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RETRACTED: Investigation of Bacterial and Fungal Load of Five Printing House in Kahramanmaraş City

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Abstract: It has been determined that the article titled "**Investigation of Bacterial and Fungal Load of Five Printing House in Kahramanmaraş City**" published in our journal on Year 2021, Vol 12, Issue:1, page10-14, 30.04.2021 was previously published in different media. This situation caused a violation of the rules stated on the page of our journal (https://dergipark.org.tr/tr/pub/mantar/policy). Therefore, this article has been retracted by the decision of the Board of Directors of the Selçuk Üniversity Mushroom Application and Research Center.

Keywords:

GERİ ÇEKİLEN: Kahramanmaraştaki Beş Matbaanın Bakteri ve Mantar Yükünün İncelenmesi

Öz: Dergimizde Yıl 2021, Cilt 12, Sayı 1, sayfa 10-14, 30.04.2021 tarihinde basılan **"Investigation of Bacterial and Fungal Load of Five Printing House in Kahramanmaraş City"** isimli makalenin daha önceden farklı ortamlarda yayınlandığı tespit edilmiştir. Bu durum dergimiz sayfasında belirtilen kuralların (https://dergipark.org.tr/tr/pub/mantar/policy) ihlaline neden olmuştur. Bu nedenle, bu makale S.Ü. Mantarcılık Uygulama ve Araştırma Merkezi Yönetim Kurulu Kararı ile geri çekilmiştir.

Anahtar kelimeler:

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Investigation of Bacterial and Fungal Load of Five Printing House in Kahramanmaraş City

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Abstract: Employee health is one of the mos...portant issues in the printing sector as well as in all sectors. In addition to the chemical ...stances ... in printing, some of the pathogenic bacteria and fungi that are formed in the e...ment m...hreaten the working health if factors such as the printing materials used, humidit...m...ure in the environment can not be controlled. In our study, it was aim...to determi...cterial and fungal load in the internal environment of the printing ho...g in different regions in Kahramanmaraş Province. In the scope of the study, petri p...me...sed for indoor sampling. Rose Bengal Streptomycin Agar (RSBA) was used for s...lin...ampling, incubation was performed at 27ºC for 7 days. After incubation, morpholog...acteristics of fungal colonies were examined and pure cultures were transf...ctive n... Fungus colonies were identified as genus and species level with morpho...cal ...acteris... According to the results of the study, it was determined that the prin...ous...re exposed to indoor pathogens intensely. The most fungi are *Penicillium* and ... were found to be followed by *Cladosporium* and *Alternaria* species ...ng t...pecies, species known as allergy sources have been identified. In such environm..., it is nec...to take preventive measures for these microorganisms.

Key...ing house, fungus, bacteria, allergy

...hraman...taki Beş Matbaanın Bakteri ve Mantar Yükünün İncelenmesi

...Çalış...sağlığı tüm sektörlerde olduğu gibi matbaacılık sektöründe de en önemli ko...n bi...n. Matbaacılıkta kullanılan kimyasal maddelerin yanı sıra kullanılan baskı altı malze...ortamdaki nem, sıcaklık gibi etkenlerin kontrol altında tutulamaması durumunda ortamda...an bazı patojen bakteriler ve mantarlar çalışan sağlığını tehdit edebilir. Bu çalışmada Kahraman...maraş ilinde bulunan farklı mahallelerde faaliyet gösteren matbaaların iç ortamında ... bakteri ve mantar yükünün belirlenmesi amaçlanmıştır. Çalışma kapsamında iç ortamdan petri plak yöntemi ile örnekleme yapılmıştır. Örnekleme için Rose Bengal Streptomisin Agar (RSBA) kullanılmıştır. Örnekleme sonrası laboratuarda 7 gün süre ile bırakılmıştır. İnkübasyon sonrası fungal koloniler morfolojik özellikleri incelenerek seçici besiyerlerine saf kültürleri elde edilmiştir. Fungus kolonileri morfolojik kriterler doğrultusunda cins ve tür düzeyinde tanımlamaları yapılmıştır. Çalışma sonuçlarına göre matbaalarda birçok fungus türüne maruziyet olduğu belirlenmiştir. Bu fungus türlerinin başında *Penicillium* ve *Aspergillus* türlerinin yer aldığı, bunları *Cladosporium* ve *Alternaria* türlerinin takip ettiği belirlenmiştir. Bu türler içerisinde alerji kaynağı olarak bilinen türler tespit edilmiştir. Bu gibi ortamlarda bu mikroorganizmaları önleyici tedbirler alınması gerekliliği ortaya konulmuştur.

