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Original Research Article

An epidemiological study of socio-demographic characteristics and pattern of use of personal protective equipments amongst agricultural workers in rural India

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ABSTRACT

Background: India being a country of agriculture, very little attention has been given to the occupational health problems of the agricultural workers; though the need of investigation and intervention towards their problems has repeatedly been mentioned. The objectives of the study were to find out the socio-demographic distribution of agricultural health hazards, to find out the personal protective measures being used by the agricultural workers and to give the necessary recommendations for the prevention of health hazards.
Methods: It was a cross-sectional study conducted from September 2009 to December 2011. A pilot study was conducted on 50 patients. Data collection was done through asking questionnaire from the patients/relatives. Data was analyzed in the form of percentage (%) and presented in the tabular form. Chi- square (χ^2) test was applied as a test of significance.
Results: Out of total 926 cases maximum number of patients were males (549, 59.29%), followed by females (377, 40.71%). Majority of the respondents were primary educated (31.87%) followed by illiterate (29.48%). majority (44.60%) of the respondents belong to Class-IV (lower) socioeconomic status. Males (53.35%) were more addicted than females (10.26%). It was revealed that maximum number of the cases was not using (85.53%) PPE and only 14.47% were using any kind of PPE.
Conclusions: Out of the total 926 cases, 549 (59.29%) were males, followed by females (377, 40.71%). Majority (63.61%) of the respondents have some kind of addiction. It was revealed that maximum number of the cases were not using (83.02%) any kind of PPE.

Keywords: Agricultural workers, Personal protective equipments, Agricultural hazards

INTRODUCTION

Agricultural workers have a multitude of health problems- a fact which is often forgotten because of the widespread misconception that occupational health is mainly concerned with industry and industrialized countries. From the standpoint of capital investment and number of persons employed, agriculture may be termed as big industry.[1]

Agricultural workers perform a wide variety of jobs. It covers not only the farming but also many other associated operations such as crop processing, storage and packing, irrigation, pest control, poultry, fish farming and livestock breeding. It is carried out in an essentially rural environment where working and living conditions are interwoven. Agricultural work is subject to health risks inherent to rural environment at the same time to those deriving from the specific work process involved. Agriculture is one of the most hazardous occupations

worldwide. Agricultural workers may suffer from multiple physical and chemical exposures that accumulate from different workplace.[2]

According to the joint ILO/WHO committee agricultural activities means "all forms of activities connected with growing, harvesting, processing of all types of crops with the breeding and caring of the animals, with tending gardens and nurseries." Due to the characteristic of the rural environment and the nature of the agricultural work, the difference of the various kinds of agricultural task is more marked than other sectors. The application of health measures in agriculture sector is more difficult than in industries.[2]

This sector of activity being most unorganized, very little attention has been given to the occupational health problems of these workers; though the need of investigation and intervention towards these problems has repeatedly been mentioned.[3]

Objectives

- To find out the socio-demographic distribution of agricultural health hazards.
- To find out the personal protective measures being used by the agricultural workers for the prevention of health hazards.
- To give the necessary recommendations for the prevention of health hazards.

METHODS

Study design

It was a cross-sectional descriptive study.

Study period

From September 2009 to December 2011.

Inclusion criteria

All farmers suffering from agriculture related occupational health hazards reported within the study period, were included in the study.

Exclusion criteria

Exclusion criteria were farmers not willing to participate in the study; patients referred to higher centre.

Study area

Pravara Rural Hospital of Rural Medical College Loni falls under Ahmednagar district of western Maharashtra, which is a tertiary care teaching hospital chiefly catering the demands of Ahmednagar and adjacent districts of Maharashtra and thus acts as an apex referral institution. Ahmednagar district has 80.34% rural population and 19.66% urban population. Majority of the people in study area are engaged in agricultural activities.

Data collection

A pilot study was conducted on 50 patients. Data collection was done through asking questionnaire from the patients/relatives; clinical examination and clinical case records of the patients by using predesigned and pretested questionnaire after taking informed consent.

Analysis of data

Data was analyzed in the form of percentage (%) and proportion and presented in the tabular form. Chi- square (χ^2) test was applied as a test of significance with the help of statistical software SPSS statistics (version- 17).

