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Determination of noise pollution knowledge in the sport centres of Konya city

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Abstract: Aim of this study was determination of noise pollution in sports fields and investigation of people knowledge level on effects of noise pollution. Noise pollution measurements was made in the stadium of Konya city centre, which was taken from *Konyaspor* on 10.11.2007 and *Election Competition* of Regional Clubs Turkey Taekwondo Championship League indoor sports complex on 15-18.11.2007. Leq values in category of dBA and minimum and maximum values that are at normal ear level height (about 170 cm high) were measured. Besides, a questionnaire including 15 questions was prepared for determination of sportsmen referees and trainer knowledge level, in these sports fields about noise pollution which is one of the insidious environment pollutions. It was determined that the maximum Leq equivalent level of noise value was 114 dBA and the minimum one was 71.5 in outdoor sports areas. In indoor areas the maximum value was found as 109 dBA and the minimum one was found as 66.5 dBA. In the questionnaire, it was asked that "How many decibels the level of noise should be in the sports complex in accordance with instruction of *"Evaluation and Control of Environmental Pollution"?* 20.4% of the sportsmen, 28.7% of the referees, 40% of the trainers and 7.8% of the spectators answered the question truly. *"According to 5237 numbered Turkish Criminal Code which one below is the punishment that is given to the one who cause noise to harm human's health clearly?"* was asked to the participants. 38.3% of the sportsmen, 43% of the referees, 58.2% of the trainers and 25.6 % of the spectators answered this question truly. It was said by the participants that "*In the first sequence the most disturbing noise pollution is sibilant and swearing demonstrations (52.9%)* ". *Secondly, the most disturbing thing is marches and slogans with drums and whistles (47.1%).* 53.6 % of the participant said that "*After the matches, my ears reverberate and hum"*. 31.1 % of them also said that *"Noise causes loss of hearing harm in the hearing sense and organs".* 15.3% of them said that *"It causes emotional and behavioural stress by damaging nerve system (lack of sleep, decrease in memorial functions, difficulty in understanding, uneasiness)"*. Besides, 46.8% of them said that *"noise pollution causes decrease in working performance and productiveness.",* 53.2% of the participants said that "*noise pollution has no effect on working performance and productiveness.* As a result of the questionnaire, it has been seen also that trainers have more information about noise pollution than the others and a little part of the spectators knows causing pollution is a legal crime and some of them doesn't know how mach decibel the maximum level should be. 53.2 % of the questionnaire participants also said that *"noise pollution has no effect on working performance and productiveness*". These results show that, in our country, noise pollution hasn't been comprehended enough, yet.

Key words: Sports fields, noise pollution, Konya

Introduction

Despite being one of the important matters nowadays, noise pollution is unwanted and disturbing. It also increases in the same way social and industrial develop of society, affects human's health, perception and physiological and physiological balances negatively, decreases working performance and removes calmness of environment. Nevertheless, it is not known enough, yet (Korkmaz & Bursalı-2003). Humanity started to be interested in noise 6.century B.C. In that time, precautions to noise were taken. Laws, envisaging having car-makers in the city and noisy small

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handicrafts extricated out of the city were put into validity in Sybaris. The matter of noise became a current issue in 1950s in Turkey. Transforming researches about noise to an effort to be protected from noise all over the country has not been accomplished yet (Dursun & Özdemir-1999). The researches about noise pollution have shown that the issue is a matter of society health and it is getting more and more important (Kalıpcı *et al.*, 2007).

In our country, to struggle with noise pollution, "The Regulation of Control of Noise", which is based on14. Clause of 2872 numbered Environment Code that is in validity by being published in 18132 numbered official newspaper on 11.08.1983, and is put into validity by being published 19308 numbered official newspapers on 11.12.1986, is put into validity. After "Regulation of Evaluation and Management of Environmental Noise" had been put into validity by being published in 25862 numbered official newspapers on 01.07.2005, "The Regulation of Control of Noise" was abolished. "Against the obligations that is determined by connected laws, one who causes noise, which harms someone's health clearly, is sentenced to prison from 2 months to 2 years or be fined with legal punishment" is decided with 183. Clause of 5237 numbered Turkish Criminal Code which was put into validity by being published in official newspaper on 12.10.2004 (Anonym- 2004).

Being transformed of sound to noise and harming to environment is a different situation and to reach to this level, amplitude of sound vibration or level of sound pressure, frequency and form has to change. Different features such as level of sound pressure and shrillness can be perceived differently person to person. On the other hand, there are some criterions that determine intensity of sound according to human's ear. The measurement, which is used in measuring noise and determining intensity according to human's ear, is decibel (dB) (Şahan & Biren-1994). The classification of noise pollution in life space is shown at Table 1 below.

