Epidemiological study of ocular morbidities in salt pan worker in Mumbai

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ABSTRACT

Introduction : India is third largest producer of salt in the world after USA and China.Salt crystals affect human body through various physical agents like UV light exposure, glare, salinity of water, soaking of feet in saline water. A study of ocular health problems in salt pan workers at Mumbai was conducted.

Aims & Objectives: To study the socio-demographic profile of salt pan workers,to assess the point prevalence of ocular morbidities in salt pan workers, to study the association between duration of salt works and presence of ophthalmic symptoms and to study the association between use of Personal Protective Equipmentslike goggles, shoes and caps and presence of opthalmological symptoms.

Materials & Methods : The present study is a Cross sectional study and 385 study sujects were enrolled. Mumbai has about seven salt pans at following sites: Wadala, Mankhurd, Kanjurmarg, Ghatkopar ,Chembur, Dhahisar, and Mulund. Individual who were working with dry salt (non-brine workers) and those working in a brine plant (Brine workers) were chosen for the study after taking informed consent.

Sampling method : Systematic random sampling method, Study tools Interview schedule and Clinical examination, **Inclusion criteria:** Salt pan workers who worked for more than six months. **Statistical Analysis:** SPSS version 15.0. The data was analyzed using 'Chi square test'

Duration of study : 18 months, from August 2011 to January 2014.

Results and conclusion: Overall prevalence of ophthalmological symptoms was 57.1 percent. The prevalence of pterygium increased with duration of employment in saltwork.

Keywords: Ophthalmic symptoms, Salt pan workers, pterygium

INTRODUCTION

Today India is third largest producer of salt in the world after USA and China.[1] In Maharashtra Salt production takes place at Mumbai, Mumbai Sub-Urban, Thane, Raigad and Sindhudurg. Workers who work with dry salt in the vicinity of salt milling plants are defined as non-brine workers and those working in brine plans located far away from milling plants were defined as brine workers[2]. Working in salt industry exposes the working population to direct contact with inhalable salt dust, salt crystals as well as concentrated brine, physical stress of hard manual labor, direct bright sunlight and glare due to sunlight reflected by salt crystals and brine surface.

Rationale of the study

Environmental conditions at workplaceput the saltpan workers at the risk of ocular problems like irritation, redness of eyes etc. [3]

Therefore, it was thought to study the ocular health problems of salt pan workers in Mumbai.

MATERIALS AND METHODS

Mumbai has many salt pans in the neighbourhoodof its urban population.This study was conducted there. Salt workers were seasonal workers coming from Dahanu, Talasari, Udhwa, Palghar, Vasai, Bhayander from Maharashtra, Gujarat, Daman and Div, Dadra Nagar Haveli during October toJune. (Fig.no.1)

The study was a Cross Sectional study of salt pan workers in Mumbai and Mumbai sub- urban.

Sample size : $n=z_{1-a/2}2\ p(1-p)/d^2 = 366.56= 367$

where anticipated population proportion (p) =60.7, at 95% confidence level, and d=5 percentage points. The sampling unit was "Individual SaltWorker".

Systematic random sampling method was used to choose the desired number of study subjects.

Salt pan workers working for more than 6months were included in the study and Salt pan workers not willing to participate in the study were excluded.

Data was collected using following data collection tools:

Pretested semi-structured interview schedule by personal interview method and Clinical examination. Referral to ophthalmologist was made whenever necessary for confirmatory diagnosis The data was analyzed using Proportion and Chi square test, to test the association between ocular morbidities and socio- demographic factors.Institutional Ethics committee approval was taken prior to the study.

Study was planned and conducted during the period, August 2011-Jan 2014

Data collection was done over 14 months i.e. from May 2012 to June2013.

RESULTS

Out of 385 Salt pan workers 124 (32.2%) belonged to age group 20-29 years i.e younger age group followed by 85 (22.1%) in 30-39 years age group. Majority of the salt workers were from Maharashtra 246 (63.9%) followed by those hailing from Gujarat 117 (30.4%), Karnataka and Daman Diu 9 (2.3%).Most of the salt workers were living in nuclear families 265 (68.8%), whereas 103 (26.8%) were fromjoint families and 17(4.4%) were from three generationfamilies.Almost half of the salt workers i.e 180 (46.8%) were illiterate, whereas 35.6 % education up to primary level and15.3 % secondary level.Out of 385 salt workers, half 191(49.6%) of the salt workers were belonging to socioeconomic class IV (Lower middle).

Approximately one third 113 (29.3%) were from upper middle class.**[Table no.1]**.Maximum salt workers i.e 46% had worked for less than 5 years followed by 22 % salt workers who worked for 6 to 10 years. Only about 32 % of them had worked as salt workers for more than 10 years. 84% seasonal workers and 16% regular workers found working in the salt industry.Majority of salt workers were addicted to "only smokeless tobacco" i.e 40.2% followed by "alcohol and smokeless tobacco19.6%,"only alcohol" 11.1% whereas other (i.e. tadi) 9.2 %.Overall availability of any personal protective equipments was 349 i.e 90.64% and overall proportion use of personal protective equipments was 67 (17.40%) out of385.

