

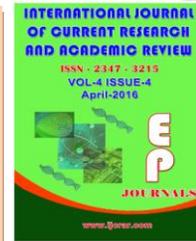


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A Cross-Sectional Study on the Morbidity Profile of Floriculture Workers in Selected Villages in Rural Bangalore, India

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Floriculture workers, morbidity profile, personal protective equipment.

A B S T R A C T

Floriculture is one of the expanding agricultural operations in India. Workers involved in this occupation suffer from high rates of occupation-related health hazards. To identify the morbidity profile of floriculture workers and the factors associated with these morbidities in areas under Sarjapur and Anugondahalli Primary Health Centres in rural Bangalore. This cross-sectional study was undertaken between May and July 2014. A semi-structured questionnaire was administered to capture the socio-demographic status, occupation, pesticide exposure and morbidity status. Workers in the age group of 18 to 60 years with previous 3 months of work experience were included in the study by convenience sampling. A total of 128 workers were interviewed and most of them were cultivating rose (75.2%) and rest of them were (24.8%) cultivating marigold. Most common health problems are musculoskeletal pain (46%), headache (38%), gastritis (21.7%), upper respiratory tract infections (14.72%) and allergic conjunctivitis (10.1%). Only 7.8% of people wear indigenously modified personal protective equipment (PPE) while working. Work-related stress was present in only 3.1% workers. There was significant association between back pain and posture of the workers. Gender, education, income, duration of working hours and flower category were the factors which were found to be significantly associated with personal protective equipment usage. The floriculture workers suffer occupational health hazards. These risks and morbidities among the workers were found to be significantly associated with poor posture while working and inadequate use of PPEs. Larger studies should be conducted in future in exploring the magnitude of the problem, which should also identify the measures to improve the health status of the floriculture workers. Improving the general health awareness of this occupational group will be essential for their well being.

Introduction

Floriculture is a branch of horticulture concerned with cultivation of flowering and ornamental plants for gardens and floristry. Owing to the steady demand of flowers nationally and internationally floriculture has become an important commercial industry in India. ("Indian Floriculture Industry Present status & scope," 2016) As per National Horticulture Database published by National Horticulture Board, during 2012-13 the area under floriculture production in India was 232.74 thousand hectares with a production of 1.729 million tons loose flowers and 76.73 million tons cut flowers. Small farms using traditional cultivation practices produce tons of traditional loose flowers like marigold, chrysanthemum and rose. The domestic Indian market for flowers is growing at 25% per year in the country. ("APEDA, Floriculture and Seeds," 2015) Karnataka ranks first in the country in the production and export of cut flowers. (Gowda, 2009)

Like any other agriculture workers floriculture workers are exposed to chemical hazards like ingestion of pesticides and chronic illness due to pesticides, respiratory problems, dermatitis, physical hazards like heat rash, cramps and muscle spasm, exhaustion, fainting spells, cuts, abrasions and single and multiple traumatic injuries mostly of hands and legs and exposure to non-ionizing radiation causes solar erythema, actinic dermatitis, irritative conjunctivitis and photo keratitis, premature appearance of cataracts (Myers, 1996).

According to a study done in Ethiopia among floriculture workers in greenhouses the common health problems prevalent were respiratory symptoms (81%), fatigue (76.5%), headache (73.4%), skin problem (67.8%), sleepiness (67.5%), dizziness (56.9%) back pain (56.6%) (Defar and Ali,

2013). According to a study in Kenya the common morbidities were respiratory tract infections (42.5%), gastro-intestinal problems (16.7%), injuries and accidents (6.5%), skin problems (6.5%), eye problems (2.4%), (Gitonga, 2010) Extensive literature review in common scientific databases and broader web searches did not identify any studies done in Indian settings. Hence this study was undertaken to gain insight into the possibility of unseen morbidities in this population.

Methodology

This study was a cross-sectional study conducted in villages under Sarjapur and Anugondenahalli primary health care centre areas, Bangalore urban district during May 2014-June 2014. Workers in the age group 18-60 years with at least 3 months work experience were included in the study. Workers were interviewed in the local language by one of the investigators at their work place during working hours. The study tool consisted of a semi-structured interview schedule which captures their socio-demographic status, years of experience in the field and work – related morbidity as well as the use of personal protective equipment while working. Participants were included in the study by convenience sampling and data was entered in excel sheet and analysed using SPSS V16.0

Results and Discussion

Socio-Demographic Details

A total of 129 workers were interviewed. Median age of the study population is 39 (IQR: 30-50). Age and gender distribution of the study population is shown in Table 1. Among the workers 86 (66.7%) had not received any formal education. Of all the workers 2 (1.6%), 34 (26.4%), 2 (1.6%),

5(3.9%) belonged to lower middle, upper middle, high school and higher secondary, graduate and above category of education respectively.

