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A Study on the Status of Occupational Environment and Health Examination Data of Aged Workers in Korea

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고령취업자의 작업환경과 건강진단 결과에 관한 실태조사

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고령근로자의작업환경실태와건강검진자료를분석하여그들의건강한생활과삶의질을향상시킬수있는정책의기초자료를마련하고자시도되었다. 대상자는 부산, 경남지역에 소재하는 41개 사업장에서 유해인자에 노출되어 작업하는 공정에 있는 50세 이상 근로자 112명(남성 91명, 여성 21명)을 대상으로 소음, 분진, 유기용제, 중금속, 작업형태 및 작업강도 등을 측정, 분석하였으며, 건강검진 자료는 일반건강진단표를 이용하여 다음과 같은 결과를 얻었다.

1. 대상자의 평균연령은 54.9(남성 55세, 여성 54.7세)세였으며, 평균근무기간은 8.7년이 였으며, 조사대상 사업장중 71.5%가 50인 이하의 근로자를 고용하고 있는 사업장이 였다.

2. 소음에 폭로 대상자 중 31.3%가 90dB(A)인 노출기준치을 초과하였으며, 그 외의 분진, 유기용제, 중금속 등의 노출기준치를 초과한 대상자는 없었다.

3. 조사대상자 중 9%는 청력이 비정상이였으며, 78.6%의 대상자는 경작업과 중등작업을 하였으며, 52.7%는 전신을 이용하여 작업하는 형태였다.

Key Words : aged workers, occupational environment, noise, hazardous agents, loss of hearing ability

Ⅰ. Introduction

All living things go through the same cycle of life. They are born, grow up and become old. Human beings experience the same aging process from infancy, through adolescence, to adulthood and until senescence (Choi et al, 2005).

Although there are no clear proofs or theories about the reasons of aging, some theories suggest that the aging process is brought about by the decrease of cell segmentation, damage to genes and damage to cells due to the accumulation of hydrogen peroxide (Ku et al 2004). As old people show a significant decrease in adaptability to internal and external environmental changes, psychological alertness and in functions involving the circulatory, respiratory, digestive system and nervous systems, they are usually also financially and clinically vulnerable (Cho, 1995).

The Aged Employment Promotion Act, a current Korean law that encourages the aged to return to work, defines people over 55 years old as "Aged People", and those from between 50 to 55 years old as "Semi-Aged People". To promote employment for aged people, this law recommends that a company which has more than 300

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employees should employ the elderly to make up 3 to 6% of their total full time workers depending on its type of business (Ministry of Labor, 2008).

Leonard Z. Breen broadly defines the elderly as people who are in the stage of change, who are functioning less effectively from a psychological perspective and are living according to past social relationships in spite of social change (Medical University Professors, 2002). According to this definition, the working capacity of aged laborer can be at their best as they perform work safely and accurately by exercising their capabilities with considerable margin during work, rather than devoting their maximum energy (Ryu, 2003). In addition, one's working capacity can change with age. For the aged laborers, their physical and psychological functions and work can be summarized into five features. First are the physiological functions, which include sensing and balancing that begin to decrease in the early period. Second, muscle power starts to drop. Third, knowledge and capability, which include techniques that were acquired from training and that can be used and maintained for a long time. Fourth, the degree of skill is increased and complex work capacity can be acquired because of the accumulation of experience and technique. Fifth, a huge difference in the physical and psychological functions of aged laborers compared to younger ones. As aged laborers themselves may not realize their limited conditions that make them more vulnerable to work related accidents, it is very important to manage them. One of the management methods for aged laborers is the retirement age that restricts the aged from pursuing economic activities, depending on the job and its functions, which is widely used in many countries. For example, in Japan, the retirement age decreased and once went under the age of 55 after 1950. However, retirement was raised to 60 years old in 1998 by the Japanese Aged Employment Promotion Act because of the increasing lack of labor force due to an aging society. In the U.S., the retirement age was abolished in 1968. In addition, the U.S. removed the upper limit of retirement age with the Age Discrimination Act that says, "No discrimination against people who are 70 years old in hiring and firing". However, in Korea, the retirement age is still decided between 55 to 65 although there are some differences according to the types of work and size of business. The retirement age was extended to 60 in 2008 and will be extended to 65 in 2033. The nation's declining birth rate and economically active population and extended average life span lead to an aging society. As a result, participation of aged people in economic activities is increasing.