Anahtar kelimeler: Matbaa, mantar, bakteri, alerji

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Introduction

With the developing industrialization in the world, the number of diseases caused by industrial working environments has increased. For this reason, studies are carried out to determine occupational diseases originating from the working environment. With the development of technology, the printing industry has become connected with almost all sectors (Yavuz, 2016). According to social security Institution statistics, Turkey in the printing industry in 2012 395 cases of occupational diseases were observed. 395 occupational disease cases were seen in the printing sector in 2012. 173 employees have become permanently incapacitated as a result of occupational disease. The causes of these diseases are the pathogen and allergen bacteria and fungi that are constantly growing in the printing house as well as the hazardous chemicals used in the facility environment. There are many studies examining the bacterial and fungal concentrations for the determination of indoor air quality (Adams et al 2014; Jafari et al, 2015; Adams et al,2015; Hanson et al, 2016; Nevalainen et al, 2015; Güneş Et al, 2016; Weikl et al, 2016; Ogbu et al, 2016; Benammar et al, 2017; Pokhum et al, 2018).Bacterial infections a fungal allergens constitute a significant expense countries' health expenditures.

The purpose of this study determine the bacterial an fungal load in different printing houses. D ion of indoor air fungal and bacterial load imp nt in determining the microorganisms tha be of disease and taking necessary ecau

Material and metod

Sampling was m he working hours of the staff in 5 different pri ng ho erating intensively in Kahramanmara center.

Prepara of m ia: Rose-be gal-Streptomycin Agar (RBA) sed irst medium for the isolation and diagnosis of mali 2011a). The isolates obtain fter i e inoculated into flat agar tub term on special media (Malt Extract Cza Dox Aga for diagnosis (Biyik et al. 2005). A) was used to determine bacterial lo

ling from the station: In the samples, Gravity sed Petri Plate Method was used. Simultaneously at all stations, it is taken from a height of 1.5 meters above the ground. Five (5) petri plates containing the appropriate medium were provided to contact with air by leaving the lid open for 15 minutes. The closed plates were wrapped with stretch film and brought to the laboratory for incubation. Incubation was performed for 48 hours at 37 ºC for growth of bacteria and 7-10 days at 27 °C for growth of fungi (Sarıca et al, 2002).

Identification: The total number of microfungi was determined according to the macroscopic appearance obtained at the end of incubation. The follo ources were used for identification of microfun glu (1991), Samson and Pitt (2000), Ca and J n (2013) and Walsh et al. (2018). Base se so identification of genus and spe leve ed under light microscope and oscopic an copic structures.

Results

The num bacteri ndoor air of the printing hou he genera d species level of microfungi re made. The following Table 1 shows the percentag acteria and microfungi.

T 1. Percentage of bacteria and microfungi mined in study

Sta	Bacteria (%)	Microfungi (%)
1	35,90	7,14
2	14,53	39,29
3	5,98	0,00
4	39,32	53,57
5	4,27	0,00

When Table 1 was examined, it was seen that the highest bacterial load was in station number 4 and the least bacterial load was in station number 5. At the same time, microfungi were not found in stations 3. and 5. while fungal diversity was determined to be the highest in station 4. When the table was examined, it was determined that the bacteria rate was the highest (39.32%) and the microfungus percentage was the highest (53.57%) in the 4th station.It was determined that the stations with the lowest bacterial density are stations 3 and 5. The majority of bacteria and microfungus organisms were found to be in the paper stack area in the printing house. It should be noted that the higher the bacterial flora in the indoor air of the studied facility, the higher the number of microfungi. Therefore, ventilation systems should be developed and widespread use in working environments.

