

# 4.8

## Green Tobacco Sickness Among Tobacco Harvesters

Tobacco growing in the field or in an uncured state is called 'green tobacco'. This is toxic when in prolonged direct contact with the skin. Workers engaged in tobacco cultivation suffer from an occupational illness known as 'green tobacco sickness' (GTS). The illness was first reported among tobacco workers in Florida, in 1970, as cropper sickness.<sup>195</sup> Later, it was found to be caused by the absorption of nicotine from wet tobacco plants and reported as GTS.<sup>196</sup> Since the sickness is self-limiting, treatment is not always necessary.<sup>197</sup> The amount of nicotine present in tobacco leaves is influenced by genetics, fertilization practices, the weather, cultivation and harvesting techniques, and ranges from 0.6% to 9%.<sup>198</sup>

Tobacco cultivation is seasonal, and hazardous cultivation practices last for 2–3 months during the harvesting season. Tobacco cultivation involves different processes such as sowing, transplanting of seedlings, topping of flowering buds, disbudding of axillary buds, harvesting of plants and leaves, separation of leaves, stringing and tying of leaves before they are kept in a barn for curing, grading, etc. Figure 4.2 shows the agricultural practices followed during tobacco cultivation, which lead to the smearing of thick, gummy plant sap on the hands of workers and other parts of their bodies that come in contact with tobacco leaves. This leads to the absorption of nicotine through the dermal route. Workers engaged in various processes get cuts and abrasions on their palms and the skin around their nails gets peeled off, facilitating nicotine absorption.<sup>199</sup>



**Fig. 4.2** Hazardous process of tobacco cultivation (a) Disbudding of axillary buds, (b) topping of flowering buds, (c) harvesting of tobacco plants, and (d and e) hands of the workers

Green tobacco sickness is an acute form of nicotine toxicity and usually occurs several hours after continuous exposure to green tobacco leaves. The illness lasts for 12–24 hours and is characterized by headache, nausea/vomiting, giddiness, loss of appetite, fatigue, weakness and, sometimes, fluctuations in the blood pressure or heart rate.<sup>199</sup> Although GTS is not reported to be associated with mortality or long-term morbidity, it causes considerable discomfort. The loss of wages depends upon the severity of 'green' symptoms and co-morbid conditions. In the mild form of the disease, workers continue to work and do not lose their wages. However, there are usually two to three occasions when they are unable to work and thus have to lose wages of 2–3 days per season.

### Global evidence

Studies from several countries have confirmed the entity of GTS, which occurs when tobacco workers hand-harvest, cut, or load tobacco plants, usually in the early morning or after rainfall when tobacco plants are covered with moisture.<sup>200,201</sup>

## Indian evidence

India is the third country to have reported GTS among tobacco harvesters.<sup>202</sup> Cross-sectional studies were carried out to assess the prevalence of GTS among tobacco harvesters in four villages of Gujarat, where tobacco is cultivated mainly for making *beedis*, chewing tobacco and snuff, as well as in a research farm of the Central Tobacco Research Institute (CTRI) at Andhra Pradesh, where mainly cigarette tobacco is grown.<sup>203–205</sup> In the two areas of Gujarat, 66%–70% of the tobacco workers studied ( $n=975$ ) were men, while in Rajahmundry (Andhra Pradesh) 69% of the tobacco workers studied ( $n=289$ ) were women (Table 4.16).

Among men, 68%–75% of tobacco workers (exposed workers) smoked in the three study areas, while in the control areas, 57%–75% of agricultural labourers were smokers. In Gujarat, only a minority of exposed women workers were smokers: 6.8% of the women working in the *beedi* tobacco fields of Sanand and 0.4% of the women working in chewing and snuff tobacco fields of Anand. In the control areas of Gujarat, 0%–0.4% of women agricultural workers smoked. In Andhra Pradesh, the percentage of smoking in

women workers was higher (36% in the exposed women and 10.6% in the control women). With regard to the habit of taking snuff, about 31% of women *beedi* tobacco workers in Sanand, and 51% of women labourers in the control area had this habit. In Anand, most women workers were occasional snuff users.<sup>203–205</sup>

