Original Research Article

OCCUPATIONAL DISEASES AMONG RUBBER PLANTATION WORKERS IN KANYAKUMARI DISTRICT – A CROSS-SECTIONAL STUDY

Sudev Kumar R[1], Gopal Muthukrishnan[2], Krishnaprasad C[3], Suresh Balan K U[4]

[1]*Senior Assistant professor, Department of Community Medicine, Kanyakumari govt medical college, Tamil Nadu, India*
[2]*Associate professor, Department of Community Medicine, Kanyakumari govt medical college, Tamil Nadu, India*
[3]*Krishnaprasad C Assistant professor, Department of Community Medicine, Kanyakumari govt medical college, Tamil Nadu, India*
[4]*Professor, Department of Community Medicine, Kanyakumari govt medical college, Tamil Nadu, India*

A B S T R A C T

Background: Rubber plantation workers are major subset of the working population in Kanyakumari district, Tamil Nadu whose health condition has been subjected to continuous exposure to harsh environment condition, latex allergens, pesticides, vector borne diseases and ergonomic hazards [1]. Despite their significant contribution to the agricultural economy, the health burden among this group is often under reported. This study aimed to assess the prevalence and determinants of occupational diseases among plantation workers in southern India.

Materials and Methods: A cross-sectional study was conducted among 142 randomly selected plantation workers from three major government run rubber estates in Kanyakumari District Tamil Nadu. Data were collected by interviewer method using a pretested structured questionnaire. Information on sociodemographic characteristics, work practices, and health complaints was obtained. Bivariate and multivariate logistic regression was performed to identify predictors of occupational diseases.

Results: The prevalence of at least one occupational disease was nearly 66%. The most common conditions were allergic diseases (71.8%), musculoskeletal disorders (61%), respiratory symptoms (12%) and vector borne diseases (9.5%). Workers aged above 50 years, male gender, lower education qualification and those with more than 20 years of service were significantly more likely to develop occupational diseases ($p < 0.05$).

Conclusion: Occupational diseases are highly prevalent among rubber plantation workers, indicating need for continuous risk assessment, risk stratification and occupational health surveillance to achieve the desired goal for optimal health among the workforce. The results of the study suggest that awareness and practice of personal protective measures during work, proper ergonomic posture and duration of strain and periodic medical check-up are the key to reduce this burden.

Keywords: Rubber plantation workers; occupational diseases; morbidity; musculoskeletal pain.

INTRODUCTION

Tamil Nadu is the second largest rubber producer in India. Rubber plantation work is a major occupation in Kanyakumari district, providing livelihood to a large section of the rural population.[1,2] Latex is the principal ingredient collected from rubber crops. Rubber cultivation workers are basically divided into rubber tappers and field workers, who are repeatedly exposed to various occupational and environmental risk. The demanding job of latex tapping compounded with harsh terrain and humid weather, along with pesticide use and latex protein allergen, contribute to wide range of morbidity like musculoskeletal disorder, respiratory, skin and ocular manifestation. There is also the risk of snake bites,

insect bites, parasitic infection and vector borne diseases. Also, the yield of rubber and price fluctuation has forced workers to grow poor and susceptible.[3] Being in the unorganised sector, there is also the possibility of their suffering being under-reported and under-treated.

Currently, there is limited data available on the occupational diseases among rubber plantation workers in Kanyakumari district. Understanding the prevailing health problems and their determinants is essential for planning effective occupational health interventions, improving workplace safety, and guiding local health authorities in formulating preventive and promotive health programs. Hence this study is justified.

Objectives:

To assess the prevalence of occupational diseases among rubber cultivation workers.

To identify the risk factors associated with the occupational diseases in rubber cultivation workers.

MATERIALS AND METHODS

A cross-sectional study was conducted among rubber plantation workers selected randomly from three government owned rubber plantation in Kanyakumari district Tamil Nadu using a multistage sampling technique. A sample of one hundred and forty-two study participants was arrived using the formula $(z^2 pq)/d^2$, where, z=1.96 for two-sided alpha at 5% level (for the 95% confidence interval), p=0.59, 1-p =0.41, and d=15% (relative precision).[4] The study included both sexes between the age group of 18 to 65yrs who were employed in the job for at least a year. A pretested interviewer administered questionnaire containing items for sociodemographic, personal, comorbidities and clinical examination both in English and local language was used. The data was analysed with SPSS 20v, by using descriptive statistics, chi square test and regression analysis to identify the significant risk factors. A p<0.05 was considered statistically significant. The participation in the study was voluntary and informed consent was obtained from the participants before administering the questionnaire, after ensuring confidentiality. The study was conducted after getting prior permission from the Institute ethics committee.

RESULTS

The mean age of the study participants was 50.54yrs (SD 10.16), being predominantly males (72.5%) and Hindu religion (57%). Only 12.7% individuals have completed higher secondary school and majority (71.8%) were having a monthly income in the range of Rs 6001 to 9000. Nearly 3/4th of the males and 2/3rd of the female workers was involved in rubber tapping and sheet preparation respectively. The years of work ranged from 1 to 50 yrs with 10.5% of study population had work experience more than 30 yrs.

