IRA-International Journal of Applied Sciences
ISSN 2455-4499; Vol.03, Issue 03 (2016)
Institute of Research Advances
http://research-advances.org/index.php/IRAJAS

Assessment of Oral Health among Salt Workers of Little Rann of Kutch, North Gujarat

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DOI: http://dx.doi.org/10.21013/jas.v3.n3.p13

How to cite this paper:
K, U., Chavan, S., & Rajyaguru, D. (2016). Assessment of Oral Health among Salt Workers of Little Rann of Kutch, North Gujarat. *IRA-International Journal of Applied Sciences* (ISSN 2455-4499), 3(3). doi:http://dx.doi.org/10.21013/jas.v3.n3.p13

ABSTRACT

Exposure to industrial chemicals and ecological pollutants results in sober health hazards amongst the workers and general public. Salt workers are exposed to various environmental conditions like direct sunlight, salt dust and make contact with brine, which encompass an impact on the health of workers. While oral wellbeing is an vital part of the general health, we intended to establish its effect on the oral health.

Objectives: *To assess the oral health among the salt workers of Little Rann of Kutch, North Gujarat, India.*

Material and Methods: *A cross sectional, descriptive survey was conducted among 650 Salt workers of little rann of kutch, subjects, Information was gathered on the demographic profile followed by clinical examination for recording the oral health, based on the WHO guidelines. The Chi–square test, t–test, were used for the statistical analysis.*

Results: M*ean DMFT of females (6.49 ± 4.15) were significantly higher as compared to those in males (p=0.001). Majority of the study participants had dental fluorosis and Attachment loss of 4–5 mm and 6-8 mm and the mean number of sextants were significantly higher among males than among females (p=0.05)*

Conclusion: *significant amount of salt workers have a higher prevalence of oral diseases. Implying a deprived ease of access and accessibility to oral health car*e.

Keywords: Oral health, salt workers, occupational hazard

Introduction:

India is one of the major producers of salt accounting for 7.8% of world's salt production. Salt is produced in India by solar evaporation of sea/ sub-soil/ inland brines. India is the third major salt producing country in the World after China and USA, with the global annual production being about 230 million tones. Salt production is one of the major industries in India, which enthralls a huge work force.[1] Gujarat, Tamilnadu, Rajasthan, Andhra Pradesh are the leading salt producing states of the country. Almost 65% of the worker population employed in salt industry is working in salt producing units of Gujarat.[2] Most of the adults splurge their waking hours at vocation. Work provides a number of financial and other benefits. At the similar time, people at work face a range of hazards owing to chemicals, biological agents, physical factors, unpleasant ergonomic situation, allergens, a complex network of safety risks, and numerous and varied psychosocial factors. WHO reports that each year an probable 160 million fresh cases of work-related illness crop up and takes 1.7 million lives, accounting for 3% of all deaths.[3] Salt workers are exposed to occupational hazards like contact with salt crystals and brine, physical stress, sunlight and glare due to sunlight reflected by salt crystals. The salt workers called *'Agarias*" in Gujarati language are not only vulnerable people in the region but they also face physical and economic exploitation by other communities. The salt production centers in Gujarat are spread all along the coast and around Little Rann of Kutch (LRK). The salt produced in coastal area and LRK region is respectively known as marine and inland salt. Very few studies have documented the morbidity among the salt workers. The manufacture of salt is extremely labour oriented. Inland water or lake water which is affluent in salt content is kept in wide and open pans which are manually constructed on the surface of the earth, from where water evaporates under direct sunlight

and salt crystallizes at the bottoms of the brine pans. Salt personnel are occupied in various processes of salt manufacturing, like, sweeping the salt crystals with a wooden spade; heaping of the salt crystals at the edges of the pans; loading, weighing, milling, packing or the transportation of salt.[4] There is some evidence which is related to the general health morbidity of the salt factory workers in association with their work environment. [5] Due to the scarcity of literature on the oral effects amongst vulnerable populace, the current study was taken up to assess the oral health status and the treatment needs of the workers little Rann of Kutch, Gujarat, India.

