

# The Effects of Consumption of Raw Egg, Apple, and Pear on Acoustic Parameters of Voice

Jong-Bok Ahn\* · Ok-Ran Jeong\*\*

## ABSTRACT

This study was conducted to determine changes of voice after consuming raw egg, apple, and pear. Ten college students vocalized /a/ before and after having raw egg, apple, and pear. Dr. Speech was utilized to obtain acoustic changes of subjects' voice. A t-test was performed to analyze changes of voice before and after consuming raw egg, apple, and pear. No significant difference was found in acoustic measurements before and after having the 3 food items. However, the subjects seemed to show some improvements in jitter, HNR, and NNE in the order of raw egg, apple and pear even though they did not reach a statistical significance. It was concluded that a more systematic research paradigm was needed in order to objectively reject or substantiate the results of the current investigation.

**Keywords:** Jitter, HNR, NNE

## 1. Introduction

Food is a necessary fuel to maintain human lives. Human body needs food to function properly as if cars need fuel. The nutrients can be broadly divided into 2 groups: essential nutrients and secondary nutrients. The essential nutrients include protein, minerals, fat, and vitamin which are essential in growth, proper function of the human body, and maintaining lives. These must be consumed in food form since these are not self-produced in human bodies. On the other hand, the secondary nutrients play a role in stimulating the germ plexus in the intestines to compose other nutrients.

Health is not only a basic component in normal functioning of body parts but is essential in normal voice production. It is uncommon to accurately predict someone's health status just by listening to his/her voice. Professional voice users would like to have a vibrant and pleasant voice, and therefore, food, medicine, or any other commodities such as cigarettes are known to affect voice quality.

The RDA (Recommended Daily Allowances) has been used in the United States since

---

\* Dept. of Speech Pathology, Catholic Sangji College

\*\* Dept. of Speech Pathology, Daegu University

1941 to facilitate children's growth and health. There are food or drink items which are harmful for health when consumed in excess such as alcohol and drinks containing much caffeine, and cigarettes. Furthermore, there are specific food items thought to be good or bad for the voice or larynx. Water, pear extract, and raw egg are considered to be good for the voice. It is not unusual to find people having raw egg before singing. Moreover, professional voice users, especially some singers, tend to continuously consume pear extract to protect their voices. On the other hand, coffee and soft drinks containing excessive caffeine, dairy products producing mucus, such as milk and cheese, and fruits containing much acid are considered to be bad for voice protection. Therefore, singers tend to avoid those food items prior to performance.

However, having raw egg or avoiding apple before performance has been practiced without scientific evidence but has been passed on from mouth to mouth. However, it has not yet been systematically investigated. Therefore, the present study attempts to explore the effects of consumption of 3 food items on voice which are known to be good or bad for voice. That is, this study measured and compared the changes of acoustic parameters of voice after consuming raw egg, pear, and apple.

## 2. Methods

### 2.1 Subjects

Ten college students ranging from 18 to 28 years in age participated in the study on a voluntary basis. The subjects' voice was judged as normal by 2 highly trained speech-language pathologists. In addition, the subjects did not have any lung disease, neurological disorders, laryngeal lesions, or oral-articulatory defects. Plus they reported no signs of cold, allergy, and laryngeal problems not only at the time of the experiment but during the 6-month period prior to the experiment.

### 2.2 Materials

Three food items, raw egg, pear and apple were selected. Forty college students majoring in speech pathology and interested in voice answered a questionnaire regarding food items that they thought affecting voice. The raw egg (good impact), pear (good impact), and apple (bad impact) showed the highest frequencies in the responses. The amount to be consumed was 1 raw egg, 100g of pear, and 100g of apple.

Dr. Speech 4.0 (Tiger Electronics) was utilized to measure acoustic changes of voice in terms of jitter, shimmer, HNR, and NNE before and after consuming each of the 3 food items.

### 2.3 Experimental Design

This study employed a within-subjects design where 10 subjects participated in 3 experimental conditions (consumption of raw egg, pear, and apple). The order of food consumption was counter-balanced in order to avoid any possible order effect where 1 food item influences the other food items. More specifically, subject 1 consumed raw egg → apple → pear, subject 2 apple → pear → raw egg, and subject 3 pear → raw egg → apple and so on.

