MONITORING OF HARMFUL CONSTITUENTS OF CIGARETTES AND TOBACCO IN PAKISTAN

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Nicotine, tar and carbon monoxide contents of tobacco smoke have been determined and reported under standard laboratory conditions by a number of workers. To control the level of nicotine, tar and carbon monoxide in cigarettes, variations made in the manufacture have reduced amounts of these constituents. In U.K[1]. during 1934-1940 the values of tar, carbon monoxide and nicotine per cigarette were 33, 19 and 2.0 mg respectively which decreased to 17, 17 and 1.4 mg respectively by 1979. In USA', average tar and nicotine contents per cigarette in 1956 was 38 and 2.7 mg respectively which was reduced to 13 and 1.0mg in 1984. The contents of nicotine, tar and carbon-monoxide in tobacco smoke under standard laboratory conditions have not been reported for cigarettes available in Pakistan. This study was undertaken to determine nicotine and tar contents of various brands of cigarettes available in this country.

MATERIAL, METHODS AND RESULTS

Mainstream smoke analysis of 47 brands of commercial cigarettes was done using 8 channel Cigarettes Smoking Machine (Model SM—302 supplied by M/S Filtrona Instruments and Automation Ltd., England) provided by WHO. Puff and puff duration was so adjusted that a complete cycle lasted 60 seconds, giving a puff frequency of one per minute. Appropriate length of cigarette was smoked leaving butt length as indicated in Table I. The puff volume was adjusted to 35 cc. After completion of smoking, the Cambridge filters used were removed and disintegrated completely in methanol. The contents of tar and nicotine for each brand were determined by the method developed by International Standardization Organisation (ISO). Tar contents which were not corrected for water contents (1-2 mg), were determined gravimetrically while nicotine was measured spectrophotometrically using the following formula:

alkaloid (as Nicotine) mg/cigarette (259- A 236 + 282) X 1.059 X 1000 X 100 343x2x5 number of cigarettes smoked on C. F. disc.

Various parameters of cigarettes studied are shown in

TABLE – I.Various Parameters of Cigarettes.