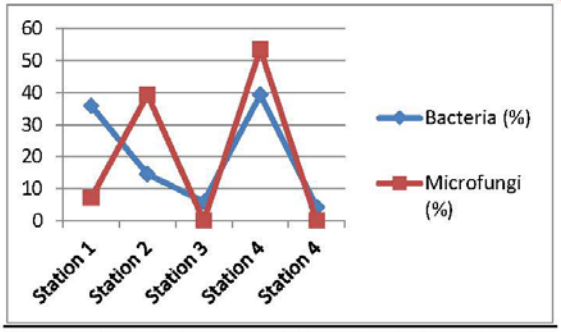

Figure 1. Graphical representation of bacteria and fungi

Table 2 below shows the microfungus species identified in the study.

Table 2. Microfungus species identified in the study

Mikrofungi genus and species	
***Aspergillus* P. Micheli ex Haller**	Samson and Pitt, (2000)
Aspergillus niger Tiegh.	Campbell and Johnson, (2013)
Aspergillus flavus Link	
Aspergillus fumigatus Fresen.	
***Alternaria* Nees**	Hasenekoğlu, (1991)
Alternaria alternata (Fr.) Keissl.	
Alternaria brassicicola (Schwein.) Wiltshire	
***Penicillium* Link**	
Penicillium sp.	
Penicillium chrysogenum Thom	
Penicillium brevicompactum Dierckx	
Penicillium commune	
Penicillium thomi	
***Mucor* Fresen.**	Hasenekoğlu, (1991)
Mucor hiem	
***Clados* Lin**	Hasenekoğlu, (1991)
Cla	
Cl	
Cl Berk. Curtis	

In our country, many studies have been conducted to determine the indoor air fungal and bacterial load (Imali et al, 2011a; Sarıca et al, 2002; Aydogdu et al, 2005;). The determination of indoor air fungal and bacterial concentration is important for the prevention of parameters affecting human health in different workin ments. Demirel et al. (2017) reported that vus fungus is a thermotolerant and may b fectiou nt. In our study, *Aspergillus* species w ntified he sampling area. *Aspergillus* s spor ich se allergen sources and other d ses wer tified (Sugeçti et al. 2018) [Tabl *Asp llus* sp , which is a dominant species tu intensively by many scientist Pitt and Tay lor (amso d Pitt (2000), İmalı et al.(2011b) ng e 16) Nascimento et al. (2019).

Alabbasy (20 ted that *Pe ium* spp.,*Aspergillus* spp.,*Alter p Cladosporium* spp. were found in his study on paper r *Penicillium* species were found to be t ost comm cies in the printing facilities wh pling is taken hin the scope of the study. This w llowed by *Aspergillus*, *Alternaria*, *Cladosporium* and r respe y. Some species belonging to these g are fo o be common in the air and spores have al s (Imalı et al, 2011b)[Fig. 1]. It can also be c that the paper origin used also contributes the reproductive environment of the microfungi. The g Figure 1, shows the images of the microfungi ed in the study.

Routine health screening of working people is important as an indicator of immune system parameters, early detection and prevention of bacteria and fungal infections. In addition, improvement of working conditions (air filtration (Burrell, 1991) removal of biological resources (Nevalainen et al, 2015) etc.) is necessary to protect employee health. It is possible to develop immunoprotective antifungal strategies (prophylaxis, empirical and preventive).

Conclusion

Identifying and identifying microfungi in the workplace is important for eliminating employee exposure. *Penicilium*,*Aspergillus*, *Alternaria*, *Cladosporium* and *Mucor* species which are commonly found in airborne microfungi have been reported to be allergen. It has been demonstrated that the necessary controls of the personel working in closed environments should be made and that they should be included in the diseases list such as COPD, asthma and allergy..

