



Compensation for Occupational Skin Diseases

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The Korean list of occupational skin diseases was amended in July 2013. The past list was constructed according to the causative agent and the target organ, and the items of that list had not been reviewed for a long period. The revised list was reconstructed to include diseases classified by the International Classification of Diseases (10th version). Therefore, the items of compensable occupational skin diseases in the amended list in Korea comprise contact dermatitis; chemical burns; Stevens-Johnson syndrome; tar-related skin diseases; infectious skin diseases; skin injury-induced cellulitis; and skin conditions resulting from physical factors such as heat, cold, sun exposure, and ionized radiation. This list will be more practical and convenient for physicians and workers because it follows a disease-based approach. The revised list is in accordance with the International Labor Organization list and is refined according to Korean worker's compensation and the actual occurrence of occupational skin diseases. However, this revised list does not perfectly reflect the actual status of skin diseases because of the few cases of occupational skin diseases, incomplete statistics of skin diseases, and insufficient scientific evidence. Thus, the list of occupational diseases should be modified periodically on the basis of recent evidence and statistics.

Keywords: Workers' Compensation; Dermatitis, Occupational; Korea

INTRODUCTION

Occupational skin diseases (OSDs) are those resulting from or aggravated by exposure to risk factors during work activity. The human body is shielded by a very thin, but strong, lipophilic layer that serves as a defense from physical factors such as temperature, humidity, radiation, friction, chemicals, and biological agents. Exogenous agents may induce damage to the skin barrier and cause toxic reactions in an individual's skin and/or internal organs following skin absorption. If an occupation negatively affects the skin, the resultant skin diseases are classified as occupational diseases (ODs).

Skin disease also has a large number of contributory, non-occupational, and predisposing factors that impact the development and progression of the diseases. Some examples of non-occupational factors include foods, drugs, cosmetics, detergents, and ultraviolet radiation. The specificity of an individual's immune response, such as atopy, is another important factor. Thus, estimating the contribution of occupational exposure to the etiology of a skin disease may be difficult. Furthermore, there are many skin diseases with similar symptoms, making an accurate diagnosis difficult. Therefore, the accuracy of statistics on OSDs is reduced. Thus, estimating the burden of OSD is difficult.

The statistics on OSD are different for each country because of the different definitions used to classify ODs and the different statistical methods used to analyze the collected data. In

addition, differences in compensation systems also have a major influence (1). The Survey of Occupational Injuries and Illnesses (SOII), conducted by the US Bureau of Labor Statistics, found that the incidence of OD in 2012 was 20.2 people per 10,000, with 3.2 of those 20.2 cases representing a skin disease (2). In the UK, according to the statistics reported by a general physician belonging to The Health and Occupation Reporting (THOR) Network, OSD had a prevalence of 122 people per 100,000 during the years 2010-2012 (3). A review paper on European Union (EU) ODs for 2003 showed that the incidence of OSD in the EU was 1.5 cases per 1,000 people per year, as a gross average.

Compared to the previous years, the incidence of OSDs is gradually declining. According to US statistics, the incidence of OD was 210.5 cases per 1,000 people in 1972, with 86.5 of the 210.5 cases representing a skin disease. Thus, skin diseases accounted for 41.1% of the overall OD. In 2012, occupational illnesses were reported by 207.8 people per 1,000, with only 33.3 of the 207.8 cases representing a skin disease. Over that 40-yr period, the proportion of OSDs was reduced by more than half (4). Reductions in the exposure of people to hazardous substances due to production facility automation may reasonably be assumed to have contributed to the decreased incidence of OSDs (5).

In Korea, the official statistics on OSDs are the numbers approved by the Industrial Accident Compensation Insurance (IACI) Act; in 2012, there were only 20 cases. OSDs in the offi-

cial statistics totaled 179 people between 2006 and 2012, or approximately 0.19 per 100,000 workers (Table 1). The very low compensation for OSDs could be attributed to several factors, including 1) the requirement for definitive evidence that the disease was work-related, 2) little profit obtained from compensation insurance, and 3) low workers' and physicians' cognition of work-relatedness.

