Mortality of tanners

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ABSTRACT The mortality of 833 male tannery workers known to have been employed in the industry in 1939 and who were followed up to the end of 1982 was studied. A total of 573 men had been employed in making leather tanned by vegetable extracts for soles and heels, and 260 men had used chrome tanning to make leather for the upper parts of shoes. No significant excesses of deaths were found for any of the common sites of cancer in either group of workers. One death from nasal cancer (0.21 expected) was reported among the men who worked with sole and heel leather.

According to medical tradition, tanners, although subject to odours and, in the past at least, wet and cold "are remarkably robust; the countenance florid; and disease almost unknown."¹ Nevertheless, several occupational factors have been discovered to be important in the causation of cancer of the nasal mucosa and accessory sinuses, of which one is the dust of leather soles and heels to which those making and repairing boots and shoes are exposed.²⁻⁵ Because of this risk it was decided to carry out a cohort study of tannery workers to see if the processes used in manufacturing leather posed similar or other risks to the workforce.

When a skin is removed from an animal it decomposes readily and tanning is required to convert the hide to leather. Depending on the type of leather required different tanning methods are needed. In order to produce soft and supple leather such as used in handbags and in the upper parts of shoes chrome salts are usually used, whereas to make leather sufficiently durable to be used for soles and heels a different process which uses tanning with vegetable extracts is necessary.⁶ Unlike the process of making boots and shoes where the leather used is dry throughout and some of the steps cause dust to be released, tanning is on the whole a wet process with few dusty operations.⁷

In the present study workers from tanneries making chrome tanned "upper" leather and workers from tanneries making vegetable tanned "sole" leather were both included in order to allow comparison of their overall mortality. We describe the

mortality from 1939 to 1982 of two groups of men who were working in tanneries in 1939. The groups comprised 573 men resident in Beverley, Yorkshire, and Edenbridge, Kent, who worked in tanneries making vegetable tanned leathers, and 260 men resident in Littleborough, Lancashire, and Millom, Cumbria, who worked in tanneries making chrome tanned leathers.

Material and methods

Using the National Health Service Central Register at Southport, staff of the Office of Population Censuses and Surveys searched the records of everyone resident in September 1939 in Beverley, Edenbridge, Littleborough, and Millom. They identified all those whose occupations indicated that at that time they were employed in the leather tanning industry.

The vital status of the workers on 31 December 1982 was ascertained, and in the case of those who had died the date and cause of death was abstracted. As only 56 women were identified the analysis was restricted to men. For the purposes of the analysis the two chrome tanneries were combined (Littleborough and Millom) as were the two tanneries (Beverley and Edenbridge) which made vegetable tanned leathers. The numbers of deaths expected in these men were calculated using the person-years method⁸ and compared with the number observed. All deaths up to 31 December 1982 were included and five year age group cause specific death rates for five year calendar periods used to calculate the expected numbers.^{9,10} The rates used were for England and Wales as a whole. Tests of the statistical significance of the observed number of deaths com-

pared with the numbers expected were based on the Poisson distribution. The average age of the men working at tanneries in Beverley and Edenbridge in 1939 was 41 and of those working at tanneries in Littleborough and Millom in 1939, 32 years.

Results

The basic follow up information is given in table 1 from which it may be seen that about two thirds of the men had died by the end of 1982. The higher

proportion of deaths among men who worked in vegetable tanneries reflects the higher mean age of their workforce in 1939. Twenty seven of the men (3.2%) have been lost to follow up and most of these probably died overseas during the war.

Table 2 gives the general mortality experience of the cohort during 1939-82, set out by the type of leather made. The group making vegetable tanned leather shows a statistically significant deficit of deaths from all causes combined compared with the numbers expected on the basis of rates for England

Table 1 *Male tannery workers by status, group, and person-years of follow up*

	<i>Beverley and Edenbridge</i>		<i>Littleborough and Millom</i>	
	<i>No</i>	<i>%</i>	<i>No</i>	<i>%</i>
Size of group	573	100	260	100
Status at 31.12.1982				
Alive	171	30.4	100	38.8
Dead	391	67.7	144	55.0
Embarked	2	0.3	5	1.9
Not registered	9	1.6	11	4.2
Person-years of follow up from 30.9.1939 to 31.12.1982	16855.33	—	8403.32	—

Table 2 *Mortality of male tannery workers between 30 September 1939 and 31 December 1982 by type of leather made (vegetable tanned Beverley and Edenbridge, chrome tanned Littleborough and Millom) in relation to the mortality of England and Wales*

<i>Cause of death</i>	<i>Leather type</i>	<i>Tannery works</i>				
		<i>No of deaths</i>		<i>Standard mortality ratio</i>		
		<i>Obs</i>	<i>Exp</i>	<i>SMR</i>	<i>L</i>	<i>U</i>
All causes	Vegetable	391	464.2	84*	76	93
	Chrome	144	126.8	114	96	134
All malignant neoplasms	Vegetable	82	92.5	89	71	110
	Chrome	30	29.9	100	68	143
Other causes	Vegetable	309	371.7	83*	74	93
	Chrome	114	96.9	118	97	141

* $p < 0.05$.