### 2.4 Procedures

The subjects' voices were measured before they consumed any food item. At first, a spontaneous speech was prompted for 1 minute to collect comfortable and stable voice samples. Each subject produced a sustained /a/ for 3 seconds, 3 times. The most stable portion of each vocal production for 1 second was taken, analyzed and averaged.

In the experiment, the subjects' voice samples were collected 30 minutes after the first food item was consumed. The second food item was consumed at least 2 hours after the first food item was consumed, and the subject's voice sample was taken again 30 minutes after the second food item was consumed. Finally, the third food item was consumed at least 2 hours after the second food item was consumed, and the last voice samples were collected.

The rationale for measuring the voice 30 minutes after the food consumption and having 2 hours of intermission was that water and fruits were considered to pass the stomach in 30 minutes and that most food items pass the stomach in 2 hours even though there may be some individual variations (<http://www.okhealth.pe.kr>, 2002).

## 3. Results

A t-test was performed to compare the acoustic parameters of voice pre- and post-consumption of raw egg, pear, and apple. The results showed no significant difference. However, the jitter, HNR, and NNE tended to show some improvements in the order of raw egg → apple → pear.

Table 1. The Comparison of pre- and post-consuming an egg

		Jitter(%)	Shimmer(%)	HNR*(dB)	NNE**(dB)
S1	pre	.26	1.83	27.69	-13.50
	post	.36	1.61	30.41	-20.80
S2	pre	.15	1.13	32.94	-16.51
	post	.19	1.42	32.25	-17.50
S3	pre	.20	2.17	27.71	-18.05
	post	.17	1.99	29.06	-18.32
S4	pre	.26	1.77	27.98	-17.62
	post	.34	1.72	29.53	-17.16
S5	pre	.25	2.37	28.79	-13.90
	post	.44	2.49	28.32	-13.54
S6	pre	.26	2.80	27.90	-17.35
	post	.20	1.96	28.50	-19.64
S7	pre	.47	3.50	22.50	-6.78
	post	.42	2.98	23.77	-11.53
S8	pre	.40	2.15	24.60	-8.78
	post	.23	2.86	23.17	-8.13
S9	pre	.55	2.04	28.45	-19.72
	post	.27	1.80	28.47	-17.43
S10	pre	.38	2.95	25.74	-6.54
	post	.28	2.28	26.62	-11.79

\* HNR: Harmonic to Noise Ratio \*\* NNE: Normalized Noise Energy

Table 2. The Comparison of pre- and post-consuming an apple

		Jitter(%)	Shimmer(%)	HNR*(dB)	NNE**(dB)
S1	pre	.26	1.83	27.69	-13.50
	post	.38	1.74	29.41	-18.98
S2	pre	.15	1.13	32.94	-16.51
	post	.20	1.48	32.39	-17.67
S3	pre	.20	2.17	27.71	-18.05
	post	.19	1.55	29.41	-20.78
S4	pre	.26	1.77	27.98	-17.62
	post	.28	1.68	29.24	-20.40
S5	pre	.25	2.37	28.79	-13.90
	post	.31	2.55	27.80	-14.29
S6	pre	.26	2.80	27.90	-17.35
	post	.42	2.24	25.38	-13.42
S7	pre	.47	3.50	22.50	-6.78
	post	.30	3.24	22.61	-8.29
S8	pre	.40	2.15	24.60	-8.78
	post	.22	2.32	23.89	-6.76
S9	pre	.55	2.04	28.45	-19.72
	post	.52	2.14	28.26	-17.59
S10	pre	.38	2.95	25.74	-6.54
	post	.30	2.26	26.10	-11.37