Among the workers surveyed, 81.7% reported working six days per week, while 16.2% indicated that they work all seven days. The daily working duration was six hours for 42.3% of workers, eight hours for 48.6%, and few worked for more than 10 hrs in a day. most workers (67.6%) travel approximately 10 kilometers to reach their workplace daily.

Current smoking was reported by 16.2% of the workers and currently alcoholic were 18.3%. Among the workers, 40.1% were classified as pre-obese, while 3.5% were underweight.
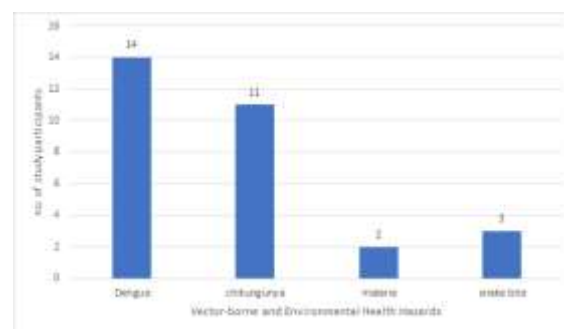

Figure 1: Distribution of vector- borne and environmental health hazard among Study Participants (n = 142)
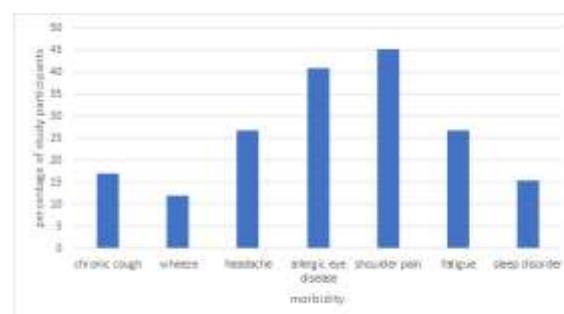

Figure 2: Prevalence of Common Morbidities Among Rubber Plantation Workers

Exposure to vector borne diseases and bites

9.9% of the study participants were affected with Dengue, 7.7% Chikungunya, 1.4% had malaria and 2.1% workers gave history of snake bite in the last one year.

Self-reported health problems- allergen exposure

Among the workers surveyed, allergic manifestations were observed in 71.8% of cases (n = 102) in the past year. The most frequently reported allergic condition was allergic conjunctivitis (40.8%), followed by watery nasal discharge (suggestive of allergic rhinitis) in 16.9% of the workers. Wheezing suggestive of respiratory allergy was noted in 12.0%, while skin irritation attributable to occupational exposure was reported by 2.1% of the participants.

Self-reported health problems- work related stress and strain

Musculoskeletal pain was reported by majority (61%) of the study participants. The joints affected in the order of frequency were shoulder (45.1%) followed by knee (35.9%), foot, back and wrist (17.6%).

Association of Musculoskeletal Pain with Selected Variables

The prevalence of musculoskeletal pain showed a statistically significant association with age, gender, education, duration of work per day, and years of service. Workers aged > 50 years reported significantly higher musculoskeletal pain compared to those aged ≤ 50 years ($\chi^2 = 833.21$, p = 0.0). Male workers were more at risk for musculoskeletal pain compared females (OR = 4.62, 95% CI: 2.94- 11.0), p = 0.0). Workers with education below higher secondary had a higher prevalence of musculoskeletal pain compared to those with higher secondary education or above (OR = 3.06, 95% CI: 1.51- 6.24). Similarly, those who worked ≥ 8 hours per day experienced higher prevalence of musculoskeletal pain than those working < 8 hours ($\chi^2 = 6.82$, p = 0.009). Workers with > 20 years of service also had a greater occurrence of musculoskeletal pain compared to those with≤ 20 years ($\chi^2 = 10.61$, p = 0.001). On Multivariate regression analysis, age, gender, education qualification was found to be significant risk factors for musculoskeletal pain.

For eye irritation, lesser duration of travel (t-value 11.6, p<0.01), older age (t-value 4.0, p<0.05), lower education (OR = 3.99, 95% CI: 1.88- 8.47) were significantly associated with higher odds of experiencing symptoms."

Table 1: Sociodemographic distribution of study participants (N=142)

Characteristics	Variables	Frequency	%
Age (yrs)	18- 30	2	1.4
	30- 60	110	77.5
	>60	30	21.1
Gender	Male	103	72.5
	Female	39	27.5
Religion	Hindu	81	57
	Christian	54	38
	Muslim	7	4.9
Education	Upto 10th std	124	87.3
	Completed 12th std	18	12.7
Family type	Nuclear	104	73.2
	Joint family	38	26.8
Type of work	Rubber tapping	80	56.3
	Others*	62	43.7
Work experience (yrs)	Upto 20	102	71.8
	More than 20	40	28.2

*denotes field work, sheet making, supervisor, watchman

Table 2: Employment and behavioural distribution of study participants (N=142)