According to the U. N. (Ku et al, 2004), a nation has an "aging society" when the percentage of people older than 65 years old is over 7% of the total population; an "aged society" when the percentage is over 14% and a "super-aged society" when the percentage is over 20%. According to this standard, Korea is believed to have an aging society since 2000 and it is expected that it will enter into an aged society (13.5%) in 2020 and a super-aged society (19.3%) in 2030 (Korea National Statistical Office, 2003). Also, the number of semi-aged people over 50 years old is at 22.1% of the total population in 2003 and it is expected to reach 28.7% in 2010 and 46.3% (almost half of the total population) in 2030. In addition, the percentage of aged people employed has steadily increased at 22.8% in 1998, 23.9% in 2000 and 23.9% in 2002 (Ryu, 2003). On the other hand, it is good that the number of industrial accidents of aged laborers has decreased from 33.3% in 2000, to 29.9% in 2001 and to 8.2% in 2002. In the same period, industrial accidents of total laborers in the country also decreased from 24.5% in 2000, to 18.1% in 2001 and to 0.6% in 2003 (Ministry of Labor, 2003). However, policies on the working conditions and environment for aged laborers are being developed as it is expected that their percentage will increase in the future.

Assuming that the average life span of Koreans is 80 and the retirement age is 60, old people can continue to live productively for more than 10 years, provided that they benefit from a good national social security system or are supported by their children. Dependency ratio for the welfare of aged people has significantly increased from 7.5% in 1970 to 10.1% in 2000, and is expected to reach 21.3% in 2020 and 37.5% in 2030 (Lim et al, 2008). However, Korea does not have a solid social security system for old people. The elderly therefore are likely to rely on the support from their children or other people. Securing their children's support, however, may be very difficult because of the wide spread nuclear family system. Therefore, aged people have no choice but to work and strive to participate in economic activities. However, because aged workers have various decreased functions and lower immune systems, as they keep working with many harmful elements, they are very likely to experience health problems. In addition, there is no basic information related to the work environment required for the protection, maintenance and management of their health. Therefore, the purpose of this study is to investigate the work environment where the aged people are employed considering that they are physically, psychologically and socially neglected and have lower immunity against various harmful elements. This paper also investigates the health examination records of the elderly and aims to provide basic data to establish policies which can contribute in

increasing their health and quality of life.

Ⅱ. Subjects and Methods

A. Subjects of Study

This study involved a total of 112 elderly workers (91 male and 21 female), over 50 year old and exposed to 41 hazardous companies located in Busan and Gyeongnam Province. Information generated between July and December 2007 was collected and analyzed. In addition, the workers' health examination records were also analyzed.

B. Selection of Sample and Method of Analysis

The hazards to the workers' health and welfare within the workplace were conducted by the Regulation for Working Environment Monitoring and its Quality Control (No. 2007-45, disclosure of the ministry of labor). Personal exposure concentration

Table 1. General characteristics of subjects (%)

