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Original Article

A Study on Sounds That Help Appetite

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Abstract *- This paper suggests a method for studying, discovering, and commercializing sounds that help appetite and lay the foundation for continuous research and development. For this study, the principle of conditioned reflex was adopted, and the waveform analysis of sounds that help with appetite and the hormonal action of the digestive organs was traced. In research on sounds that help appetite, selecting and verifying sounds that are effective in stimulating appetite is important. In addition, it is necessary to prove that sound stimulates the associative part of the brain and evokes memories of sounds accumulated through direct and indirect experiences, thereby stimulating appetite. As a solution to this problem, the principle of conditioned reflex was adopted as the central research method, and the reliability of the research was increased through waveform analysis. In addition, the process through which sounds that help appetite are received and act on the human body was implemented in drawings and flowcharts. Finally, the MOS test was used to trace whether sounds that help appetite cause human physical and mental reactions. The results can be used to derive a method for practical use by incorporating them into future medical assistance tools or applications.*

Keywords *- Conditioned reflex, Digestive system, Hormones, Associative action, Appetite stimulation, Flow chart, MOS test, Application.*

1. Introduction

Busy modern people are suffering from various problems caused by irregular food and shelter environments in pursuit of convenience and speed. Among them, the most direct problem is related to eating habits. Some people do not keep meal times properly because they are busy or often eat. Sometimes, they quickly eat fast food, have stomachaches after eating late, or get gastroenteritis due to nutritional imbalances. If such daily life is repeated, they become obese, and to solve the obesity, they go on extreme diets or, in severe cases, take medication. In this way, modern people's eating habits act as great stress, and as a result, the number of patients with anorexia who refuse food or patients with bulimia who excessively crave food increases. In particular, among the elderly, the number of elderly people living alone is increasing, and if they do not eat regularly or starve repeatedly, they lose their appetite. This paper aims to study sounds that help appetite as a treatment method for patients with anorexia due to side effects of dieting, patients with anorexia due to illness, and elderly patients with malnutrition.

Research on using sounds to help appetite is based on the principle that the auditory area of the brain receives sounds related to food and interacts with the associative area. The effect is a method to recall the memory of sounds accumulated through experience in humans and cause a reaction that promotes appetite. Such a principle has been proven in the famous “Pavlov’s Dog” experiment, which studies conditioned reflexes. In parallel, sound waveform analysis and the human body’s response to sounds were studied. In Chapter 2, sounds that help appetite were selected, and their legitimacy was studied and proven. For the study, two samples of sounds of making food and two samples of sounds of eating food were carefully selected, and spectrum graphs were derived through sound analysis tools. The process of how sounds that help appetite respond to the human body was presented using pictures and flowcharts. In Chapter 3, the practical application of sounds that help appetite was presented based on the results obtained in Chapter 2. Four practical applications of sounds to stimulate appetite were presented. In Chapter 4, the sounds that helped appetite were selected for the study and were finally verified through MOS tests. In Chapter 5, the conclusion was presented that effective results could be obtained if appropriate sounds were used to help human appetite. This study on sounds that helped appetite was presented as having the potential for practical application and could be applied to various fields in the future[1-3].

2. Research on Sounds that Help Appetite

The study on sounds that help appetite borrowed the principle that triggers associations through imagination by awakening auditory experiences of food accumulated through human experience. This study used the conditioned reflex principle to elicit auditory experiences. In addition, sound samples that help appetite were extracted, and characteristics were derived through waveform analysis of the sounds.

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Table 1. Classification of sounds that help appetite

Sounds that Help Appetite	Composition of Sound	Reason for Selecting Sound
The sound of cooking	The sound of chopping, boiling, stir-frying, frying, and kitchen utensils	The sound of cooking reminds us of the ingredients and the scene of cooking, which helps our appetite.
The sound of eating food	biting sound, chewing sound, drinking sound, swallowing sound	The sound you make when you put food into your mouth can help your appetite.
The sound of calling out the names of food	cooking names, fruit names, vegetable names, food names, etc.	Just hearing the name of a food that I have tasted delicious helps my appetite.

