

# Clinical picture of snuff dipper's lesion in Swedes

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**Abstract** - In a survey of oral mucosal lesions in 20 333 individuals, 1 466 individuals with snuff dipper's lesions were found. All but seven of the snuff dippers were men, which gives a prevalence of snuff dipper's lesions of 15.9% in the male population. Four degrees (1-4) of clinical severity of lesions were allotted. There were positive correlations between the severity of the lesion and years with the habit, daily amount of snuff used, time with contact between snuff and the oral mucosa, and, to some extent, with age of the snuff dipper. There were differences between the different brands of snuff as regards the severity of the snuff dipper's lesion produced.

**Key words:** tobacco; habits; mouth diseases

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Snuff dipping causes a recognizable mucosal reaction, which may best be labelled snuff dipper's lesion (1-5).

The habit of using unburned tobacco is encountered in many parts of the world and consequently the composition of the snuff and its usage vary considerably between different geographic regions. In Scandinavia wet snuff is used, and it is composed of finely ground tobacco, water, sodium chloride, potassium salts, glycerine, ammonium chloride, extract of malt, and a variety of flavoring substances. During the manufacturing some brands are cured at 70°C. pH is between 7.5 and 9.5. In the United States dry snuff is most frequently used. Snuff in Scandinavia and the United States is produced on a large scale, and each brand is therefore rather well defined. However, the exact formula is a closely kept secret. In many parts of the world most snuff is homemade and therefore inhomogeneous in composition. Additives such as moistened ash of aloe leaves are commonly used in Africa (6). In Southeast Asia, the tobacco is commonly mixed with slaked lime and swept into leaves from the betel bush (7-10).

Snuff may be used in several ways, and its usage is often restricted to certain social classes. In Sweden, where snuff dipping is almost exclusively a male habit (12), the most common usage by far is the placing of a quid in the oral vestibule between the gum and the upper lip. In the United States, a similar habit has been particularly common among rural

women in the Southeast (11), but the habit has lately spread rapidly, especially among college students (12).

The heterogeneous conditions surrounding the habit of snuff dipping have made reports concerning the developed mucosal lesions contradictory (3). Distinctions have not always been made between the habits of dipping, chewing, and sniffing tobacco.

In a study of 50 male habitual snuff dippers a correlation between snuff habits and the clinical degrees of the snuff dipper's lesions has been found (13). A correlation between the histologic appearance and the brand of snuff used has been reported (3).

The present study was undertaken to investigate in more detail to what extent peculiarities in the habit of snuff dipping and different brands of wet snuff influence the clinical appearance of snuff dipper's lesion in a Swedish population.

## Material and methods

The material was drawn from an epidemiologic survey of oral mucosal lesions in Sweden (15). The survey was carried out in a region about 100 km west of Stockholm. This region, which is demographically typical for Sweden as a whole, is described in detail by Axéll (15). Around 1600 (8%) snuff dippers were identified among 20 333 individuals examined. Of these, 1466 snuff dipper's lesions were recorded.

Out of the 1466 individuals with snuff dipper's lesions, seven (0.5%) were women. For practical reasons these were excluded from this study. Thus, of the male population, 15.9% were snuff dippers. Owing to the fact that some information for individual cases was missing, the number of individuals in some statistical tests was somewhat less than 1459.

The diagnosis of a snuff dipper's lesion was set when there was a lesion of the oral mucosa in a location which, upon a direct question, was found to be the exact site for the regular placing of snuff. The clinical severity of the lesion was graded as follows (Fig. 1 a-d):

*Degree 1.* A superficial lesion with a color similar to the surrounding mucosa, and with a slight wrinkling. No obvious thickening. *Degree 2.* A superficial, whitish, or yellowish lesion with wrinkling. No obvious thickening. *Degree 3.* A white-yellowish to brown, wrinkled lesion with intervening furrows of normal mucosal color. Obvious thickening. *Degree 4.* A marked, white-yellowish to brown and heavily wrinkled lesion with intervening, deep and reddish furrows and/or heavy thickening.

If the quid was held in more than one place in the mouth, the severity of the most affected lesion was recorded.

