

Longevity Factors of Centenarians in Korea*

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CONTENTS

I . Introduction	IV. Conclusion
II . Methods	References
III. Results	Abstract

I . Introduction

To live to the age of 100 years, healthily and happily, is everyone's dream. This is not an impossible dream. In 1996, there were 23 centenarians per 100,000 people in U.S.A. and 12 per 100,000 in Japan. In Korea, there were 5 centenarians per 100,000 people in 2000 living mostly in Cholla provinces. There were 41 in Boseong-gun, South Cholla Province and 31 in Sunchang-gun, North Cholla Province (Kim, 2002a).

Preceding studies of centenarians have

been conducted in New England, Italy, Denmark, Japan, Sweden, the United States and Shanghai (Zheng et al, 1993; Buono et al, 1998; Perls et al, 1999; Andersen-Ranberg et al, 1999; Hagberga et al, 2001; Poon et al, 2002). In Korea, preceding studies on social and environmental factors related to centenarians prevalence (Kim, 2002a) and comparative studies on centenarians and youths have been performed (Kim, 1998; 1999). Predictors of healthy aging among very old men were conducted in U.S.A. (Reed et al, 1998). One of the problems in the preceding studies was the failure to identify of systems

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analysis prevalent factors that are linked to longevity among centenarians. Since longevity is believed to be associated with a several factors, continued study is still required to identify the secrets that lead to long life, focusing on centenarians. Thus, the purpose of this study is to analyze longevity factors of centenarians in Korea.

II. Methods

1. Factors of Prevalence that are linked to Longevity among Korean Centenarians

This study is a theoretical study on longevity factors using the results of previous studies (Kim, 1999; 2002a; Grundy & Glaser, 2002). The factors related with longevity comprised with physical, mental, socio-demographic, dietary, others habits and residential environmental factors.

The physical factors included as mean of weight and size of waist. Mental factors included degree of happiness based on laughter every day, optimist based on denial of anger and absence of stress. Socio-demographic factors were gender, occupation, region, education, social and economic level, and religion. The residential environmental factor was presence of air pollution.

Dietary factors were; light eating less than 1 rice bowl sized serving for a meal, intake of Korean bean paste soup, vegetarian diet

includes eating fish as well as vegetables, having a low-salt and low-fat diet, and frequency of intake of meat and wine. Others habits noted were smoking, everyday activity, and walking. These factors might exercise influences on longevity of centenarians individually or interaction with one another.

We hypothesize that centenarians in Korea are optimist, non-smoker, female, light eating, vegetarian, and rural residents who inhale not contaminated air.

2. Population of Study

Centenarians are a valuable resource for the study of successful aging (Perls et al, 1999). 507 centenarians living in Korea were enrolled. The sample was comprised of 22.8% of 2,220 centenarians (190 men, 2030 women) living across the country as of 2000. The Sample was simple random sampling.

3. Data Collected and Investigated

In order to collect the data of centenarians, their telephone numbers and addresses were obtained from 7 metropolitan and 9 provincial offices. Researchers directly contacted centenarians who were able to communicate 31% (157 centenarians), or contacted centenarians' caregivers 69% (350 centenarians) by means of telephone interview from Dec. 1999 to Jan. 2001. Questionnaires were administrated over the telephone.

There were 27 items, classified into 5

categories including socio-demographic factors (7 items), physical factors (4 items), mental factors (4 items), living habit factors (9 items), and environmental factors (3 items), covering their way of living during the last century in a retrospective manner. The rest of the measures they reported were excluded.

4. Data Analyzed

The differences (%) among 507 centenarians in Korea were analyzed by X²-test. The association longevity factors with centenarians such as socio-demographic, physical, mental, dietary, others habits and residential environmental factors were analyzed by odds ratio derived from logistic regression. For

independent variables, this study tried to select variables of significant to represent each characteristics well, and organized them into the female, rural, size of waist, optimist, light eating, vegetarian diet and nonsmoker variables (Fig.1). To identify relationships of variables were transformed form continuous scales to binomial dummy scales.

