumed for a short period of time during the exam period, physical and psychological changes were experienced. Physical changes that occurred due to excessive consumption of energy drinks included health-threatening symptoms such as rapid heartbeat, chest tightness, bloodshot eyes, and prolonged arousal, and psychological changes included increased nervousness, increased irritability, mood swings, and changes in lifestyle patterns such as day and night."

"Bloodshot eyes due to inability to sleep, chest tightness due to heartbeat too fast, head fatigue but unable to fall asleep even with eyes closed, stomach pain and rumbling sound every time consumed Difficulty finishing a speech normally, rapid heartbeat, sweating,"

"Habitually drinking energy drinks during the exam period is a psychological change, such as nervousness, irritability, mood swings, and changes in lifestyle, which makes anxiety or stress about the exam worse."

"I became more nervous and irritated. I also have severe mood swings. I stay awake when tired. Changes in lifestyle are perceived due to shift in day and night. I habitually look for energy drinks, and demonstrate dependent behavior. There is no change in facial expression. I go crazy, and feel dazed."

Topic 2. Recognition of the problem of excessive consumption of energy drinks

In particular, the energy drinks containing high levels of caffeine stimulate the central nervous system, increasing physical dependence on caffeine, and can have a negative impact on academic performance due to side effects such as insomnia and nervousness[12]. The continuing consumption of energy drinks can cause seizures, anxiety, cardiac arrhythmia, and even death in serious cases[2].

1) Recognition of physical changes

As he high school girls experience more stress related to academic achievement, the amount of energy drink consumed increases and the frequency of consumption also increases, which leads to increased heart rate and continued excitement, leading to physical symptoms and mental problems rather than the expected results.

"Rather, I feel more unable to concentrate, my mind is blank, I am awake but I cannot concentrate at all and my mind is alerted, I feel like my body is not circulating as well as before, I feel blank often, I have headaches, stomachaches, increased heart rate, tremors, cavities, difficulty speaking, feeling like my heart is going to burst, my face flashes quickly, I hear auditory hallucinations, I become aware of the negative effects through my parents and teachers, I see articles about the problems caused by excessive energy drink consumption among teenagers on the news, internet articles, and the social media."

2) Recognition of the problem related to excessive consumption

'You come across the problem of excessive consumption

through the news and the Internet articles. You read the articles about excessive energy drink consumption among teenagers on the social media. You become aware of the negative effects through your parents and teachers. You feel negative physical changes from your friends."

Topic 3. Energy drink intake control

45.4% of the female high school students who consumed energy drinks reported on experiencing side effects[18]. The students who experienced side effects such as palpitations, facial flushing, headaches, hallucinations, and nervousness began to look for alternatives on their own. Energy drinks contain high levels of caffeine. Caffeine has the effect of stimulating the central and peripheral nervous systems, and by activating the nervous system, it increases energy, improves concentration, and causes sustained arousal, making it difficult for students who have consumed it once to stop consuming energy drinks during the exam period.

1) Attachments to the energy drinks

Many high-caffeine energy drinks are consumed frequently during the exam period, without recognizing the dangers of high-caffeine energy drinks, to achieve a short-term arousal effect. However, the Korean teenagers are highly exposed to the high-caffeine energy drinks, and although regulations such as a complete ban on the sale of all high-caffeine drinks are applied, the teenagers are still easily purchasing and consuming energy drinks. The high school girls who are still in their teens are more dependent on the energy drinks as they are vulnerable to stress from exams and schoolwork.

"Feeling that the effect of supplements is less than that of energy drinks. Since they experienced the novel effects once, psychological factors are significant. Not making efforts to control, missing the time to quit. Feeling like caffeine addiction remains, not being able to distinguish energy drinks from regular drinks. Feeling anxious, remembering the stimulating taste makes them keep looking for it. Thinking that if I don't drink it, concentration and vitality decrease."

2) How to deal with the problem

After consuming the energy drinks, they experienced side effects such as increased heart rate, insomnia, headaches, dizziness, and hand tremors, and as they learned about the side effects of energy drinks from teachers, parents, the news, and social media, they began to reduce their energy drink intake and find ways to reduce the side effects.

"Drinking cold iced water, chewing sleepy gum, taking vitamins or nutritional supplements. Studying while standing at a standing desk, moving their body a lot. Trying to get a good night's sleep and focus while awake. Trying to stop consuming energy drinks. Take a nap during breaks, create a healthy sleep pattern. Meditate. Drink plenty of cool water. Wash your face, chew sleepy gum, eat sour candy, stretch, do acupressure. Sleep when you sleep and maintain an average of 7-8 hours of sleep."