Approved OSDs in Korea include only acute and definitely work-related diseases. Between 1971 and 1980, a total of 2,038 people were identified as having an OSD during routine employee health checks. All of the OSDs accounted for 5.5% of the total OD (37,145 people) (6). The identified skin diseases mainly included cellulitis, dermatitis acquired during silk-reeling or textile manufacturing (7, 8), chemical burns, other burns, and frostbite. The incidence of OSDs was concentrated in a specific job group. Between 1971 and 1980, 92% of all OSDs occurred in the silk-reeling and textile industries (9). Since 2000, 42% of all OSDs have been reported by forestry care workers participating in local government public works projects. This fact shows that a large proportion of compensable cases of skin disease occurred in recognized outbreaks of OSDs.

Recently, painters with chemically induced vitiligo and scabies-infected caregivers in group care facilities have been reported. The Stevens-Johnson syndrome, induced by trichloroethylene (TCE) exposure, has also been reported. Contact dermatitis and cellulitis also occur and represent a proportion of the total OSD number.

The authors consider that the list of ODs to have played an important role in both prevention policy and worker compensation. Physicians know the list and carefully ask their patients about their occupational history. Therefore, physicians provide advice concerning occupational hazards. Workers are therefore able to better recognize compensable diseases. The Korean list of ODs was placed in both the Enforcement Decree of the Labor Standards Act (ED-LSA), Article 44 (scope, etc., of occupational disease, Schedule 5) (10), and the IACI Act, Article 34 (criteria for recognition of work-related diseases, Schedule 3) (11).

Table 1. Number of cases of occupational skin disease as detected by compensation, 2006-2012

| Year | OD | OSD | Proportion (%) of total ODs | OSD cases per 100,000 workers |
|-------|--------|-----|-----------------------------|-------------------------------|
| 2006 | 9,114 | 29 | 0.32 | 0.25 |
| 2007 | 10,449 | 19 | 0.18 | 0.15 |
| 2008 | 8,760 | 37 | 0.42 | 0.27 |
| 2009 | 7,941 | 20 | 0.25 | 0.14 |
| 2010 | 6,986 | 35 | 0.50 | 0.25 |
| 2011 | 6,516 | 19 | 0.29 | 0.13 |
| 2012 | 6,742 | 20 | 0.30 | 0.19 |
| Total | 56,508 | 179 | 0.32 | 0.19 |

Occupational skin diseases are classified separately since 2006 in the Industrial Accident Compensation Insurance statistics in Korea. OD, occupational disease; OSD, occupational skin disease.

Both Korean lists of ODs were amended in July 2013.

This article presents a detailed description of the revised list of OSDs and explains the differences between the previous list and the revised list. This article also explores the background of the list, the reasons for its revision, and suggests evidence needed for work-related OSDs that are included in the revised lists. The similarities and differences between the International Labor Organization (ILO) list and the revised Korean list are also presented.

MATERIALS AND METHODS

The procedure for amending the specific recognition criteria for ODs in the ED-IACIA and ED-LSA was described by Song et al. (12).

RESULTS

History

The father of occupational medicine, Benardino Ramazzini (1633-1714) noted various OSDs in his papers. For example, impetigo of the breasts among nursing women, leg ulcers in fishermen, chrysoderma in gold diggers, irritant contact dermatitis among laundry women and soap workers, cement burns in masons and bricklayers, varices in persons constantly standing while at work, hand eczema in pharmacists, and acid-induced leg ulcers in salt workers. He also showed the relationship between causes and tasks, by occupation (13). The first scientific description of an OSD was skin cancer of the scrotum, in 1775. Percivall Pott reported an association between exposure to soot and the incidence of scrotal cancer in chimney sweepers (14). Scrotal cancer was the first occupational cancer and, simultaneously, the first listed OSD. Josef Jadassohn (1863-1936) developed a patch test in 1896, and Poul Bonnevie created a standard series of patch tests in 1939. The International Contact Dermatitis Research Group was founded in 1967, and this group standardized routine patch tests. Robert Adams published a famous textbook for OSD in 1983.