The validity and practicality of this study were presented through an analysis of the endocrine system's role in responding when the human body arouses appetite by listening to the sounds. The study of conditioned reflex was based on the "Pavlov's dog" experiment, and the conditioned reflex that responds by associating content learned through direct and indirect experiences rather than the unconditional instinctive response that occurs when eating food was centered on the principle. In addition, by analyzing the waveform of the sounds, common correlations between sound samples that help appetite were found, suggesting that sounds that stimulate appetite can have a common effect on arousing human appetite, which increases persuasiveness. Finally, we tried to increase the reliability of this study by conducting a parallel study on the hormone ghrelin. This appetite-stimulating hormone is produced when sounds that help appetite are mentally perceived by the brain and responded to within the body [4, 5].

2.1. Selecting Sounds that Help Appetite

The research that should be conducted before this procedure was to find sounds that help increase appetite. Finding sounds that stimulate appetite was conducted based on common sense, general, and theories that the public can accept. Since food is directly related to appetite, sounds that stimulate appetite should be found in sounds related to food. There are three types of sounds related to food. First, the sound of making food. Second, the sound of eating food, and third, the sound of calling out the name of food you usually eat deliciously.

The sound of making food induces the imagination of how the ingredients are combined and completed. Those sounds can increase appetite by associating the atmosphere of the cooking space with the fact that various kitchen tools are cooking vegetables, meat, edible oils, sauces, and seasonings. Those sounds can also cause the body to secrete ghrelin and saliva, resulting from bodily changes that stimulate appetite by associating taste and smell. The sound of eating food is the most effective in stimulating appetite. Because it directly reminds us of the image of food going into the mouth, it stimulates hearing more intensely and maximizes imagination. This is because, from the moment you hear the sound of chewing food, you are reminded of the appearance and smell of the food, as well as its taste and chewing sensation. The sound of calling out the name of a food is the least reliable of the sounds that stimulate appetite, but if the name of the food is a sound you have strongly recognized through experience, its effect can be the most outstanding. The most powerful example is the phenomenon in which saliva immediately gathers in the salivary glands when you say the name of the fruit "lemon," and the phenomenon in which you feel cool all over your body and thirsty when you say the word "patbingsu" in the middle of summer. In the same way, the names of foods that you usually like are immediately associated with you just by hearing them, stimulating your salivary glands. Food names are extensive. There are names of dishes made with food, names of fruits or vegetables that are natural products, and names of foods that are commercialized and artificial [6,7].

2.2. Spectral Waveform Analysis of Sounds that Help Appetite

In order to increase the reliability of this paper, waveform analysis of sounds that stimulate the appetite was performed. The waveform analysis of sounds that stimulate the appetite was conducted by targeting sounds of cooking and eating food among the sounds that stimulate the appetite. Sounds that call out food names were excluded from the waveform study as noun-type words that refer to objects or product names. For waveform analysis, two sound samples were selected and analyzed from the sounds of cooking and eating food, and the meaning was derived based on commonalities through waveform analysis of each sound source. Waveforms were analyzed to represent the sounds of making food, such as boiling stew and cutting, and the sounds of eating food, such as the sounds of eating cookies and apples [8, 9]. Figure 1 is a spectrum comparison graph of the chopping sound, and the stew boiling sound among the sounds of making food. Figure 2 is a spectrum comparison graph of the sounds of eating snacks and the apple eating sound among the sounds of eating food. The results show that, as shown in the above spectrum, they commonly show repetitive, regular, and gentle waveforms. The result is that the regular and repetitive sounds that occur when cooking or eating food continuously affect people to make them feel comfortable and stable. In addition to such a situation, the possibility that the information about food experienced so far can be linked to the associative action based on the conditioned reflex principle was derived to stimulate appetite. Such regular, repetitive, and stable comfortable sounds can also have a hypnotic effect that helps with appetite.