Parameter	Male	Female	Total
Age (years)			
50-54	48 (52.7)	12 (57.1)	60 (53.6)
55-59	30 (33.0)	6 (28.6)	36 (32.1)
60-65	10 (11.0)	1 (4.8)	11 (9.8)
65-69	3 (3.3)	2 (9.5)	5 (4.5)
Avg.	55.0±4.0	54.7±4.9	54.9±4.2
Total	91 (100)	21 (100)	112 (100)
Work duration(years)			
-5	25 (27.5)	11 (55.0)	36 (32.4)
5-10	31 (34.1)	3 (15.0)	34 (30.6)
10-15	17 (18.7)	5 (25.0)	22 (19.8)
15-20	6 (6.6)	1 (5.0)	7 (6.3)
20^{+}	12 (13.2)	0 (0.0)	12 (10.8)
Total	91 (100.0)	20 (100.0)	111 (100.0)
Avg.	9.2±9.3	6.3±4.5	8.7±7.0
BMI(kg/m^2)			
-18.5	2 (2.2)	2 (2.2)	4 (3.6)
18.6-24.9	68 (74.7)	13 (61.9)	81 (72.3)
25.0-29.9	18 (19.8)	6 (28.6)	24 (21.4)
30.0-	3 (3.3)	0 (0.0)	3 (2.7)
Total	91 (100.0)	21 (100.0)	112 (100.0)
No. of employees	No. of factories		
-10	7 (16.7)		
11-30	17 (40.5)		
31-50	6 (14.3)		
51-99	10 (23.8)		
100^{+}	2 (4.8)		
Total	41(100)	Avg.	39.2±40.0

was calculated by the analysis carried out by the NIOSH Manual (1994). General health examination records were used as information related to the health condition of workers. Finally, SPSS/pc (ver14.0) was used for statistical processing.

Ⅲ. Results and Discussion

Table 1 shows the general characteristics of subjects. Such characteristics include: average age of participants - 54.9 years old (male, 55.0 years old, and female, 54.7 years old); 85.7% of are between 50 and 59 years old; average work experience - 8.7 years; male workers have approximately 3 years longer work experience than female workers; and 63% have less than 10 years work experience.

Based on the weight classification of the Body Mass Index (Ku et al, 2004), which suggests 18.5 kg as "under weight", 18.6-24.9kg as "normal ", 25.0-29.9kg as "over weight", 30.0-39.9kg as "obese" and more than 40kg as "severely obese", participants were determined to be 3.6% under weight, 72.3% normal, 21.4% over weight and 2.7% obese. Similar to the results of Choi et al (2005), this study shows that male workers are weightier than female workers and less obese (Choi et al., 2005). There were no severely obese workers.

This study investigated the number of employees to determine the size of each workplace. The average number of employees in the participating companies was 39. At 40.5% of the total number of participating companies, most have 11-30 employees and 16.7% have less than 10 employees. Most of the workplaces were small, as 95.2% of the participating workplaces had less than 100 employees (Refer to Table 1).

Considering the many hazardous agents that adversely affect the health of workers, which include noise, particles, organic solvents, heavy metals, gas, causes of musculoskeletal disorders and work stress (Beak, 2003), this study focuses its investigations on noise, particles, organic solvents, heavy metals, work methods and work intensity. Table 2 shows the number of the exposed stressors for aged workers as discovered in this study, which include noise, particles, organic solvents, heavy metals and others (gas, high temperature).

Among these hazards, at 88.4%, noise is the leading agent that harms the health of aged workers. (Noise is the most hazardous agent among the identified health hazard in the general manufacturing industry and the most basic agent to be estimated.) Particles, heavy metals and solvents are the next most hazardous at 36.6%, 20.1% and 17.0%, respectively (Refer to Table 2).

Sound is generated by a change in air pressure caused by the vibration of an object (Beak, 2003). People can hear a sound when a vibration reaches a person's eardrum. Noise is defined as unwanted sound, which may be subjective according to a person's perspective. Noise may be defined as an irregular, non-periodic and high frequency sound (Kim, et al, 1984) that can cause hearing disorders (hearing loss) and other disorders (unpleasantness, sleep disturbance, disruption of conversation, decrease of efficiency and bodily effects) (Medical University Professors, 2002). The main occupational disabilities found in aged workers are noise-induced hearing loss and high sound pressure that are most probably due to high frequency noise and continuous exposure to unwanted sounds (Beak, 2003). In Korea, the standard of noise exposure in a workplace is 90dB(A) per 8 hours (Minstry of Labor, 2008) and it was discovered that the average noise exposure of the total participants was 87.6dB(A). Table 3 indicates the participants' degree of exposure to noise.

