Abstract

Environmental risks are being threatened to public health significantly. The purpose of the study was to assess knowledge and attitudes on health effects of environmental risk of university students in the region of Kocaeli as an industrial city. A questionnaire was developed that focused on university students’ knowledge and attitudes of environmental risk. The questionnaire was distributed randomly to university students in Kocaeli, and completed and returned anonymously. The highest rate (74.3%) of correct answers was obtained with the question about smoking “tobacco smoking is a risk factor for respiratory disease”. The lowest rate of correct answers (30.1%) was obtained with the question “residential exposure to radon gas is a risk factor for lung cancer”. When university students were asked to self-rate “environmental risks and resulting threat to health”; 59.1% of answers were indicating “the most significant threat is water pollution”, 15.2% of answers were indicating that “the lowest threat aspect is noise”. School education on significant environmental risks is extremely needed for these university students in order to correct misconceptions, provide accurate information and to develop a positive attitude towards environmental risks.

Key words: Environmental risks, health, university students, knowledge and risk perception

Introduction

The World Health Report 2002 has underlined that, worldwide, the attributable fractions for tobacco smoke were about 12% for vascular disease, 66% for trachea bronchus and lung cancers and 38% for chronic respiratory disease and, in particular, among industrialized countries, environmental tobacco smoke causes disease in non-smokers, while urban air pollution is associated with serious health effects (1,2).

Climate change could harm human health in many ways, including adverse changes in food production, malaria, dengue fever, thermal stress, allergens extreme events, waterborne diseases and other diseases (3). The elderly, infants, children, and urban poor are expected to be most vulnerable to the rapidly changing climate (4,5). Water sanitation and hygiene are important in protecting people from diarrhoeal and other diseases and small water supplies represent a health risk to people served by them throughout the world (6,7).

Radon is one of the most extensively investigated human carcinogens and one of the few for which there is demonstrable epidemiologic evidence of carcinogenic potential (8). Radon is an inert gas formed by the radioactive decay of uranium-238, which is present in rocks and soils in the earth’s crust. Radon can enter homes through tiny cracks and fissures in the foundation of homes, and is present in most homes at some level. Radon further decays into radioactive daughter products, which release alpha particles into indoor air. Upon inhalation such particles possess sufficient energy to damage DNA in lung tissue (9). Current estimates suggest that radon in homes is responsible for approximately 10% of all lung cancer deaths in Canada, making radon the second leading cause of lung cancer after tobacco smoking (9).
estimated to be the second leading cause of lung cancer after smoking (10).

In spite of all this evidences, people’s risk perceptions are based on a diverse array of information that they have processed on risk factors, as well as on their benefits and contexts. People receive information and form their values based on their past experiences, communications from scientific sources and the media, from familiar and peers groups. In a similar way, perceptions of risks to health are embedded within different economic, social and cultural environments (11).

To increase the awareness of the community is the crucial stage to reduce environmental risks (12). The purpose of the study was to assess knowledge and attitudes on health effects of environmental risk of university students in the region of Kocaeli as an industrial city.

Materials and methods

The study was conducted according to the human research ethics principles and code of conduct. The Kocaeli University located in Kocaeli were randomly selected for the survey which was conducted in the fall semester of 2009. A questionnaire form was used that developed by Cinar et al (13). The questionnaire was distributed randomly to university students in Kocaeli, and completed and returned anonymously.

The first section of the instrument included personal characteristics (gender, age,); the second section inquired knowledge about the following eleven risk items: tobacco smoking, sunlight exposure and skin cancer, global climate change, air pollution, noise exposure, smoking during pregnancy and low birth-weight, exposure to radon and lung cancer, reducing radon, air pollution and cardiovascular diseases, base stations, Extremely Low Frequency Electric and Magnetic Fields (ELF-EMF).

The third section explored the degree of threat for each of a set of preselected environmental eleven risk items: water pollution, environmental tobacco smoke, air pollution, ozone depletion and continuing exposure to radon gas, soil pollution, exposure to ELF-EMF, noise pollution, formaldehyde gas emission related to furniture, ground ozone, pesticides.