Materials and methods:

The Study Design and the Study Population

The Great Rann of Kutch is a seasonal salt marsh located in the Thar Desert in the Kutch District of Gujarat, India and the Sindh province of Pakistan. It is about 7,505.22 square kilometres (2,897.78 sq mi) in size and is reputed to be one of the largest salt desert in the world.[6] The present study is a cross sectional, descriptive survey was conducted among the workers of little Rann of Kutch, Gujarat, India. Little desert of Kutch is a salt marsh located near the Great Rann of Kutch in Kutch district, Gujarat, India,[7] situated around 180 km north of Ahmedabad, capital of Gujarat. The rann of kutch is a geographically unique landscape that was once an arm of the arabialn sea. As the land separated from the sea by geological forces, it became a vast featureless plain encrusted with salt that is inundated with water during the rains. All the salt lake workers who were willing to participate in the study, irrespective of their age, sex, designation, work experience, etc, were studied.

Ethical Considerations

The study protocol was reviewed by the ethical committee of Pacific University.

Training and Calibration

Prior to the start of the study, the examiner was consistent and calibrated in the Department of Public Health Dentistry, by the Head of the Department, to make sure uniform interpretations, understanding, and relevance of the codes and criteria for the diseases to be observed and recorded and to ensure a reliable examination. The Kappa statistics, which were found to be 89% and 87% respectively.

The Proforma Details

The survey proforma was designed with help of WHO Oral Health Assessment form (2013)[8] The demographic data which included the age, gender, education and the marital status. Information about the oral hygiene practices and unpleasant habits. Fluorosis, the community periodontal status, the loss of attachment, the dentition status, the prosthetic status and needs were assessed.

Pilot Survey

A pilot study was carried out among 50 salt workers to establish the feasibility and probability of the study and the time which was required for the examination of each

subject. It took more or less 15 minutes to assess every subject. It helped us in discerning and overcoming the practical difficulties.

Clinical Assessment and Data Collection

A sample survey of the households was conducted with families engaged in salt making activity to validate the findings of regional variations in conditions of communities involved in salt production system. Since the salt production is done in inland. The workers (n=650) who gave informed consent were included in the study. The examination was conducted from November 2015 to February 2016. Based on the pre–determined dates according to the schedule, the subjects were examined by making them to sit on a chair in such a way that the maximum lighting was obtained and the oral cavity was examined. The examination was made with the aid of a mouth mirror and a CPI (Community Periodontal Index) probe according to the Type III examination which was described in the WHO Oral Health Survey Basic Methods 2013.[8] On an average, the examination of each subject took about 15 minutes.

Statistical analysis:

The data was compiled and entered into a computer program (Microsoft Excel 2007) along with it was then exported to the data editor page of IBM SPSS Statistics 2015. The explanatory statistics included the calculation of the percentages, means and the standard deviations. The statistical tests which were applied for the study were Pearson's Chi-square test (χ^2), and t-test. For all the tests, the confidence interval and the p-value were set at 95% and ≤ 0.05 respectively.

Results:

A total of 650 subjects who participated in the survey; 356 (55%) were males and 294 (45%) were females. The mean age of the study population was 30.52 ± 14.08. Nearly 63% of the population was married. 3 to 5 % were having education more than high school and rest of the salt workers had education below the middle school level. A majority (n=405; 62.1%) of the study populace were using chew sticks to clean their teeth. As the age increased the use of tooth paste and brush was receded in the study participants (p=0.001). The dominance of consumption of tobacco, alcohol and the combinations of tobacco and alcohol were 33.1%, 12% and 8% respectively. The unfavorable habits showed a considerable rise through rising age (p=0.001).

Bleeding and shallow pockets were seen more among younger and adult age group respectively (p=0.001). Shallow pockets (4–5 mm) and calculus were recognized among 52.3% and 29.8% of the study subjects. 481 (70.1%) subjects substantiated a loss of attachment of 4–5 mm. (6-8 mm) and 99-11mm). Attachment loss of 4–5 mm and 6-8 mm and the mean number of sextants were significantly higher among males than among females (p=0.05). (Table.1)

The mean DMFT of the study population was found to be 5.04 ± 3.29. Females had significantly higher mean DMFTs, decayed, missing and filled teeth as compared to males. (Table.2)

Majority of the study participants had severe fluorosis (53.4%). Only 5.5% of the participants had questionable fluorosis. A significant relationship between dental fluorosis and gender was evident (p=0.001).