Information on tobacco habits was collected on pretyped forms (15).

For information about the validity and reliability of the clinical registration of snuff dipper's lesion, reference is made to Axéll (15). Reliability of information

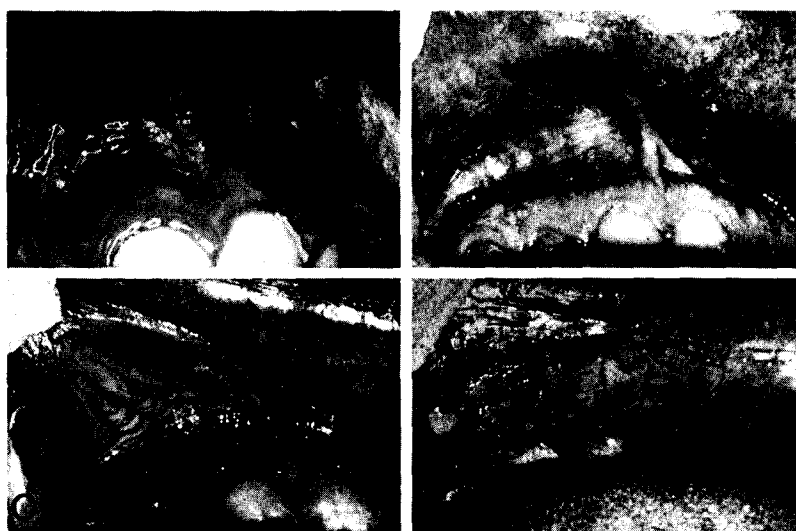


Fig. 1 a-d. Clinical appearance of snuff dipper's lesions. Degrees 1 to 4, respectively.

about tobacco habits was estimated by questioning 278 individuals 1-2 wk after the clinical examination and the primary questioning. Of 261 individuals referring to unchanged tobacco consumption, 252 (97%) gave the same and nine (3%) divergent information on the two occasions of questioning. Of the 17 individuals referring to changed tobacco consumption, four (24%) gave the same and 13 (76%) divergent information. Changed snuff consumption was defined as a decrease or increase in the daily consumption by at least 5 g of snuff.

The 1459 male snuff dippers were characterized as follows: 1. Age distribution. 2. Influence of age on the daily amount of snuff consumed, and on the time of contact between snuff and the oral mucosa.

Possible influences of snuff dipping habits and brands of snuff on the degree of severity of the snuff dipper's lesion were investigated as regards: 3. Influence of the number of places where snuff was held on the severity of the lesion. 4. Influence of age on the severity of the lesion. 5. Influence of years with habit on the severity of the lesion. 6. Influence of amount of snuff used per day on the severity of the lesion. 7. Influence of daily exposure of snuff on the severity of the lesion. 8. Influence of brand of snuff on the severity of the lesion.

Owing to the fact that the brands "Ettan", "Röda Lacket", and "Grovsnus" made up 94.2% of the brands used, and

that the remaining 5.8% was shared between seven different brands (Table 1), only the first three brands mentioned were tested for relationships between snuff brands and clinical appearance.

The severity of the snuff dipper's lesion was statistically related to a series of possible influencing factors, as described above. The central value of the severity of the lesion was described by mean value. The mean of the grouped data, treated as being continuous and even over intervals, was defined as the value that divides the area under the frequency curve in half. Statistical inferences were tested with SPSS (16). Parametric statistics are described in the

Table 1. Distribution of the different brands of snuff used

Brand	Absolute frequency	Relative frequency
Condrad Laangard	2	0.1
Ettan	743	50.7
Generalsnus	19	1.3
Göteborgs prima finsnus	4	0.3
Grovsnus	273	18.6
Happy days*	3	0.2
John Silver cigarette tobacco	1	0.1
Röda Lacket	200	13.6
Smoke less*	3	0.2
Svenskt exportsnus	43	2.9
No information	175	11.9
Total	1466	100.0

\*Tea bag packed snuff.