All questions about knowledge were on a three-point Likert scale with options for “yes”, “no” and “no idea”, whereas questions on attitudes had a standard closed-ended format with three point scale response alternatives for each potential environmental risk ranging from “extreme threat”, “Mild/moderate threat”, “no threat at all”.

Statistical analysis

The data were analysed using a statistical packet programme. Kuruskal-Wallis Test was used for comparisons of non-parametric variables. Differences were considered significant at $p<0.05$. Other data were descriptively presented as percentages.

Results

278 students (39.2 % of the male and 37.6% of the female) participated in the study. The mean age of these students was 20.23 ± 1.48 years (range: 17-26).

The frequency of responses about knowledge on environmental risk factors and related health effects is presented in Table 1.

The highest rate (74.3 %) of correct answers was obtained with the question about smoking “tobacco smoking is a risk factor for respiratory disease”. The lowest rate of correct answers (30.1 %) was obtained with the question “residential exposure to radon gas is a risk factor for lung cancer”.

Male students had a higher rate of correct answers compared to female students for the question “Is exposure to ELF-EMF increasing the risk of brain cancer?” ($\chi^2=4.096$, $P=0.043$).

Table 2 presents proportions of respondents who perceive very strong/extreme dread related with a list of environmental issues.

When university students were asked to self-rate “environmental risks and resulting threat to health”; 59.1 % of answers were indicating “the most significant threat is water pollution”, 15.2 % of answers were indicating that “the lowest threat aspect is noise”.

When it was compared opinion of students according to gender regarding to health threats of environmental risks, male students’ opinion com-
pare to female ones, respectively; “Environmental tobacco smoke” ($\chi^2=11.714$, $P=0.001$), “Ozone depletion and continuing” ($\chi^2=12.619$, $P=0.000$), “Exposure to ELF-ELM” ($\chi^2=13.800$, $P=0.000$), “Residential exposure to radon gas” ($\chi^2=5.871$, $P=0.015$), “Residues of pesticides on the vegetables and fruits” ($\chi^2=9.223$, $P=0.002$), “Noise exposure” ($\chi^2=5.668$, $P=0.017$), “Formaldehyde gas emission related to furniture” ($\chi^2=7.339$, $P=0.007$) and such environmental risks are more threatening for health. Difference was found meaningful statistically.

### Table 1. Respondents’ knowledge about environmental risk factors and health effects

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
<th>No idea</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>N</strong></td>
<td><strong>%</strong></td>
<td><strong>N</strong></td>
<td><strong>%</strong></td>
</tr>
<tr>
<td>Is tobacco smoking a risk factor for respiratory disease?</td>
<td>269</td>
<td>74.3</td>
<td>9</td>
</tr>
<tr>
<td>Is solar ultraviolet radiation a possible risk factor for skin cancer?</td>
<td>245</td>
<td>67.7</td>
<td>18</td>
</tr>
<tr>
<td>Is there any role of human actions at the global climate change?</td>
<td>266</td>
<td>73.5</td>
<td>7</td>
</tr>
<tr>
<td>Is outdoor air pollution associated with an increase in daily mortality for chronic respiratory disease?</td>
<td>247</td>
<td>68.2</td>
<td>7</td>
</tr>
<tr>
<td>Is there any relation between tobacco smoking during pregnancy and low birth-weight?</td>
<td>166</td>
<td>45.9</td>
<td>15</td>
</tr>
<tr>
<td>Is continued noise exposure a possible cause of irreversible hearing loss?</td>
<td>182</td>
<td>50.3</td>
<td>22</td>
</tr>
<tr>
<td>Is outdoor air pollution associated with an increase of cardiovascular hospital admissions?</td>
<td>203</td>
<td>56.1</td>
<td>19</td>
</tr>
<tr>
<td>Is exposure to ELF-EMF increasing the risk of brain cancer?</td>
<td>194</td>
<td>53.6</td>
<td>6</td>
</tr>
<tr>
<td>Is living near mobile phones base stations increasing the risk of childhood leukaemia?</td>
<td>176</td>
<td>48.6</td>
<td>11</td>
</tr>
<tr>
<td>Regular ventilation is a way to reduce residential radon gas?</td>
<td>113</td>
<td>31.2</td>
<td>11</td>
</tr>
<tr>
<td>Is residential exposure to radon gas a risk factor for lung cancer?</td>
<td>109</td>
<td>30.1</td>
<td>11</td>
</tr>
</tbody>
</table>

