

The Hidden Danger for the Users of Playgrounds and Sport Complexes

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Abstract: The aim of this study was to determine the microorganisms harmful for human health and available in playgrounds and sport complexes and to offer solutions for prevention methods. For this reason, equipment used by many people and toys in the playgrounds, especially the parts that handled and contacting to body, and swimming pools were preferred. The samples taken from determined areas by culture rod with carrying medium were immediately brought to the Laboratory of Infection Illnesses and Clinical Microbiology in Medical Faculty, Kirikkale University. The samples were put into bloody EMB and Sabouraud Medium, waited in 37 degree incubator and they were evaluated after 24, 48 and 72 hours. As a result of the study, two Staphylococcus aureus were found in the gymnastic mats of fitness saloons and floor mats in wrestling saloons and it was understood that one of them was sensible to methicillin and the other was resistant. The MRSA (Methicillin Resistant Staphylococcus Aureus) in the places open to public has started to create problems in terms of health for the people interested in playing and sport. For decreasing the infection risks into minimum level, cleaning the equipment and materials in playgrounds and sport complexes regularly by the suitable disinfectants and obeying the individual hygiene rules are the most important steps.

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Introduction

One of the common goals of developed societies is to have healthy generations and to provide individuals the opportunity to live in the highest living quality available. Today, the rapid growths on technological field have been providing positive contributions to human life. In spite of these developments, the negative changes in the basic behaviours of people may cause to new problems. Today, if we consider that mind, science and technology have been forcing their own limits, then it is possible to say that human beings are addicted to the technological developments which are the products of their own minds. A lot of objects like escalators, elevators, small home tools and cars have been inseparable part of our life; the technological developments facilitating our life have moved to the centre of our life and make people adopt a sedentary life style which degrades human relations to the lower levels. Sedentary life style is the reason of illnesses like arteriosclerosis, hypertension, diabetes and especially obesity and also it is the trigger of many illnesses and the first reason as well (Özer, 2001; Yoshinaya et al., 2004; Tammelin et al, 2004; Davy et al, 2004). Individuals go to the sport saloons for coping with the mentioned health problems or for meeting the need of physical activity occurred as a result of busy business life. Correspondingly, the problems like weak neighbourhood relations and insufficient playground that is the result of unplanned urbanisation head the children towards the sport fields and playgrounds for

discharging their inner energies. Games and playgrounds have an important place for meeting the need of action and removing children from the health problems arising from physical inactivity (Harmandar, 2004). Sport and game is a socializing and learning action for the child. The child unwittingly learns skills, behaviours and knowledge for adapting to life with the help of game and makes progress in each growing field (Tamer, 1987; Demirci et al, 2006). Game which can also be identified as a mental training is a trial field where positive behaviours are reinforced and negative ones are changed (Hazar, 1996). While playgrounds and sport fields have an important role for living, they can cause an important danger for the people. This danger is the problem of infectious diseases that may occur with microbial agent infection after not obeying the hygiene rules. Many people doing sport for different purposes are unaware of this danger. As a result of the researches, it has been revealed that every kind of infections from the equipment and surface fields may directly or indirectly infect individuals. Different viruses (e.g., Herpesvirus, HIV, Epstein-Bar Virus, Scrupox Virus, Hepatitis B Virus etc.), fungi, bacteria (e.g., Tetanus Bacillus, Staphylococcus, Streptococcus, Pseudonomas etc.) and parasites (e.g., Visceral Larva Migransi, Toxocara Canis) have been identified on these equipment by the help of many studies done before (Sharp, 1994; Leski, 2002; Goldhammer et al, 2006; Daugherty, 2003; Caputo et al, 2001; Bassiri-Jahromi and Khaksar, 2010). It has been known that diseases caused by many bacteria and

virus in addition to parasite infections are often seen in the places where individuals and children reside gregariously (Doğan and Akgün, 1998; Uzun et al, 2004). The possibility of fomites' infection to these equipment and materials occurs with hand-nose contact, hand-eye contact, hand-mouth contact and then the same hand-exercise tool contact (Goldhammer et al, 2006). The main cause of the risk of children's contacting the infection of visceral larva migrants is the playgrounds. In a study searching the samples taken from the sand pools in the playgrounds, *Toxocara canis* larva was seen in the three of 30 samples in Kütahya. In the study, the eggs of the larva were seen on the nine children in the sample group (Akdemir, 2010). Many of the users are the nominee of infection diseases, but they are not aware of this danger. In our study, it has been aimed to determine the microorganisms harmful for human health and available in playgrounds and sport complexes and offer solutions for prevention methods.

