

Health Status of Haenyeo Who Visited the Emergency Department

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Abstract

Professional female free divers (Haenyeo) in Korea have been exposed to breathing in the water without any respiratory equipment and are increasingly aging. However, data on their general health status are scarce. A total of 733 electronic medical records of 480 professional female free divers who visited the emergency department from July 2012 to June 2013 were analyzed. Their mean age was 74.3 years, and 87.4% were 65 years or older. Most women had one or more comorbid conditions and were taking medication. The most common discharge diagnosis based on the International Classification of Disease-10 was symptoms and abnormal clinical and laboratory findings. Furthermore, 12.3% had a discharge diagnosis related to injury, and almost half of the injuries were caused by slip down. Older professional female free divers were more likely to have comorbid conditions and take medication, and have discharge diagnoses related to slip-down injury, and digestive, respiratory, and circulatory conditions more frequently. Therefore, specific symptoms related to diving and various age-related aspects such as injury prevention and chronic disease management should be considered in developing a health program for professional female free divers.

Keywords: *diver, health status, emergency department*

1. Introduction

There is an approximately 20,000 Korean professional female free divers (Haenyeo) that lives on Jeju Island. It is such a symbolic profession in Jeju Island that it will be added to the UNESCO Intangible Cultural Heritage List. According to Jeju Special Self-Governing Province, professional female free divers (Haenyeo) are increasingly aging. In other words, 29.5% of female free divers were over 50 years old in the 1980s, but in 2010, 43.3% were over 70 years old [1]. Aging professional female free divers still work in the harsh work environment of the sea. At times, they have discussed physical symptoms related to their job in the media or during interviews [2].

Professional female free divers (Haenyeo) have been exposed to breathe without any respiratory equipment for several decades. They experience higher physical exertion levels than leisure divers because they search and catch shellfish or seaweed under the sea [3]. According to several studies, free diving affects the physical condition of senprofessional female free divers, including pulmonary function, bone mineral density, or optic pressure and nerve function [4-7]. Also, professional female free divers (Haenyeo) experience respiratory symptoms during ascents after a median dive duration of 29 minutes involving strenuous exercise. More so, diving in a high-pressure environment is an osteogenic stimulus. Age and body weight were predictors of proximal femur bone mineral densities in divers, and intraocular pressure was so much higher in

professional female free divers (Haenyeo) that they needed to have a glaucoma test regularly.

Many professional female free divers (Haenyeo) suffer from hearing difficulties, tinnitus, or vertigo caused by repeated barotrauma, and the severity of these symptoms usually increases with the duration and depth of diving [8]. Also, many of these divers experience chronic headache. One study [3] said that 21.4% of professional female free divers experienced tension-type headache, 9.1% experienced migraines, and 11.4% had chronic daily headaches, and the rate of overuse of combination analgesics was reported by 70.7% of divers. According to the media, many Korean professional female free divers (Haenyeo) report chronic use of nonprescription medication, including high levels of caffeine (called Neusun powder) in order to prevent or control their headaches. And, they routinely use combination analgesics prior to diving [3], but there is little basic data about this usage.

As seen from above, professional female free divers (Haenyeo) suffer from various symptoms or changes related to free diving, chronically use analgesics or caffeine, and are aging. However, there is little data regarding the basic health status of professional female free divers (Haenyeo). Therefore, the basic health status of this population must be analyzed to provide health management programs for professional female free divers.

2. Methods

2.1. Design and Subjects

This study was designed to identify the basic health status of professional female free divers (Haenyeo). Participants included 480 professional female free divers (Haenyeo) who had professional female free divers insurance with the Jeju Special Self-Governing Province and who visited the emergency department (ED) at one hospital from July 2012 to June 2013.

2.2. Procedure

Ethical approval was obtained from the Institutional Review Board of Jeju National University Hospital in South Korea in order to use data from electronic medical records. A total of 733 electronic medical records from 480 professional female free divers (Haenyeo) who visited the ED from July 2012 to June 2013 were analyzed. Analyzed contents included sex, age, symptoms, diagnosis, outcome of treatment, vital signs, functional status, medication history, and treatment outcome. We used the International Classification of Disease-10 (ICD-10) to classify diagnosis at discharge.

