



Skin diseases among tribal pesticide handlers handling pesticides in rural areas of a coastal block, Odisha

Dr Shalini Ray, Dr Ipsa Mohapatra , Dr R.N Rout, Dr Sai Kalinga
Institute Of Medical Sciences,Bhubaneswar,India,drshalini.medhealth@gmail.com

Abstract: Skin diseases among farmers handling pesticides are usually under reported and farmers ignore it as most of them consider it as “part of their job”. Skin being the most exposed organ while pesticide handling, the farmers are predisposed to skin diseases among other health hazards. Little data is available on skin diseases among tribal farmers, especially in coastal region of Odisha where agriculture is the predominant occupation. This study aims at finding out the prevalence of skin disease and associated risk factors in this group of population.

Introduction

Agriculture is a vital part of both the economy and the health of consumers, and the health and productivity of farm workers ultimately affects everyone. Lower productivity may result in lower crop yields and higher prices for consumers. Both are interlinked as good health requires productive agriculture and productive agriculture requires healthy people. The rural areas of Odisha are dominated with 85% population. Agriculture provides 73% of the total work force belonging to cultivators and agricultural laborers and contributes 30% of the net domestic product of the state. According to ILO, the agriculture sector is exposed to health hazards to a great extent³. Agricultural workers engaged in outdoor activities are exposed to large number of health problems in the form of physical factors like extreme weather conditions, sunrays, long working hours, etc. chemical, toxicological hazards in the form of exposure to pesticides/fertilizers. Skin is the most exposed organ while spraying the pesticide on fields ¹. Skin diseases among pesticide handlers handling pesticides are often underreported because their association with the workplace is not recognized ². Due to paucity of data on skin diseases among tribal pesticide handlers handling pesticides in the state of Odisha, particularly in the coastal areas, where farming is widely practiced; this study was conducted.

Objectives

To find out the prevalence of skin disease among tribal pesticide handlers and the associated factors in this section of population.

Methodology

The present study was conducted among tribal pesticide handlers in the Krushna Prasad block of Puri district from October 2014 to July 2015. The inclusion criteria was tribal pesticide handlers aged >18years involved in pesticide application for agricultural purpose for more than a year and a permanent resident of the study area and who give consent to participate in the study. Assuming prevalence of skin disease among pesticide handlers to be 70%³, adequate sample size was calculated. With confidence interval at 95%, relative error of 10% and design effect 2, the following formula was used to determine the sample size:

$$\begin{aligned} n &= Z^2 p(1-p)/d^2 \times DEFF \\ &= ((1.96)^2 \times 0.7 \times 0.3 \times 2) / (0.07 \times 0.07) \\ &= 329.2 = 330 \text{ (approx)} \end{aligned}$$

Considering, 10% non-response rate, final sample size was calculated to be 400.

Multistage cluster random sampling was adopted in the study. Cluster random sampling using PPS (probability proportional to size) was used in identifying villages in the block. From each village, households were selected using simple random sampling to reach the sample size. Households were visited up to two times if the eligible participant was found absent during the first visit. Information was elicited on socio demographic characteristics, pesticide use, and pattern of PPE use. Complete dermatological examination was conducted in a well-lit area. Skin diseases and their pattern was diagnosed by trained doctors according to clinical presentation and morphology of lesions.

Results and discussion

Table 1 shows that a total of 400 tribal pesticide handlers aged ≥ 18 years were surveyed, of which 268 (67%) were males and the rest 132 (33%) were female pesticide handlers. A majority of pesticide handlers (65.5%) belonged to the age group of 40-60 years, followed by 18% in > 60 years age group and only 16.5% were < 40 years age. About 61% of the pesticide handlers were illiterate. About 41% pesticide handlers were from lower socioeconomic class, followed by 40% from lower middle and rest 19% were from middle socioeconomic class

A complete dermatological examination was done for all the pesticide handlers for the diagnosis of skin disease among them. The overall prevalence of skin disease was 63% among pesticide handlers. As per Fig 1, among the lesions of face, acne was the most common (29%). The pigmentary lesions included melasma (7.5%) and freckles (2.5%). The photo induced reactions included PLE (10.5%).

On the basis of self reported symptoms and dermatological examination of the upper extremity of the pesticide handlers as shown in Fig 2, it was found that the most common skin lesions in the upper extremity could be categorized into three types: Infections, Dermatitis and Keratinization defects (Table 3). The common lesions were hyperkeratosis 21% , nail dystrophy 19.5 % , palmar fissuring 7.5% , paronychia 6%. Hyperkeratosis could be attributed to the manual work among pesticide handlers. The causes of large proportion of nail dystrophy could be fungal infection or due to occupational trauma. Similar findings were noted in a study by Tosti et al ⁴. Tinea versicolor , a superficial fungal infection was seen in 12.5% pesticide handlers in the upper extremity. This infection seems to prefer hot and humid climate of coastal areas.

