JOURNAL OF AWARENESS

E-ISSN: 2149-6544

Ocak 2018, Cilt:3, Sayı:1 January 2018, Vol:3, Issue: 1

http://ratingacademy.com.tr/journals/index.php/JoA/

ENCOUNTERED OCCUPATIONAL RESPIRATORY TRACT DISEASES IN THE PRODUCTION OF CERAMIC*

Assist. Prof. Dr. Halide OKUMUS

Çanakkale Onsekiz Mart University, Faculty of Fine Arts, Traditional Turkish Arts Department, Çanakkale, E-mail: halideokumus@yahoo.com

Prof. Dr. Ateş ARCASOY

Marmara University, Faculty of Fine Arts, Ceramic Department, İstanbul

Prof. Dr. Arzu MİRİCİ

Çanakkale Onsekiz Mart University, Medical School, Chest Diseases Department Çanakkale, E-mail: arzumirici@gmail.com

ARTICLE INFO

Article History:
Received: *2018-02-17*
Accepted: *2018-01-30*

Keywords:
Ceramic, Pneumoconiosis, Silicosis, Occupational Diseases

DOI: *10.26809/joa.2018.9*

ABSTRACT

It is a serious problem that the ceramists are exposed to substances detrimental to the health in the production of ceramic. In recent years, the developing technology as well as the increase in the number and the diversity of the chemicals and the raw materials used has increased the severity of the detriment. The product of ceramic, contributing greatly to the needs of the humans, requires the ceramicist to deliberately use the facilities of the ceramic design and its technology in order to protect the health of theirs and the people using such products. The measures to be taken are very easy to apply. However, irreversible risks may occur in terms of health when the necessary attention is ignored.

In this study, it is aimed to raise awareness about the causes and consequences of occupational respiratory tract diseases that ceramicists may encounter.

1. INTRODUCTION

Most of the substance may be detrimental when taken through mouth, skin and respiration, or when exposed to for a long time. The substances used in ceramic can be divided into two groups in terms of the dangers they cause; a) those naturally b) the chemical compounds and synthetic substances. Chemical combinations and synthetic substances are toxic and detrimental to the health due to their internal structures (Fraser, 1998: 121-125). They need to be kept in closed containers and any contact with the body should be prevented (Fraser, 2005: 171-180).

In general, the processes that may be exposed to health problems in the production of ceramic are listed as preparation of raw materials, preparation of slip and application,

* This article has been produced from art proficiency thesis named "Precautions to be taken in terms of health in ceramic design and production". Presented on 12-14 October 2009 in Eskişehir at the "I. International Ceramics, Glass, Enamel, Glaze and Pigment Congress ".

preparation of paint and application, preparation of frit and application, preparation of glaze and application, preparation of mud**,** the shaping of ceramic mud, the drying of ceramic, the firing of ceramic and the decoration of ceramic (Okumuş, 2008: 16-50,52-85).

Those working in ceramic firing and glaze making are exposed to many harmful chemical substance and gases. The dry preparation of the substances used especially for glaze and structure in ceramic making, the dry modification of the ceramic parts and various gases emitted from kiln chimney while firing cause these substances to be mixed into the air breathed in the working place (Canduran, 2006: 124). There are compounds in the raw materials of ceramic that may create adverse effects from cadmium, uranium, chrome, lead, coolers, and toner with barium carbonate (Güler and Çobanoğlu, 1994).

The cold releases generally contain particles released during the processes such as glazing, shaping, and raw material and mud preparing carried out at atmospheric levels (Döğeroğlu and Kara, 1991: 430-445).

2. RESPIRATORY TRACT DISEASES FACED IN THE PRODUCTION OF CERAMIC

Respiratory system is the biggest one vulnerable to the external influence, so environmental and occupational exposures such as smoke, gas, and vapor may create various adverse effects. This effect may give rise to the more detriment in closed areas especially where there is an airing problem. The reaction of the respiratory system to these exposures generally depend on the exposure level, but it may develop immediately or a slow development (URL-1, 2007).

Dust is referred to as solid particles that can move through the air conduction or remain hanged in the air (Kavak and others, 2004: 69-75). The dusts encountered in the ceramic production can be divided into two groups according to the effect they caused in the people. The dusts causing systemic posinining are heavy metals such as lead, cadmium and zinc, whereas the radioactive dusts are radioactive substances such as uranium, thorium, zirconium and cerium (Akdur, 2007). As has been known, even if the raw materials with mineral origin (quartz, kaolin, feldspar, talc, asbestos etc..) are at low levels, it causes various lung diseases generally referred to as pneumoconiosis when long inhaled (Döğeroğlu and Kara, 1991: 430-445).