S. No.	Brand Code No.	Weight of Cigarette (gms) (10 samples) Mean ± SD	Length of Cigarettes (mm) (10 samples) Mean ± SD	Diameter of Cigarettes (mm) (10 samples) Mean ± SD	Length of Overwrap (mm) (10 samples) Mean ± SD	Length of Filter&Tip (mm) (10 samples) Mean ± SD	But Length (mm ± 1) (10 samples)
1.	Br	0.963 ± .018	84 ± .13	8.0 ± .29	24.0 ± .28	21.0 ± .15	28
2.	Ms	0.954 ± .016	80 ± .11	8.2 ± .15	22.0 ± .27	17.0 ± .09	25
3.	Sm	0.975 ± .023	84 ± .16	8.0 ± .10	25.0 ± .24	21.0 ± .10	25
4.	Wl	1.039 ± .031	85 ± .24	8.2 ± .23	24.0 ± .11	15.0 ± .09	28
5.	Dn	1.126 ± .023	94 ± .64	8.0 ± .22	28.1 ± .23	24.0 ± .29	30
6.	Bt	1.003 ± .049	80 ± .21	8.1 ± .20	23.9 ± .21	20.0 ± .33	25
7.	Kt	0.890 ± .041	80 ± .32	8.1 ± .13	24.2 ± .29	19.5 ± .28	28
8.	Wn	0.928 ± .017	84 ± .26	8.0 ± .19	25.4 ± .30	21.0 ± .18	28
9.	Rn	1.042 ± .017	84 ± .23	8.1 ± .14	25.0 ± .41	20.0 ± .33	25
10.	Mo	0.868 ± .022	79 ± .25	8.1 ± .15	23.0 ± .31	19.5 ± .31	25
11.	Ke	1.095 ± .040	84 ± .36	8.2 ± .10	23.5 ± .17	11.0s ± .19	25
12.	Bh	0.963 ± .017	84 ± .34	8.0 ± .08	23.7 ± .26	20.0 ± .22	25
13.	Ff	0.938 ± .014	84 ± .30	8.1 ± .20	23.9 ± .13	20.0 ± .07	25
14.	Bm	1.020 ± .028	83 ± .22	8.0 ± .08	26.0 ± .12	20.0 ± .26	28
15.	Wk	1.068 ± .063	83 ± .23	8.0 ± .13	24.4 ± .72	10.5 ± .22	25
16.	Sz	1.139 ± .011	94 ± .22	8.0 ± .13	29.0 ± .15	24.5 ± .47	30
17.	Gt	1.225 ± .065	78 ± .38	8.1 ± .10	20.0 ± .50	11.0 ± .29	23
18.	Gf	1.111 ± .063	83 ± .31	8.0 ± .10	22.8 ± .26	11.0 ± .25	25
19.	Wt	0.789 ± .029	69 ± .18	8.1 ± .13	17.3 ± .28	10.5 ± .19	23
20.	Pr	0.997 ± .050	83 ± .19	8.0 ± .12	23.5 ± .57	11.0 ± .18	25
21.	Bg	1.131 ± .044	83 ± .15	8.1 ± .08	20.0 ± .30	11.0s ± .11	25
22.	Rl	1.134 ± .031	78 ± .20	8.1 ± .32	17.3 ± .28	8.0 ± .42	25
23.	Kx	1.100 ± .021	99 ± .36	8.0 ± .12	31.8 ± .22	27.0 ± .19	33
24.	Ks	0.928 ± .057	70 ± .38	8.0 ± .15	17.0s ± .30	10.5s ± .20	23
25	Cp	0.925 ± .026	79 ± .95	8.0 ± .10	20.8 ± .31	11.0 ± .18	25
26.	Pn	1.269 ± .024	93 ± .47	8.0 ± .10	25.8 ± .19	11.0 ± .19	28
27.	Bk	1.027 ± .029	83 ± .45	8.0s ± .24	25.9 ± .26	20.0 ± .38	28
28.	Gl	1.055 ± .015	83 ± .38	8.1 ± .11	25.0 ± .24	17.0 ± .11	25
29.	St	1.180 ± .084	83 ± .39	8.2 ± .12	20.3 ± .16	11.0 ± .20	25
30.	Kt	1.109 ± .035	83 ± .30	8.0 ± .12	22.2 ± .48	9.0 ± .38	25
31.	Cd	1.048 ± .025	83 ± .19	8.0 ± .17	22.3 ± .19	10.5 ± .29	25
32.	Mg	0.941s ± .035	78 ± .47	8.0 ± .17	18.0 ± .11	11.0 ± .20	23
33.	Mn	1.108 ± .042	84 ± .46	8.0 ± .10	20.0 ± .35	10.5 ± .25	25
34.	Ef	0.921 ± .028	69 ± .43	8.1 ± .12	17.8 ± .27	11.0 ± .25	23
35.	Mt	0.923 ± .026	70 ± .71	8.0 ± .12	18.0 ± .41	10.5 ± .26	23
36.	Sc	0.899 ± .031	69 ± .21	8.1 ± .12	16.7 ± .45	11.0 ± .15	23
37.	Pm	0.913 ± .015	68 ± .25	8.0 ± .25	18.0 ± .20	9.0 ± .28	23
38.	Rw	1.115 ± .017	83 ± .31	8.1 ± .11	24.5 ± .22	11.0 ± .21	25
39.	Mh	1.197 ± .059	78 ± .30	8.0 ± .13	19.8 ± .54	11.0 ± .22	23
40.	Wn	1.139 ± .76	84 ± .30	8.0 ± .14	19.0 ± .68	11.0 ± .12	23
41.	Cl	1.136 ± .040	77 ± .31	8.1 ± .17	18.0 ± .32	9.0 ± .13	20
42.	Sp	1.160s ± .032	67 ± .27	8.0 ± .13			20
43.	Kr	0.849 ± .062	69 ± .56	7.9 ± .17			20
44.	Sr	0.891 ± .031	67 ± .23	7.9 ± .21			20
45.	En	0.906 ± .062	69 ± .73	7.9 ± .22			20
46.	Ko	1.093 ± .035	68 ± .29	8.0 ± .23			20
47.	Wd	0.955 ± .049	69 ± .44	7.8 ± .11			20

TABLE II. Tar and Nicotine Contents of various Brands of Cigarettes.