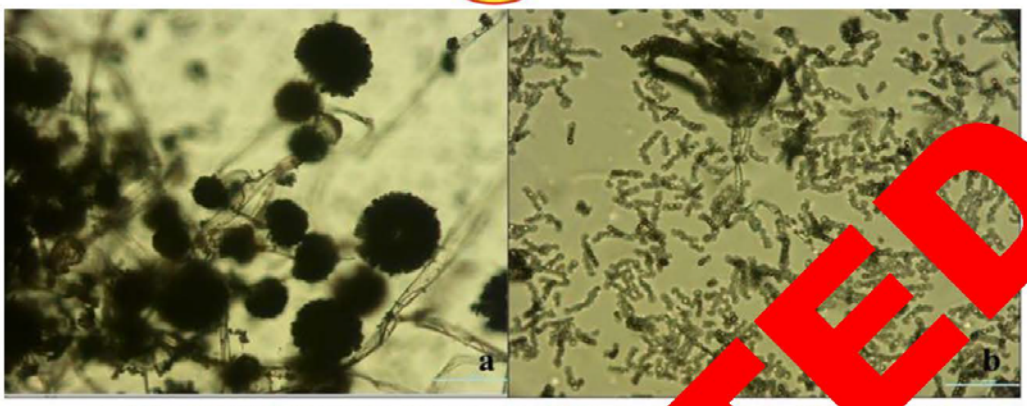

Figure 2. Images of microfungi obtained in the study [a: *As* b: *Penicill* (40x)

References

Adams, R.I., Miletto, M., Lindow, S.E., Taylor, J.W. and Bruns, T.D. (2 Airborne ba communities in residences: similarities and differences with fungi. *PLoS One*, 9(3), e912

Adams, R.I., Bhangar, S., Pasut, W., Arens, E.A., Taylor, J.W. dow, S.E azaroff, W.W. and Bruns, T.D. (2015). Chamber bioaerosol study: outdoor air and human occupa s sourc indoor airborne microbes. *PLoS One*, 10(5), e0128022.

Alabbasy, A.J. (2019). A Literature review on microbial contaminati rency. *IJEC*, 18, 22.

Burrell, R. (1991). Microbiological agents as health ris or air. *E mental Health Perspectives*, 95, 29-34.

Andayani, S.J., Amanah, A. and Permatasari, T.O. (2 Effect of Sansevieria trifasciata L on aerial pathogenic microfungi in tutorial rooms. *In Proceedings of t nference on Applied Science and Health* (No. 3, pp. 279-286).

Aydogdu, H., Asan, A., Okten, M.T. ve Ture 005). M g of fungi and bacteria in the indoor air of primary schools in Edirne city, *Turkey. Indoor Built* 4, 411

Benammar, L., Menasria, T., Chergui Ben S. an yachi, A. (2017). Indoor fungal contamination of traditional public baths (Hammams). *Inte on & Biodegradation*, 117, 115-122.

Biyik, H., Imali, A., Atalan, E., Tu kci Og (2005). Diversity of microfungi in soil polluted by cement factory. *Fresenius Environmenta etin.* 0-137.

Campbell, C.K. and Johnso (2013). *ation of pathogenic fungi.* John Wiley & Sons.

Demirel, R., Sen, B., Kad Yoltas, A. kten, S., Ozkale, E., Berikten, D.,Samson, R.A., Uztan, A.H., Yilmaz, N., Gunyar, Ö.A., Ay u, n, A., Kivanc, M., Ozdil, S. and Sakartepe, E. (2017). Indoor airborne fungal pollution in newborn u s in Turkey. *nmental monitoring and assessment*, 189(7), 362.

Do, Nascimento, López, A.M d Andrade, M. (2019). Airborne fungi in indoor hospital environments. *Int. J. Curr. Microbio p. S* 8(1), 2749-2 72.