Table 1.The intensity of noise is classified like in this diagram (Anonymous-1998)

0-30 decibels	too silent
30-50 decibels	silent
50-60 decibels	noisy at middle level
60-70 decibels	noisy
70-80 decibels	too noisy

Decibel is a unit of sound evaluation which high and medium frequencies are especially stressed. Human ears are too sensitive to high and medium frequencies. If normal respiration that is hearing point, is accepted to be zero; Normal respiration is 0 decibel (dBA), the conversation between two people is 60 decibels (dBA), crowded traffic is 70 decibels (dBA), lathe counter is 85 decibels (dBA) and subway is 100 decibels (dBA) (Anonym-1998). It is under consideration that noise at the maximum level, which is constituted by especially spectators in sports areas, affects physiological and physiological health of sportsmen and spectators considerably. If intensity and density of sound increases (above 85 dBA), side effects such as tiredness of hearing, reverberation and hum in ear can be appeared (Akgün-1993).

The negative effects of noise on human's health can be gathered under three tittles:

1-Physiological effects: loss of hearing, harm in hearing sense and organ, discomforts related to increase of adrenaline too much.

2-Physcological effects: defeats in behaviour, defeats in nerve system, uneasiness, decrease in memorial functions, defeats in concentration, defeats in order of sleep.

3-Effects on social life: decrease in working performance and productiveness.

Besides these effects, it is also known that noise cause changes in character and cause also problems and depression to become worse in people who tend to. It also lengthens the period of patient's cure and causes different cardiac-artery diseases (Liu & Tan-2000).

Material and Method:

For noise pollution measurements in indoor and outdoor sports areas, stadium of Konya city centre, which is used by Konyaspor (team in Turkey First Football League), and indoor sports complex in the same city, in which Regional Taekwondo Competition was made, were chosen. Besides, a questionnaire including 15 questions was made to determine the level of knowledge of sportsmen, trainers, referees and spectators about noise pollution.

In total, 743 people participated to the questionnare. 75.4% of them were males and 24.6% of them were females. 543(73%) of them were spectators, 136(18.3%) of them were sportsmen, 47(6.3%) of them were referees and 17(2.4%) of them were trainers. Participants were between19-40 year-old. They had been in this area for 3-9 years.

The noise pollution measurements were made in the stadium of Konya city center which belongs to Konyaspor (team in Turkey First Football League) on 10.11.2007 and in the same city, in indoor sports complex in which "Election Competition of Regional Clubs Turkey Taekwondo Championship" was carried out on 15-18.11.2007. The measurement level of noise device marked Testo 815, which is calibered, was used in measuring level of noise. The maximum level of sound pressure of device is 130 dBA and it can measure levels of noise between 32-130 dBA. Measurements were made at normal height (from 165 to 180 cm). Minimum and maximum values and Leq values in category of dBA were determined by calculating averages of noise measurements after being repeated four times. Measurements were made when there were approximately 900 people in indoor sports complex and 10.000 people in stadiums. While the noise measurements were being done the questionnaire were carried out firstly on spectators and referees then on trainers and sportsmen.

Results:

In Konya, measurement was made at different points of indoor and outdoor sports areas. It was shown in Table 2. According to the studies which were made by World Health Organizations and International Working Organization, physiological symptoms related to personal sensitiveness can be seen in 30-60 dBA sand also it can be seen in 85-120 dBAs that physiological and physiological-otologic sickness appear (Gür et al.-1995; Arslan et al.-2002).

Table 2: Averages of noise levels, that are measured in outdoor and indoor sports areas (dBA)

SPORTS AREAS	indoor sports complex			city stadium		
	L_{max} value	L_{min} value	Leq değeri	L_{max} value	L_{min} value	Leq value
Sports fields and outside(0 meter)	83.4	78.6	81.0	80.5	71.9	76.2
Entrance	80.6	74.4	77.5	81.8	72.2	77.0
Lavatory and WCs	70.3	62.7	66.5	73.8	69.2	71.5
While teams are coming to the field	89.0	81.4	85.2	97.0	92.0	94.5
During Turkish National Anthem	84.0	81.6	82.8	78.2	73.4	75.8
While the match is starting	92.9	79.7	86.3	98.0	89.8	93.9
Collective demonstrations during the match	111	105	108	108	98.0	103
Demonstrations with sibilant and swearing during the match	112	98.0	105	111	103	107
In the event of there is a goal or point	116	102	109	118	110	114
At interval	83.7	79.7	81.7	78.4	74.0	76.2
In the event of there is no goal or point	98.0	86.0	92.0	108	94.0	101
In the event of rival team scores	88.9	83.7	86.3	80.0	77.2	78.6
Decision of referee(in favour of host team)	98	84.6	91.3	96.2	83.4	89.8
Decision of referee(in favour of rival team)-sibilant protest	100	91.2	95.6	106	93.6	99.8
At the end of the match	90.0	80.6	85.3	81.5	70.9	76.2
At the end of the match-outside of the field	82.0	74.0	78.0	80.0	70.0	75.0

With the purpose of determination of noise pollution knowledge of sportsmen, referees, trainers, spectators, a questionnaire was carried out. The results of the questionnaire are shown at Tables 3-5 below.