Hand dermatitis was found in 9.5% pesticide handlers. A cross sectional study among agricultural fruits pesticide handlers in Southern Taiwan⁵, 122 pesticide handlers were clinically examined and 30% of pesticide handlers had dermatitis. The difference in findings could be because the latter was conducted only among fruit pesticide handlers. Papules were found in 2.5% of pesticide handlers. Many crops can traumatize the skin by their thin prickly spikes or by laceration. They can produce urticarial papules in pesticide handlers handling crops.

Fig 2 shows the distribution of skin lesions in the lower extremity. In the present study it was found that traumatic and frictional reactions like hyperkeratosis 27% , plantar fissuring 26.5%, paronychia 17.5% , nail dystrophy 17% and pitted keratolysis 13.5% were common in the lower extremity. Other lesions found were foot dermatitis 12%, Tinea versicolor 4% and non-specific rash 1.5%. Only four cases of frictional callosity were found.

As shown in Table 2, there was no significant difference in the prevalence of skin disease in both genders. However, a higher prevalence of skin disease i.e. 71.9% was found in pesticide handlers belonging to lower socioeconomic class as compared to 62.5% in lower middle and



only 44.7% in middle socioeconomic class. This was also found to be statistically significant ($p < 0.001$). Again the prevalence of skin disease was more among the illiterate pesticide handlers as compared to the literate pesticide handlers. The association between skin disease and literacy was found to be highly significant ($p < 0.0001$).

The duration of pesticide handling in terms of years and hours/day of exposure had significant association with skin disease. The findings of the study revealed that skin disease was more common in pesticide handlers who handled pesticide for > 10 years with a prevalence of 78.9%, followed by 57.8% in those who handled for 8-10 years and least i.e. 23.9% in those who handled pesticides for < 8 years. This association between years of pesticide handling and skin disease was found to be statistically highly significant ($p < 0.0001$). Similarly, it was also found that with those pesticide handlers who handled pesticides for < 5 hrs/day were reported to have a lower prevalence of skin disease as compared to those who handled for > 5 hrs/day. The association between hours of pesticide use per day and skin disease had statistical high significance ($p < 0.0001$).

In the present study, 37.3% of the PPE (Personal protective equipment) users developed skin disease while 79.5% of PPE non-users had skin disease. The lower prevalence of skin disease among PPE users as compared to non-users was found to be highly significant ($p < 0.0001$). The findings justify the role of appropriate protective gears in prevention of skin diseases among pesticide handlers.

Conclusion

The findings of the present study estimated the prevalence of skin diseases to be high i.e. 63% among the tribal pesticide handlers in rural settings. The common skin diseases reported among pesticide handlers were hyperkeratosis, paronychia, fungal infections, nail dystrophy, dermatitis, melasma, freckles, PLE and others. Lower socioeconomic status, illiteracy, longer exposure to pesticides, non-usage of PPE were found to be possible risk factors in causation of skin diseases among pesticide handlers.

Recommendations

Information on common skin diseases among pesticide handlers should be properly informed. Since majority of pesticide handlers in rural setting are illiterate and of low socioeconomic status, different schemes should be introduced for addressing the issues. Provision of better quality seeds, non-toxic pesticides and up gradation of traditional skills in farming should be promoted. Immediate attention should be given to implementation of proper awareness programs for pesticide handlers regarding pesticides, their impact on human skin, their storage and usage of safety measures to be practiced while handling, like protective clothing, nose cover, gloves, facial masks and boots etc. Further study should be conducted for suitable protective clothing/gears for pesticide handlers subject to the terms and conditions of different parts of the country. Therefore, an integrated approach as suggested will go a long way in combating the problem of higher prevalence of skin diseases amongst pesticide handlers.

Table 1. Socio demographic profile of pesticide handlers, N =400

Variables	Male (n=268)	Female (n=132)	Total (N=400)
Age (YEARS)	Number (Percentage)		

18-40	40(14.9)	26(19.7)	66(16.5)
40-60	182(67.9)	80(60.6)	262(65.5)
≥60	46(17.2)	26(19.7)	72(18)
Literacy			
Literate	98(36.6)	58(43.9)	156(39)
Illiterate	170(63.4)	74(56.1)	244(61)
Socio economic class (Per capita monthly income)			
Lower (Below Rs 843)	146(54.5)	18(13.6)	164(41)
Lower middle(Rs 843-1684)	82(30.6)	78(59.1)	160(40)
Middle(Rs 1685-2807)	40(14.9)	36(27.3)	76(19)
Total	268(67)	132(33)	400