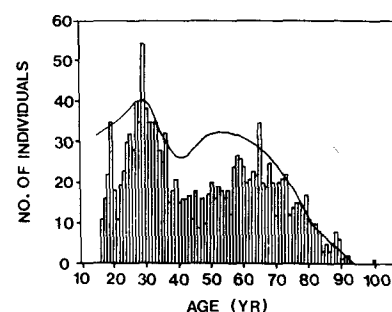


Fig. 2. Age distribution of snuff dippers. Inserted line represents age distribution of the total male population. The scale is adjusted to fit the heights of the bars.

SPSS manual and nonparametric statistics by SIEGEL (17) and in the SPSS update 7-9 manual (18).

## Results

### Age distribution of snuff dippers (Fig. 2)

The age distribution had a bimodal appearance with high frequencies around the ages of 30 and 65 yr, and a low frequency in the interval of 35-55 yr. In comparison with the age distribution of the total male population in the country, there was an over-representation of individuals with the snuff dipping habit in the age groups 25-35 and 70-95 yr. The mean age was 48.0 yr.

*Influence of age of snuff dipper on daily amount of snuff consumed and daily exposure of snuff (Figs. 3 and 4)* - Younger persons consumed more snuff (as g/day) than older persons (Fig. 3). Older persons held snuff in the mouth for a longer period (as h/day) than did younger persons (Fig. 4).

*Influence of number of places where snuff was held on severity of lesion (Table 2)* - 77.3% of the individuals regularly held the quid in only one location and 22.7% changed locations from time to time. There was a slight tendency of less severe lesions if the quid was held in more than one location, but the difference was not statistically significant (Mann-Whitney U-test,  $P=0.10$ ). A further division of the material was made by studying each brand *per se*. Only for the brand "Röda Lacket" did a less severe lesion appear if the quid was held in more than one location (Mann-Whitney U-test,  $P<0.05$ ). The same results were obtained if comparisons were made between the pooled degrees 1+2 and 3+4. Therefore, in the following, tests for re-

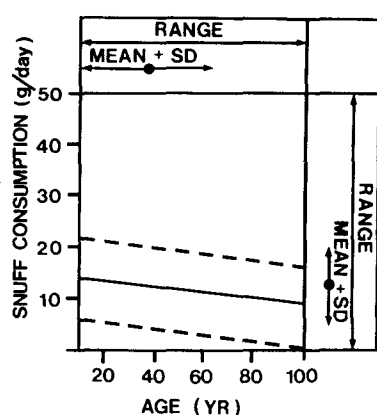


Fig. 3. Correlation between age and amount of snuff consumed per day. Dotted lines show standard error of estimated Pearson's  $r = -0.12$ ,  $P < 0.001$ .

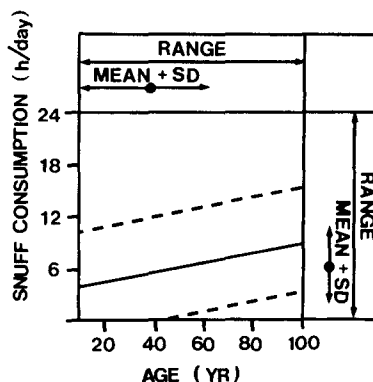


Fig. 4. Correlation between age and time snuff was held in mouth. Dotted lines show standard error of estimated Pearson's  $r = 0.24$ ,  $P < 0.001$ .

Table 2. Cross-tabulation of number of locations where snuff was held in mouth versus severity of lesion

		Severity of lesion (degree)				Row total	Mean
		1	2	3	4		
No. of locations	1	96	287	549	53	985	2.70
	2	50	75	144	20	289	2.64
Column total		146	362	693	73	1274	2.69

relationships were performed on the whole material without regard to whether the quid was held in one or more locations.

**Influence of age on severity of lesion (Table 3)** – The distribution of the degrees of severity of the lesions differed between the age groups (Kruskal-Wallis 1-way ANOVA,  $P < 0.001$ ). The differences between the various age groups were statistically significant (Mann-Whitney U-test,  $P < 0.05$ ) for all but the youngest and oldest groups. Up to the age of 74 yr the lesions were more severe in higher age groups. In the highest age group (75–98 yr) the severity was less pronounced, and the distribution of the degrees of severity was not statistically different from the youngest group.