III. Results

1. Subject of Characteristics

Table 1 shows the features of 507 centenarians in Korea. In X²-test, all factors were statistically significant at P=0.000.

Fig.1. Description of Variables

Characteristics of centenarians	Independent	Dependent
Socio-demographic	Female	Religion, Education, Weight, smoker
	Rural	Education, Optimist, Vegetarian, Low salt and fat
Physical	Size of waist	Gender, Light eater, Excessive desire for possession, Everyday activity & walk
Mental	Optimist	Region, Degree of happiness with laughter every day, Excessive desire for possession, Everyday activity & walk, Air pollution
Dietary	Light eating	Weight, Vegetarian, Low salt and fat
	Vegetarian	Region, Bean paste soup, Light eater, Meat taking
Others habits	Nonsmoker	Gender, Occupation, Region, Alcohol consume

More than 90% of centenarians are female, manual workers, under poor to middle

TABLE 1. Characteristics of 507 Centenarians in Korea, 2000

Factor	N=507	%	X ²	p
So.cio-demographic factor				
Gender				
Female	463	91.32	346.274	0.000
Male	44	8.68		
Place of residence				
Rural	384	75.74	134.361	0.000
Urban	123	24.26		
Occupation				
Manual worker	479	94.48	401.185	0.000
Non-manual worker	28	5.52		
Economic status				
Poor, middle	481	94.87	408.333	0.000
Upper	26	5.13		
Physical factor				
Waist, size				
32 >	64	12.62	283.316	0.000
31 <	443	87.38		
Mental factor				
Degree of happiness, with laughter every day				
No	43	8.48	349.588	0.000
Yes	464	91.52		
Optimist, not allowing angers and stress				
No	49	9.66	329.943	0.000
Yes	458	90.34		
Dietary factor				
Quantity of a meal, rice bowl sized serving				
Large eater, 2 >	64	12.62	283.316	0.000
Light eater, 1 <	443	87.38		
Intake Korean bean paste soup				
Scarcely	25	4.93	411.931	0.000
Everyday	482	95.07		
Vegetarians, vegetable + fish				
No	137	27.02	107.079	0.000
Yes	370	72.98		
Meat taking in 1 month, time				
4 >	135	26.63	110.787	0.000
3 <	372	73.37		
Others habits factor				
Smoking				
Yes	162	31.95	66.053	0.000
No	345	68.05		
Residential environmental factor				
Air pollution; residents who inhale not contaminated air				
Yes	79	15.58	240.239	0.000
No	428	84.42		

economic status, a high have degree of happiness and optimism and eat Korean bean paste soup. Centenarians have lower scores

for anxiety and depression. Centenarians have higher scores in eating bean paste soup daily, manual workers and under poor to middle

TABLE 2. Odds Ratio for Association of Longevity Factor with Centenarians in Korea, 2000