RESULTS

In the present study total 926 participants were interviewed, out of which maximum number of patients were males (549, 59.29%), followed by females (377, 40.71%). Majority of the patients (33.80%) were belonging to age group of >20 to 30 years. Males (19.33%) were preponderant in the age group of >20 to 30 years followed by females (14.47%), in the same age group. Male:Female ratio was 1.46:1. Mean age was 30.36 with SD of 15.19. This highlights that majority of the respondents were between age group of 15 to 45 years which is physiologically active and most commonly engaged age group in agricultural activities (Table 1).

Table 1: Age and gender wise distribution of cases of agricultural health hazards.

Age group (years)	Male (%)	Female (%)	Total (%)
<20	148 (15.99)	89 (09.61)	237 (25.60)
>20-30	179 (19.33)	134 (14.47)	313 (33.80)
>30-40	95 (10.26)	73 (07.88)	168 (18.14)
>40-50	61 (06.59)	41 (04.43)	102 (11.02)
>50-60	47 (05.07)	23 (02.48)	70 (07.55)
>60-70	14 (01.51)	15 (01.62)	29 (03.13)
>70-80	05 (0.54)	02 (0.22)	07 (0.76)
Total	549 (59.29)	377 (40.71)	926 (100)
Mean/SD	30.53/15.47	30.10/14.75	30.36/15.19

In this study majority of the respondents were primary educated (31.87%) followed by illiterate (29.48%), middle school (14.79%), high school (11.12%), below 7 years of age (6.26%), intermediate (5.94%), and least (0.54%) were graduate and above (Table 2).

In this study majority (44.60%) of the respondents belong to Class-IV (lower) socioeconomic status followed by Class-V (35.64%), Class-III (12.74%), Class-II (5.94%), and least cases were belonging to Class-I (1.08%) socioeconomic status (Table 3).

Table 2: Educational status of cases.[1]

Educational status	Male (%)	Female (%)	Total (%)
Illiterate	142 (15.34)	131 (14.14)	273 (29.48)
Primary	189 (20.42)	106 (11.45)	295 (31.87)
Middle	78 (08.42)	59 (06.37)	137 (14.79)
High School	63 (06.80)	40 (04.32)	103 (11.12)
Intermediate	39 (04.21)	16 (01.73)	55 (05.94)
Graduate and above	04 (0.43)	01 (0.11)	05 (0.54)
N/A (<7 years)	34 (03.67)	24 (02.59)	58 (06.26)
Total	549 (59.29)	377 (40.71)	926 (100)

Value of $\chi 2=13.217$, df=6, $p<0.05$, significant

Table 3: Socioeconomic status of cases (as per modified Prasad's classification).[4]

S-E Class	Male (%)	Female (%)	Total (%)
I (upper)	06 (0.65)	04 (0.43)	10 (01.08)
II (upper middle)	29 (03.13)	26 (02.81)	55 (05.94)
III (lower middle)	66 (07.13)	52 (05.61)	118 (12.74)
IV (upper lower)	237 (25.59)	176 (19.01)	413 (44.60)
V (lower)	211 (22.79)	119 (12.85)	330 (35.64)
Total	549 (59.29)	377 (40.71)	926 (100)

Value of $\chi 2=0.668$, df=4, $p>0.05$, not significant

Table 4: Use of PPE amongest cases of agricultural hazards.

Use of PPE	Male (%)	Female (%)	Total (%)
Not using	455 (49.14)	337 (36.39)	792 (85.53)
Using	94 (10.15)	40 (04.32)	134 (14.47)
Total	549 (59.29)	377 (40.71)	926 (100)

Value of $\chi 2=7.658$,df=1, $p<0.01$, significant

In the present study majority of the patients of agricultural hazards were not using (85.53%) personal protective equipments and only 14.47% were using any kind of PPE (gloves-9.07%, mask-0.32%, goggles-0.22%, hat/helmet-0.86%, gumboots-0.22%, jacket/ apron-2.05% and using >1 PPE -1.73%) (Table 4).