The relationships were less pronounced if the material was broken down for the individual brands. The differences between the age groups were then statistically significant (Kruskal-Wallis 1-way ANOVA,  $P < 0.001$ ) only for the brand "Ettan".

Table 3. Cross-tabulation of age of snuff dipper versus severity of lesion

		Severity of lesion (degree)				Row total	Mean
		1	2	3	4		
Age (yr)	15–34	116	173	259	17	565	2.46
	35–54	38	88	195	14	335	2.71
	55–74	33	93	238	35	399	2.81
	75–98	21	69	54	6	150	2.28
Column total		208	423	746	72	1449	2.63
Mean (yr)		40.5	48.6	48.8	53.9	48.0	
SD		20.4	21.6	18.5	16.3	19.8	

Table 4. Cross-tabulation of years with habit versus severity of lesion

		Severity of lesion (degree)				Row total	Mean
		1	2	3	4		
Years with habit	1	37	36	47	0	120	2.14
	2	26	39	44	5	114	2.29
	3	18	38	46	4	106	2.42
	4	7	25	34	1	67	2.54
	5–19	36	102	254	21	413	2.77
	20–39	13	49	132	20	214	2.84
	40–59	11	53	116	21	201	2.81
	60–80	6	23	21	1	51	2.35
Column total		154	365	694	73	1286	2.68
Mean (yr)		11.1	18.2	18.7	25.4	18.1	
SD		16.8	20.3	17.7	17.5	18.6	

Table 5. Cross-tabulation of amount of snuff consumed versus severity of lesion

		Severity of lesion (degree)				Row total	Mean
		1	2	3	4		
Amount of snuff (g/day)	1–3	14	16	10	1	41	1.91
	4–7	85	169	241	11	506	2.49
	8–20	41	148	339	37	565	2.78
	21–50	5	26	100	23	154	2.96
Column total		145	359	690	72	1266	2.69
Mean (g/day)		8.0	10.3	13.2	19.0	12.1	
SD		5.2	7.2	8.3	11.2	8.3	

**Influence of years with habit on severity of lesion (Table 4)** – There was a clear difference in distribution of severity of the lesion after different length of time with the habit (Kruskal-Wallis 1-way ANOVA,  $P < 0.001$ ). The severity of the lesion was more pronounced after longer periods (Kendall rank order coefficient = 0.15,  $P < 0.001$ ). An exception was recorded in the group with the longest period with the habit. The difference between the groups 40–59 and 60–80 yr with the habit was significant (Mann-Whitney U-test,  $P < 0.01$ ).

**Influence of amount of snuff used per day on severity of lesion (Table 5)** – The amount of snuff used was  $12.1 \pm 8.3$  g/day (range 1–50 g/day). There was a positive correlation between the amount of

Table 6. Cross-tabulation of daily exposure of snuff versus severity of lesion

		Severity of lesion (degree)				Row total	Mean
		1	2	3	4		
Time with snuff in mouth (h/day)	1-2	68	92	88	12	260	2.17
	3-6	53	190	305	19	567	2.63
	7-15	21	76	264	35	396	2.88
	16-24	2	1	33	6	42	3.05
Column total		144	359	690	72	1265	2.69
Mean (h/day)		3.8	4.8	6.8	8.0	6.0	
SD		3.2	3.2	4.2	5.1	4.1	

Table 7. Cross-tabulation of brand snuff versus severity of lesion

		Severity of lesion (degree)				Row total	Mean
		1	2	3	4		
Ettan		51	187	442	56	736	2.79
Grovsnus		36	83	136	13	268	2.61
Röda Lacket		40	64	88	3	195	2.40
Column total		127	334	666	72	1199	2.71
All brands		208	423	745	73	1449	2.63

snuff used and the severity of the lesion (Kendall rank order coefficient = 0.27,  $P < 0.001$ ).

*Influence of daily exposure of snuff on severity of lesion (Table 6)* - The daily exposure of snuff was  $6.0 \pm 4.1$  h/day (range 1-24 h/day). There was a positive correlation between the severity of the lesion and the time snuff was held in the mouth (Kendall rank order coefficient = 0.23,  $P < 0.001$ ).