Table 3. The source of noise pollution disturbing sportsmen, referee, trainer and spectators most

Which source of noise pollution disturbs you most?	Sportsman (n: 136)			Referee (n: 47)			Trainer (n: 17)			Spectator (n: 543)			Total (n: 743)		
	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%
1- Collective demonstrations including sibilant and swearing that are made by spectators	82	11.0	60.2	30	4.0	63.8	6	0.8	54.5	275	37.0	50.6	393	100	52.9
2- Demonstrations with marches and slogans made with instruments (such as drums, whistles)	54	7.2	39.7	17	2.2	36.1	11	1.4	64.7	268	36.0	49.3	350	100	47.1

Note:(n=number of people who answer, **T.%**=the ratios in total answers, **Gr.%**=the ratios in groups)

Table 4. The answers which are given by sportsmen, referees, trainers and spectators, to the question of "What are the effects of noise pollution on your health?".

What are the effects of noise pollution on your health?	Sportsman (n: 136)			Referee (n: 47)			Trainer (n: 17)			Spectator (n: 543)			Total (n: 743)		
	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%
1-After matches, my ears reverberate and hum.	50	6.7	36.7	20	2.6	42.5	6	0.8	35.2	322	43.3	59.3	398	100	53.6
2-It causes loss of hearing harm in the hearing sense and organ.	22	2.9	16.1	9	1.2	19.1	3	0.4	17.6	197	26.5	36.2	231	100	31.1
3-It causes behavioural and emotional stress by damaging order of sleep.(lack off sleep, decrease in memorial functions, difficulty in understanding, uneasiness)	64	8.6	47.0	18	2.4	38.2	8	1.0	47.0	24	3.23	4.4	113	100	15.3

Table 5: The answers given by sportsmen, referees, trainers and spectators to the question of "What is the effect of noise pollution on working performance and productiveness?"

What is the effect of noise pollution on working performance and productiveness?	Sportsman (n: 136)			Referee (n: 47)			Trainer (n: 17)			Spectator (n: 543)			Total (n: 743)		
	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%	n	T.%	Gr.%
1- It causes decrease in working performance and productiveness	89	11.9	65.4	34	4.5	72.3	11	1.4	64.7	213	28.6	39.2	347	100	46.8
2- It has no effect on working performance and productiveness.	47	6.3	34.5	13	1.7	27.6	6	0.8	35.2	329	44.2	60.5	395	100	53.2

Discussion

In outdoor sports fields, it has been determined that the minimum Leq value of measured equivalent noise level is 71.5 dBA and the maximum one is 114 dBA. In indoor sports complex, the minimum value is 66.5 and the maximum one is 109 dBA. However, it has been said that the value of equivalent noise level can't be more than 55 dBA during the activity in sports areas because of the value of the noise level which is defined in the item C of 28. Clause of the Regulation of Evaluation and Management of Environmental Noise (Anonym-2005) in conclusion of measurements, it has been seen that Leq values in sports areas are more than the value (55 dBA) that has been defined in the Regulation and it threatens human's health. The results of measurements at different points of indoor and outdoor sports areas, is given in Table 2.

According to international standards, the level of intensity that harms ear is 85 dBA. Sound pressure like a sudden bomb can tear eardrum in outer ear without going into ear, or it can cause the round eardrum in inner ear to be torn. Another important type of loss of hearing related to noise is loss of hearing with being under excessive noise above 85 dBA. It is slowly-developing and impossible to threat (Dursun & Özdemir-1999).

If the effects are classified according to intensity of noise, unwanted noise between 30-60 dBA, has physiological effects and the noise between 60-90 dBA has effects on both physiological and organism functions (Dursun & Özdemir-1999). The level of noise, which is more than normal, causes stress and loss of motivation and hinders sportsmen to show necessary performance. In a research that was made on golfers showed that; noise affects golfers' putting the ball into hole and also increases heartbeats of golfers (Hassmen & Koivula-2001).

Primary school students, between 8 and 9, were not successful when they were in noisy classes, but when they were taken to silent classes; they became well-behaved and successful at their studies (Arslan-1988).