Occupational History

Majority of the workers were in the field of floriculture for 1-5 years. Among the study population 75% were cultivating rose and 25% were cultivating marigold. Apart from growing flowers a minimal number of workers cultivated chillies, tomato and beans seasonally. 94.6% of the workers were working for more than 5 days in a week. Working hours ranged between 6-12 hours for 77.5% of the workers.

Morbidity Profile of the Floriculture Workers

Among the workers interviewed about 79% had experienced at least one health problem in the previous three months. The common morbidities among floriculture workers were musculo-skeletal pain (64%), headache (38%), gastritis (21.8%), allergic conjunctivitis (10.1%), dermatological symptoms (3.1%), and allergic rhinitis (2.3%). Of the musculo – skeletal symptoms generalized body ache (48.1%) was more prevalent followed by lower back pain (10.9%) and limb pain (5.4%). The prevalence of non-communicable diseases like hypertension and diabetes was found to be 6.2% and 2.3% respectively. Only few workers reported to have work related stress (3.9%) and or to have experienced sleep problems (3.1%). 40.3% of the workers sustained at least one injury in the past 3 months and among them only 4% of the workers sought medical care following that. Work related injury was more among rose garden workers as compared to marigold workers. There was significant association between back pain and unphysiological posture of the workers ($p=0.05$).

Pesticide Spraying and Personal Protective Equipment Usage

Pesticide spraying was carried out in the fields by all the workers interviewed. The frequency of spraying pesticide was more than 4 times a month for 91.5% of the workers interviewed. Although all the workers were aware of the benefits of personal protective equipment during work and while spraying pesticides only 7.8% and 26.4% of workers were using indigenously modified personal protective equipment during work and while spraying pesticide respectively. The workers were using clothes wrapped around their palm instead of impermeable gloves; and full-face helmets while spraying pesticide instead of a face mask or respirator. No use of personal protective clothes like aprons and gowns was observed. The reasons for not using personal protective equipment included non-availability and discomfort while working. Table 2 describes the factors associated with personal protective equipment use while spraying pesticide

This study was conducted with an objective to assess the morbidity profile of floriculture workers and factors associated with it in villages under Sarjapur and Anugodenahalli Primary Health Center areas. In our study most of the workforce was males (53.5%) which is in contrast to the studies done abroad. According to NSS 2004-05, in India an estimated 249 million workers are in agriculture, 73% of them are rural workers and women comprise 41.5 per cent. Women workers engaged in agricultural activities are less in India (Thomas, 2012) and which was observed in this study as well. Middle age group contributed the major workforce in our study which is similar to the findings of a study which looked into the socio - demographic profile of the farmers in Tumkur district in Karnataka (Gowda *et al.*, 2015). However most of the workers had not

received any formal education in our study which is similar to a study where socio-economic profile of millet growers from eight districts in Karnataka was explored (S Hemalatha, 2013). Majority of our workers were growing rose as compared to marigold.

This result is similar to the growing pattern of flowers in Karnataka. Among cut flowers rose is the most cultivated plant and among loose flowers it is Marigold or Chrysanthemum (K. Dadlani, 1998).

Table.1 Distribution of Workers by Age Group and Gender

| Age group in years | Gender | | Total N (%) |
|--------------------|-----------------------------|-----------------------------|-----------------------------|
| | Males N (%) | Females N (%) | |
| 18-30 | 15 (21.7%) | 17 (28.3%) | 32 (24.8%) |
| 31-45 | 32 (46.4%) | 22 (36.7%) | 54 (41.9%) |
| 46-60 | 22 (31.9%) | 21 (35.0%) | 43 (33.3%) |
| Total | 69 (100.0%) | 60 (100.0%) | 129 (100.0%) |