TAR Content mg/Cig.	Nicotine contents as mg/cigarettes in number of Brands						
	1.0–1.5	1.6–2.0	2.1–2.5	2.6–3.0	3.1–3.5	3.6–40	4.1–4.5
10–20	5	2					
21–30		4	4	1	2	1	
31–40		2	2	3	3	5	
41–50		1	2	2	2	2	1
51–60				1			
61–70				1		1	

Table I whereas Table II shows nicotine and tar contents (mg/cigarette) of some commercial brands available in Pakistan as measured under standard laboratory conditions. The tar yields of mainstream smoke of various cigarette brands varied from 16.3 - 66 mg/cigarette and nicotine content ranged between 1.2 to 4.2 mg/cigarette. Tar and nicotine levels in Pakistani cigarettes are higher than those reported from other countries (Table III).

TABLE III. Ranges of Tar and Nicotine yields of commercial Cigarettes from selected Locations.

Location Yrs Cigarettes bought.	Tar		Nicotine		No. of Brands
	mg/cig.	median	mg/cig.	median	
Austria (not given)	6.36	19	0.2–2.7	0.9	27
China (1981)	21–33	26	0.7–1.2	0.9	10
France (1978)	15–44	23	0.6–2.2	1.3	10
Germany Federal Republic of (1979)	2–25	14	0.2–1.5	0.8	18
Hong Kong (1975, 1976, 1981).	1–32	19	0.1–2.6	1.2	47
India(1980)	21–38	27	1.1–2.0	1.5	16
Indonesia (1980)	18–55	36	0.8–2.8	1.7	20
Israel(1979)	9–26	21	0.6–1.3	0.9	10
Italy(1977, 1979)	14–36	23	0.4–2.2	1.1	23
Japan(1980)		15.9		1.05	
(1981)		15.6		1.02	
Kenya(1978)	16–32	23	1.0–3.4	1.7	15
Philippines (1975,1977)	22–44	32	0.8–2.3	1.4	64
Scotland (1979)	9–33	18	0.7–2.4	1.4	11
Singapore (1981)	13–24	20	0.8–1.6	1.3	14
South Africa (1978)	12–39	28	0.5–2.4	1.7	68
UK (1978)	17–28	21	0.9–1.8	1.1	6
USA (1981)	1–27	14	0.1–1.8	1.1	32
USSR(1983)	21–31	25	1.3–1.9	1.6	17
Pakistan (present Study)	16.3-66	–	1.2–4.2	–	47

Source: IARC (Monographs Vol 38).

Maximum limits fixed by legislation or by voluntary agreement by some of the countries (U.K., USA, Egypt, Finland) are 20 mg/cig arette: for tar and 2 mg/cigarette for nicotine. Of 47 Pakistani brands 41 had tar and 37 nicotine levels per cigarette above these limits. Considering the effective length of the cigarettes studied and with certain limitations it can be said that the cigarettes with filter tips have

lower nicotine deliveries than ‘cigarettes without filter tips. The same trend is found in the case of tar levels. This may suggest that filter tip plays a certain role in retaining a part of the contents of these two noxious substances. However, evidently a significant amount of both tar and nicotine is inhaled by the smokers; as such the protection provided by the filters is of little consequence.

COMMENTS

Of 47 brands of cigarettes in Pakistan, 87% had tar and 78.7% nicotine levels above the allowable international limits. The fact that some brands of cigarettes in the market deliver high levels of tar and nicotine shows that there exists no legislative control on the maximum permissible limits for these noxious substances in cigarettes and the manufacturers ignore the grave risks associated with high concentration of tar and nicotine in cigarette smoke.

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REFERENCE

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