2.3 Data Analysis

Data analysis was performed using the SPSS Statistics version 18.0 software package. Descriptive statistics were used to describe the characteristics of participants. Chi-square analysis was used to identify health status according to age. The statistical significance threshold was 0.05.

3. Results

3.1. Characteristics of the Participants

A total of 733 cases of 480 professional female free divers (Haenyeo) were enrolled during the study period. The mean age was 74.3 years (range: 46 to 98), and 87.4% were 65 years or older. Furthermore, 96.3% had health insurance, and 3.6% used a Medicaid

type of insurance. Most had one or more comorbidity (88.0%) and were taking medication (90.5%). Only 2% were currently taking Neusun powder (Table 1).

Table 1. Demographic Characteristics of the Participants

(N=733)

Characteristics	n (%)	Mean (SD)
Age		74.3 (9.0)
Insurance		
Health insurance	706 (96.3)	
Medicaid type 1	26 (3.5)	
Medicaid type 2	1 (0.1)	
Comorbid disease		
Yes	645 (88.0)	
No	88 (12.0)	
Currently taking medication		
Yes	663 (90.5)	
No	70 (9.5)	
Currently taking Neusun powder		
Yes	15 (2.0)	
No	718 (98.0)	

3.2. Characteristics Related to Emergency Department Visits

Two-thirds of the professional divers used personal transportation to visit the ED. The outcome of treatment at the ED for 64.3% of participants was immediately discharged , and 35.2% were admitted to the hospital. The IDC-10 was used to analyze discharge diagnoses. According to this analysis, 643 cases (87.7%) had a discharge diagnosis related to illness and 90 cases (12.3%) had a discharge diagnosis related to injury. The most common discharge diagnosis using the ICD-10 was symptoms, signs and abnormal clinical and laboratory findings (28.2%), followed by digestive disorders, respiratory issues, circulatory disorders, infections, neoplasms, genitourinary complaints, and musculoskeletal disorders. And, almost half of injuries were caused by slip down (Table 2).

Table 2. Characteristics Related to Emergency Department Visiting of the Participants

(N=733)

Characteristics	n (%)
Mode of arrival	
119	212 (28.9)
Other ambulance	18 (2.5)
Others	503 (68.6)
Outcome at ED	
Immediate ED discharge	471 (64.3)

Discharge diagnosis	Admitted to hospital	258 (35.2)
	Death	4 (0.5)
	Injury	90 (12.3)
	Slip-down	47 (6.4)
	Others	43 (5.9)
	Illness	643 (87.7)
	Symptoms, signs and abnormal clinical findings	207 (28.2)
	Digestive	83 (11.3)
	Respiratory	59 (8.0)
	Circulatory	55 (7.5)
	Infections	52 (7.1)
	Neoplasms	47 (6.4)
	Genitourinary	46 (6.3)
	Musculoskeletal	32 (4.4)
	Endocrine	13 (1.8)
	Others	49 (6.7)

3.3. Comparison of Clinical Characteristics of Patients by Age

The clinical characteristics that showed a significant difference by age were comorbidity ($\chi^2=29.379$, p -value<.001), currently taking medication ($\chi^2=29.053$, p -value<.001), mode of arrival ($\chi^2=33.052$, p -value<.001), outcome at ED ($\chi^2=35.902$, p -value<.001), injury ($\chi^2=8.067$, p -value=.044), and illness ($\chi^2=41.278$, p -value=.001). There was no statistical difference based on usage of Neusun powder (Table 3).

In other words, older professional female free divers (Haenyeo) were more likely to have comorbid diseases, to take medication, and to use the 119 fireman rescuer to visit the ED. Also, older professional female free divers (Haenyeo) were admitted to the hospital more often. Older professional female free divers (Haenyeo) had more discharge diagnoses related to injury from slip-down, digestive disorders, respiratory disorders, and circulatory disorders, but middle-aged professional female free divers (Haenyeo) had more discharge diagnoses related to infections and genitourinary problems.