Two international lists of ODs were created for the International Harmonization of Occupational Disease list. One was created by the ILO, and the other was the European Commission List. The structures of the 2 lists were based on the exposure to agents by target organs. In 1925, the ILO announced, at Convention 018 (C018), the international list of ODs, for the first time. ILO Convention 121 (C121), created in 1964, suggested the first list of skin diseases, other than skin cancer. Occupational skin cancer was defined as "primary epitheliomatous cancer of the skin caused by tar, pitch, bitumen, mineral oil, anthracene, or the compounds, products, or residues of these substances" as item 27. The first list of skin diseases caused by physical, chemical, or biological agents appeared in item 26 of ILO C121

and was revised in 1980. ILO Recommendation 194, created in 2002 and revised in 2010, added new items to the revised list. The ILO List of 2002 witnessed the addition of skin diseases caused by physical, chemical, or biological agents and occupational vitiligo. In 2010, the revised ILO list subdivided OSDs into four items: allergic contact dermatoses and contact urticaria, irritant contact dermatoses, vitiligo, and other skin diseases caused by physical, chemical, or biological agents (15). A European schedule of ODs (European Commission Recommendation 90/326/EEC) was created in 1990 and revised in 2003 (European Commission Recommendation 2003/670/EC). The EU list of ODs was divided into annexures 1 and 2; annexure 1 included diseases with proven work relationships, and annexure 2 contained a list of included diseases with suspected and considered work relationships (16). Annexure 1 included skin diseases and skin cancers caused by soot, tar, bitumen, pitch, anthracene, or compounds derived from them, as well as mineral and other oils, crude paraffin, carbazole or compounds derived therefrom, and byproducts of the distillation of coal. The general provision for OSDs was presented as "Occupational skin ailments caused by scientifically recognized allergy-provoking or irritant substances not included under other headings" (15). Many countries follow the international list of ODs. However, in most lists, "skin disease" is often presented as a general term. One of the major OSDs on the list was skin cancer, which had previously been important, but currently has a greatly decreased incidence. OSDs included on the list of ODs are due to exposure to hazardous materials. Vitiligo is only present in the OD lists of Ireland and New Zealand. Thus, unlike the lists of other ODs, the list of OSDs shows a large variation between countries.

The list of ODs was first established in Korea in 1954 and was presented in the ED-LSA. The list contained 36 items, organized by causes. Eight of the 36 items on the list were skin diseases or diseases associated with skin lesions. Among these were chemical burns; cellulitis; eczema; other skin disorders; primary skin carcinoma due to smoke, pitch, asphalt, mineral oil, and paraffin; and other diseases of the skin and mucous membranes. Considering that ILO C042 was presented in 1934 and ILO C121 showed a separate list of skin diseases, presented in 1964, the Korean list of 1954 was more specific and detailed than the international standard (Table 2).

The list of occupational diseases on the ED-LSA played the role of Korea's list of ODs, without amendment, until the criteria for specific recognition in the ED-IACI Act were established in July 2008. The ED-IACI Act list was revised in 2013, and the list of occupational diseases in the LSA was similarly amended. The list of ODs in the ED-IACI Act has been composed of a total of 23 items since 2008. The causative agent of the disease and the disease-specific classification were mixed in this list. The amended list of 2008 was derived from the existing ED-LSA list and included work-related diseases, such as cardiovascular diseases, musculoskeletal disorders, skin diseases, and liver diseases. These changes reflected the fact that work-related diseases were affected by a combination of factors. However, the list of target organs remained to be added to the existing list. The purpose of the 2013 amendment was to correct these problems.

Details of current revision focusing on OSDs

The list of OSDs in the 2008 IACI Act was a relatively systematic description of OSDs. The list included 7 skin diseases caused by physical factors, contact dermatitis, infectious skin diseases, vitiligo, and chemical burns (Table 3). In addition, the document included a separate list of ODs, classified by harmful substances. The substances were vinyl chloride, tar, chromium, benzene, hydrocarbons, aromatic compounds of organic solvents, diisocyanates, and TCE.