Silica and silicates especially quartz are fibrogenic particles (URL-1, 2007). Pb, Cd, Be, As, Co, Ni and similar metallic compounds that are likely to be found in the particle and similar metallic compounds cause various diseases to occur, adversely affecting the organisms (Döğeroğlu and Kara, 1991: 430-445). As in the silica dust, the particles taken in the cells may penetrate the cell as a result of the toxic effect or lead to functional disorder (Mirici and Tutar, 2002: 3-6)

Gases give way to parenchymal damage, upper and lower respiratory system depending on the dissolvability in water.

The respiratory tract diseases encountered in the making of ceramics are also regarded as occupational diseases or occupational lung diseases (URL-2, 2007). Slipped disk**,** varicose and the respiratory tract disorders experienced by the workers working in these environments because brick sector is an industry which requires one to stand for a long time exerting tremendous labor where there is a lot of dust (Zeybek, 2007).

The respiratory tract diseases encountered in the production of ceramics can be listed as pneumoconiosis (silicosis, asbestosis, silicatosis, berylliosis, and talcosilicosis) and occupational asthma.

2.1.Pneumoconiosis

Lung diseases occurring as a result of excessive inhale of various dusts are defined as pneumoconiosis. The factors such as the size of the particles taken in through inhaling, the length of exposure, the structure of the dust, and the silica toxic effect, the awareness of the individual affected or an infection with it play a key role in the reaction to occur (Oktan and Aydin, 2006). Pneumoconiosis are one of the leading diseases that are preventable lung diseases. That pneumoconiosis-generating agents are reduced to the lowest level through the engineering measures is the main measure, but when this is not always obtained, it is quite possible that the exposure can be stopped and the progress can be prevented through early diagnosis (Akkurt, 2001: 61-71). The term "pneumoconiosis" does not include all the respiratory system disorders arising as a result of the factors in the working life because there is no accumulation of dust and fibrosis in all the diseases occurring due to the dusts in the lung (Bilir and Yıldız, 2007).

2.1.1. Silicosis

Silicosis is one of the dust diseases of the lung that develops the fastest and that results in death under the title of pneumoconiosis. It has three clinically different forms; chronic, accelere and acute. In chronic form, the lung symptoms appears at least 15 years after the first exposure to the dust. In accelere silicosis, this period ranges from 5 to 15 years. However, in acute form silicosis develops in a few months and there will be an excessive exposure to crystal silica (Akkurt, 2000).

Silicosis generally develops slowly. It results from the lengthy respiration of free silica and long exposure to silica dust concentration. Silica is the basic raw material of glaze and glass. It is found in all the clay and rock minerals from which ceramic raw materials are obtained (Okumuş, 2008: 16-50,52-85).

SiO_2, shaped like crystal, is more dangerous than that in the amorphous structure, but because substances with amorphous silica, when exposed to high temperature, may change into crystal shape (cristobalite) due to amorphous hydrate silica calcinations, the fibrogenic effects increase. Owing to its fibrotic effect, silica penetrates into deeper points in the no decayed cells in the lung and the symptoms develop even after the exposure to the dust is prevented. Asthma, cough and mucus are generally observed in the bad cases. In the course of the silicosis disease, such complications as lung tuberculosis, ganglion silicosis made up of nerve cell bodies found outside the central nerve system in the places where vein, cell and flowing channels appear from the organs, lung cancer, blood coming through the mouth from the lungs or respiratory channels, blood spitting, spontaneous pneumothorax, silico-arterit complications are reported to appear. In the kaolin pneumoconiosis, which is regarded as complicated silicosis, such occurrences as nodular fibrosis, heavy fibrosis, asthma, cough and mucus are observed (Döğeroğlu and Kara, 1991: 430-445).

In a study in which silicosis is investigated among the workers of a ceramic plant, it was found out that there are some measures more than the amount allowed in the average dust measurement in various sections of the plant. As the age and the length of working increases, the risk of silicosis also increases (Şakar and others, 2005: 148-155). Even though there is a serious parencyhmal corruption in the lung, one cannot complain seriously and detect it, so it is an insidious disease. However much exposure to dust is prevented, parencyhmal corruption will play up in time. The person inhaling the dust cannot realize that s/he has a disease until there is a serious damage to the lung (Çımrın 2007: 118-122).

Silicosis is the most frequently encountered pneumoconiosis and is the occupational disease resulting in disability. Silicosis generally continues to develop even years after the exposure to it stops (Özcan and Şimşek, 2004: 117-131).