Table 2: Identified stressors (No.: 112)(%)

Parameter	Noise	Particle	Solvent	Heavy metal	Mixed*	Others**	Total
Noise	43	25	2	10	15	4	99 (88.4)
Particle	25	0	0	0	12	4	41 (36.6)
Solvent	2	0	10	0	7	0	19 (17.0)
Heavy Metal	10	0	0	2	11	0	23 (20.1)
Others	4	4	0	0	0	5	13 (11.6)
Over exposure level (%)	3(131.3)	0(0)	0(0)	0(0)	-	0(0)	31(31.3)

* Exposed to more than 3 health hazardous agents
** Exposed to hazardous agents other than listed above

Considering the effect of noise relative to the number of employees, the average noise level at factories with 11-30 employees was 88.5dB(A), which was the highest level, and 90.5dB(A) in factories with 51-100 employees. These factories have a bit higher noise level than the average level (refer to the Table 3).

On the other hand, considering the level of noise most employees were exposed to in relation to the number of employees hired, most employees are exposed to the level of noise between 85.0 to 89.0dB(A) in factories with less than 10 employees and 11-30 employees. In factories with 31-50 employees, workers were exposed to a noise level between 80.1 to 84.9 dB(A), and in the factories with more than 50 employees, higher than 90dB(A). Of the total number of participants, 37.4% were exposed to 85.0 to 89.9dB(A) and 31.3% were exposed to higher than 90dB(A), which was the standard of noise exposure per 8 hours. Considering the number of employees hired, almost half of the employees(48.4%) from the factories with 11-30 employees and more than 50 employees were exposed to noise levels that were higher than the standard. As the already weak hearing of aged workers could become even weaker due to continuous exposure to high noise levels, methods to protect aged workers should be established as soon as possible. On the other hand, 67.7% of the participants are exposed to high noise levels at 85dB(A) if one applied the standards set forth by the ACGIH's TLV (Threshold Limit Values) of U.S.A. (ACGIH, 2004).

Based from studies, it was determined that the effective hearing range of conversation between 20-year-olds is 75cm to 85cm and for 50-year-olds at 35cm to 45cm, which is almost half of that for 20-year-olds (Ryu, 2003). Companies must therefore set up methods to prevent industrial accidents and diseases that are caused by not hearing warning or work instructions, as well as mechanical and medical measures to prevent health problems such as noise-induced hearing loss (Choi et al, 2005). Considering however, that it might be very difficult for small companies to improve the work environment in their factories, improvement plans must be established alongside measures and policies in the national level.

Particles floating in the air may cause pneumoconiosis by invading the respiratory organs and attaching to lungs, toxication by being absorbed into the body, and other diseases (Kim et al., 1984). The degree of disease depends on work experience, types of particles, concentration, size, toxicity and work intensity (Medical University Professors, 2002). The Korean Occupational Safety and Health Act prescribes the standards for the total quantity of particles and respirable suspended particles, which include the standards for

Table 3: Noise level by factory scale

Noise level (dB(A))	Factory scale by employees				
	-10	11-30	31-50	51-100	No. (%)
-80	0 (0)	0 (0)	0 (0)	2 (2.0)	2 (2.0)
80.1-84.9	2 (28.6)	7 (17.1)	9 (31.0)	11 (37.9)	29 (29.3)
85.0-89.9	4 (57.1)	19 (46.3)	4 (30.8)	10 (26.3)	37 (37.4)
90.0+	1 (14.3)	15 (36.6)	0 (0)	15 (39.5)	31 (31.3)
Total	7 (100.0)	41 (100.0)	13 (100.0)	38 (100.0)	99 (100)
Over exposure level(%)	1 (3.2) (1.0)	15 (48.4) (15.1)	0 (0) (0)	15 (48.4) (15.1)	31 (100.0) (31.3)
Avg.(dB(A))	87.1±3.0	88.5±4.3	83.8±2.2	88.0±5.10	87.6±4.6

Table 4: Number of subjects by particle exposure limit and factory scale

Exposure level (㎎/㎥)	-10	11-30	31-50	51-100	No. (%)	Avg.
0.00-0.99	2	11	1	17	31(75.6)	0.38±0.19
1.00-4.99	2	6	0	2	10(24.4)	2.33±0.90
Total	4 (9.8)	17 (41.5)	1(2.4)	19 (46.3)	41100)	
Avg.	1.85±1.65	1.05±1.05	0.24	0.49±0.42		0.85±0.97

the first class particles (exposure level: 1㎎/㎥), second class particles (exposure level: 5㎎/㎥), third class particles (exposure level: 10㎎/㎥), asbestos and other types of particles (Ministry of Labor, 2008).

