EVALUATION OF CUTANEOUS LESIONS IN WORKERS OF ISFAHAN TAR REFINEMENT FACTORY: A CROSS SECTIONAL STUDY

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Abstract: Occupational disorders may be caused by chemical, physical, mechanical and biological reason. One of the chemical agents responsible for many of the chemical damages is aromatic, polycyclic hydrocarbons (PAHs) that are found in coke, coal tar, cresosote, asphalt and gases produced by coal. In the current study, we evaluated cutaneous lesions in workers of Isfahan tar refinement factory. This was a cross-sectional study. All (about 340) workers of the factory during 2006-2007 were included in the study. They were asked for presence of any skin disorder or symptoms. All of them were then examined for presences of any cutaneous lesion. Physical examination was performed by 2 expert dermatologists. Wood’s lamp examination, biopsy or direct smear and culture were performed to establish diagnosis in the doubtful cases. Overall, 340 subjects, 334 male and 6 female, were included in this study. 58 subjects (17.1%) had history of direct exposure and without protective measure to chemicals. 159 subjects (46.8%) had history of direct exposure but with protective measure to chemicals. In addition, 82 subjects (34.1%) had history of indirect exposure to chemicals. Different kinds of dermatitis were found in 82 subjects (24.1%). Tar itch as defined by presence of folliculitis along with pruritus and comedones were found in 67 subjects (19.7%). It seems that annual examination of the tar–exposed workers to find any signs of cutaneous malignancies are essential. In addition, follow up of the workers, even after change of occupation and during retirement, seems to be essential.

Key words: Cutaneous lesions, Tar workers,

INTRODUCTION

Occupational disorders may be caused by chemical, physical, mechanical and biological reasons [1]. One of the chemical agents that is responsible for many of the skin damage is aromatic, polycyclic hydrocarbons (PAHs) found in coke, coal tar, cresosote, asphalt and gases produced by coal [2].

Workers with risk of exposure to PAHs are usually those who work in coke and coal tar, iron and steel, aluminum, carbon electrode and asphalt manufacture industries [3]. Lesions such as folliculitis, multiple pruritic comedones called tar itch, large open comedones on the trunk and extremities, phototoxic dermatitis and skin pigmention are reported due to exposure to coal tar [4].

Exposure to these chemical substances can induce chronic cutaneous changes such as poiklioderma on the cheeks and lateral area of the neck [4]. Tar keratoses or tar wart may occur on the skin of face, forearms, hands, dorsum of the feet and scrotum [5]. These lesions may transform to SCC, BCC or keratoacanthoma [4]. In the current study, we evaluated cutaneous lesions in workers of Isfahan tar refinement factory.
MATERIALS AND METHODS

This cross-sectional study was performed in Isfahan coal tar refinement factory. All of the personnel (334 male and 6 female) working in this factory during 2006-2007 were included in this study. Out of these, 303 workers were working in industrial parts and 31 were in administrative jobs. Informed consent was obtained from all subjects.

Demographic characteristics of the patients such as sex, age, occupation, duration of employment, type of exposure to chemical substances and use of protective measures such as mask and glove and regular use of sunscreen were also obtained.

All of the subjects were asked for presence of any skin disorder or symptoms and simultaneously examined for the presence of any cutaneous lesion. Physical examination was performed by 2 expert dermatologists. Wood’s lamp examination, biopsy or direct smear and culture were performed to establish diagnosis in the doubtful cases. Collected data were analyzed using SPSS software ver 13.00.

RESULTS

Overall, 340 subjects (334 male and 6 female), were included in this study. 58 subjects (17.1%) had history of direct exposure and without protective measure to chemicals. 159 subjects (46.8%) had history of direct exposure but with protective measure to chemicals. In addition, 82 subjects (34.1%) had history of indirect exposure to chemicals.

According to our examination, 205 subjects (60.3%) regularly used appropriate protective measures including masks and gloves and 49 subjects (14.4%) only occasionally used these protective measures. 55 subjects (16.2%) never used any protective measure. 3.8% of subjects were complaining of photophobia. Different kinds of dermatitis were found in 82 subjects is presented in tables 1, 2 and 3. Tar itch as defined by presence of folliculitis along with

Table 1: Prevalence distribution of cutaneous lesions in workers of tar refinement factory:

<table>
<thead>
<tr>
<th>Type of Lesion</th>
<th>Lentigo</th>
<th>Tinea Versicolor</th>
<th>Nevus</th>
<th>Phototoxic Reaction</th>
<th>Large Blackheads and Folliculitis</th>
<th>Hemangioma</th>
<th>Conjunctivitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number (%)</td>
<td>11</td>
<td>26</td>
<td>155</td>
<td>56</td>
<td>131</td>
<td>39</td>
<td>2</td>
</tr>
<tr>
<td>(3.2%)</td>
<td>(7.6%)</td>
<td>(45.6%)</td>
<td>(16.5%)</td>
<td>(38.5%)</td>
<td>(11.5%)</td>
<td>(0.6%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2: Prevalence distribution of cutaneous lesions by type of exposure in workers of tar refinement factory