There were problems with the previous version for recognizing OSDs. The first list, classified according to harmful substances, was limited because the scope of the substances was too broad. Although the list of OSDs by hazardous agents is more clearly associated with skin diseases and harmful substances, this list shows just a few among the many potentially causative substances. Furthermore, physicians and workers find the list difficult to use, in part because the description of the skin diseases is heterogeneous. For example, eczema, dermatitis, warts, and skin pigmentation are on the list as descriptions of primary skin lesions. This made these terms difficult to use for diagnosis and compensation. The list was also old and reflected past times. Significant changes in the structure of industry also resulted in a change in the most frequent major illnesses. Before its revision, the list had included rarely occurring skin diseases, such as primary skin carcinomas, tar-related skin diseases, and skin

Table 2. Skin diseases in the first Korean list of occupational diseases, 1954

| |
|--|
| 6. Over 2nd-degree hot burn by working with hot material or hot environment work, and over 2nd-degree frostbite by working with cold material or cold environment work |
| 10. Dermatitis and hand cellulitis induced by silk mill work or spinning |
| 17. Ulcer or other diseases induced by exposure to chrome, nickel, aluminum, or their compounds |
| 26. Corrosion or inflammation of ulcer induced by exposure to mineral acids, alkalis, chlorine, fluorine, phenol, or their compounds and other corrosive or irritant substances |
| 30. Cellulitis, eczema, or other skin diseases induced by exposure to soot, mineral oil, tung oil, paints, tar, or cements |
| 31. Primary carcinomas induced by exposure to smoke, par, pitch, asphalt, mineral oil, paraffin, or other substances including the forenamed materials |
| 32. Poisoning including its secondary diseases and skin or mucosal diseases induced by exposure to toxic, irritant, or other dangerous substances other than diseases mentioned above in clauses 14-31 |
| 36. Anthrax, erysipelas, pest, and pock induced by dealing with animals and their carcasses, animal byproducts including animal hairs and leathers or rags, and other scrap materials |

Table 3. Comparison before and after the amendment of the Korean occupational skin disease (OSD) list according to the International Labor Organization (ILO) list

| ILO list in 2010 | Korean List in 2008 | Revised Korean list in 2013 |
|---|---|--|
| 1. Allergic contact dermatoses and contact urticaria | Vinyl chloride (no. 8), tar (no. 9), chrome (no. 13), benzene (no. 15), organic solvents (no. 16), diisocyanate (no. 18), | a. Contact dermatitis induced by exposure to soot, mineral oil, cement, tars, chrome and its compounds, benzene, diisocyanate, toluene, xylene styrene, cyclohexane, n-hexane, trichloroethylene and other organic solvents, mechanical irritants like glass fiber or hemp, compounds including irritants, allergens, phototoxic agents, or photo allergens and ultraviolet rays |
| 2. Irritant contact dermatoses | OSDs (no. 22) (f) dermatitis induced by handling mechanical irritants like glass fiber or hemp | |
| 3. Vitiligo | OSDs (no. 22) (i) leukoderma by phenol and hydroquinone | b. Leukoderma by phenol, hydroquinone, and tars |
| 4. Other skin diseases caused by physical, chemical, or biological agents | Trichloroethylene (no. 17) | c. Erythema multiforme or Stevens–Johnson syndrome induced by exposure to trichloroethylene |
| | OSDs (no. 22) (j) chemical burns by acids, alkali, and other chemical compounds | d. Chemical burns caused by hydrochloride, hydrochloric acid, hydrofluoride, hydrofluoric acid, or other acids and alkali |
| | OSDs (no. 22) (a) Burn | e. Chlorine acne, wart, or localized telangiectasia induced by exposure to tar |
| | (b) miliaria | f. Burn or miliaria |
| | OSDs (no. 22) (c) chilblains, frostbite, or Raynaud's disease | g. Chilblains or frostbite |
| | OSDs (no. 22) (d) sunburn, chronic actinic dermatitis, or actinic keratosis | h. Sunburn, chronic actinic dermatitis, or actinic keratosis |
| | OSDs (no. 22) (e) acute or chronic radiation dermatitis | i. Skin ulcer or radiation dermatitis induced by ionizing radiation |
| | | j. Cellulitis by work-related skin injury |
| | OSDs (no. 22) (h) infectious skin diseases | k. Infectious skin diseases |

Korean occupational skin disease list is presented in the Industrial Accident Compensation Insurance Act, Article 34 (criteria for recognition of work-related diseases, Schedule 3) (11).

diseases caused by exposure to vinyl chloride. On the other hand, new skin diseases had not been included in the OSD lists. Thus, the list needs to be re-evaluated and renewed, periodically.