Based on the measured particles for 41 workers, it was determined that the average quantity of particles exposed was less than 0.85㎎/㎥. In the factories hiring 51-100 employees, 46.3% of the workers were exposed to particles. Particle exposure was highest at 1.85㎎/㎥ in factories hiring less than 10 employees. There were no participants exposed to particles higher than the standard (refer to Table 4).

Organic solvents are inevitable industrial materials in the workplace. They are defined as liquids, well dissolving, non water-soluble materials, having volatility and allowing the collection of original dissolved materials when the solvents are removed from solutions (Lee et al, 2004), and that may be used as one solvent or a mixture of solvents (Medical University Professors, 2002). Also, organic solvents can be classified (Kim et al, 1984) according to their chemical structure: aromatic hydrocarbons, chlorinated aromatic hydrocarbons, chlorinated aliphatic hydrocarbons, alcohols, ethers, ketons, glycol ethers, hydrocarbons and aliphatic hydrocarbons. In the past, the country's Occupational Safety and Health Act prescribed and managed first, second and third class organic solvents. However, this act has been revised and now organic solvents are identified as either harmful chemicals or safe chemicals (Ministry of Labor, 2004). Harmful chemicals are further reclassified into physically dangerous chemicals and health and environmentally hazardous chemicals. Regulations on industrial health standards prescribe 113 types of organic solvents among the materials to be controlled (Ministry of Labor, 2008).

It has been revealed that health disturbances caused by organic solvents may include depressing the central nervous system (anesthesia), removal of skin fats, skin irritation, and special harmful effects of each solvent on the different organs of the human body (liver, kidney, hematopoietic tissue, peripheral nerves, optic nerves and blood vessels) (Barbara A. Plog et al, 1995). This study examined 19 workers who were dealing with organic solvents. Fifty four organic solvents from 14 types of solvents were collected and analyzed (a worker may handle more than one solvent). The results showed that no one was exposed to organic solvents higher than the exposure limit, which was possibly due to the fact that the quantity of solvents used was small, as well as the number of workers who participated in this study. This paper investigated only the workers who are over 50 years old (refer to Table 2).

Heavy metals are accumulated in the human body and cause various diseases such as damage to the circulatory system, kidney, nervous system, gastrointestinal system, muscular system, and central nervous system. Such disorders may include quadriplegia, asthma and abnormalities of breathing (Catholic University, 2003). Symptoms heavily depend on the types of exposed heavy metals, period of exposure and the concentration of exposed heavy metals. A total of 23 participants were investigated. Like solvents, as a worker may handle more than one heavy metal, we collected and analyzed a total of 28 heavy metals from 6 types of heavy metals. And it was also determined that no participants were exposed to

Table 5: Data of special health record (%)

Parameter	Total no.	Item	Criteria	No.	Avg.
Blood pressure	112	Systolic	-159	10(997.3)	126.2±21.9
			160+	3(2.7)	
		Diastolic	-95	106(94.6)	83.5±7.7
			96+	6(5.4)	
GOT	112		-40	101 (90.2)	30.8±16.2
			41+	11 (9.8)	
GPT	112		-40	84 (75.0)	33.5±18.3
			41+	28 (25.0)	
Hemoglobin	91	Male	-12.9	3 (3.3)	14.5±1.7
			13+	88 (96.7)	
	21	Female	-11.9	3 (14.3)	3.3±1.7
			14.9+	18 (85.7)	

heavy metal levels higher than the standard (refer to Table 2).