*Influence of brand on the severity of the lesion (Table 7)* - Regardless of whether the snuff was placed in one or more locations, there was a significant difference of lesion severity between the three brands tested (Kruskal-Wallis 1-way ANOVA,  $P < 0.001$ ). The brand "Ettan" caused a more severe lesion than did the other two brands (Mann-Whitney U-test,  $P < 0.001$ ). The difference between the brands "Röda Lacket" and "Grovsnus" was not statistically significant (Mann-Whitney U-test,  $P = 0.12$ ). The brand "Röda Lacket" did not cause as severe lesions as did the other two brands; thus only 2.1% of those using it had degree 4 compared to 5.4% in the whole material (6.6% for "Ettan" and 5.3% for "Grovsnus").

## Discussion

It is quite obvious that the sometimes contradictory results of earlier studies on the clinical appearance and histopathology

of the snuff dipper's lesion and the possible carcinogenic effects of snuff are due to the heterogeneous composition of snuff and to different regional and cultural habits of its use. This study, therefore, does not claim any universal validity as regards its results. The findings are applicable only to the Swedish population, and perhaps only to the specific population on which the study was carried out, and to the brands of snuff investigated. The 10-15 different brands of snuff commercially available in Sweden have specific regional distributions. Some brands with high national sales figures are, for example, not represented in this study, nor are the tea bag packed brands of snuff.

The age distribution of the habitual snuff dipper differs in two particular age groups from the age distribution in the total population. Some decades ago, snuff dipping was socially questionable, and was practiced mostly by elderly men in rural areas. During the last two decades, however, the habit has spread into most social groups and especially to young adults. Smoking as an additional source of nicotine is most common

among elder men, and it is reasonable to suggest that young people consider snuff dipping as a more innocent way of nicotine administration than smoking.

There was a somewhat less severe lesion if the quid was placed in more than one location in the mouth. Since it was the most severe lesion that was registered, this means that some degree of healing occurs during the time the mucosa is not irritated by the quid. This is in agreement with previous studies (1, 3), in which clinical and histologic evidence of healing was found already after a few days of cessation.

There appears to be some differences in the habit of snuff dipping between young and old individuals. Young individuals consume more snuff than old ones, who, on the other hand, retain the quid for a longer time in their mouths. This may reflect changes in social distribution of the habit; the young generation snuff dippers are from all social groups and can perhaps afford a new quid a little more now and then, and need not extract the very last drop of nicotine from the quid as do the older individuals.

As expected, the severity of the lesion was in general positively correlated with age, years with habit, amount of snuff consumed per day, and the time with contact between snuff and the oral mucosa. The only exception from this general rule was that individuals in the highest age group ( $> 75$  yr) had, on the average, less severe lesions. This may depend on the fact that the elderly population used less snuff, albeit they retained it in the mouth for a longer time. Alternatively, the mode of reaction may be changed at high age. Not presented under Results, and as expected, there was a high covariation both between age of the snuff dipper and years with the habit and between the amount of snuff used and the time snuff was held in the mouth per day. Therefore no further statistical analyses were made of the combined effects of the various habits (2, 13).

There was a clear difference between the various snuff brands as regards their

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ability to cause lesions on the oral mucosa. On the average the brand "Ettan" caused more severe lesions than did the other two brands. This is in agreement with the general opinion among snuff dippers that this brand gives both the strongest kick and the strongest itching feeling. "Röda Lacket", on the other hand, is generally said to be a weak snuff.

It is still unknown which ingredients in snuff are responsible for the tissue injuries. In a previous study (3), a high pH was suggested important in this context because of the histopathologic appearance. Tests on pH (10 g of snuff suspended in 100 ml of distilled water) of the three brands "Ettan", "Röda Lacket", and "Grovsnus" showed pH-values of 9.2, 8.5, and 9.0, respectively. Thus there appears to be some correlation between pH, severity of the lesion, and subjective feeling in the mouth. PINDBORG *et al.* (4) suggested a still unknown factor in tobacco, since some clinical and histopathologic findings were characteristic of several tobacco habits.

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