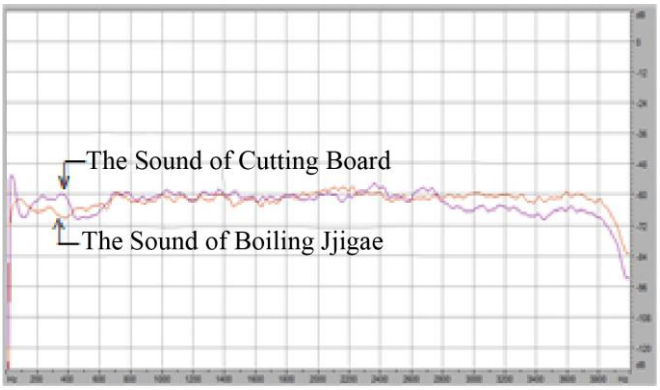

Fig. 1 Comparison of two waveforms of cooking sounds

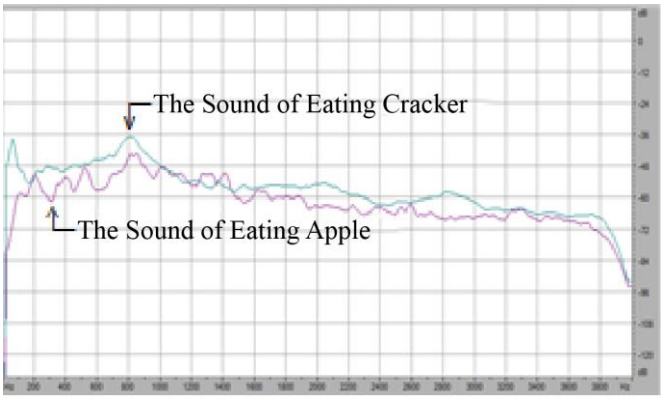

Fig. 2 Comparison of two waveforms of food-eating sounds

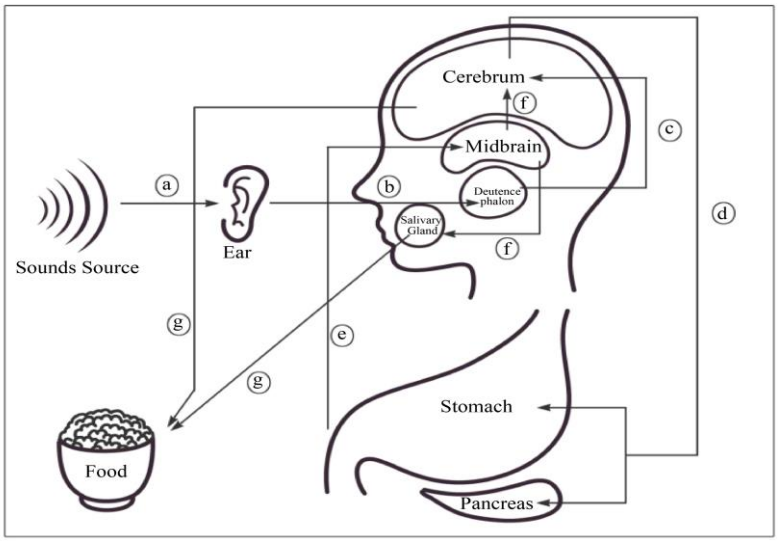

Fig. 3 Human body response process to sounds that help appetite

2.3. How the Human Body Responds to Sounds that Help Appetite

Figure 3 shows how sound samples selected as appetite-stimulating sounds are transmitted to the brain through the ears, causing the endocrine system's appetite-stimulating hormone ghrelin and the salivary gland's amylase enzyme to be secreted. This figure easily expresses how the midbrain, which controls hearing, evokes experiential memories through the diencephalon and transmits them to the cerebrum, which controls behavior, to prepare for food consumption. Appetite-stimulating sounds (sound sources) are transmitted to the auditory control center of the midbrain through the ears in the process ⓐ.