Table.2 Factors Associated with Personal Protective Equipment use while Spraying Pesticide among Floriculture Workers

| Factors associated with PPE usage | | PPE while spraying pesticide | | Test Statistic | p value |
|-----------------------------------|--------------------|------------------------------|-----|--------------------|--------------|
| | | No | Yes | | |
| Gender | Males | 41 | 28 | 15.46 ^a | 0.000 |
| | Females | 54 | 6 | | |
| Education | Illiterate | 80 | 6 | 10.02 ^b | 0.012 |
| | Primary | 1 | 1 | | |
| | Middle | 31 | 3 | | |
| | Higher secondary | 2 | 0 | | |
| | Graduate and above | 5 | 0 | | |
| Hours/day | 2-6 hours | 20 | 1 | 7.065 ^b | 0.022 |
| | 7-12 hours | 94 | 6 | | |
| | >12 hours | 5 | 3 | | |
| Income | 3000-10000 | 69 | 18 | 6.418 ^b | 0.05 |
| | 10001-50000 | 24 | 14 | | |
| | 50000-1 lakh | 2 | 1 | | |
| | >1 lakh | 0 | 1 | | |
| Flower category | Rose | 65 | 32 | 8.86 ^a | 0.003 |
| | Marigold | 30 | 2 | | |

^aChi-square value, ^bFischer exact value

In our study about 79% of the workers experienced at least one symptom related to work in the previous three months. This is comparatively less to a study conducted in Ethiopia looking into the prevalence of work related symptoms (93%) for a period of 12 months. This low prevalence of morbidities in our study could be explained by the shorter recall period for which we looked into the symptoms and around 51.6% of the workers work in greenhouses whereas the workers in our study work in open fields (Defar and Ali, 2013). It is likely that prospective studies will reveal higher incidence of morbidity. Occupational related allergic symptoms were found to be more in greenhouse workers as compared to open field workers as evidenced by studies. (Astarita *et al.*, 2001)

The common morbidities found among the floriculture workers were similar although the proportion of symptoms varied in studies done in Ethiopia and Kenya. Respiratory symptoms were the most common symptom among the workers in these studies where as in our study it was musculo – skeletal pain. (Defar and Ali, 2013)(Gitonga, 2010) Life time prevalence of musculo – skeletal symptoms among Irish farmers was found to be 90.6% and the prevalence was found to be higher in greenhouse farmers as compared to open field workers.(Osborne *et al.*, 2012)

Though studies have found out that among the musculo –skeletal symptoms low back pain is the most common site,(Osborne *et al.*, 2013) in our study generalized musculo – skeletal pain was reported more. This difference in our study is more to do with the different type of cultivation and work involved. Work related injury is comparatively more among floriculturist than vegetable farmers which can be explained with the type of plant they are

growing which in this case is rose.(Lu, 2011)

The prevalence of use of personal protective equipment was very low in our study. Similar findings are seen in a study done to assess the pattern of personal protective equipment for safe use of pesticides among agricultural workers in India.(Singh and Gupta, 2009) The reasons for not using PPE were unavailability of the devices and discomfort while working with the PPE in high temperature conditions. Similar reasons were quoted by farmers in Australia for not using PPE while working.(Eun-Kee Park, 2009) Non availability of the personal protective equipment could be due to economic reasons too which needs to be explored further. We found a significant association [Table 2] between gender, category of flowers, income, education and hours of work in a day and personal protective device usage. Females were found to be not using PPE while spraying pesticides as compared to males. The less the education they have received the more the chance of them using a personal protective equipment while spraying pesticides. The decline in usage of PPE while spraying was seen more among workers with duration of work for 7-12 hours and this association was significant. Farmers cultivating rose were more reluctant to use PPE while spraying as compared to marigold workers in our study. We could not find any association between PPE usage and injury sustained probably due to inadequate sample size.

Conclusion

Musculoskeletal symptom was found to be the commonest morbidity among floriculture workers in our study. Limitations of our study is the non-probability sampling which was used and inadequate sample size, issues

of recall also could have been a limitation of the study. Inadequate response by the workers since they were interviewed during working hours adds to the limitation.

Given the prospects of further expansion of this industry, it is important that further studies are carried out which will look deeper and more systematically into the incidence and prevalence of occupational health and safety issues among floriculture workers. Simultaneously, obvious factors that impede the use of PPEs will have to be addressed so as to prevent occupational injuries and illnesses in this population.

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