### Table 2. Respondents’ attitudes toward environmental risk

<table>
<thead>
<tr>
<th>Feelings of dread when thinking of:</th>
<th>extreme threat</th>
<th>mild/moderate threat</th>
<th>no threat at all/minimal threat</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
</tr>
<tr>
<td>Unsafe water</td>
<td>214</td>
<td>59.1</td>
<td>61</td>
</tr>
<tr>
<td>Outdoor air pollution</td>
<td>201</td>
<td>55.5</td>
<td>74</td>
</tr>
<tr>
<td>Environmental tobacco smoke</td>
<td>158</td>
<td>43.6</td>
<td>105</td>
</tr>
<tr>
<td>Ozone depletion and continuing</td>
<td>205</td>
<td>56.6</td>
<td>65</td>
</tr>
<tr>
<td>Residues of pesticides on the vegetables and fruits</td>
<td>186</td>
<td>51.4</td>
<td>78</td>
</tr>
<tr>
<td>Exposure to ELF-ELM</td>
<td>154</td>
<td>42.5</td>
<td>98</td>
</tr>
<tr>
<td>Ground ozone related with dye and adhesive</td>
<td>97</td>
<td>26.8</td>
<td>119</td>
</tr>
<tr>
<td>Soil pollution</td>
<td>144</td>
<td>39.8</td>
<td>106</td>
</tr>
<tr>
<td>Residential exposure to radon gas</td>
<td>96</td>
<td>26.5</td>
<td>137</td>
</tr>
<tr>
<td>Formaldehyde gas emission related to furniture</td>
<td>76</td>
<td>21.0</td>
<td>113</td>
</tr>
<tr>
<td>Noise exposure</td>
<td>55</td>
<td>15.2</td>
<td>130</td>
</tr>
</tbody>
</table>
Discussion

The survey demonstrated a complex pattern of knowledge and attitudes on environmental risk of university students. As expected, almost all participants recognized tobacco smoking as a risk factor for respiratory disease. Bianco and colleagues, Cinar and colleagues have been defined in their studies that smoking is the first factor as health hazard among environmental risks (2,13). Smoking is being cause 87% of all lung cancer cases. (14). It is thought that education and legislative studies in Turkey about tobacco smoking and its hazards are effective on university students to perceive smoking as the most significant health risk factor.

The knowledge about the association of tobacco smoking during pregnancy and low birth-weight was not well known in our sample (26.8 % had “no idea” about the subject). This indicates a need for educating the public on this issue. Pregnant women who smoke are more likely to have babies who have an increased risk of death from sudden infant death syndrome and respiratory distress. They are also more likely to have low birth-weight babies; low birth weight is linked to many infant health disorders (14). Karacaaltincaba and colleagues had found in a study they performed in Turkey; smoking rates before and after pregnancy were 34.7% and 14%, respectively. Passive smoking was seen in 69.2%. The result of the same study showed that tobacco smoking or exposure to smoking rate is high during pregnancy (15).

Obviously, training needed regarding to this subject for the parents candidates of future.

Outdoor air pollution is the first priority aspect which threatens health significantly according to parent’s opinion which is in accordance to the results of Bianca’s study (1). In a study performed in Turkey by Gursoy and colleagues air pollution and ozone layer depletion is emphasised as a primary environmental risk definition, as well (12).