There were major points of revision from previous OSDs. First, the revised list was constructed according to a disease-based system used in the International Statistical Classification of Disease and Related Health Problems, 10th revision (ICD-10th) and the 2010 ILO list (Table 3). Workers were often not aware of the risks associated with hazardous substances, and their physicians tended to overlook the hazards while focusing on symptoms. Second, typical examples of hazardous substances, associated with specific diseases, are also presented in the list. Toxic substances associated with contact dermatitis, vitiligo, Steven-son-Johnson syndrome, and chemical burns were retained from the previous hazardous substances list. However, the revised list also includes hydrogen chloride (HCl) and hydrogen fluoride (HF) as substances causing chemical burns. Third, special OSDs having higher incidences are distinguished from other items. For example, cellulitis is an element of infectious skin disease. In particular, cellulitis induced by skin wounds, dermatitis, and the lack of hygienic management, accounts for a large proportion of the OSDs in Korea. Thus, cellulitis was presented as a separate item in the revised list. Fourth, a specific hazardous substance-related OSD was included in the revised list. Tar-related skin disease is a group of diseases that includes skin cancer, localized telangiectasia, tar warts, chloracne, and tar-acne. Historically, tar was famous as a hazardous material among workers, such as roofers, asphalt workers, and pavers, who have significant skin exposure to tar. Fifth, despite being systemic diseases, those in which the major lesion is a skin lesion were included in the revised list. A prime example is the Stevens-John-

son syndrome, which is caused by exposure to TCE. The major target organs of this disease are the skin and liver. However, the initial symptoms appear on the skin and warn against additional exposure. Sixth, skin diseases, for which the evidence to establish a causal relationship was insufficient, were excluded. For example, there is insufficient evidence to link scleroderma to individual organic solvents. Seventh, skin diseases that lacked objective information for evaluating work-related causes or provided less compensation were not included in the revised list. Some typical examples are tinea pedis, acne, folliculitis, and onychodystrophy.

Revised occupational skin diseases list

Contact dermatitis

Contact dermatitis is a skin disease resulting from exposure to allergens or irritants. According to the Korean workers' compensation statistics (8), a majority of OSDs were cases of contact dermatitis (53.70%) for the 5 yr between 1999 and 2003. Contact dermatitis may be classified as irritant contact dermatitis, allergic dermatitis, contact urticaria, or photo-contact dermatitis; however, it is difficult to easily classify it into these types based only on its symptoms. Contact dermatitis, as an inclusive disease name, is convenient even if the specific cause of OD cannot be confirmed. This disease listing includes a provision that limits claims to diseases which develop within 3 months of the last exposure; this provision was also included in the past list. The revised list does not include contact urticaria, which is an acute skin disease characterized by the development of wheal-and-flare reactions on the skin and mucous membranes after exposure to a specific substance. The reaction causes itching and skin lesions, which may progress to severe rhinitis, conjunc-

titivitis, asthma, and gastrointestinal symptoms; anaphylaxis may occur in severe cases. There are many causes of induced contact urticaria, with the most well-known cause being natural rubber latex. Recently, however, powder-free or low-protein latex gloves have replaced latex gloves, with a correspondingly significant reduction in incidence (17). The substances that can cause contact urticaria are very broad, making a list of specific substances difficult to create because of the variety of responses to an allergen. Additionally, there have not been any compensated cases of contact urticaria, resulting in its removal from the revised list. However, contact urticaria may still be included in the broad interpretation of contact dermatitis.