Variables	OR	95%CI
Female		
Religion have (vs. Haven't)	2.16	1.09, 4.29
Lower primary (vs. Upper)	3.86	1.96, 7.57
Weight, > 59kgs (vs. 60 >)	3.21	1.31, 7.88
Non-smoker (vs. Smoker)	4.06	2.06, 7.98
Rural		
Lower primary (vs. Upper)	8.38	5.21, 13.47
Optimist, not allow anger (vs. Pessimist)	2.26	1.11, 4.59
Vegetarian, Yes (vs. No)	1.92	1.17, 3.15
Lower salt and fat, Yes (vs. No)	2.16	1.21, 3.85
Waist, > size 31		
Female (vs. Male)	3.11	1.43, 6.76
Excessive desire for possession, No (vs. Yes)	2.71	1.56, 4.71
Light eater, > 1 rice bowl (vs. Large eater, < 2)	2.56	1.28, 5.10
Everyday activity & walk, <10 minute (vs. > 5)	2.37	1.36, 4.14
Optimist, not allowing angers and stress		
Rural (vs. Urban)	2.46	1.10, 5.54
Degree of happiness, with laughter every day, Yes (vs. No)	26.15	11.61, 58.89
Excessive desire for possession, No (vs. Yes)	2.36	1.12, 4.95
Everyday activity & walk, < 10 minute (vs. > 5)	0.27	0.10, 0.68
Water pollution, No (vs. Yes)	2.92	1.17, 7.29
Light eater, > 1 rice bowl sized serving		
Weight, >59kgs (vs. 60>)	2.30	1.17, 4.51
Vegetarian, Yes (vs. No)	2.72	1.57, 4.70
Lower salt and fat, Yes (vs. No)	2.15	1.14, 4.03
Vegetarian, vegetable + fish		
Rural (vs. Urban)	2.25	1.38, 3.67
Bean paste soup, everyday (vs. scarcely)	3.43	1.40, 8.42
Light eater, > 1 rice bowl (vs. Large eater, < 2)	2.37	1.31, 4.26
Meat taking in 1 month, >3 time (vs. 4 >)	5.12	3.24, 8.08
Nonsmoker		
Female (vs. Male)	4.21	2.10, 8.45
Manual worker (vs. Non-manual)	3.02	1.26, 7.26
Rural (vs. Urban)	0.55	0.33, 0.92
Alcohol, > 1 cup (vs. 2 >)	3.60	2.35, 5.50

economic status. The survey also confirmed the relevance of environmental factors, revealing that centenarians live in the comfortable, rural environments without air pollution.

2. Association Longevity Factors with Centenarians

Table 2 shows the association longevity factors with centenarians in Korea. With regard to socio-demographic factors, females and rural residents are found to live longer. Female centenarians show a higher rate of non-smoking than males (OR=4.06, CI=2.06, 7.98). Centenarians residing in rural areas are more accustomed to consuming a higher quantity of vegetables than their urban peers (OR=1.92, CI=1.17, 3.15). Low fruit and vegetable consumption was particularly associated with being male and smoking (Johnson et al, 1998).

According to the survey concerning physical factors, centenarians tend to have smaller waist circumference (Table1). There is also convincing evidence that centenarians are mostly women (OR=3.11, CI=1.43, 6.76). In terms of mental factors, higher probability for longevity is found among optimists who live a life with happiness, and laughter every day (OR=26.15, CI=11.61, 58.89).

Regarding dietary and habit factors, there is a higher probability that someone will become a centenarian if they are a light eater,

a vegetarian and a non-smoker (Table1). Among centenarians, vegetarians who were light eaters showed a significant difference in longevity from those vegetarians who were heavy eaters. Ratios of vegetarians among centenarians include those who consume a small quantity of meat, those who reside in a rural district, those who eat light meals, and those who eat bean paste soup everyday (OR=3.43, CI=1.40, 8.42). A strong difference was seen among non-smoking female manual workers residing in agricultural areas than among smokers (OR=4.21, CI=2.10, 8.45).

IV. Discussion

This study found that females tend to non-smoking habit (Table2). Actually, non-smoking habit may lead to prevention of adult diseases including lung cancer. In a survey of 160 centenarians in Shanghai, performed autopsies on eight centenarians, which revealed that the main causes of death were pneumonia and cancer (Zheng et al, 1993). This means that non-smoker had a positive effect on women' longevity.

It also found that the rural residents have higher vegetable-centered eating habits than their urban peers do. Such living habits as eating larger quantities of vegetables are

closely connected with the probability of long life (Table2). In a study by Morgan, respondents in rural areas reported a substantially healthier diet than their urban peers in definition of the current World Health Organization's recommendations for fruit and vegetable consumption (Morgan et al, 2000).

In terms of physical factors, waist circumference is an indicator of abdominal fat distribution and body mass index for the measure of overall adiposity (Pescatello et al, 2000). This study revealed that longevity of people with small waist circumference was attributed to health promotion through light eating (OR=2.56, CI=1.28, 5.10) and activity including walking (OR=2.37, CI=1.36, 4.14). To put it another way, people can live longer with the help of regular activity and a healthy diet, because doing exercises and light eating, at the same time, positively affects health (Yu, 1997). The elderly may have greater cardiovascular protection by spending more time in walking (Morgan et al, 2000). Large waist circumference may affect quality of life in the domain of social function, changing health for men and causing bodily pains for women (Park et al, 2000).