Characteristics	Variables	Frequency	%
Working days per week	5	3	2.1
	6	116	81.7
	7	23	16.2
Working hours per day	5-6	64	45.1
	6-8	76	53.5
	>8	2	1.4
Commute for work	Upto 5 kms	38	26.8
	5- 10 kms	96	67.6
	> 10 kms	8	5.6
Co- family members working	Yes	29	20.4
	No	113	79.6
Smoking	Current smoker	23	16.2
	Ever smoked	49	34.5
	Never	70	49.3
Alcohol intake	Current alcoholic	26	18.3
	Ever alcoholic	44	31
	Never	72	50.7
Preference to healthcare	Government	109	7.8
	Private	33	23.2
Diabetes Mellitus	Yes	44	31
	No	98	69
Hypertension	Yes	28	19.7
	No	114	80.3

Table 3: Association between Selected Factors and Shoulder Pain among Participants (χ^2 Test, N=142)

Variables	Category	N	Shoulder pain		χ^2 value	significance
			Yes (%)	No (%)		
Gender	Male	103	56 (54.4)	47 (45.6)	13.1	0.00
	Female	39	8 (20.5)	31 (79.5)		
Religion	Hindu	81	36 (44.4)	45 (55.6)	0.03	0.86
	Others	61	28 (45.9)	33 (54.1)		
Education	Upto high school	84	47 (56)	37 (44)	9.84	0.00
	Higher secondary	58	17 (29.3)	41 (70.7)		
Family type	Nuclear	104	41 (39.4)	63 (60.6)	5.01	0.02
	Non-nuclear	38	23 (60.5)	15 (39.5)		
Smoking	Yes	23	10 (43.5)	13 (56.5)	0.03	0.87
	No	119	54 (45.4)	65 (54.6)		
Alcohol	Yes	26	12 (46.2)	14 (53.8)	0.01	0.90
	No	116	52 (44.8)	64 (55.2)		
Diabetes mellitus	Yes	44	30 (68.2)	14 (31.8)	13.7	0.00
	No	118	48 (42.1)	66 (57.9)		
Hypertension	Yes	28	16 (57.1)	12 (42.9)	2.05	0.15
	No	114	48 (42.1)	66 (57.9)		

DISCUSSION

In general, plantation workers are a vulnerable workforce to a variety of health hazards. Being predominantly an unorganised sector, they are unprotected and do not enjoy any medical, economic and social welfare benefits. The present study showed that musculoskeletal pain was a common occurrence among rubber cultivation workers. 45.1%, 35.9% and 19.7% of the study participants were suffering with shoulder pain, knee pain and back pain respectively. The findings were different from the study done by Chokprasit P et al. who conducted a study on 317 rubber farmers and found 71.2% of the subjects add low back pain.[1] These differences probably could be due to the tall mature rubber trees and use of arms above shoulder levels to make diagonal cuts for latex collection. The proportion of subjects affected by shoulder pain and knee pain in the present study were consistent with the cross-sectional study done by Anjali Sharma et al. in the rubber plantation workers of Idukki and Kottayam districts, which were 43.4% and 53% respectively.[5] The present study findings were in line with a study among rubber tappers in Sri Lanka, where 65% of participants reported musculoskeletal symptoms in the last 12 months.[6]

Among the allergic diseases noted, eye irritation and watering of eyes was found to be more common (40.8%) among cultivation workers, probably due to the IgE mediated latex protein allergy.[7] The finding was in contrast to the study done by Chaiear et al. in the rubber tappers of Thailand that showed only 1.3% of the study participants sensitive to airborne latex allergen.[8] In the current study, 14% of rubber cultivation workers were affected with any one mosquito borne diseases in the past year. The finding was similar to a cross-sectional study done by Tangena et al,[9] in rubber tappers of Lao, that showed increasing number of workers exposed to Aedes albopictus. The similarity probably was due to the rubber cultivators work between 2 am to 10 am, with peak exposure of mosquito bite between 6am to 10am. The present study identified that 2.1% of the rubber cultivation workers had exposure to snake bite. This finding was similar to the study done by Stahel E in the Liberian rubber harvesters that showed 4.2 bites per 1000 population per year.[10]

Sleep problems and altered sleep pattern were reported in 15.5% of the study participants. Similar findings were seen in the study done by Moreno et al. in the Amazon rubber tappers who lived with electric light at home.[11] The reason probably could be due to early work schedule beginning before dawn, physical workload and exposure to chemicals. The present study also showed that 26.8% of the rubber plantation workers gave history of frequent fatigue. Their work time, physical demand, repetitive nature of work and hot, humid climate could be the probable reason

Limitations: The temporal association could not be established because of the study design. The dependency on self-reporting of some of the morbidities could have been measured through objective method like spirometry. A larger sample size proportional to the number of workers in the 8 govt aided rubber plantation can be taken for better generalisability.

CONCLUSION

Rubber cultivation workers are prone to be affected by large number of occupational diseases pertaining to their work environment. There is increased prevalence of musculoskeletal disorders, allergic ocular diseases and vector borne diseases. The variables like age, gender, education and working hours emerged as key determinants. There is a need for tailor made preventive strategies and robust health surveillance system to safeguard this vulnerable workforce.

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