2.1.2. Asbestosis

Pneumoconiosis caused by the asbest dust is called asbestos. Asbestos, causing lung disorders, is taken in through lungs (Canduran, 2006: 124). Asbestos has many uses such as especially to reduce the excessive effect of heat and the isolators. A specific kind of two sided interstitial pulmonary fibrosis occur through the inhaling of numerous fibers separated from the minerals where effective substance is used (Oktan and Aydın, 2006).

As in the other kinds of pneumoconiosis, there won't be an indication in asbestosis at the beginning as well. In the later phases as fibrosis gets formed, asthma begins. Pleural fluid may be accumulated in some workers exposed to asbestos. If so, the indications related to pleural fluid such as shoulder ache, asthma, pleural ache are clinically proved. One of the important problems arising from the exposure to asbestos is lung cancer and mesothelioma (Bilir and Yıldız, 2007).

The fibrous minerals such as talc, aluminum silicates, and zeolite as well as organic fibers cause asbestos fibers to form. Having been taken in through respiration, fibrous minerals in the asbestos group provokes the pleural inflammation due to the toxic effects of the mesethelial on the cells. The fibrous asbestos inhaled reveals the pleural damage indirectly and gives way to the release of inflammatory cytokines from the lung. Asbestos fibers may cause local tissue reaction in the lung, and metaplasia and cancer developing in the bronchial especially on the cell surface covering the small bronchial (Kavak and Others, 2004: 69-75).

2.1.3. Silicatosis

Simple silicosis, a type of a pneumoconiosis seen after silicates (clay, feldspar, kaolin, benthonic etc.) having long been inhaled is different from other types in that they create collagen fibrosis (the formation of thick collagen fibers) seen in silicosis and antrosilicosis except for silicates, asbestos, and talc. Silicates create a thin fiber net. This type of pneumoconiosis draws attention as a result of the accumulation of the dusts around the bronchial and veins and the increase in the intensity in the films of the lungs (Döğeroğlu and Kara, 1991: 430-445).

2.1.4. Berylliosis

The respirable dusts of the metal compounds containing beryllium and beryllium salts and metal oxide and the inhaling of the smoke cause berylliosis. Nuclear weapon and ceramic production make the workers sensitive more often. The excessive exposure to beryllium causes upper and lower airway inflammation, bronchiolitis, lung edema, and chemical pneumonia. The chronic beryllium is a systemic granulomatous disorder keeping skin and many internal organs, and lung, pleura, lenfoid nodule. It may play up years after the exposure is stopped. It is typically insidious, slow developing, and more common than the acute forms. The period passing between when the disorder first appeared to the time it played up is averagely ten years, but ranges from a few months to forty years. Early symptoms are cough, fatigue, exercises, asthma. Fever, night sweating, loss of appetite, loss of weight, arthralgia are other systemic symptoms. The experiments with animals show that beryllium causes cancer (Önal and Ökten, 2004: 102-110).

2.1.5. Talcosilicosis

Talcosilicosis depends on the exposure to talc containing quartz in high concentration. In these cases, there are irregular star-shaped fibrosis points observed in the pneumoconiosis

of typical malign nodular lesions and mixed dust in the lung. Talc pneumoconiosis can be seen in the form of diffuse interstisial pulmonary fibrosis due to the existence of asbestos and is defined as talcoasbestosis. Following the clinically long exposure, effort asthma, cough, reduction in the respiratory voice, abnormal respiratory voices in the basis of the lung, decline in the expansion of the lung, and clubbing of the fingers are identified. It might also appear years after the exposure to talc ends. Epidemiologic studies with those exposed to talc demonstrate that the risk of death from non-malign lung disorders and of cancerous malign lung tumor or tumor related to the lung (Önal and Ökten, 2004: 102-110).

2.2.Occupational asthma

Occupational asthma is basically the one related to work arising as a result of the substances encountered in the work place (Can and Çımrın, 2001: 163). Though there is a serious decrease in many of the lung disorders especially pneumoconiosis in many countries**,** occupational asthma is increasing day by day. Today the number of the substances causing occupational asthma is more than 250. Occupational asthma ranks first among occupational lung disorders in many countries. The surest treatment approach for occupational asthma is to change the environment causing it. The identification of the risky cases through early diagnosis and employing the person in a suitable work, and protective respirators and gradual general asthma treatment when one cannot leave the work constitute the sub-titles. Permanent withdrawal is the surest treatment because occupational asthma develops with the allergens even at the lowest level, which is different from the other occupational diseases. When there is a delay in the treatment and in the withdrawal from the culprit, there will be disorder of permanent tension in the airway and of lung functions (Akkurt, 2007).