Tropospheric ozone pollution should be distinguished from the problem of stratospheric ozone depletion, which is linked to global warming and risks of UV radiation (16). Heat exhaustion is the most common heat-related illness. As a result of differences in climate and the prevalence of adaptations such as air conditioning, heat-related mortality rates can be expected to vary among cities. Prolonged exposure to high temperatures can cause heat-related illnesses, including heat cramps, heat syncope, heat exhaustion, heat stroke, and death (17-20).

In Turkey, Beyhun and colleagues reported that damage of ozone layer was perceived among very high environmental risk factor in their study that was conducted among the medical faculty students. In our study; according to the students ozone depletion was in second range, air pollution was third range among the importance of environmental risks (21).

It was observed that male students gave more correct answers to the question related to negative effects of exposure to ELF-EMF on health.

Females tended to be significantly more concerned by environmental issues and this has been reported also in previous studies suggesting a stronger belief in women on the significance of environment quality on well being (2,22,23). Our findings were not similar with theirs. In Beyhun and colleagues’ study it was reported that mobile phone is perceived as more important risk factor by male students (21). This finding is similar with ours.

In our study it was determined that water pollution is perceived as the most important health threatening risk factor by the students. In Beyhun and colleagues’ similar study the factors that related with water and soil pollution are not the place in premier environmental risk factors.

Exposure to radon gas and association of lung cancer has been rated as the lowest among all investigated environmental health risks by the participated students. Nearly half of the participants (43.6 %) had “no idea”. One third of the students (37.8 %) were thinking that exposure to radon represents a middle level risk. It has been observed that students are in need of information about this issue. This results are similar to a study run in Italy by Bianco and colleagues. Also, in Bianco’s study the rate of parents who had “no idea” about radon was found as high as 35.5% (2).

In Rafique and colleagues’ study it was denoted that about 30% people (excluding medical students and physicians) were aware of radon, and about 6% had knowledgeable awareness of radon. About 80% of the medical students and physicians had heard about radon and about 30.5% of them had knowledgeable awareness about radon and its hazards (24).
In Pakistan Rahman and colleagues made a survey on 7000 people with different educational backgrounds. In this survey, participants included uneducated people (1000), science and humanities graduates (2000 each) and under graduate (2000). Statistical analysis, excluding uneducated people, revealed that 30.4% of the total respondents were aware of radon and 69.6% had even not heard of radon. Only approximately 8.4% of the total respondents were knowledgeably aware of radon (25).

Cigarette smoking is the most common cause of lung cancer. Radon represents a far smaller risk for this disease, but it is the second leading cause of lung cancer in the United States. Scientists estimate that approximately 15,000 to 22,000 lung cancer deaths per year are related to radon. Although, the association between radon exposure and smoking is not well understood, exposure to the combination of radon gas and cigarette smoke creates a greater risk for lung cancer than either factor alone. The majority of radon-related cancer deaths occur among smokers (26).

Environmental tobacco smoke has recently received considerable publicity and an extensive public health campaign has been carried out by the Ministry of Health conducting to the banning of smoking from all public places, whereas radon gas, the second leading cause of lung cancer, is not subject to much attention by the media and the public (Bianco et al. 2008). It is clearly seen that information about this subject in terms of public health is a conspicuous necessity.

Noise pollution was the rated the lowest threat to health among environmental risk factors by students. Similar to the present finding, in the studies of Gokcay and colleagues, Cinar and colleagues and Bianco and colleagues noise pollution is declared as the lowest risk to threaten health (2,12,13). Noise was highlighted in the most bottom rank as an environmental risk in a study with Medical students by Beyhun and colleagues (21). Even though, noise pollution is a significant environmental problem in the modern world which depends on technological revolution, it is emphasised in various studies as a less known type of pollution in Turkey (27,28).

Conclusion

It was determined that university students’s knowledge about some of environmental health risks is insufficient, the results of this study revealed that some of the most significant environmental health risks were not widely known and the corresponding threat to health was underestimated. School education on significant environmental risks is extremely needed for these university students in order to correct misconceptions, provide accurate information and to develop a positive attitude towards environmental risks. For this purpose, it is suggested to take elective lesson about development of health for university students.

References


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