They are analyzed in the midbrain through the auditory nerve in the process ⓑ. The analyzed appetite-stimulating sounds are transmitted to the cerebrum in the process ⓒ, where they recall memories of experiences through the memory and thinking centers of the cerebrum. In the process ⓓ, they stimulate the stomach and pancreas by causing a conditioned reflex. The pancreas, stimulated by the conditioned reflex, secretes ghrelin, an appetite-stimulating hormone. Through the process ⓔ, it is analyzed by the diencephalon's appetite control centre and transmitted to the process ⓕ to stimulate the cerebrum's motor control center and salivary glands. The salivary glands secrete amylase enzymes that are promoted to prepare for digestion, and the stimulated motor control center of the cerebrum transmits action commands to each sensory organ to resolve the appetite [10, 11].

Organizing Figure 3 into a flowchart to make it easier to understand will look like Figure 4. In the order of the numbers, in process ①, sounds that stimulate the appetite are detected by the midbrain through the ears. In process ②, the auditory control center analyzes the sound and transmits it to the cerebrum. The cerebrum remembers the sound and causes a conditioned reflex, and in process ③, it transmits it to the stomach and pancreas to produce ghrelin. Ghrelin stimulates the appetite control center of the midbrain in process ④ and activates the desire to eat food in the cerebrum and salivary glands in process ⑤. The cerebrum activates the motor center for food intake behavior, and the salivary glands secrete amylase, a digestive enzyme, in advance for the food to be eaten. All processes send a behavioral command to eat food in process ⑥.