\* HNR: Harmonic to Noise Ratio \*\* NNE: Normalized Noise Energy

Table 3. The Comparison of pre- and post-consuming a pear

		Jitter(%)	Shimmer(%)	HNR*(dB)	NNE**(dB)
S1	pre	.26	1.83	27.69	-13.50
	post	.27	1.16	31.56	-21.84
S2	pre	.15	1.13	32.94	-16.51
	post	.22	1.63	30.09	-15.29
S3	pre	.20	2.17	27.71	-18.05
	post	.40	2.42	26.24	-16.35
S4	pre	.26	1.77	27.98	-17.62
	post	.29	1.85	28.56	-18.31
S5	pre	.25	2.37	28.79	-13.90
	post	.37	2.61	26.51	-12.12
S6	pre	.26	2.80	27.90	-17.35
	post	.28	2.33	26.70	-17.76
S7	pre	.47	3.50	22.50	-6.78
	post	.51	3.01	22.14	-6.60
S8	pre	.40	2.15	24.60	-8.78
	post	.18	2.00	23.99	-6.47
S9	pre	.55	2.04	28.45	-19.72
	post	.39	1.86	29.46	-18.96
S10	pre	.38	2.95	25.74	-6.54
	post	.31	2.27	26.78	-10.49

\* HNR: Harmonic to Noise Ratio \*\* NNE: Normalized Noise Energy

#### 4. Discussion

This study explored the effects of 3 food items: raw egg and pear which have been considered to improve the vocal quality and apple to worsen the vocal quality. The results did not reveal any significant difference before and after consuming them. Therefore, it can be said that the belief that they are good or bad for voice is a misconception. However, the effects of those food items on voice has not been determined yet if consumed regularly in a long term unlike the present experimental condition in which they were consumed just once and vocal parameters were evaluated.

There have been a variety of methods suggested to maintain a good voice. They include vocal training, proper diet, and behavioral approach to promote vocal hygiene. Several vocal training methods have been considered helpful to maintain a good voice. They include the Accent Methods of voice therapy (Yoo & Jeong, 2002), the Vocal Function Exercise (Stemple, 1994), and the Resonant Voice Therapy (Verdolini et al., 1998). A common aspect of these techniques is that they are holistic voice therapy or training programs.

In terms of proper diet, there are food items which positively influence voice and food items which should be avoided to maintain a good voice. For example, alcohol caffeine

and dairy products are recommended to avoid. However, there are food items which are thought to be good or bad for voice without any objective data.

There are food items which adversely affect the voice when consumed excessively. Valetin (1994) reported specific medicine, vitamin deficiency, improper rest and diet negatively affect the voice, especially nicotine, alcohol, and caffeine are bad not only for voice but for whole body.

He suggested 18 guidelines to protect the voice. One of which is to limit the consumption of chocolate, caffeine, milk, cigarette, alcohol, diuretic, and anti-histamine substances. Paul and Andrew (2000) pointed out the risk of gastroesophageal reflux (GER) resulting from cigarette smoking, excessive alcohol consumption, and improper diet habit.

Another study reported that the tricyclic anti-depressants, anti-histamine causing dryness of the vocal folds surface, drugs, and some other medicine can lead to a bad voice. The study further suggested avoid cigarette, alcohol, and some spicy food items (Rosen et al., 1998).

Considering those studies, especially coffee and alcohol have the urinating effect by which the vocal folds and larynx become dry. Similarly, the anti-histamine and tricyclic anti-depressants result in dryness of the vocal folds, and in turn, production of improper voice. In addition, cigarette, marijuana, and steroids can cause vocal folds or laryngeal problems.

On the other hand, there are food and drink items considered to be helpful in maintaining a hygienic voice. They include water, pear extract, honey water, and Japanese apricot. The most important item to protect and maintain a hygienic voice is water (Jeong et al., 2002; Boone & McFarlane, 1999; Valetin, 1994). Water lubricates vocal folds when they are vibrating and helps produce a good voice. Insufficient water intake causes surface of the vocal folds to abrasively contact each other when vibrating, and in turn, dry and metallic voice can be produced.

Frequent coughs resulting from cold or asthma can cause swelling of pharynx and larynx and dryness of the vocal folds. Widely used ways at home to control coughs include having the mixture of pear extract and lotus root or ginger extract and having the mixture of luffa and cucumber extract. Among those food items, pear contains fructose, sucrose, tartaric acid mainly containing apple acid, citric acid, and enzyme, by which coughs can be effectively controlled and voice can be protected. A hoarse voice due to cheering at a sport event or singing performance can be alleviated by having dried Japanese apricot and honey water. Finally, ginkgo nut containing histadine is also known to be helpful in ceasing coughs due to its anti-mucolytic function.