Materials and Methods

For the study, 119 samples were taken from different sport complexes, playgrounds, swimming pools and schools in Kırıkkale. These samples were examined in terms of the microorganisms that may be harmful for human health. Microbiological samples were taken from the surfaces that especially humans contacted. For this reason, equipment used by many people and toys in the playgrounds, especially the parts that handled by many people and contacting to body directly, and water of swimming pools were preferred. The samples taken from determined areas by culture rod with carrying medium were immediately brought to the Laboratory of Infection Illnesses and Clinical Microbiology in Medical Faculty, Kırıkkale University. The samples were put into bloody EMB and Sabouraud Medium and wait in incubator of 37 degree. The

samples were evaluated after 24, 48 and 72 hours. The reproduced samples were taken into account and the samples that reproduction was not seen were thrown after 72 hours. Every colony found in the medium was evaluated separately and gram painting was done for every microorganism. Microorganisms were determined as gram positive, gram negative and fungi. These microorganisms were identified by using GP, GN, YST cards and Vitek 2 (Biomérieux, France) device; and by the same device, antibiogram was done to microorganisms with high potential of making people ill.

Results

The most important potentials are materials and exercise equipment in the playgrounds and sport complexes (Beam and Buckley, 2006). It is obvious that many organisms like staphylococcus and MRSA locate to the humid environment as a result of sweating after the effort used by the people playing-exercising with the materials and equipment, then the new microbes transfer after the usage of the other people (Brady et al, 1990; Centres for Disease Control and Prevention, 2003; Kazakova et al, 2005). The microorganisms always transferred in this way cause to the infection diseases that directly or indirectly transmitting to the people via respiration (hand-nose, hand-eye contact), digestion (hand-mouth), skin and the other ways. Although there are a lot of studies for infection types of viral and bacterial pathogens in houses and hospitals, the status of exercise equipment is different on this subject, because the possibility of being ill for people using exercise tools is low. The most important danger in these environments arise from the sweating of the people exercising. The effect of this sweating is that it gives opportunity for the bacteria to reproduce (Goldhammer et al, 2006).

Table 1. Patient Data, January 16, 2013 11:42 CST, Patient name: Fitness Saloon Gymnastic Mat

Laboratory ID: MMM110		Organism chosen: Staphylococcus Aureus			
The sensitivity information		Analyse time: 10,75 hours		Status: End	
Antimicrobial	Amount	Commend	Antimicrobial	Amount	Commend
Cefoxitin Scanning	NEG	-	Inducible Clindamycin Resistant	NEG	-
Penicillin	<= 0,03	S	Erythromycin	<= 0,25	S
Ampicillin			Clindamycin	<= 0,25	S
+Amoxicillin/Clavulanic Acid		S	Linezolid	2	S
+Ampicillin/Sulbactam		S	Teicoplanin	<= 0,5	S
Oxacillin	<= 0,25	S	Vancomycin	<= 0,5	S
+Cefazolin		S	Tetracycline	<= 1	S
Imipenem	1	S	Tigecycline	<= 0,12	S
Gentamicin High level (synergy)			Fosfomicin	<= 8	S
Streptomycin High level (synergy)			Fusidic acid	<= 0,5	S
Gentamicin	<= 0,5	S	Rifampin	<= 0,5	*1
Ciprofloxacin	<= 0,5	S	Trimethoprim/Sulfamethoxazole	<= 10	S
Moxifloxacin	<= 0,25	S			
+= antibiotic widen *= changed by AES **= changed by the user					
AES findings					
Harmon:	Consistent		Bionumbers: 050402026763231		
Phenotype:	Macrolides/Linkosamides/Streptogramyns		Streptogramyns Resistant (SGA-SGB)		

In our study, while reproduction wasn't observed in 10 of 119 samples which were taken from the surfaces of equipment and materials in sport complexes and playgrounds, 120 microorganisms were produced in 109 samples. 75 of 120 microorganisms were gram positive, 44 of them were gram negative and one was fungi. In the study, while the most seen microorganism group is Staphylococcus, 43 of the microorganisms belong to the group of Staphylococcus. As a result of the study, two of the microorganisms found in gymnastic mats in fitness centres and floor mats in the wrestling saloons are Staphylococcus aureus, one of them is sensitive to methicillin and the other is resistant (Table 1; Table 2). Some of the staphylococcus don't do infection to the people, but Staphylococcus aureus is a kind of bacteria that may cause very serious infections. Especially, one of the most important points for the treatment of the infections that these bacteria caused is whether it is methicillin resistant or not. In its resistant strains,

treatment options are low and more serious clinical tables may occur. Thus, it is a serious danger that one of the two Staphylococcus aureus is methicillin resistant and it is found on equipment and materials that people contact in sport complexes and playgrounds where they go for living healthy. While MRSA is an important problem for the patients in the hospital, observing it in the society is more important. In 2003 it is reported that MRSA infections were in the fifth line in terms of the diseases that cause for death and that originate from hospitals (Becton et al, 2008). The risk ratio of becoming Staphylococcus aureus carrier in a period of life of an adult changes between 10% and 50% depending on regional, seasonal and epidemiological factors (Kantarcioglu and Yücel, 2002), and as Staphylococcus aureus becomes resistant against antibiotics in a short time, it may cause important troubles in the treatment process (Özdemir et al, 2004).