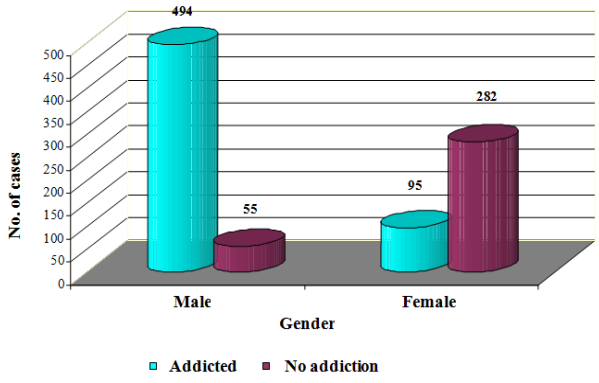

Figure 1: Gender wise addiction pattern of cases.

Majority (63.61%) of the respondents in the present study have some kind of addiction in the form of alcohol (7.99%), smoking (5.83%), smokeless tobacco (gutkha, khaini, mishri etc.-38.77%) or multiple addictions (11.02%). Males (53.35%) outnumbered the females (10.26%). For instances person who is engaged in spraying of pesticides may consume gutkha or tobacco in any form, in between the operations without washing the hands. Alcohol decreases inhibitory control on mind, there by increase chances of risk taking behaviour and not taking adequate precautions and PPE in various agricultural activities like operating mechanical devices and equipments (Figure 1).

DISCUSSION

The finding in present study revealed that maximum number of patients were males (549, 59.29%), followed by females (377, 40.71%). Majority of the patients (33.80%) were belonging to age group of >20 to 30 years. Our findings were consistent with the findings of Nayak et al where they revealed (n=138) males-83.33%, females-16.67%; commonest age group was 21-30 years.[3] Kadam et al also observed (n=935) males-56.1%, females-43.9%, commonest age group was 26-35 years.[5] Gupta et al found that (n=611) males-69.23% and females were 30.77%.[6] Singh et al also observed males were more than 99%.[7] Rastogi et al revealed that (n=530) all were males, mean age was 28.9±8.2 yrs.[8] Calton et al

found that (n=439) males-95.22%, females-3.87%, childern-0.91%, mean age was 26.32±2.98 yrs.[9] Arcury et al also revealed males-93.2%, females-6.8%, almost two third were young under 30 years of age.[10] Ward et al found that (n=716) males-91.48%, females-8.52%.[11] VanderHoek et al also observed males-60%, females-40%, majority belong to age group of 16-29 years.[12] Gurav et al revealed (n=288) males-59.72%, females-40.28%, one third of the respondents were in the age group of 26-40 years.[13] Singh found (n=385) males-68.30%, females-31.70%, 61.8% of the patients were between 21 to 30 years.[14] Verma et al observed (n=30) males-70%, females-30%.[15] Jonathan et al revealed (n=389) males-53.1%, most of the study participants (41.1%) were belonging to 18-34 years age group.[16] Rao et al also found (n=1185) males-93%, females-7%.[17] Rastogi et al observed (n=225) males-58.67%, females-41.33%, mean age was 28.9±8.2 yrs.[18] Saha et al revealed (n=400) 86.25% were males, mean age-38±10.7 yrs and majority in the age group of 30 to 49 years.[19] Khan et al also found (n=105) all were males, mean age 26±9 yrs.[20] Bhat et al also observed (n=389) males-71.72%, females-28.27% and maximum number of respondents were in the age group of 19 to 50 years.[21]

Our findings were different from Mancini et al (males=47, females=50) and Zhang et al (n=910) in which they found that 53.1% cases were females.[22,23]

Regarding educational status our findings were consistent with VanderHoek et al where they revealed that 76% were educated upto primary school.[12] Gurav et al observed illiterate respondents were 67.36%.[13] Jonathan et al found 60.4% respondents were below high school.[16] Rao et al revealed illiterate-28%, high school-5% and graduate<1%.[17] Zhang et al observed that 58%were primary school educated.[23] Nagenthiraraja et al also found primary educated-21% and intermediate-60% and Bonani Mazumdar also revealed that more than two third were illiterate.[24,25]