One interesting finding of this study is that vocal quality before and after the consumption of the 3 food items tended to show improvements in the order of raw egg

→ apple → pear in terms of jitter, HNR, and NNE but not of shimmer even though they did not reach a statistical significance. It means that the untested old saying that apple is bad and pear is good for voice is a misconception under the short-term measurement condition such as the present experimental paradigm. It can also mean that apple has the same water content as pear and is also good for voice in a short term.

In conclusion, maintaining a good voice can be achieved more effectively by systematic and holistic vocal training or exercises rather than consuming certain food or medicine. This is the similar conclusion drawn from a previous study conducted by Hwang et al. (2001). Especially professional voice users need to put it into practice to systematically and continuously train their voice rather than depending on certain food or medicine.

One limitation of this study was that the number of subjects was small. This resulted in a large standard deviation. In addition, the number of voice measurements and intermission duration were limited as well.

## 5. Conclusions & Suggestions

This study attempted to determine the effects of 3 food items which have been considered to be helpful or harmful for voice. The food items included raw egg, pear and apple based on a questionnaire result. The 3 food items did not significantly improve or worsen vocal quality. However, jitter, HNR, and NNE tended to show some improvements in the order of raw egg → apple → and pear. Although it did not reach a statistical significance, it was an interesting finding, given the fact that the number of subjects was limited.

A widely known conception that raw egg and pear are good for voice and apple with sour taste is bad for voice is wrong in a research paradigm such as the present study. If it is good for lungs and bronchi, it may be good for voice which is paradoxical to the belief that apple is bad for voice.

It is uncertain whether the same results would be shown if the 3 food items used in this study were consumed regularly and continuously for a long period of time. Therefore, it is expected to prove it in a following study.

In addition, water and fruits stay in the stomach for approximately 30 minutes, whereas egg stays for the longer period of time. However, the voice was measured after equivalently 30 minutes after the food consumption. Therefore, It is also suggested to investigate whether the same results are shown if the voice measurements were taken with a longer intermission time employed in a follow-up study.

## References

- Boone, D. R. & S. C. McFarlane. 1999. *The Voice and Voice Therapy*. (6th Edition.) Allyn and Bacon: Boston.
- Hwang, B. M., D. W. Noh, E. Paik & O. R. Jeong. 2001. "Analysis of acoustical characteristic changes in voice after drinking and singing." *Speech Sciences*, 8(2), 39-48. (in Korean)
- Jeong, O. R. et al. 2002. *Professional Voice User*. Daegu: Korean Speech & Hearing Association, (in Korean).
- Paul, C. & W. Andrew. 2000. "Managing dysphonia caused by misuse and overuse." *British Medical Journal*, 321, 1544-1545.
- Rosen, C. A. 1998. "Evaluating hoarseness: Keeping your patient's voice healthy." *American Family Physician*, 157, 2775-2783.
- Stemple, J. W., L. Lee & J. C. Stemple. 1995. "The value of vocal function exercise in the practice regimen of singers." *Journal of Voice*, 9, 27-36.
- Valentin, M. S. 1994. "Unspeakable truths." *American Fitness*, 12, 4-5.
- Verdolini, K., G. D. David, M. P. Phyllis & H. Samawi. 1998. "Laryngeal adduction in resonant voice." *Journal of Voice*, 12(3), 315-327.
- Yoo, J. Y. & O. R. Jeong. 2002. *The Accent Method of Voice Therapy*. Daegu: Korean Speech & Hearing Association, (in Korean).
- [Http://www.okhealth.pe.kr](http://www.okhealth.pe.kr). 2002.

Received: January 24, 2003

Accepted: March 4, 2003

▲ Jong-Bok Ahn

Department of Speech Pathology, Catholic Sangji College  
393 Yulse-dong, Ahndong, Gyeongbuk, 760-711, Korea  
Tel: +82-54-851-3172  
E-mail: antato@hanmail.net

▲ Ok-Ran Jeong, Ph. D., CCC-SLP

Department of Speech Pathology, Daegu University  
2288 Daemyeong-dong, Nam-gu, Daegu, 705-823, Korea  
Tel: +82-53-650-8274  
E-mail: oj@daegu.ac.kr