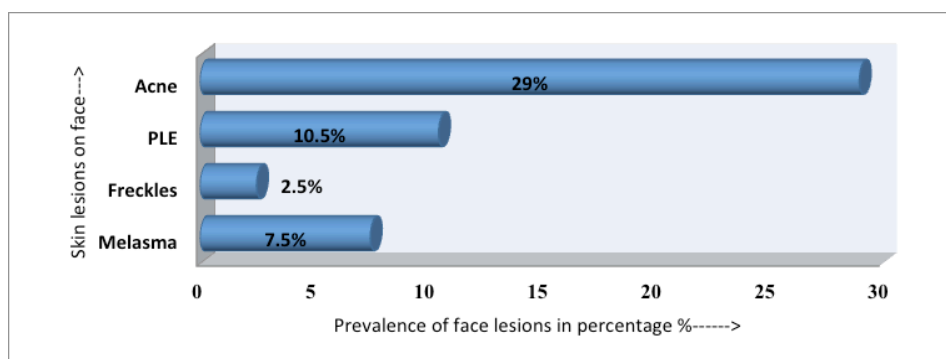


Figure 1. Distribution of skin lesion on face

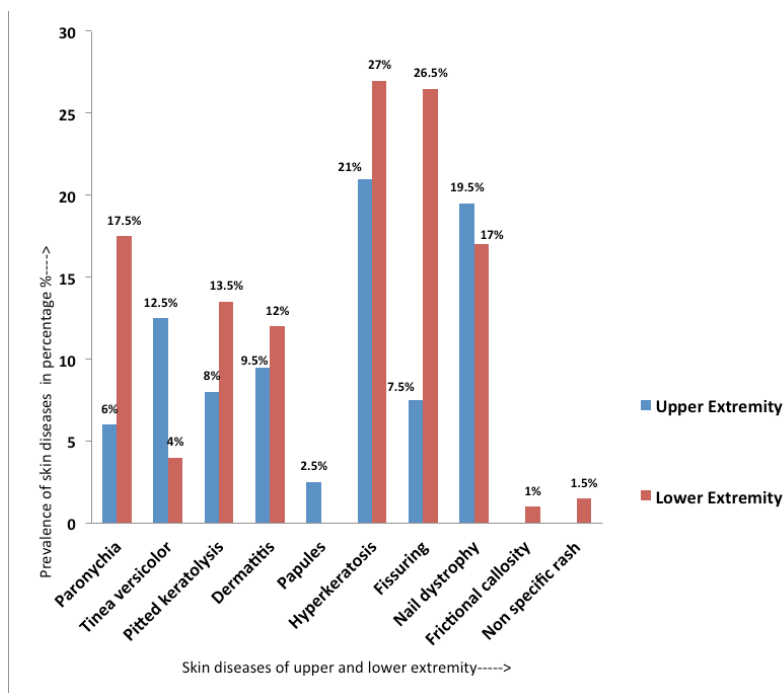


Figure 2. Distribution of skin lesions in upper and lower extremity



Table 2. Association between skin disease and different variables, N =400

Gender	Disease present	Disease absent	Total
Male	170(67.5%)	98(66.2%)	268
Female	82(32.5%)	50(33.8%)	132
Total	252(63%)	148(37%)	400
$\chi^2 = 0.02, d f = 1, p = 0.8$			
Literacy	Disease present	Disease absent	Total
Literate	66(26.2%)	90(60.8%)	156
Illiterate	186(73.8%)	58(39.2%)	244
TOTAL	252(63%)	148(37%)	400
$\chi^2 = 45.53, d f = 1, p < 0.0001$			
Socio Economic Class	Disease present	Disease absent	Total
Lower	118(46.8%)	46(31.1%)	164
Lower Middle	100(39.7%)	60(40.5%)	160
Middle	34(13.5%)	42(28.4%)	76
Total	252(63%)	148(37%)	400
$\chi^2 = 16.53, d f = 2, p = 0.0003$			
Years of pesticide exposure	Disease present	Disease absent	Total
<8 years	13(23.9%)	42(76.1%)	56
8 -10 years/day	90(57.7%)	66(42.3%)	156
>10 years/day	149(78.9%)	40(21.1%)	188
TOTAL	252(63%)	148(37%)	400
$\chi^2 = 56.52, d f = 2, p < 0.0001$			
Hours of Pesticide exposure	Disease present	Disease absent	Total
<5hours/day	65(50.8%)	63	128
>5hours/day	187(68.7%)	85	272
TOTAL	252	148	400
$\chi^2 = 11.3, d f = 2, p = 0.0008$			
USAGE OF PPE	Disease present	Disease absent	Total
YES	59(37.3%)	97	156
NO	194(79.5%)	50	244
TOTAL	252	148	400
$\chi^2 = 69.3, d f = 1, p < 0.0001$			

References:

1. Spiewak R. Pesticides as a cause of occupational skin diseases in pesticide handlers. *Ann Agric Environ Med* 2001;8, 1-5
2. Occupational injuries and illnesses counts, rates, and characteristics, 1995. Washington, D.C.: U.S. Dept. of Labor, Bureau of Labor Statistics, 1998.
3. Shenoj SD, Davis SV, Rao S, Rao G, Nair S. Dermatoses among paddy field workers – A descriptive, cross-sectional pilot study. *Indian J Dermatol Venereol Leprol* 2005;71:254-8.
4. Tosti A, Piraccini BM, Ghetti E, Colombo MD. Topical steroids versus systemic antifungals in the treatment of chronic paronychia: an open randomized double blind and double dummy study. *J Am Acad Dermatol* 2002;47:73-6.
5. Guo YL, Wang BJ, Lee CC, Wang JD: Prevalence of dermatoses and skin sensitisation associated with use of pesticides in fruit pesticide handlers of southern Taiwan. *Occup Environ Med* 1996, 53, 427-431.