In this study majority (44.60%) of the respondents belong to Class-IV (lower) socioeconomic status and Similar findings were observed by Kadam et al where they found that 54.4% of the AWs were belonging to lower socio-economic class.[4] VanderHoek et al also observed 60% of respondents were belonging to lower socioeconomic status.[12] Jonathan et al revealed majority of the AWs were belonging to class-IV socioeconomic status.[16] Mancini et al also found 41% of the workers were belonging to lower socioeconomic class and Mobed et al also observed that majority (>90%) were belonging to lower socioeconomic status.[22,26]

However Saha et al in their study did not show similar findings (majority of the workers belong to class-II and class-III socioeconomic status) because they have studied in a agriculture industrial setup.[19]

Majority of the cases in the present study were not using (85.53%) any kind of PPE. Similar findings were observed by Nayak et al where they observed that majority of the workers were not using protective measures.[3] Rao et al revealed that 50% of the farmers in India were not using any kind of PPE.[17] Khan et al noted that most of the farmers did not use any PPE and only a few used shoes (31%), masks (14%) and gloves (9%) during pesticide handling.[20] Nagenthirarajah et al observed that only 6% of the farmers had awareness towards recommended protective measures.[24] Mazumdar Bonani also observed that majority of the farmers hardly use any preventive measures while spraying the chemicals in the fields.[25] Cornwall et al also found that majority of the farmers were not using any PPE which leads to more risks to exposure to pesticides and increased the frequency of poisoning while working in the tobacco farms.[27] Singh and Gupta also revealed that 77% of the respondents were not using recommended protective gears.[28]

Majority (63.61%) of the respondents in this study have some kind of addiction. Similar findings were observed by Gupta et al where they revealed that 59.9% of the farmers were addicted and there was significant association between addiction and impairement.[5] Singh et al also found 73.8%-smokers, 18.9%-chewing tobacco and no addiction-7.3%.[7] Rastogi et al also observed prevalence of chronic bronchitis in relation to smoking habit was 6.3%.[8] VanderHoek et al also found that alcohol dependence was a major risk factor for pesticide poisoning.[12] Gurav et al also observed that no addictions-12.50%, alcohol-42.71%, tobacco products-44.79%.[13] Saha et al revealed that 64% males and 27.8% females were addicted.[19] Singh and Gupta also found that considerable no. (20%) of the respondents were smoking or chewing tobacco or consuming other items during working in the farms.[28] Zhou et al also revealed that incidence of agricultural injuries was maximum in alcoholic farmers.[29] Tiwari and Zodpey also observed higher prevalence of respiratory morbidity amongst smokers.[30] Global Adult Tobacco Survey, 2009-2010, conducted by Ministry of Health and Family Welfare, Government of India, where they found that more than one third (35%) of adults in India use tobacco in some form. The prevalence of tobacco use among males was 48% (smokers-15%, smokeless tobacco-24%, both-9%), as compared with 20% among females.[31]

CONCLUSION

In the present study out of total 926 cases 549 (59.29%) were males, followed by females (377, 40.71%). Majority (63.61%) of the respondents in the present study have some kind of addiction. It was revealed that maximum number of the cases of agricultural hazard were not using (83.02%) any personal protective equipments. So from the present study we can conclude that, various types of the hazards are frequently found amongst the agricultural workers. If these hazards are addressed correctly, can be

prevented by simple precautionary and personal protective measures.

Recommendations

1. Government must organize training programmes, regarding pesticide handling/pesticide application equipment by professionally trained people preferably agricultural engineers, for agricultural workers.
2. The moving parts of the machineries (threshers, chaff cutters etc.) should be fully protected by adequate guards, as to prevent access to them.
3. All personal protective measures like wearing proper clothing, wearing gumboots/shoes while working in the farms are to be taken to prevent occurrence of health hazards.
4. Ensure proper monitoring of pesticide consumption at state and national level so that its misuse can be restricted.
5. Sale of alcohol and tobacco products should be restricted and its use should be discouraged by properly educating the farmers.
6. De-addiction programmes to be organized for addicted farmers.
7. There is need of further exploratory research in direction of early detection prevention and control of occupational hazards and use of suitable protective gears amongst AWs.

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