HEALTH COMPLAINTS AMONG SUBJECTS INVOLVED IN OIL CLEANUP OPERATIONS DURING OIL SPILLAGE FROM A GREEK TANKER “TASMAN SPIRIT”

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Abstract

Background: Oil spillage in the sea water is a disaster for marine life and humans in the vicinity. The study aimed at investigating health complaints among subjects involved in oil cleanup operations during a spillage from a Greek oil tanker “Tasman Spirit”. Subjects and Methods: The project was conducted under the supervision of the Department of Physiology, College of Medicine, King Khalid University Hospital, King Saud University, Riyadh, Saudi Arabia. The study concerned the respiratory and general health complaints in 50 apparently healthy, non-smoking male workers exposed to crude oil during oil cleanup operations. The exposed group was matched with a similar number of male, non-smoking controls. The health complaints were evaluated based on a comprehensive interview. Results: The subjects involved in oil cleanup operations had significantly higher rates of health complaints including cough (38%), runny nose (36%), eye irritation/redness (32%), sore throat (28%), headache (28%), nausea (24%), and general illness (18%), compared to their matched controls. Conclusion: Air pollution due to crude oil spillage into sea water may cause respiratory and general health complaints in workers involved in oil cleanup operations.

Key words:
Oil spill, Tasman Spirit, Respiratory findings, Health complaints, Greek oil tanker

INTRODUCTION

The sea ports are the most productive and populated spots on earth but, unfortunately, they are also likely to face a variety of natural hazards such as hurricane strikes (e.g. Katrina or Rita) or tsunami following the earthquakes, as well as other disasters, like oil spills. Oil spillage into the sea results in severe pollution of marine environment. A number of oil spill incidents have been recorded during the transportation of crude oil [1–5]. A famous example is the spillage from a Greek oil tanker, the “Tasman Spirit”,...
Subjects
This study was commissioned immediately after the incident. The investigators visited the coastal areas of Karachi, Pakistan, observed the situation onsite and conducted an interview with 115 subjects who were engaged in oil cleanup operations at Clifton beach, Karachi, for at least 8–10 h a day for six days a week. These workers were wearing a simple, cloth-made, nose and mouth mask as a protective measure. A temporary shelter was built on the Clifton beach, where the participants were interviewed. The principal investigator, Professor Meo, conducted a comprehensive interview, based on a standardized questionnaire, including a general introduction, family history, job description, smoking habit, tobacco chewing habit, and respiratory and general health complaints. Eventually, 50 subjects were admitted to the study group.

This interview was also used to select the control group. A total of 80 subjects were interviewed and finally 50 healthy males were enrolled in the study as matched controls. The control group was composed of clerical staff, shopkeepers and salesmen who lived at a distance of about 15–20 km from the coastal belt.

Exclusion criteria
Subjects with a history of gross anemia, diabetes mellitus, pulmonary tuberculosis, bronchial asthma, chronic bronchitis and malignancy were excluded. Drug addicts, cigarette smokers, subjects exposed in any industry which generated smoke and dust, and subjects working at petrol pumps and gas stations were also not considered in the study [13].

Statistical analysis
The odds ratio was computed with a 95% confidence interval, and using GraphPad InStat, 4.0 software.

RESULTS
Table 1 summarizes the respiratory health complaints among the workers involved in oil cleanup operations (study group) and in their matched controls.
The subjects showed a higher rate of cough (38%), runny nose (36%), sore throat (28%), general illness (18%), shortness of breath (14%), chest tightness (8%), phlegm (8%) and wheezing (6%), compared to controls.

Table 2 demonstrates the frequency of symptoms among individuals involved in oil cleanup operations compared to that in the control group. The exposed group complained of eye irritation/redness (32%), headache (28%), nausea (24%), itching skin (14%), vomiting (8%), diarrhoea (4%), abdominal pain (2%) and fever (6%) (Table 2, Fig. 2).

### Table 1. Respiratory health complaints in subjects exposed to crude oil vs. controls

<table>
<thead>
<tr>
<th>Clinical symptoms</th>
<th>Subjects exposed to crude oil (n = 50) %</th>
<th>Controls (n = 50) %</th>
<th>OR</th>
<th>95% CI</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>General illness</td>
<td>9/50 (18%)</td>
<td>0/50 (0%)</td>
<td>30.46</td>
<td>1.7–542.2</td>
<td>0.0004</td>
</tr>
<tr>
<td>Cough</td>
<td>19/50 (38%)</td>
<td>3/50 (6%)</td>
<td>9.60</td>
<td>2.61–35.22</td>
<td>0.0002</td>
</tr>
<tr>
<td>Sputum</td>
<td>4/50 (8%)</td>
<td>1/50 (2%)</td>
<td>4.26</td>
<td>0.46–39.57</td>
<td>NS</td>
</tr>
<tr>
<td>Shortness of breath</td>
<td>7/50 (14%)</td>
<td>1/50 (2%)</td>
<td>7.98</td>
<td>0.94–67.5</td>
<td>NS</td>
</tr>
<tr>
<td>Wheezing</td>
<td>03/50 (06%)</td>
<td>0/50 (0%)</td>
<td>7.44</td>
<td>0.38–148.0</td>
<td>NS</td>
</tr>
<tr>
<td>Chest tightness</td>
<td>4/50 (8%)</td>
<td>0/50 (0%)</td>
<td>9.77</td>
<td>0.51–186.7</td>
<td>NS</td>
</tr>
<tr>
<td>Sore throat</td>
<td>14/50 (28%)</td>
<td>3/50 (6%)</td>
<td>6.09</td>
<td>1.6–22.8</td>
<td>0.006</td>
</tr>
<tr>
<td>Runny nose</td>
<td>18/50 (36%)</td>
<td>2/50 (4%)</td>
<td>13.5</td>
<td>2.9–62.2</td>
<td>0.0001</td>
</tr>
<tr>
<td>Asthmatic attacks</td>
<td>4/50 (8%)</td>
<td>0/50 (0%)</td>
<td>9.77</td>
<td>0.51–186.7</td>
<td>NS</td>
</tr>
</tbody>
</table>

OR — odds ratio.
95% CI — 95% confidence interval.
NS — non-significant.