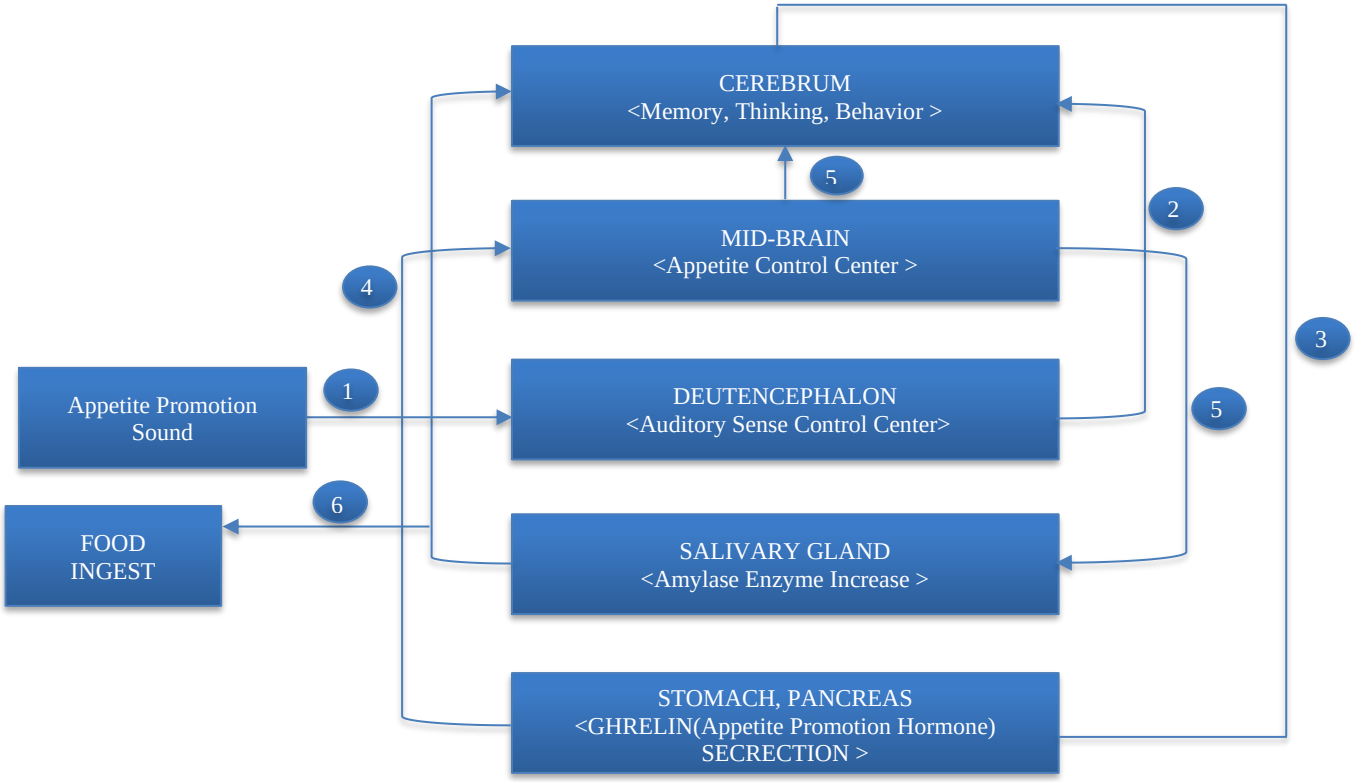

Fig. 4 Flow chart of human body response to sounds that help appetite

3. Study on Practical Application of Sounds that Help Appetite

Based on the results of waveform analysis of selected appetite-stimulating sounds and the study of human body response processes, we aim to present a practical plan for research on sounds that help appetite. The practical application methods can be classified into four categories: the effect of stimulating patients' appetite, the effect of promoting national health, the effect of advertising food or restaurants, and the effect of dieting through reverse thinking. First, the appetite-stimulating effect of patients can be mentioned as a healing effect that helps the appetite of patients with anorexia and malnutrition due to illness and anorexia patients and malnutrition patients due to aging. In particular, in the case of anorexia patients, the effect of appetite-stimulating sounds can differ depending on the cause and method of food refusal, so continuous and diverse research is necessary. The second is the national health promotion effect. Modern people often skip breakfast. Many office workers and students skip meals because of financial burdens, but some skip meals because they are pressed for time to go to work or school. However, the problem is that many people skip meals because their appetite decreases due to work or school stress. To solve this problem, research on appetite-stimulating sounds is necessary. Third, the advertising effect of food or restaurants can be derived through mass media or a simple speaker system on-site. Finally, there is a diet effect through reverse thinking. This method is a reverse concept of the principle of stimulating appetite through sound. It is the principle of developing and selecting sounds that can reduce appetite rather than sounds that stimulate appetite, thereby suppressing appetite and thus bringing about a dieting effect. The principle is to use sounds that suppress appetite, selected at a time when the level of ghrelin, which induces appetite, increases during the human body's metabolic cycle, to reduce ghrelin and increase leptin (Leptin: appetite-suppressing hormone), a hormone that suppresses appetite. Research on sounds that help appetite like this can be applied to various fields through the commercialization of sounds, such as by developing them into smartphone applications and putting them to practical use, so continuous research, development, and promotion are necessary [12].