<table>
<thead>
<tr>
<th>Lesion type</th>
<th>Skin Pigmentation</th>
<th>Dermatitis</th>
<th>Tar Pruritus</th>
<th>Erythema</th>
<th>Large Blackheads and Folliculitis</th>
<th>Conjunctivitis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct W/O protective measures</td>
<td>46 (79.3%)</td>
<td>17 (29.3%)</td>
<td>13 (22.4%)</td>
<td>1 (1.7%)</td>
<td>20 (34.5%)</td>
<td>1 (1.7%)</td>
</tr>
<tr>
<td>Direct with protective measures</td>
<td>115 (72.3%)</td>
<td>32 (20.1%)</td>
<td>39 (24.5%)</td>
<td>5 (3.1%)</td>
<td>75 (47.2%)</td>
<td>1 (0.6%)</td>
</tr>
<tr>
<td>Non-Direct</td>
<td>52 (63.4%)</td>
<td>25 (30.5%)</td>
<td>11 (13.4%)</td>
<td>2 (2.4%)</td>
<td>25 (30.5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Administrative Jobs</td>
<td>17 (45.9%)</td>
<td>7 (18.9%)</td>
<td>3 (8.1%)</td>
<td>0 (0%)</td>
<td>9 (24.3%)</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Table 3: Prevalence distribution of cutaneous lesions by duration of exposure in workers of tar refinement factory

<table>
<thead>
<tr>
<th>Lesion type</th>
<th>Skin Pigmentation</th>
<th>Dermatitis</th>
<th>Erythema</th>
<th>Conjectivitis</th>
<th>Phototoxic Reaction</th>
<th>Poiklioderma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of Exposure</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 year</td>
<td>3 (30%)</td>
<td>4 (40%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>1-6 year</td>
<td>50 (64.9%)</td>
<td>14 (18.2%)</td>
<td>1 (1.3%)</td>
<td>0 (0%)</td>
<td>5 (6.5%)</td>
<td>3 (3.9%)</td>
</tr>
<tr>
<td>More than 6 years</td>
<td>160 (74.4%)</td>
<td>52 (24.2%)</td>
<td>7 (3.3%)</td>
<td>2 (0.9%)</td>
<td>48 (22.3%)</td>
<td>11 (5.1%)</td>
</tr>
</tbody>
</table>
Fig. 1: Tar comedones on the face of a patient

Fig. 2: Reil’s melanosis on the forearms of the patient

Fig. 3: Tar folliculits on the thigh of a patient
pruritus and comedones were found in 67 (19.7%) subjects.

**DISCUSSION**

Schwartz and his colleagues [6] reported that tar and its derivatives are among the most common causes of occupational cancers. 35% of these cases were due to tar, 54% were due to pitch and 5% of cases were due to heavy tar oils. Working in the coke oven were responsible for 5% of cases of occupational cancers [6].

Everall and Dowd [7] found that exposure to pitch increases the risk of SCC by 11 times. Nokso and Pukkiala [8] establish that locomotive driver have 1.5 times more risk of non-melanoma skin cancers than others.

Karlehagen et al. [9] caimed that incidences of skin cancers were 2.37 time more in creosote exposed workers as compared to control. Izikson et al. [10] reported a case of combined basal cell carcinoma and langerhans cell histiocytosis of the scrotum in a patient with occupational exposure to coal tar and dust. Further, the development of semi-malignant acanthoma was also reported on the hand of coke oven worker [11].

The analysis of current study showed no case of basal cell carcinoma, squamous cell carcinoma or keratoacanthoma although 5.6% cases of poikiloderma were observed. This finding may be due to the fact that the longest duration of exposure to chemicals for these workers was 10 years as this factory was established in 1997. The usual time for development of skin changes following exposure to chemical is variable between 1 to 20 years [12]. Henry et al. [13] recorded that majority of malignancies following exposure to tar or pitch develop after 20-24 years of exposure to these chemicals. Everall and Dowd [7] also concluded that minimum time require for development of skin cancers following exposure to tar and mineral oil (a derivative of coal tar) is about 20 and 50 years respectively. Regarding the aforementioned facts, it seems that annual examination of the tar exposed workers to check cutaneous malignancy, is essential. Follow up of the workers, even after change of occupation and during retirement also seems to be essential.

**REFERENCES**