Vitiligo

Occupational vitiligo is the depigmentation of the skin, resulting from repeated exposure to chemicals causing skin discoloration. Occupational vitiligo is referred to as chemical leukoderma, chemical vitiligo, or contact leukoderma, and is seen in people who have a genetic predisposition for melanocyte vulnerability. Occupational vitiligo and idiopathic vitiligo are commonly caused by apoptosis of melanocytes, but clinical histopathological criteria to distinguish between its 2 types do not exist. In 1939, chemical vitiligo, among leather manufacturing workers, was first reported by Oliver et al.; the hydroquinone in the workers' rubber gloves was the causative substance (18). Vitiligo was listed in the ILO list as a separate disease in 2002. Chemicals that reportedly cause vitiligo include mostly phenols and aromatic or aliphatic derivatives of catechol. Sanjay Ghosh divided the offending agents into phenol and catechol-based aromatic organic compounds, sulfhydryl-based organic compounds, and other substances, by investigating the literature on chemical leukoderma (18). The vehicles of exposure were dyes, deodorants, detergents, adhesives, rubbers, cosmetics, toys, pesticides, etc. Tar was included among the examples of offending agents in the revised list because tar had been included in the list of OSDs classified by hazardous ingredients. Sulfhydryl-based organic compounds are not included in the current list of examples because there have not been enough related cases or research in Korea. In 1999, the initial cases of occupational vitiligo, in Korea, involved exposure to paint and hardeners (19).

Stevens-Johnson syndrome due to trichloroethylene

The Stevens-Johnson syndrome is caused by an immune complex-mediated hypersensitivity reaction and is characterized by the involvement of the skin and mucous membranes with acute hepatitis. Toxic epidermal necrolysis is a particularly severe form of the Stevens-Johnson syndrome. The representative example of the Stevens-Johnson syndrome, caused by occupational exposure to chemicals, was the result of TCE exposure, which was associated with significant mortality (20). Since the Stevens-Johnson syndrome associated with TCE exposure was first re-

ported by Bauer and Rabens in 1974 (21), many cases have been reported in Korea, Japan, China, Taiwan, East Philippines, Singapore, the US, etc. The Stevens-Johnson syndrome resulting from exposure to other chemicals, such as hydrogen cyanamide (9) and carbamate (22), has also been reported. However, the number of cases is too small to include in the example list. The Stevens-Johnson syndrome originating from other causes, like adverse reaction to drugs, infections, acquired immune deficiency syndrome, and malignant tumors, are excluded. Representative causes of the Stevens-Johnson syndrome in the general population have been medication related. Patel et al. reported that other causes of the Stevens-Johnson syndrome are antimicrobials, anti-epileptics, non-steroid anti-inflammatory drugs, carbamazepine, phenytoin, fluoroquinolones, and paracetamol (21). Other major factors include viral, bacterial, fungal, and parasitic infections, with human immunodeficiency virus, herpes simplex virus, and mycoplasma being the most important of these.

Chemical burns

Chemical burns cause severe, acute irritant skin necrosis. Exposure to corrosive materials, strong acids, strong alkalis, etc., may precipitate these types of burns. In China, chemical burns account for approximately 10% of all burns. Approximately, 60%-90% of chemical burns reportedly occur at work (23). The most common cause of chemical burns is exposure to strong acids, such as sulfuric acid, hydrochloric acid, and hydrofluoric acid, as well as to strong alkali, such as phosphorus, sodium hydroxide, lime, and silver nitrate. In Korea, a large number of reported chemical burns have occurred as a result of exposure to HCl and HF. Accidents involving large chemical spills occurred in Korea in 2012 and 2013. For example, the accidental release of hydrogen fluoride killed 5 employees in 2012 (Hube Global, Gumi city). These events led to hydrogen chloride, hydrochloric acid, hydrogen fluoride, and hydrofluoric acid being presented as examples of chemical burns.

Tar-related skin diseases

Tar-related skin diseases are a group of skin symptoms and diseases caused by tar. Tar-related skin diseases include contact dermatitis, photodermatoses, skin cancers, localized telangiectasia, tar warts, chloracne, and tar-acne (24). Workers involved in wood preservation, asphalt production, and coal tar paint handling and those using coke ovens may be directly exposed to tar.

Skin conditions resulting from physical factors

Skin lesions caused by physical factors, such as high and low temperatures, friction, humid environments, and ionizing radiation, have traditionally been recognized as OSDs. Such lesions still occur in workers in extreme work environments. Because

of their severity, the depth and width of burns and frostbite should be considered. The provision of “burn and frostbite in the list limited to 2 degrees or more hot burn and 2 degrees or more frostbite” in the past list has been deleted.