Optimists are more outlive pessimists since the former usually enjoy their lives 26 times (OR=26.15, CI=11.61, 58.89) more than the latter, a lifestyle that does not allow anger and stress. According to the findings of Williams et al.'s study, participants that

were 60 years of age who reported having a higher anger had 2.8 times greater risk of stroke alone than their counterparts who reported having a lower tendency anger. The tendency anger was associated with an increased risk of being liable to stroke (Williams et al, 2002). Thus, a pleasant attitude toward life, without anger, will certainly minimize the risk of being afflicted with stroke, paving the way to a long life. Centenarians have less anxiety and depression than the subjects in the younger groups (Perls et al, 1999). Those who do not get angry and control stress are believed to live longer (Kim, 2002b).

Light eaters are more apt to be centenarians than large eaters because they are mostly vegetarians. Vegetarianism is usually connected with light eating habit, daily intake of bean paste soup, and less meat intake (Table2). Centenarians have higher scores for light eating habit than the subjects in the 20-69 years groups (Kim, 1999). Light eating habits will protect a person from getting acidic stress, prevent aging, and extend life expectancy (Yu, 1997). More than 95% of centenarians are known to consume bean paste soup daily (Table1). Kim witnessed this in a study, which proved correlation between the ratio of longevity and bean consumption in the region of longevity (Kim, 2002a). Genistein in bean paste soup is believed to work as an anti-cancer agent.

Most centenarian women in rural districts work manually, refraining from smoking as well as from drinking. Significantly, the study by Kim affirmed that the ratio of longevity gets particularly lower in the area where cigarette consumption is high (Kim, 2002a). It is well known that, even among centenarians, the ratio of drinking smokers is higher than that of non-drinking smokers, (OR=3.93, p=0.000) a fact that strongly implies correlation between smoking and drinking (r=0.300, p=0.000). That is, drinking instigates smoking.

In conclusion, it became evident from the survey of 507 centenarians in Korea that women with small waist circumference, manual workers, under poor to middle economic status, rural residents, optimists, light eaters, vegetarians and non-smokers have more probability to live longer. This is because they are usually pleasant, maintain positive attitudes toward life, have light eating habits, practice vegetarianism, don't smoke, go for a walk or activity regularly, consume bean paste soup and eat only small quantities of meat. Thus, longevity is the result not only of inherent but also of acquired factors.

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ABSTRACT

Objectives: The purpose of this paper is to analyze longevity factors of 507 centenarians in the Republic of Korea.

Methods: This paper is designed to survey physical, mental, socio-demographic and dietary factors of 507 centenarians. The data was collected by means of telephone interview from 1999 to 2001. The survey directly contacted centenarians who were able to communicate, or contacted the centenarians caregivers. The association between longevity factors of centenarians was verified by odds ratio of logistic regression.

Results: Female centenarians appeared to be non-smokers more often than males (OR=4.06, CI=2.06, 7.98). The longevity of persons with a small waist circumference was attributed to health promotion through eating lightly as well as keeping active including walking (OR=2.37, CI=1.36, 4.14). A higher probability for longevity is found among optimists who live a happy life and laugh every day (OR=26.15, CI=11.61, 58.89).

Among centenarians, vegetarians were shown to be light eaters. More ratios of vegetarians among centenarians included those who reside in a rural district, eat bean paste soup everyday, and consume small quantities of meat (OR=5.12, CI=3.24, 8.08).

Conclusion: Women, manual workers, under poor to middle economic status, rural residents, optimists, light eaters, vegetarians and non-smokers seemed to have a higher probability of becoming centenarians in The Republic of Korea.

Key Words : Longevity factor, Centenarians, Optimists