Table 2. Data on January, 16, 2013 11:43 CST, Patient Name: Wrestling Saloon Floor Mat

Laboratory ID: MMM115			Organism chosen: Staphylococcus Aureus		
The sensitivity information		Analyse time: 9 hours		Status: End	
Antimicrobial	Amount	Commend	Antimicrobial	Amount	Commend
Cefoxitin Scanning	POZ	+	Inducible Clindamycin Resistant	NEG	-
Penicillin	>= 0,5	R	Erythromycin	>= 8	R
Ampicillin			Clindamycin	>= 8	R
+Amoxicillin/Clavulanic Acid		R	Linezolid	2	S
+Ampicillin/Sulbactam		R	Teicoplanin	<= 0,5	S
Oxacillin	>= 4	R	Vancomycin	<= 0,5	S
+Cefazolin		R	Tetracycline	<= 1	S
Imipenem	>= 16	R	Tigecycline	<= 0,12	S
Gentamicin High level (synergy)			Fosfomycin	<= 8	S
Streptomycin High level (synergy)			Fusidic acid	4	I
Gentamicin	<= 0,5	S	Rifampin	<= 0,5	*1
Ciprofloxacin	>= 8	R	Trimethoprim/Sulfamethoxazole	<= 10	S
Moxifloxacin	2	*R			
+= antibiotic widen *= changed by AES **= changed by the user					
AES findings					
Harmony:	Consistent		Bionumbers: 010402062763271		
Phenotype:	Beta lactams		Modification of PBP		
	Macrolides/Linkosamides/Streptogramyns		Structural MLSB+SA		

Methicillin resistant Staphylococcus aureus is an organism that commonly infects from the hospital, but it has been observed recently that this bacteria is harmful for the healthy people. This risk rate has been increasing in the schools. The possibility of sportsman's and children's contacting with the bacteria is high, especially in the places where hygiene is not enough. In Stanforth et al's study which the training places in the schools and wrestling mats were examined, this bacteria was confronted in some schools. As a result of the study, it has been suggested that the regions contacting the skin in training places should seriously be hygienic (Stanforth et al, 2010).

Discussions

When doing sport and playing, there is an important and also very dangerous situation overlooked: 'hygiene'. Hygiene meaning "science of preventing the health" includes the cleaning rules and all the measures (Helfand, 1998; AÇSAPGM, 2002). In a study, Oller et al have pointed out the importance of personal hygiene to protect ourselves from the harmful effects of microorganisms available everywhere and to control the infection diseases (Oller et al, 2010). So in relation to personal hygiene, the subjects of nutrition, toilet habit, hair, mouth-tooth,

ear, hand-foot care, genital organ and arm pit hygiene and dressing come to mind (Greene, 2001). The studies suggest that when personal hygiene habit improves, frequency of infection diseases increases (Dirican and Bilgel, 1993; Güler, 2008; Özel et al, 2009). In these studies, it has been pointed out that materials like towel and soap that used in common and have direct dermal exposure, hamams and saunas, the dust in the environment, equipment used in common in sport complexes and playgrounds contain various microorganisms and so this kind of environment poses a threat in terms of health (Wilkoff et al, 1969; Leonas and Jinkins, 1997; Gosbell, 2005; Nguyen et al, 2005; Borchardt et al, 2005; Grundman et al, 2006).

As it has been known that there are several microorganisms infected by hands and may negatively affect the health of people using the materials and equipment in sport complexes and playgrounds, the risk of becoming the carrier by taking these microorganisms into the body or clinical infections may occur (Goldhammer et al, 2006). In this century, the number of individuals who do physical activities to decrease the risk of diseases because of sedentary life style is increasing fast; because of the insufficient natural fields, these people go to the sport complexes and playgrounds to meet this physical activity need and be away from the busy and boring metropolis life; as a result, hygienic risks about the usage of the equipment and material in these places draw attention (Schindler et al, 2007; Polak, 2007).