Headache, giddiness, nausea and vomiting were the four most common symptoms observed in all tobacco workers. The overall prevalence of GTS was higher (86.2%) among *beedi* tobacco cultivators compared to cigarette tobacco cultivators (60.6%), and in chewing and snuff tobacco cultivators (47.0%), as shown in Table 4.16. Among men, the proportion of workers with GTS was higher in the chewing and snuff tobacco-growing areas of Anand, Gujarat than in the cigarette tobacco-growing area of Andhra Pradesh. No symptoms were reported among the control group.<sup>203–205</sup>

According to Gehlbach *et al.*,<sup>206</sup> cigarette smoking affords protection against this occupational illness, but in all the three National Institute of Occupational Health (NIOH) studies, workers who smoked were found to have a higher prevalence of GTS.<sup>203–206</sup> Studies have reported a substantially higher urinary excretion rate of nicotine and its

**Table 4.16** Green tobacco sickness (GTS) among workers engaged in *beedi* tobacco cultivation in Sanand and Anand, Gujarat and Rajahmundry, Andhra Pradesh<sup>203–205</sup>

GTS symptoms*	Number of subjects						Total $n$ (%)
	<i>Beedi</i> tobacco workers	Chewing and snuff tobacco workers		Cigarette tobacco workers			
		Sanand, Gujarat**	Anand, Gujarat		Rajahmundry, Andhra Pradesh		
			Men	Women	Men	Women	
Headache	162	156	107	NR	NR	425 (56.9)	
Weakness	NR	NR	NR	32	96	128 (17.1)	
Giddiness	137	143	102	22	65	469 (62.8)	
Abdominal pain	NR	1	3	6	39	49 (6.6)	
Nausea and vomiting	103	80	84	6	6	279 (37.3)	
Increased sweating	NR	4	0	2	7	13 (1.7)	
Breathlessness	83	NR	NR	NR	NR	83 (11.1)	
Total subjects	250	195	127	43	132	747 (100)	

NR: not recorded

\*Subjects may complain of one or more symptoms at a time

\*\*Men–women break-up not available for this area

major metabolite cotinine among different groups of exposed workers handling all types of tobacco, compared to workers in the control group.<sup>207,208</sup>

### Intervention studies on protection for workers

Intervention studies were carried out by providing seamless knitted nylon gloves to a group of non-flue-cured Virginia (FCV) tobacco harvesters who suffered from GTS.<sup>208</sup> To check the efficacy of the gloves, urinary excretion levels of nicotine and cotinine were selected as markers. The first urine sample was collected after 15 days of work, without the use of gloves, at the end of the work shift. The second urine sample was collected after 15 days of work, with the workers using gloves, at the end of the day's work. Simultaneous measurement of nicotine and cotinine was done by the method described by Doctor *et al.*<sup>209</sup>

The use of any type of gloves significantly reduced the levels of nicotine ( $p < 0.01$ ) and cotinine ( $p < 0.0005$ ) in the urine. Urinary concentrations of nicotine and cotinine decreased after 15 days of use of gloves in 87% of the workers. All the workers reported that the use of gloves completely prevented smearing



**Fig. 4.3** Clean hands after the use of nylon gloves

of gummy plant sap on the hands, abrasions on their palms, peeling of the skin around the nails, bitter taste in the food due to the plant sap, and work-related symptoms such as headache and giddiness (Fig. 4.3).

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## 4.8 GREEN TOBACCO SICKNESS AMONG TOBACCO HARVESTERS

### KEY MESSAGES

- Tobacco is harmful without being smoked or chewed.
- Workers engaged in tobacco cultivation suffer from an occupational illness known as green tobacco sickness (GTS), an acute form of nicotine toxicity resulting from absorption of nicotine through the skin.
- The use of gloves prevents nicotine absorption through the skin and thus prevents GTS. Gloves also prevent abrasions and cuts.

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