Table 3. Comparison of Clinical Characteristics of the Patients by Age

(N=733)

Characteristics	Age (years)				χ^2 or F	p -value
	≤64 (n=92)	65 ~ 74 (n=247)	75 ~ 84 (n=322)	≥85 (n=72)		
Comorbid disease	n(%)					
Yes	68 (73.9)	210 (85.0)	299 (92.9)	68 (94.4)	29.379	< .001
No	24 (26.1)	37 (15.0)	23 (7.1)	4 (5.6)		
Currently taking medication					29.053	< .001
Yes	72 (78.3)	216 (87.4)	308 (95.7)	67 (93.1)		
No	20 (21.7)	31 (12.6)	14 (4.3)	5 (6.9)		
Currently taking Neusun powder						

Yes	1 (1.1)	4 (1.6)	9 (2.8)	1 (1.4)		
No	91 (98.9)	243 (98.4)	313 (97.2)	71 (98.6)	1.178	.778
Mode of arrival						
119 Fireman rescuer	12 (13.0)	56 (22.7)	115 (35.7)	29 (40.3)		
Other ambulance	0 (0.0)	7 (2.8)	10 (3.1)	1 (1.4)	33.052	< .001
Others	80 (87.0)	184 (74.5)	197 (61.2)	42 (58.3)		
Outcome at ED						
Immediate ED discharge	74 (80.4)	172 (69.6)	194 (60.2)	31 (43.1)		
Admitted to hospital	17 (18.5)	75 (30.4)	127 (39.4)	39 (54.2)	35.902	< .001
Death	1 (1.1)	0 (0.0)	1 (0.3)	2 (2.8)		
Discharge diagnosis						
Injury						
Slip-down injury	7 (53.8)	14 (42.4)	16 (48.5)	10 (90.9)		
Other injury	6 (46.2)	19 (57.6)	17 (51.5)	1 (9.1)	8.067	.044
Illness						
Symptoms, signs and abnormal clinical findings	21 (26.6)	72 (33.6)	93 (32.2)	21 (34.4)		
Digestive	6 (7.6)	19 (8.9)	47 (16.3)	11 (18.0)		
Respiratory	7 (8.9)	17 (7.9)	32 (11.1)	3 (4.9)		
Circulatory	4 (5.1)	21 (9.8)	20 (6.9)	10 (16.4)	41.278	.001
Infections	15 (19.0)	21 (9.8)	14 (4.8)	2 (3.3)		
Genitourinary	8 (10.1)	11 (5.1)	24 (8.3)	3 (4.9)		
Others	18 (22.8)	53 (24.8)	59 (20.4)	11 (18.0)		

4. Discussion

This study is significant that it provides basic data on the health status of professional female free divers (Haenyeo) on Jeju Island. Studies about professional female free divers (Haenyeo) are somewhat limited. In Korea, research regarding pulmonary function [7] or changes in thermal insulation during underwater exercise [9] was mostly performed in the 1980s. However, studies of professional female free divers (Haenyeo) did not take place until later, some studies were performed again after the year 2000 regarding physical conditions related to free divers, such as intraocular pressure and optic nerve function [6], blood pressure, changes to the musculoskeletal system [5, 10, 11], or use of public welfare services [12], however because most of these studies were focused on specific symptoms, it is difficult to ascertain the general health condition of professional female free divers (Haenyeo) in Korea.

As expected, the results of this study demonstrated that professional female free divers (Haenyeo) are aging. The mean age was 74.3 years, and 87.4% of participants were aged over 65 years. Seven years ago, the mean age of female free divers was 64.1 years [3], and this reflects the national trend of an increasingly aging population compared to ten years ago in Korea [13]. As it is common for the elderly to experience declining physical function, depression, financial problems, or a decrease in quality of life, services to mitigate this reduced ability and to enhance social integration should be provided when

developing programs for elderly populations [13]. From these results, it is possible to consider how to make policies for professional female free divers (Haenyeo).

The outcome of treatment at the ED for 64.3% of participants was immediate discharge, while 35.2% were admitted to the hospital. Furthermore, 87.7% had discharge diagnoses related to illness. The most common discharge diagnosis was symptoms, signs and abnormal clinical and laboratory findings (28.2%), followed by digestive disorders, respiratory disorders, circulatory disorders, infections, neoplasms, genitourinary disorders, and musculoskeletal disorders. This means that most professional female free divers (Haenyeo) had nonspecific discomfort, which is common in the elderly. According to some studies, professional female free divers experience symptoms related to pulmonary function, optic pressure, hearing difficulties, tinnitus, vertigo, or headache [3, 4, 6, 8]. However, the result of this study is somewhat different from past research. Only data from professional female free divers (Haenyeo) in the ED were analyzed for this study. Most people tend to visit the ED when they feel severe symptoms or for an emergency situation. As a result of this fact, it is likely that the prevalence of common symptoms, such as headache and hearing difficulties, was low in this study. In order to identify the true overall state of disease or common symptoms in professional female free divers (Haenyeo), it is necessary to include outpatient and inpatient ward data as well as ED data in future studies.