The health management of workers is primarily concerned in addressing occupational diseases and adult diseases. As adult diseases are the major health management consideration after an employee reaches middle age, workers who are older than semi-aged workers should be carefully observed (Choi et al, 2005). For this purpose, regular health examination is observed in order to prevent and monitor the health and possible diseases of workers (Catholic University, 2003). In other words, changes in the work environment or work conditions can be identified by observing changes in the health condition of individual workers (Catholic University, 2003). The Korean Industrial Safety and Health Protection Act prescribes as a standard that all companies must conduct a general health examination (protection and management of worker's health and periodical evaluation of work suitability), health examination before assignment (additional collection of basic health information of workers who are assigned to work, exposing them to harmful factors and re-evaluation of appropriation of the assignment to the exposed work), special health examination (protection of workers from occupational diseases as they are exposed to harmful elements and re-evaluation of appropriation for the exposed work), occasional health examination (quick prevention of occupational asthma, skin diseases and other health disorders which workers may complain of and re-evaluation of appropriation for the exposed work) and temporary health examination (conducted by the order of the local labor office to check toxicity by health hazards, morbidity of diseases and causes of diseases) (Ministry of Labor, 2004).

According to the statistics on industrial accidents and disease, the top work-related health condition is cerebrovascular diseases (44%) followed by occupational diseases (39.5%) and musculoskeletal system disorders (14.7%). Statistics also reveal that the main cause of occupational death of aged workers were also cerebrovascular diseases (56%) followed by pneumoconiosis (40%) (Ryu, 2003). Since cerebrovascular diseases are the number health problem threatening the aged worker, companies may address this problem by conducting regular health examinations. This study used and investigated the general health examination records of participants (refer to Table 5).

The World Health Organization (WHO) defines hypotension as blood pressure under 100/60; Normal blood pressure is 120 to 130 systolic over 80 to 85 diastolic; borderline blood pressure is 140 to 160 over 90 to 95; and hypertension is over 160/95 (Ku, et al, 2004). According to the WHO criteria, it seems that 3-5% of the participants have hypertension.

Using the GOT and GPT methods, this study investigated the liver function and status of the participants and discovered that more than 40 were classified as abnormal (Henry, 2007). Ten to 25% of

Table 6: Loss of hearing (%)

Parameter		Normality	Abnormality		Total
			(Right ear)	(Left ear)	
Gender	M	82 (91.1)	3 (3.3)	5 (5.6)	90(100.0)
	F	19 (90.5)	1 (4.8)	1 (4.8)	21(100.0)
Factory scale (No. of persons)	10-	79 (87.5)	0 (0)	1 (12.5)	8 (100.0)
	11-30	38 (88.4)	3 (7.0)	2 (4.7)	43 (100.0)
	31-50	14 (100.0)	0 (0)	0 (0)	14 (100.0)
	51-100	39 (90.7)	1 (2.3)	3 (7.0)	43 (100.0)
	100+	3 (100.0)	0 (0.0)	0 (0.0)	3 (100.0)
Work duration (years)	4.9-	34 (94.4)	1 (2.8)	1 (2.8)	36 (100.0)
	5.0-9.9	31 (91.2)	1 (2.9)	1 (2.9)	34 (100.0)
	10-14.9	21 (95.5)	1 (4.5)	0 (0.0)	22 (100.0)
	15-19.9	5 (71.4)	0 (0.0)	2 (28.6)	7 (100.0)
	20+	10 (83.3)	1 (8.3)	1 (8.3)	12 (100.0)
Total		101 (100.0)	4 (100.0)	6 (100.0)	111 (100.0)
		(91.0)	(3.6)	(5.4)	(100)

the participants were abnormal, 89.3% were within normal range of hemoglobin, and 14.3% of the female workers showed abnormality, which was 3.3% higher than that of male workers (refer to Table 5).

Table 6 shows hearing test results using 1KHz frequency: 9% of the participants showed abnormality in hearing; the left ear (5.4%) was less normal than the right ear (3.6%); and female workers showed a bit higher abnormality than male workers. A high number of workers with abnormal hearing was found in factories with 11-30 employees and more than 50 employees and aged workers who had 15 years to 19.9 years and more than 20 years of work experience. However, since participants of this study are aged workers, it was difficult to determine whether the hearing disorder was caused by aging or by the noise in their work areas. It is, therefore, necessary to conduct audiogram tests on aged laborers for further investigation (Beak, 2003).