Infectious skin diseases

Skin diseases mediated by infectious pathogens (viruses, bacteria, fungi, and parasites) are classified as infectious skin diseases. Representative examples include impetigo, boils or abscesses, cellulitis, paronychia, herpes simplex, and tinea pedis. Impetigo, cellulitis, and abscesses are caused by normal skin flora and are triggered by skin damage. Therefore, this disease is not caused by infection with a pathogen. Scabies is a parasite-mediated skin disease that is characterized by severe itching, skin rash, and acne. This disease has occurred among caregivers at nursing homes or long-term care institutions (25). The infection usually develops because of direct skin contact with an infected person or contaminated bedding, clothes, or towels used by an infected person.

DISCUSSION

Chloracne, scleroderma, and Raynaud’s phenomenon, which had been included in the previous list, were excluded from the revised list. Chloracne is a skin disease characterized by blackheads, pustules, and yellow cysts on the cheeks that is caused by halogenated aromatic compounds, such as dioxin. Chloracne can not only occur as a result of inhalation exposure but may also occur following the ingestion of the contaminant, and may be accompanied by systemic complications (26). Cases of chloracne that are caused by occupational exposure, except accidental exposure, have not been reported, and workers’ compensation cases have not occurred in Korea.

Scleroderma is a chronic systemic autoimmune disease characterized by symmetrical skin thickening, fibrosis, and Raynaud’s phenomenon that often involves the internal organs. There is a large variation in the incidence of the disease (3-24 people per million), depending on the location and specific occupations of the people in the area (27). Many studies have shown that the risks of occurrence increase when an individual is exposed to vinyl chloride, silica, and some solvents (28). The incidence of the disease in workers exposed to vinyl chloride during polyvinyl chloride production is relatively high (29). Thus, in France, Germany, and Canada, scleroderma, caused by exposure to silica and vinyl chloride, is compensable. However, the risk varies depending on the type of organic solvent to which an individual is exposed. High-risk organic solvents include trichloroethylene, trichloroethane, perchloroethane, gasoline, aliphatic hydrocarbons, halogenated hydrocarbons, and BTX-solvents (containing benzene, toluene, or xylene) (30). In general, exposure has involved complex exposure to paints, thinners,

and removers and was evaluated by determining the cumulative exposure through self-reporting methods. Thus, there was the possibility of an information bias. For this reason, estimating the risk of scleroderma associated with individual substances is difficult. In addition, the numbers of scleroderma cases in Korea is absolutely insufficient to warrant the disease remaining on the OSD list. On the other hand, specific diseases, such as acroosteolysis, Raynaud’s phenomenon, and scleroderma, induced by exposure to vinyl chloride, may also manifest as a connective tissue disease rather than a skin disease. Therefore, diseases caused by vinyl chloride exposure were included in the item covering acute poisonings or diseases caused by chemical factors (11th item in the revised list).

Raynaud’s phenomenon is a vascular disease characterized by white fingers due to recurrent vasospasms in the fingers. The disease is also accompanied by connective tissue disease, such as systemic sclerosis and systemic lupus erythematosus. Raynaud’s phenomenon is caused not only by physical factors, such as vibrations and cold, but also by exposure to chemicals, such as vinyl chloride. This disease was included in the previous skin disease list because some symptoms are expressed in the skin. However, this disease is primarily a connective tissue disease and was included among the ODs caused by physical factors in the 2013 list.

The initial purpose of the list of ODs was for determining workers’ compensation. However, the authors think that the list now focuses on the prevention of ODs and the use of a reporting system. This review presented detailed descriptions of the revised compensable list of OSDs in Korea and describes the history of the list and the reasons for the revision.

This revised list will be more practical and convenient for both physicians and workers due to its disease-based approach. The ILO is trying to harmonize the lists of ODs in each country. Thus far, however, these lists vary by country because there are differences in workers’ compensation systems, national political characteristics, and social security systems in each country (1). Publicly available compensation systems, except IACI, do not exist in Korea. Therefore, Korean workers and labor unions are highly interested in the list of ODs on IACI. Because of this context, the Korean list of OSDs is more detailed than similar lists in other countries.

However, this revised list cannot perfectly reflect the actual occurrence of skin diseases due to the small number of cases of OSD, incomplete statistics on skin diseases, and the insufficient scientific evidence. Thus, the list of ODs needs to be modified periodically on the basis of current evidence and statistics.

DISCLOSURE

The authors have no conflicts of interest to disclose.

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