Table 3 *Mortality from specific cancers of male tannery workers between 30 September 1939 and 31 December 1982 by type of leather made (vegetable tanned Beverley and Edenbridge, chrome tanned Littleborough and Millom) in relation to the mortality of England and Wales*

<i>Cause of death</i>	<i>Leather type</i>	<i>Tannery works</i>				
		<i>No of deaths</i>		<i>Standard mortality ratio</i>		
		<i>Obs</i>	<i>Exp</i>	<i>SMR</i>	<i>L</i>	<i>U</i>
Cancer of stomach	Vegetable	11	13.0	85	42	152
	Chrome	2	3.9	52	6	187
Cancer of large intestine	Vegetable	5	7.2	69	22	162
	Chrome	2	2.0	100	12	362
Cancer of rectum	Vegetable	9	5.7	157	72	298
	Chrome	2	1.6	127	15	459
Cancer of lung	Vegetable	31	32.6	95	65	135
	Chrome	13	12.0	108	58	185
Cancer of prostate	Vegetable	5	6.7	75	24	175
	Chrome	2	1.5	133	16	482
Other cancers	Vegetable	21	27.3	77	48	117
	Chrome	9	9.0	100	46	191

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and Wales. No statistically significant excesses are seen. Table 3 shows the standardised mortality ratios of the cohort for the leading sites of cancer in men. Only sites for which more than five deaths were recorded in one or other group are shown. Again no statistically significant excesses are seen. It is not possible to draw firm conclusions about the mortality from the rarer sites of cancer because of the small numbers of deaths. One death from nasal cancer was recorded in a tan press attendant employed in producing vegetable tanned leather (0.21 expected, SMR 476, 95% confidence limits 12–2653). The histology of the tumour is not known. No excess of bladder cancer was seen in either group of workers with only four deaths observed from this cause in the total cohort (5.15 expected, SMR 78, 95% confidence limits 21–199). One death from a soft tissue tumour occurred in a worker making chrome tanned leather (0.07 expected, SMR 1458, 95% confidence limits 37–8123).

Discussion

The object of this study was to determine whether the risk of nasal cancer associated with making and repairing the soles and heels of leather shoes is also associated with the processes used in preparing and tanning leather. Other causes of death have also been examined. Although the number of men available for study was unfortunately small, we calculate that there was a probability of 62% or greater of detecting a statistically significantly raised mortality from nasal cancer in the vegetable tanneries if the relative risk was 10 or more. This would be a comparable risk to that found in men who work in the preparation or finishing departments in the boot and shoe industry.⁵ As it happens, however, only one death attributable to nasal cancer occurred in the study, and although it occurred in a man who worked in a tannery producing sole leather tanned with vegetable extracts, this was not statistically significant. A case-control study of nasal adenocarcinoma in the Netherlands reported one tanner among the cases and none among the controls (other nasal cancers).¹¹ Other studies have reported nasal cancers among leather workers, but it is not known whether these people were tannery workers or people working finished leather.^{12–14}

Other studies of occupational mortality based on death certificates have reported excesses of lung cancer¹⁵ and bladder cancer¹⁶ among tannery workers and a case-control study of bladder cancer¹⁷ also reported an increased relative risk, although this was not statistically significant. The study reported here has found no statistically significant excesses in mortality from cancer of any of the major sites.

Looking at causes of death other than cancer an

excess of deaths (not statistically significant) is seen in the chrome tanneries. This excess is almost completely accounted for by deaths due to circulatory and respiratory disorders. Both the tanneries making chrome tanned leather were in north west England; this result is not unexpected since the mortality rates are generally higher in this area when compared with those in the north east and south England where the vegetable tanneries were situated.

So far as it goes this study suggests that Charles Turner Thackrah may have been correct in not attributing any particular occupational risk to tanners, but the confidence with which we can support his opinion is unfortunately limited by small numbers.

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