Relative Metabolic Rate (RMR) was used as one of the methods to determine the intensity of work. Although this method classifies work intensity as "light" (0-2), "medium" (2-4), "severe" or "heavy" (4-7) and "extremely severe" or "super heavy" (more than 7) (Ku et al 2004), this study combines medium and heavy, and reclassifies light, severe, and extremely severe (refer to Table 7).

This study was able to determine that among the participants most are involved in severe work (43.8%), followed by light (34.8%) and extreme severe (21.4%). Female workers were mainly involved in light work (47.6%) and severe (47.6%). For intensity of work according to the size of factories, 87.5% of the participants who were working for factories hiring 11-30 employees were involved in super heavy work. Therefore, there should be measures and studies on the working conditions of aged workers in these factories.

Table 7 classifies the types of work as "work using hands", "work using one arm" and "work using the whole body". Although the participants were aged laborers, they were mostly involved in work that makes use of their whole body (52.7%). There were fewer who worked just using their hands (35.7%) and those using just one arm (11.6%). 59.3% of the male participants were involved in work using the whole body, which was the highest figure, while 71.4% of the female workers worked using just their hands. Considering the sizes of the factories, most participants work using their hands in the factories with 51-100 employees, while participants in factories with 11-30 employees mostly worked using the whole body. Therefore,

Table 7: Intensity of work according to gender, factory size and type of work

Parameter		Intensity of work			Types of work			Total
		Light class work	Severe class work	Extreme severe class work	Hands	One arm	Whole body	
Gender	M	29 (31.9)	39 (42.9)	23 (25.3)	25 (27.5)	12 (13.2)	54 (59.3)	91 (100.0)
	F	10 (47.6)	10 (47.6)	1 (4.8)	15 (71.4)	1 (4.8)	5 (23.8)	21 (100.0)
Factory scale (persons)	10-	3 (37.5)	4 (8.2)	1 (4.2)	1 (2.5)	1 (7.7)	6 (10.2)	8 (7.1)
	11-30	7 (15.9)	16 (32.7)	21 (87.5)	4 (10.0)	10 (76.9)	30 (5.08)	44 (39.3)
	31-50	6 (15.4)	8 (16.3)	0 (0)	6 (15.0)	1 (7.7)	7 (11.9)	14 (12.5)
	51-100	20 (51.3)	21 (42.9)	2 (8.3)	26 (65.0)	1 (7.7)	16 (27.1)	43 (38.4)
	101+	3 (7.7)	0 (0)	0 (0)	3 (7.5)	0 (0)	0 (0)	3 (2.7)
Total		39 (34.8)	49 (43.8)	24 (21.4)	40 (35.7)	13 (11.6)	59 (52.7)	112 (100.0)

there should be measures and studies on the types of work for aged workers, as well as the intensity of their work.

Ⅳ. Conclusion

By analyzing the work environment and investigating the health records of aged workers, this study aims to prepare basic information that could lead towards establishing policies that can promote better health for semi-aged workers as well as increase their quality of life. The participants of this study include a total of 112 workers (91 male and 21 female) over 50 years old and are exposed to health hazards from 41 companies located in Busan and Gyungnam province. Based upon an investigation of the aged workers' general health examination reports from their health examination records, this study measured and analyzed work hazards such as noise, particles, organic solvents and heavy metals, as well as types of work and intensity of work. The findings are as follows.

Average age of participants was 54.9 year old (Male, 55.0 years old and female, 54.7 years old); average work experience was 8.7 years; 71.5% of factories investigated had less than 50 employees.

31.3% of the participants were exposed to noise that was higher than the standard exposure level of 90dB(A). No participants were exposed to particles, organic solvents or heavy metals higher than their standard exposure levels.

9% of the participants have hearing abnormalities; 78.6% were involved in light work and heavy work; and 52.7% were involved in work using the whole body.

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