Unlike the MRSA infected in the hospital, MRSA related to the society causes to skin infections, because it spreads more quickly and easily (Centres for Disease Control and Prevention, 2005). While MRSA is an organism usually infected from the hospitals, MRSA in the places which is open to public and where cleaning isn't done started to cause trouble to the individuals interested in the game and sport. In a study done in Ohio, it was aimed to identify the availability level of MRSA in dressing rooms and health centres. As a result of the study, at least one positive MRSA sample was encountered on each of 9 wrestling mats (Stanforth et al, 2010). Every year, approximately 12 million Americans go to the doctor because of the infection of MRSA (Centres for Disease Control and Prevention, 2008). MRSA has the power of going into the delicate region of skin and infecting the deeper tissue. The colonization of MRSA may last for months or sometimes years (Stanforth et al, 2010). Many risks factor for MRSA's reproduction are available in the environment of sport, for example, shared clothes, sport equipment, towels, blades, soaps, creams and skin to skin contact with the people with lesion (Beam and Buckley, 2006). The two wrestlers in the same team in Indiana, America infected MRSA though they didn't wrestle. The reason of this was

reported as the equipment and tools shared (Centres for Disease Control and Prevention, 2003).

When the total and annual staphylococcus aureus cases were considered, the rate of MRSA infected people was 29% in 2001-2002 and 64% in 2003-2004 (Mckenna, 2008). MRSA cases related to the sport increase in the sports like wrestling, American football and rugby that involve physical contact (Kirkland and Adams, 2008). While the first MRSA case in the wrestling team was reported in 1993 (Lindenmayer et al, 1998), in a study done in 2010, positive MRSA was found on about the half of 90 wrestling mats (Montgameri et al, 2010). In a study for determining the places where there was staphylococcus aureus sensitive to methicillin, the fitness saloons at universities were examined and staphylococcus aureus bacteria sensitive to methicillin was seen on 10 of 99 samples. It has confirmed with the studies that the surfaces in the sport complexes causes to staphylococcus colonization and infections (Markley et al, 2012). Also in the study done by Oller et al, staphylococcus aureus bacteria in the regions used for training (football and wrestling dressing rooms, weight lifting saloons) was examined before-after cleaning the environment. While this bacteria was seen on 30% of these dressing rooms and weight lifting saloons before the cleaning, after the cleaning it wasn't seen (Oller et al, 2010). Apart from these, it has been proven that the risk of infection may be decreased by getting the habit of true hand wash. For example, in a study done in America, it was observed that hand wash decreased the risk of diarrhoea with the proportion of 47% (Curtis and Cairncross, 2003) and it was reported in an education program in Bangladesh that the application about hand wash and toilet education decreased the diarrhoea cases (Stanton and Clemens, 1987). Hand wash and having a shower were the two golden standards that would prevent the infections related to the body contact.

One of the dangers related to the sport is a tetanus that develops by infection of the spores of clostridium tetani bacteria to the people in the sport centres. This disease grows after the infection of this bacteria to the deep and unattended wounds. Infections caused by bacteria like staphylococcus, streptococcus, pseudomonas may infect the people with the skin or airway from playgrounds, dressing rooms, sport clothes and equipment (Sharp, 1994). Especially after 1997, there has been an increase in the infections caused by methicillin resistant or sensitive staphylococcus aureus bacteria for the individuals who do the sports seriously requiring contact (Sedgwick et al, 2007). It has been reported that the proportion of diseases including infection related to skin is 21% for the wounds and health problems in university activities and 8.5% for the wounds and health

problems in high school activities. The half of these cases is related to the regions of head, face and neck, and most of the agents causing to infection are the bacteria of staphylococcus and streptococcus. The dermatological diseases not treated or treated late may give serious harm to the sport success and health of the individuals (Likness, 2011). It is very important in terms of saving the health of the society to make an audit and to be careful about the hygiene of playground and sport complexes that used intensively by the children and individuals (Bonadonna et al, 2009). World Health Organization suggests making the hygienic controls in the sport complexes especially in the swimming pools (WHO, 2006).

Because in our study we found MRSA as an important infection factor, it has been very important to obey the hygiene rules. The most important steps for this are to clean all the sport equipment and surfaces before-after training, using suitable disinfectants which can kill MRSA, to search for the colonization existence regularly and to obey the personal hygiene rules. The regular cleaning of materials and tools in the sport complexes and playgrounds will decrease the risk of infection from this kind of materials and tools to the children and adults. Our study will elucidate to the new studies in terms of taking measurements by the government and administrators for the places mentioned in our study like the sport complexes and playgrounds against the risk of infection that may reproduce and spread and raising awareness by the schools, universities, local managements, units of health ministry and civil society organisations for saving the health of all individuals especially the children and adults who use mentioned places.

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