Güneş, G., rt, onmez, S. and Erdinç, N. (2016). An investigation of the indoor air quality in libraries: *Marmara Univer l Libr Information World*. 16(2).222-241.

Hanson, B., Zh Ba E.J., Urch, B., Speck, M., Silverman, F., Muilenberg, M., Phipatanakul, W., Weinstock, G., ren, D.R., Joanne, E. and Sordillo, J.E. (2016). Characterization of the bacterial and fungal me ome in or dust and outdoor air samples: a pilot study. *Environmental Science: Processes & Impacts*, 18 724.

1). *Soil microfungi*. Cilt:1-7. Atatürk University Publications. 689. Erzurum.

Ir Kocer, and Yalcinkaya, B. (2011a). Microfungus flora of indoor and outdoor air in primary schools, Corum, v. *Australian Journal of Basic and Applied Sciences*, 5(9), 2274-2278.

Imali, çer, F. and Yalçınkaya, B. (2011b). Microfungus flora in buttons of ATM's and some GSM phones in Çorum. *Journal of TUBAV Science*. 4(4) 214-218.

Jafari, A.A., Aminipour, M.R., Ahmadieh, M.H. and Mirzaee, F. (2015). The Rate of airborne fungal contamination in Yazd Textile Factories in 2007. *Journal of Kerman University of Medical Sciences*.

Mahfouz, T. and Anaissie, E. (2003). Prevention of fungal infections in the immunocompromised host. *Current opinion in investigational drugs* (London, England: 2000), 4(8), 974-990.

Nevalainen, A., Täubel, M. and Hyvärinen, A. (2015). Indoor fungi: companions and contaminants. *Indoor Air*, 25(2), 125-156.

Ogbu, K.I., Pam, V.A., Chukwudi, I.C., Momoh, A.H. and Agwu, E.O. (2016). Survey of bacterial and fungal contamination on beef suya sold in jos and environs. *International Journal of Science and Applied Research* (ISSN: 2504-9070), 1(1).

Pitt, J.I. and Taylor, J.W. (2014). Aspergillus, its sexual states, and the new international code of nomenclature. *Mycologia* 106(5):1051–1062.

Pokhum, C., Intasanta, V., Yaipimai, W., Subjalearndee, N., Srisitthiratkul, C., Pongsorrarith, V., Phanc and Chawengkijwanich, C. (2018). A facile and cost-effective method for removal of indoor airborn hic bacterial and fungal flora based on silver and zinc oxide nanoparticles decorated on fibrous ai *Atmo ic Pollution Research*, 9(1), 172-177.

Samson, R.A. and Pitt, J.I. (2000). *Integration of modern taxonomic methods for Penicillium and erg ssifi n*, (4rd ed.) Singapore: Harwood Academic Publisers, p:510.

Sarıca, S., Asan, A., Okten, M.T. and Ture, M. (2002). Monitoring indoor airborne fungi and teria the di areas of Trakya University Hospital, Edirne, Turkey. *Indoor Built Environ.* 11, 285-292.

Sugeçti, S., Imalı, A. and Koçer, F. (2018). Molecular methods used in the purificati o prote nternational *Anatolia Acad emic Online Journal.* 4(2), 13-28

Walsh, T.J., Hayden, R.T. and Larone, D.H. (2018). *Larone's medically importa gi: a guid ification* (No. Ed. 6). ASM Press. 553p.

Weikl, F., Tischer, C., Probst, A.J., Heinrich, J., Markevych, I., Jochner, S K. (2016). Fungal and bacterial communities in indoor dust follow different environmental determinants *PLoS* (4), e0154131.

Yang, C., Pakpour, S., Klironomos, J. and Li, D.W. (2016). Microfungi i or environ What is known and what is not. *In Biology of Microfungi* (pp. 373-412). Springer, Cham.

Yavuz, V. (2016). Integration of digital printing technologies in ing sector *5th International Printing Techologies Symposium*, 251-262.