3. RESULTS

The designers and producers of ceramic objects that contribute to humanity should use the opportunities of ceramic design and technology consciously in order to protect both their own health and that of the user. While creating the glaze and mud ingredients and while choosing the coloring substances, raw materials and metal oxides, issues such as the hazards of the materials to the environment and human health both while producing ceramic object and using the final product, preference of the least hazardous ones should be taken into account. Usage conditions and limits of ceramic components should be followed meticulously. Workers should be informed about the hazards of the raw materials and metal oxides that they use. Trainings about their effects on health, alternative protective precautions against them and to this end use of material safety data sheets should be popularized. Production should be done within the circle of proper using conditions and personal security rules.

Precautions should already be taken while the workspace is chosen, places like workplaces, schools and their interior decoration is being done, working circumstances should be rendered suitable, production should be carried out in standards that will cause no sanitary problems. Eating, drinking and smoking should be forbidden in the workplaces.

At the institutions providing ceramics education, the issue should be held within the course content while in the workplaces employees should be educated through in-service trainings. Workers (employees and employers) should be informed about the properties of raw material and auxiliary materials, main and by-products so as to minimize the troubles faced in ceramic production.

In the event that ignoring the necessary care about the raw materials and metal oxides that might possibly cause health problems, not taking the necessary precaution, employees could face irreversible serious health problems. Measures to be taken are fairly simple and

when taken, no serious danger could occur. Workers should know the hazards of the materials and ways to protect themselves from them, production should be done to protect the body from these materials, necessary hygiene and security standards should be followed, personal controls should be increase, working conditions should be controlled by up-to-date laws (Okumuş, 2006: 148).

REFERENCES

AKDUR, R., "İşyerinde Toksinler" http://209.85.129.104/search?q=cache:iztKb3iGXGoJ:www.recepakdur.com/getfile.asp%3Ffile%3D%C4%B0%C5%9EYER%C4%B0NDE%2520TOKS%C4%B0NLER%2520RA.pdf+silisyum+dioksit+tozu+seramik+silikozis&hl=tr&ct=clnk&cd=2&gl=tr (erişim tarihi: 26.12.2007).

AKKURT, İ., Ağustos 2001, Toraks Dergisi, Cilt 2, Sayı 2, Sayfa(lar) 62-71 "Pnömokonyozda ILO Standartlarında Radyolojik Değerlendirme" http://www.toraks.org.tr/journal/text.php3?id=124#r6 (erişim tarihi:10 Ekim 2007).

AKKURT, İ., 2000, Sted Bilimsel ve Dostça, Sürekli Tıp Eğitimi Dergisi, Silikozis, http://www.ttb.org.tr/STED/sted0300/03003.html (erişim tarihi:10 Ekim 2007).

AKKURT, İ., Mesleki Akciğer Hastalıkları, http://216.239.59.104/search?q=cache:VPhBfbYgkFMJ:www.toraks.org.tr/mesleki-gelisim-kursu-4-ppt-pdf/iakakurt.pdf+ilo+silika+seramik&hl=tr&ct=clnk&cd=4&gl=tr (erişim tarihi:10 Ekim 2007).

BİLİR, N., and YILDIZ, A. N., Mesleksel Akciğer Hastalıkları http://www.solidebv.nl/asbestğMAH.pdf (erişim tarihi: 7 Ocak 2007).

CANDURAN, K., 2006, "Seramikte Toksik Maddeler", Seramik Türkiye, Seramik Federasyonu Dergisi, No:14, İstanbul, Mart-Nisan, s.124.

CAN, S., ÇIMRIN, A., "Meslek Astımı", Bronş Astması 2001, Editör: A. Fuat Kalyoncu, Ankara, Atlas Kitapçılık Limited Şirketi, 2001, s.163.

ÇIMRIN A., 2007, Tüberküloz ve Toraks Dergisi; 55(1): 118-122, Silikozis Yeniden; Sebepler ve Sorumluluklar, http://66.102.9.104/search?q=cache:TXOxW_vjOkwJ:www.journalagent.com/z4/download_fulltext.asp%3Fpdir%3Dtubtoraks%26plng%3Deng%26un%3DTUBTORAKS-24582+ilo+silika+seramik&hl=tr&ct=clnk&cd=12&gl=tr (erişim tarihi:1 Nisan 2007).