Overall use of goggles by salt workers was only 20% out of 265. Also overall use of shoes by salt workers was 16.66% out of 84. Very few i.e 7 salt workers used goggles and cap both as personal protectiveequipments.The most common ocular morbidity found was pterygium 30.4% followed by redness of eyes 27%, watering of eyes 23.9%. Overall percent prevalence ophthalmic symptom was 57.1%**[Table no.2]**.There was highly significant association between duration of salt works and pterygium. The prevalence of pterygium increased with duration of employment in saltwork **[Table no.3]**. Ophthalmological symptoms were higher among brine workersi.e. 195 (60.37%) as compared to non-brine worker 25 (40.32%). The association between ophthalmological symptoms and nature of job was statistically significant **[Table no.4]**.The prevalence of ophthalmic symptoms to be more in those using goggles **[Table no.5].**

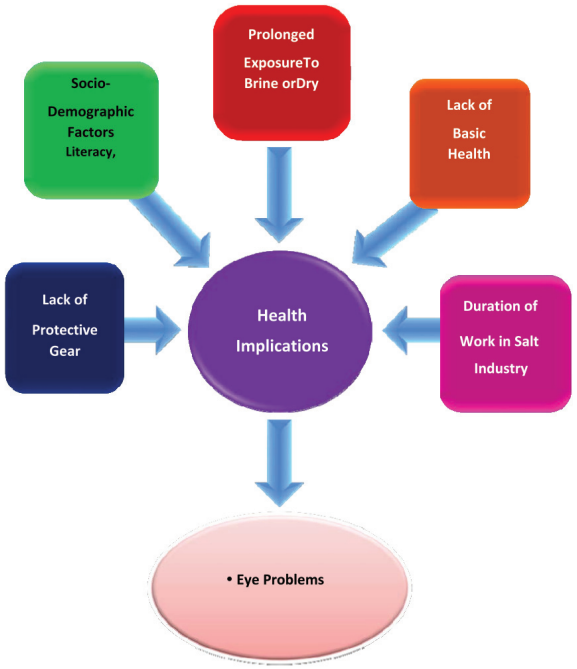

Fig. 1 : CONCEPTUAL FRAMEWORK

Table No. 1: Distribution of salt workers according to socioeconomic status

Socio-Economic Class as per Modified BG Prasad classification, April 2013 (per capita income in Rs.)	Frequency	Percentage
I (Rs 5156 and above)	5	1.3
II (Rs 2578-5155)	53	13.8
III (Rs1547-2577)	113	29.3
IV (Rs 773-1546)	191	49.6
V (Below Rs 773)	23	6.0
Total	**385**	**100.0**

Table No. 2 : Percent prevalence of ophthalmological symptoms among salt workers

Ophthalmic symptoms	Frequency	Percent Prevalence
Pterygium	117	30.4
Redness of eyes	104	27
Burning sensation	55	14.3
Watering of eyes	92	23.9
Glare (intolerance to light)	25	6.5
Diminution of vision	43	11.2
All Ophthalmic symptoms	**220**	**57.1**

Table No. 3: Association between duration of salt works and pterygium

Duration of salt works (years)	Pterygium		Total
	Present (%)	Absent (%)	
0-5	30 (16.9)	147 (83.1)	177
6-10	31 (36.0)	55 (64.0)	86
11-15	19 (38.0)	31 (62.0)	50
16-20	12 (54.5)	10 (45.5)	22
Above 20	25 (50.0)	25 (50.0)	50
Total	**117 (30.4)**	**268 (69.6)**	**385**

X^2 = 35.17 p = 0.0000039 degree of freedom = 4 Significant

Table No. 4 : Association between nature of job and ophthalmological symptoms

	Ophthalmological Symptoms		Total
	Present (%)	Absent (%)	
Brine	195 (60.37)	128 (39.63)	323
Non Brine	25 (40.32)	37(59.68)	62
Total	**220 (57.14)**	**165 (42.86)**	**385**

X^2=8.538 p=0.005 Degree of freedom=1.

Statistically Significant

The risk of ophthalmic morbidity was two times higher among brine worker than non- brine worker. Odd's ratio = 2.255 (1.295, 3.924).

Table No. 5: Association between goggle user and various ophthalmic symptoms

Goggle user	Total (%)	Pterygium	Glare	Watering of eyes	Redness of eyes
Yes	53 (100)	25 (47.1)	7(13.2)	16(30.2)	21(39.6)
No	332(100)	92 (27.7)	18(5.4)	2(0.6)	83(25.0)
Total	**385**	**117**	**25**	**18**	**104**

DISCUSSION

In the present study all salt workers were male. Nearly half of them were illiterate. Similar to these findings **Raman Sachdev[4](2006)** reported that nearly half of the salt workers was literate. Most of them were belonging to socioeconomic class IV.Majority had worked for nearly 6 years and were addicted mainly to smokeless tobacco.Findings of **Kripa Ram Haldiya[3], MurliLalMathur[5](2005)** were compatable as they also found smokeless tobacco as the main addiction among salt workers.Use of Personal protective equipments was not regular.Goggles were not used to prevent the problem but to lessen the discomfort once the worker/s had ophthalmic complaint/s. Likewise **Raman Sachdev[4](2006)** and **R. Sornaraj[6](2007)** in our study also we found that pterygium and other ocular symptoms like redness of eyes, watering of eyes, burning sensation, diminution of vision and glare were common among the salt pan workers. The duration of salt work was significantly associated with pterygium as found in **Murli L Mathur[5] (2005)** study. So working in the salt field exposes the workers to many opthalmological symptoms.

CONCLUSION

Nearly half of the salt workers had work for less than five years and more than one fifth of the salt workers had work for six to ten years. More than one third of the salt workers had only smokeless tobaccoaddiction. Though personal protective equipments were available at the work place only one fifth of the salt worker use goggles, shoes and cap as a protection from reflection of salt crystal by sunlight for eyes and skin.

Most of the common occupational health problem observed among salt worker were ocular morbidities .As the duration of work increased most of the salt workers suffered from more than one ophthalmologicalsymtpoms. One third of the salt workers suffered frompterygium.

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