Also, the results of this study suggest that it is necessary to concentrate on health management related to aging.

First, most professional female free divers (Haenyeo) had at least one comorbidity and took medication. Of these individuals, 88.0% had one or more comorbidities. The rate of comorbidities in the general elderly population is 89.2% [13], therefore, the results of this study reflect the general health situation of the elderly in Korea. Interestingly, according to a survey of seniors in Korea, various objective health indicators for women appeared worse in comparison to men [13]. Elderly women had a higher prevalence of chronic disease compared to elderly men, especially in regards to hypertension and osteoarthritis and rheumatoid arthritis. Also, elderly women experienced more depressive symptoms, and the physical function of elderly women was more limited. Therefore, it is important to provide more detailed programs for professional female free divers (Haenyeo) that address these characteristics

The prevalence of chronic disease in professional female free divers between ages 65-69 and ages 70-74 showed a large difference of approximately 10% [13]. Therefore, there is a need to focus on developing programs for chronic disease management in professional female free divers (Haenyeo) who are older, as well as programs for preventing complications of chronic disease.

Second, a substantial number of professional female free divers (Haenyeo) experience injuries caused by slip down. Older professional female free divers (Haenyeo) are more likely to experience this type of injury. One report on the elderly in Korea [13] showed that 25.1% of the total elderly population experienced slipping over the past year, and 78.8% of the elderly had a fear of slipping. This indicates that falls are a major concern for the elderly. Since falls can lead to decreased functional status, interest in fall prevention is required.

These facts indicate that although female free divers (Haenyeo) are unique in their profession, it is also important to pay attention to general elderly care such as management of chronic disease, medication compliance, drug interaction, and safety.

While many Korean professional female free divers (Haenyeo) reported chronic use of nonprescription medication in order to prevent or control their headache and routinely use combination analgesics prior to diving [3], only 2% professional female free divers (Haenyeo) reported taking Neusun powder. This shows a big difference compared with past studies. According to research of Korean professional female free divers (Haenyeo), almost 30% of professional female free divers (Haenyeo) experienced headache, and

overuse of combination analgesics was reported by 70.7% of divers [3]. A difference in survey method is likely the cause of this discrepancy. Prior research conducted surveys by phone. The current study analyzed medical records of professional female free divers (Haenyeo) who visited the emergency department. As a result, actual usage of medication might be under-reported. In addition, because many of the over-the-counter medications reported by participants contain caffeine, symptoms related to caffeine use, as well as basic dosages, needs to be considered.

Based on these results, there is a clearer understanding of the basic health status of professional female free divers (Haenyeo). In particular, the population of female free divers (Haenyeo) aged 80 or older is increasing, and their overall state of health is expected to decline. Therefore, ongoing health management programs should take into consideration common health issues inherent in elderly women as well as diving-related issues, including chronic disease management, fall prevention, physical changes related to diving, and daily over-the-counter drug usage.

5. Limitations of the Study

There were some limitations to this study.

First, as this study only examined data from the electronic medical records of a university hospital in South Korea, it may not be possible to generalize results to other settings.

Second, this study only examined data of professional female free divers (Haenyeo) who visited the ED. Since individuals tend not to visit the ED for mild symptoms, there is a possibility that other important symptoms related to diving were not collected that may have been apparent in the outpatient setting.

Therefore, it is necessary to expand the range of participants beyond one hospital, or to perform field surveys about health status

6. Conclusion

This study showed that older professional female free divers (Haenyeo) were more likely to have comorbid diseases, to take medication, and to experience more injuries. Therefore, as health programs for professional female free divers (Haenyeo) are developed, it is important to consider specific symptoms related to diving as well as issues related to aging, such as injury prevention and chronic disease management. Despite the limitations, this study illustrates important factors regarding the health status for professional female free divers (Haenyeo), which is important due to the lack of prior research in this area.

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