### Table 2. Health complaints among subjects exposed to crude oil vs. controls

<table>
<thead>
<tr>
<th>Clinical symptoms</th>
<th>Subjects exposed to crude oil (n = 50) %</th>
<th>Controls (n = 50) %</th>
<th>OR</th>
<th>95% CI</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eye irritation/redness</td>
<td>16/50 (32%)</td>
<td>1/50 (2%)</td>
<td>23.06</td>
<td>2.9–182.3</td>
<td>0.0001</td>
</tr>
<tr>
<td>Itchy skin</td>
<td>7/50 (14%)</td>
<td>1/50 (2%)</td>
<td>7.98</td>
<td>0.94–67.5</td>
<td>NS</td>
</tr>
<tr>
<td>Fever</td>
<td>3/50 (6%)</td>
<td>0/50 (0%)</td>
<td>7.44</td>
<td>0.38–148.0</td>
<td>NS</td>
</tr>
<tr>
<td>Nausea</td>
<td>12/50 (24%)</td>
<td>2/50 (4%)</td>
<td>7.98</td>
<td>1.6–35.9</td>
<td>0.007</td>
</tr>
<tr>
<td>Vomiting</td>
<td>4/50 (8%)</td>
<td>0/50 (0%)</td>
<td>9.77</td>
<td>0.51–186.7</td>
<td>NS</td>
</tr>
<tr>
<td>Diarrhoea</td>
<td>2/50 (4%)</td>
<td>0/50 (0%)</td>
<td>5.2</td>
<td>0.24–111.3</td>
<td>NS</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>1/50 (2%)</td>
<td>0/50 (0%)</td>
<td>3.06</td>
<td>0.12–77.0</td>
<td>NS</td>
</tr>
<tr>
<td>Headache</td>
<td>14/50 (28%)</td>
<td>2/50 (4%)</td>
<td>9.33</td>
<td>1.99–43.7</td>
<td>0.002</td>
</tr>
</tbody>
</table>

OR — odds ratio.
95% CI — 95% confidence interval.
NS — non-significant.
The authors observed that the prevalent respiratory symptoms among male workers were wheezing with breathlessness (9.6%); shortness of breath (10.3%); chronic cough (16.1%); chronic phlegm (17.6%); asthma (4.7%); chronic bronchitis (4.6%); nasal allergy or rhinitis (7.9%). Furthermore, Surez et al. [17] and Carrasco et al. (2006) [11] reported the toxic effects including headache, itchy eyes, nausea, vomiting, dizziness, throat and respiratory tract problems and noted that these symptoms were more prevalent among workers who did the cleanup in highly polluted areas. The overall frequency of the health complaints reported by Surez et al. [17] was 8% for headache, 5% for eye symptoms, 10.7% for neuro-vegetative disorders, and 8.1% for the throat and respiratory problems.

In the present study, the subjects involved in oil cleanup operations showed a high prevalence of cough (38%), runny nose (36%), eye irritation/redness (32%), sore throat (28%), headache (28%), nausea (24%), and general illness (18%). In this study, we attempted to minimize the confounding factors by using matched controls, excluding smokers, workers with any previous industrial exposure to dust, fume and oil. Moreover, workplace exposure conditions were approximately consistent for all the exposed subjects.

This study has also some limitations. Firstly, we were constrained to recruit a limited number of subjects (50 in each group) because of the odor of crude oil, a general concern in the community, and a rapid changing of work shifts. Secondly, most of the subjects were workers at the Karachi Municipal Corporation (KMC) who were directed to the disaster site by the administration of Karachi. It should be noted that the KMC workers were already exposed to dust while cleaning the streets and roads and dust is among the causal factors of respiratory health problems [18]. For this reason, the KMC workers were also excluded from the study. Thirdly, the workers were at first unwilling to participate for fear that they would have to go on early retirement if their health condition was found to be impaired. However, when the workers were assured that this type of study can be beneficial to them, they usually...
agreed to take part in the project. Considering the above circumstances, we were constrained to recruit 50 subjects in each group.

CONCLUSION

The results of the present study suggest that the subjects involved in oil cleanup operations had a higher rate of such complaints as general illness, cough, runny nose, eye irritation/redness, sore throat, headache and nausea, compared to the control group. These findings indicate that environmental disasters caused by oil spillage incidents lead to a number of health consequences, which should be taken into consideration when the cleanup tasks are being planned and performed. Most of these health effects are due to the physicochemical properties of crude oil, the magnitude of spillage and the nature of the tasks involved. Therefore, appropriate protective measures, such as wearing an apron, hand gloves and long boots, should be undertaken, and respiratory protection equipment, should be provided to the workers engaged in oil cleanup operations. One should also bear in mind that, apart from the respiratory and general health complaints reported in this study, being a witness of such catastrophes may also lead to short- and long-term psychological disorders. Therefore, it is worthy to highlight the need for a serious action on the part of the national/international community and relevant authorities to minimize the number of such environmental disasters and to prevent the adverse, long-term toxicological effects on human health.

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