Discussion:

The mean DMFT of the study population was (5.04 ± 3.29) females though they had a better oral hygiene than males, females had higher dental caries. The current result is similar with the study conducted by Sudhanshu Sanadhya et. al.[1] the reason for increase in dental caries among females could be the negative influence of the female sex hormones and change in the bodily processes and the activities, which were linked with pregnancy and other associated factors.[9]

Almost 62.1% of the study participants were using chewsticks to 32.4% were using their fingers with tooth paste or powder to clean their teeth. This result were in line with the results reported by Sudhanshu Sanadhya et. al [9]and Sakthi et al [10] Tobacco consumption (33.1%) considered to be the most commonness among adverse habits observed in salt workers. The tobacco prevalence in the present study was slighter when compared to the studies reported by Sudhanshu Sanadhya et. al [1] and Ansari et al.[11] The prevalence of dental fluorosis in the present study was 63%, greater part had severe dental fluorosis (53.4%), which might be due to the high water fluoride level, wherein further studies are needed to rule out the instance and contact to fluoride. Periodontal disease, as was assessed by the Community Periodontal Index (CPI), showed females had a greater number of healthy sextants than males, which is in line with the studies conducted by corbet et. al.[12] Oral hygiene practices, adverse habits, the educational status and the marital status are some of the factors associated with periodontal diseases. A study conducted by paulander[13] and person GR et.al [14] showed that smoking was the strongest independent factor and educational and marital statuses the apparent risk factors for the periodontal disease.

The working conditions followed in Little Rann of Kutch, Gujarat are highly primal and involves intensive physical labour, in very hot and gusty conditions for most part of the day. Most workers have problems connected to eye sight due to reflections of sunlight from the salt crystals. The labourers get into the saltpans in the dawn; the children are left behind devoid of any support or care. It can be broadly pragmatic among children skin infections, running nose, and symptoms of malnutrition.

The awareness of Government schemes and level of access of these are extremely low among salt workers. The actors in the value chain, i.e. lease holders, do not necessarily pass on
information and help these workers to avail their entitlements. The intersectoral harmonization of various departments (Salt manufacture, Health and Labour welfare) in preparing strategies which are efficient regarding progress in the health and the oral health of the salt workers Moreover, salt being considered as an commerce, the policies and priorities are mostly trade related (on productivity and efficiency) and very little that are workers'-centric

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Table. 1: Distribution of mean number of sextants affected by periodontal disease in the study population.

Variables (n=650)	Community Periodontal Index (Mean ± SD)					Loss of attachment (Mean ± SD)			
	Healthy	Bleeding	Calculus	Pocket (4-5 mm)	Pocket (> 6 mm)	0-3	4-5	6-8	9-11
Male (n=356)	0.09 ± 0.11	0.39 ± 0.11	2.41 ± 0.49	2.29 ± 0.83	0.41 ± 0.02	1.62 ± 1.48	4.31 ± 0.92	1.01 ± 1.21	0.39 ± 0.61
Female (n=249)	0.82 ± 0.08	0.10 ± 0.01	2.06 ± 0.03	1.26 ± 0.23	0.32 ± 0.04	2.01 ± 1.89	1.86 ± 0.67	0.28 ± 0.74	0.17 ± 0.29
p-value	0.001	0.001	0.013	0.731	0.658	0.001	0.001	0.001	0.001

Table. 2: Mean DT, MT, FT and DMFT according to age groups and gender

Variables	Mean ± Standard deviation			
	DT	MT	FT	DMFT
Male (n=356)	3.31 ± 1.46	1.19 ± 1.01	0.96 ± 0.48	4.46 ± 2.53
Female (n=249)	4.96 ± 3.80	1.87 ± 1.23	1.63 ± 0.92	6.49 ± 4.15
p-value	0.001	0.001	0.001	0.001