DÖĞEROĞLU, T. and KARA, S., 16-20 Eylül 1991 "Seramik Tesislerinde Hammadde Hazırlama Süreçleri, Madde – Enerji Tasarrufu ve Çevre Kalitesi İlişkileri", V. Ulusal Kil Sempozyumu Bildiriler Kitabı, Eskişehir, s.430-445

FRASER, H., 1998, Glazes for the Craft Potter A&C Black, London, The American Ceramic Society, s.121-125.

FRASER, H., 2005, Ceramic Faults and Their Remedies, Second Edition, A&C Black. Publisher Ltd. London, s.171-180.

GÜLER Ç. and ÇOBANOĞLU, Z., 1994, Çevre ve İş Öyküsünün Alınması, Çevre Sağlığı Temel Kaynak Dizisi No:2, Birinci Baskı, Ankara-, I.Basım:3500 Adet, ISBN 975-7572-50-0 http://www.hm.saglik.gov.tr/pdf/kitaplar/css2.pdf (erişim tarihi: 9 Ekim 2006)

KAVAK, O, DALGIÇ, A. and ŞENYİĞİT, A., 2004, "İnsan Sağlığına Etki Eden Mineraller ve Analiz Yöntemleri", Dicle Tıp Dergisi, Cilt: 31, Sayı:1, s.69-75. http://www.dicle.edu.tr/fakulte/tip/dergi/yayin/15(.)InsanSagligina.doc (erişim tarihi: 10 Ekim 2007)

MİRİCİ, A., and TUTAR, Ü., Nisan 2002, "İnhale Edilen Partikülün Solunum Sistemindeki Serüveni", Toraks Dergisi, Cilt 3, Ek 2, İstanbul, Torks Derneği Yayını, s. 3-6.

OKTAN, E., and AYDIN Ö., 2006, MAHE Bursa, Mesleki Akciğer Hastalıkları Enstitüsü, 20 Aralık, "Mesleksel Akciğer Hastalıklarında Patoloji" http://www.bursamahe.com/habermahe/haber_oku.asp?haber=17 (erişim tarihi: 10 Ekim 2007).

OKUMUŞ, H., 2008, "Seramik Tasarım ve Üretiminde Sağlık Açısından Alınması Gereken Önlemler", Yayınlanmamış Sanatta Yeterlik Tezi, Marmara Üniversitesi, Güzel Sanatlar Enstitüsü, s.16-50, 52-85.

OKUMUŞ H., 2006, "Seramik Üretiminde Sağlık Açısından Dikkat Edilmesi Gereken Hammadde ve Metal Oksitler", III. Ulusal Analitik Kimya Kongresi, Bildiri Özetleri Kitabı, Çanakkale, 5-7 Temmuz, s.148.

ÖNAL, M., and ÖKTEN, F, Kasım 2004, "İnorganik Tozlara Bağlı Akciğer Hastalıkları", Difüz Parankimal Akciğer Hastalıkları, 1. Baskı, Ankara, s.102-110.

ÖZCAN, A. and ŞİMŞEK, C., Kasım 2004, "Silikoz ve Kömür İşçisi Pnömokonyozu", Difüz Parankimal Akciğer Hastalıkları, 1. Baskı, Ankara, s.117-131.

ŞAKAR, A., KAYA, E., ÇELİK, P., GENCER, N., TEMEL, O., YAMAN, N., SEPİT L., YILDIRIM, Ç. A., DAĞYILDIZI. L., COŞKUN, E., DİNÇ G., YORGANCIOĞLU and A., ÇIMRIN, A. H., 2005, Seramik Fabrikası İşçilerinde Silikozis" Tüberküloz ve Toraks Dergisi, Cilt:53 Sayı:2 148-155, http://www.abstractagent.com/home/jvi.asp?pdir=tubtoraks&plng=tur&un=TUBTORAKS-38589&look4= (erişim tarihi:10 Ekim 2007).

ZEYBEK, S., Tuğla Kiremit Sektöründe İş Sağlığı ve Güvenliği http://isggm.calisma.gov.tr/docs/sunumlar/corum/sz.ppt (erişim tarihi: 10 Ekim 2007).

(URL 1, 2007) Türk Toraks Derneği, II. Mesleki Gelişim Kursu, Mesleki Akciğer Hastalıkları, http://www.toraks.org.tr/mesleki_gelisim_kursu.php?pid=97&sayfa=0 (erişim tarihi: 9 Ekim 2007).

(URL 2, 2007) T.C. Sağlık Bakanlığı, Sıkça Sorulan Sorular, http://www.ankarameslekhastanesi.gov.tr/sss.asp (erişim tarihi: 9 Ekim 2007)