According to a research made by an insurance agent, these results have been seen: decrease of noise reduces the faults of accountants at a rate of 52% and the faults of typists at a rate of 29%. It is also determined that, noise affects the baby in mother's abdomen. During the pregnancy, babies of 75 mothers, who work in noisy places, was made a hearing test and it was seen that 35 of them had loss of hearing at high frequency. In other researches, the babies whose mothers work under continual noise, between 65-95 dBA, were evaluated after they had been born, and it was seen that they had loss of hearing (Dursun & Özdemir-1999).

Ramon Fernando Hans (2001) found in his study, named "the analysis of noise values around school", that the source of noise is sounds, movement in equipments of laboratory and furniture and wandering of people. Besides, he determined that the average Leq values 74.8 dBA with SPL max.97.1 dBA and SPL min. 49 dBA were found in the noisiest places such as sports areas and places where student wander.

The question that was asked to the participants ***"How many decibels should the level of noise in sports complex at maximum level in accordance with The Regulation of Evaluation and Management of Environmental Noise?"*** was answered truly by 20.4% of the sportsmen, 28.7% of the referees, 40% of the trainers and 7.8% of the spectators Another question ***"Which one below is the punishment that will be given to the person who causes noise that harms humans' health clearly in accordance with 183. Clause of 5237 numbered Turkish Criminal Code?"*** was answered truly by 38.3% of the sportsmen, 43% of the referees, 58.2% of the trainers and 25.6% of the spectators. It was determined that trainers have more information than sportsmen, referee and spectators. It is known that a little part of the spectators knows that being the reason of noise is a legal crime and they have insufficient information about how many decibels the level of noise should be at maximum rate in sports areas. These show that in our country, noise pollution is a type of pollution which is not known enough.

The answers, which are given to the questions related to the noise pollution by participants in the questionnaire, are shown at Tables 3-5. According to this, In the first sequence, The most disturbing noise pollution disturbs sportsmen, referees, trainers and spectators is ***"The collective demonstrations including sibilant and swearing"***(52.9%), secondly ***"The demonstrations, marches and slogans with drums and whistles"*** (47.1%).

"What are the negative effects of noise pollution on your health?" was asked to the participants, 53.6% of them answered like that ***"After matches, my ears hum and reverberate."***, 31.1% of them answered like that ***"It causes loss of hearing and harm in the haring sense and organ"***, 15.3% of them said that ***"It causes emotional and behavioural stress by damaging nerve system (lack of sleep, decrease in memorial functions, difficulty in understanding, uneasiness.)".*** 46.8% of the participants also said that ***"Noise pollution causes decrease in working performances and productiveness."***, but 53.2% of them said that ***"It has no effect on working performance and productiveness".***

In conclusion, as a result of noise measurements made in outdoor and indoor sports areas, it has been seen that the Leq value in the sports areas is higher than 55 dBA, the value that is defined by Regulation, and it threatens humans' health. The result of the questionnaire shows that a little part of the spectators knows being reason of the noise is a legal crime and they have no information about how many decibels the maximum level of noise it should be in sports areas. Besides, trainers have much information about the noise pollution than sportsmen, referees and spectators. 53.2% of the participants also said that *"Noise pollution has no effect on working performance and productiveness."* Briefly, in our country people are still unconscious of the noise pollution.

This study verifies the study of Arslan et al. about noise pollution in sports areas and research in level of knowledge about health risks of people in noisy areas in 2002.

It has been thought that the matters below should be done immediately to struggle with noise pollution: The negative effects of noise pollution on human's health should be told to the managers of factories and especially to businessmen who causes noise pollution. Environment training should be done and nongovernmental organizations should be set into action. The environment training should start at primary schools, go on during educational life of individuals and turn into a behaviour (Kalıpcı-2007).

Te requirements of "Regulation of Evaluation and Management of Noise Pollution", which was put into validity by being published in 25862 numbered official newspaper on 01.07.2005, based on 2872 numbered environment law, should be followed and put into validity immediately. In building new buildings, isolation should be taken into consideration and during the building, a material that provides sound insulation should be used builders should be encouraged to use sound insulation materials. In buildings, application of double-window should be indispensable condition. Municipalities should control whether materials which provide sound insulation, are used in buildings or not. Buildings which are sensitive to noise, such as school, hospitals, courses, hotels and vacation places should be built in areas away from noise.

To provide the balance in using and protecting environment in the limit of continual progress and preventing all of the environment pollutions, Environment Order Plans scale with 1/25.000,Master Development Plans scale with 1/5.000 and Application Development Plans scale with 1/1.000should be prepared immediately and future planning of city should be made. After existing condition is determined by making noise pollution maps of all cities, applications which will reduce pollution at sources of noise at minimum level, should be determined and carried out immediately (Kalıpcı-2007).

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