Discussion

Energy drinks are widely consumed among the adolescents for the purposes of improving concentration and recovering from fatigue. In particular, the Korean female high school students frequently consume energy drinks due to the academic stress and increased competition, and the physical and psychological effects are consequently emerging as important social issues. This study aims to analyze the motivation, changes, problem awareness, consumption control, and problem-solving methods through the experience of high school female students consuming energy drinks, and discuss them by comparing them with previous studies.

The main motivations for high school female students to consume energy drinks are to prevent drowsiness and the influence of peer groups. They often consume them to maintain concentration during exam periods, and they become habitual consumers due to their accessibility and the influence of friends.

According to the previous studies, the adolescents frequently consume energy drinks to prepare for the exams and study for long periods of time, and they are strongly influenced by their peers, which is consistent with the results of this study[17-18]. These results indicate that the high accessibility and social pressure of energy drinks are the main factors that promote consumption. Accordingly, it is necessary to analyze

the long-term health effects of energy drink consumption and verify the effectiveness of educational programs.

After consuming energy drinks, the female high school students demonstrated negative changes such as increased heart rate, digestive problems, sleep disorders, mood swings, and dependent behavior. This shows that caffeine and sugar, the main ingredients of energy drinks, can have negative effects on physical and mental health. The previous studies have reported that adolescents initially have increased concentration after consuming energy drinks, but when they consume excessively, they experience side effects such as anxiety, sleep disorders, and increased heart rate, which is consistent with the results of this study that long-term consumption can have negative effects on academic performance[19-20]. Accordingly, the educational programs or environmental settings that can mediate negative changes after consuming the energy drinks are needed.

The female high school students responded that they are aware of the negative effects of excessive consumption of energy drinks on their health and that they obtained information through the news, the Internet, parents, and teachers. In particular, they recognized that they became aware of the problem by directly experiencing physical side effects or confirming them through friends. The previous studies related to this suggest that adolescents habitually seek out drinks even when they are aware of health problems, and this is related to caffeine addiction and psychological dependence[21-22]. Accordingly, it can be seen that providing correct information and health education to adolescents is necessary.

High school girls try to reduce their consumption of the energy drinks, but it is difficult to find a way to replace the effects, so they continue to consume them. Furthermore, it is not easy to stop consuming them due to psychological dependence and caffeine addiction. Various attempts are being made to cope with this, such as drinking cold water, taking nutritional supplements, consuming sour candy, stretching, and inducing deep sleep. According to previous studies, forming a healthy sleep pattern plays an important role in reducing energy drink consumption[23], and it is emphasized that providing a healthy alternative is effective.

This study has analyzed the experiences of he Korean high school girls consuming energy drinks, the positive and negative changes resulting from it, and their awareness of problems. The short-term effects of the energy drinks are positive, yet the long-term side effects and dependence are emerging as problems. Hence, providing the correct information and education on healthy alternatives for the adolescents is necessary. Furthermore, a support system that can control energy drink consumption at the home and school level is required. Future studies are needed to analyze the long-term health effects of energy drink consumption and verify the effectiveness of education programs.

Conclusion

This study has analyzed the experiences of energy drink consumption by the Korean female high school students and confirmed the short-term effects and long-term side effects of energy drinks. The female high school students mainly consume the energy drinks to prevent against drowsiness and under the influence of peers, and the easy accessibility in academic stress and competitive environments was the main factor that increased their consumption. However, the negative changes such as increased heart rate, digestive problems, sleep disorders, and mood swings emerged after consumption, and it was confirmed that it could have a negative impact on the academic performance and health over the long term.

The female high school students were aware of the side effects of the energy drinks, and they obtained the information through the news, the Internet, parents, and teachers, and realized the seriousness of the problem. However, they had difficulties in controlling their consumption due to the caffeine addiction and psychological dependence, and demonstrated limitations in finding alternative methods. These results suggest that the more systematic education and support are needed for the female high school students to reduce their energy drink consumption. Furthermore, the future studies ought to develop health education programs at the school and community levels to ensure that female high school students can systematically learn about the risks of the energy drink consumption and healthy alternative methods. Further studies are also

needed to evaluate the perceptions of the high school girls who participate in such programs.

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