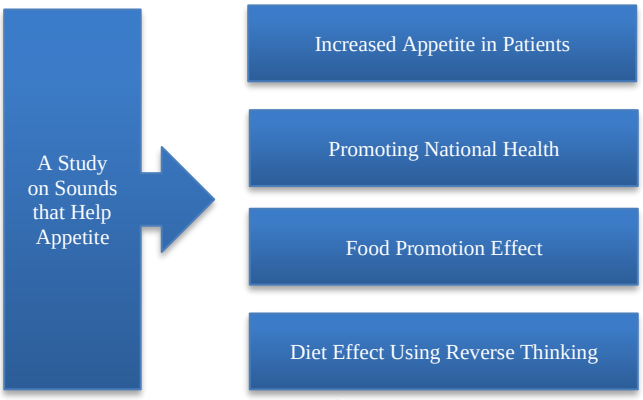

Fig. 5 Practical application of sounds that help appetite

Table 2. MOS test of listeners' reactions to sounds that help appetite

Sounds that help with appetite		Listener1	Listener2	Listener3	Listener4	Listener5
The sound of cooking	The sound of stew boiling	5	4	4	5	4
	The sound of the chopping	3	4	3	3	3
The sound of eating food	The sound of eating cookies	4	5	4	5	5
	The sound of eating an apple	4	5	5	4	5

Top point: 5 points

4. MOS Test for Sounds that Help Appetite

The MOS (Mean Opinion Score) test is a test that collects opinions from a minimum number of people and reflects them in an experiment. It is an effective means of collecting opinions when a large-scale survey is difficult. For the MOS test of sounds that stimulate appetite, the reliability of sounds that stimulate appetite was analyzed by targeting sounds of cooking and sounds of eating food among the categories of sounds that stimulate appetite. For the MOS test, two sound samples each from the sounds of cooking and eating food were selected and played to five listeners, and their reactions were investigated. Cooking sounds were prepared as representative sounds of stew boiling, chopping, and eating snacks and apples. The sounds of calling out the names of foods were excluded because they are noun-type words that refer to objects or product names, as in the case of waveform analysis.

The overall results of the MOS test in Table 2 show that the sound of eating food directly stimulates appetite more than the sound of cooking food. Among the sounds of cooking food, the sound of boiling stew received a higher score than the sound of chopping. This seems because it directly brings to mind an empirical response that the stew will smell delicious as it boils. Since the sound of chopping cannot specify what is being cut just by the sound, it seems that the score for it is somewhat low because it is difficult to imagine what kind of food ingredient it is.

Among the sounds of eating food, the sound of eating cookies stimulates the auditory sense more clearly as a sound. However, it does not stimulate the salivary glands as much as the sound of eating an apple, so it seems to have received a somewhat higher score than the sound of eating cookies. However, since neither the sound of cooking nor eating food received a score below 3, the results are somewhat positively accepted as helping the appetite. In the future, a survey should be conducted on more sound sources to DATA them [13,14].

5. Conclusion

The study of sounds that help appetite should be utilized through continuous research, analysis, and development to stimulate appetite by interacting with the brain's associative area with food-related sounds. For the study, Pavlov's conditioned reflex principle was adopted, the body's response structure was reflected, and even the analysis of sounds that help appetite and opinions was heard through the MOS test. This paper is a study that aims to develop a method of stimulating appetite through sounds as a treatment method for patients with anorexia caused by the side effects of modern people's irregular and poor eating habits, patients with anorexia due to various diseases, and patients with geriatric and other malnutrition. The results of the study showed that sounds that help appetite help continuous associative actions and can also have a hypnotic effect that stimulates appetite. In addition, it was confirmed through waveform analysis that sounds that help appetite are calm, gentle, regular, and repetitive sounds that give a sense of stability, comfort, and rhythm. The human response to sounds that help appetite is that the brain's auditory centre receives sounds related to food and interacts with the associative area, thereby recalling the memories of sounds accumulated through experience in humans, thereby stimulating the appetite. Through the opinions of ordinary listeners who participated in the MOS test, it was possible to derive the possibility that sounds that help appetite can help appetite. In addition, by applying these research results to practical use, it was discovered that it is possible to cure problems in modern people's eating habits and side effects. First, it was approached as a treatment method for patients with anorexia and malnutrition. Secondly, it was approached from the perspective of promoting national health, and thirdly, it was approached from an economic perspective as a promotional perspective through food and restaurant advertisements. Lastly, it opened up the possibility of developing it to the point where it can be used for dieting for obese people by using the reverse idea of sound research for stimulating appetite.

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