TRACES OF NUCLEAR RADIATION IN STIMULANTS

ISSN: 2141 – 3290
www.wojast.com

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ABSTRACT: This paper examined the traces of radioactive radiations in stimulants, which were classified as local stimulants, synthetically derived stimulants and stimulating beverages. The analysis of measurements performed on the three classes of stimulants shows that the sample of marijuana, which is a local stimulant has the highest nuclear radiation count of 17.66mBq/g. The synthetically derived stimulants have phenolphthalein with nuclear radiation counts of 12.533mBq/g as the highest. In stimulating beverages, Nescafe shows the highest nuclear radiation counts of 11.11mBq/g. These show in all, that for the three classes of stimulants considered, local stimulant shows the highest nuclear radiation counts. The radiation count rates in each of the classes of stimulants examined is suggestive of the impending health hazard that may result on continued consumption of the radioactive stimulants.

INTRODUCTION

Local stimulants and synthetically processed stimulants generally known as 'Uppers' are drugs, which make a person more active, mentally illusory and generally perturbed when injected, sniffed or taken orally. The rapidity of the catastrophic ionization of radiation present in stimulants depends partly on the count rate per gram and partly on the quantity grossly injected, sniffed or taken orally (Lewis and Elvin-Lewis, 1977). The gravity of the psychoactivity and the gross perturbation characterised with boundless energy of the body caused by the lurking radiation in stimulants when taken beyond the maximum permissible limit can be indirectly quantified in terms of the radiation count rate. This could be expressed in Becquerel (Bq), curie (C_i), Roentgen, Rad and Roentgen Equivalent Man (REM), (Sandin, 1987; Frasenko *et al*, 1990 and Henry, 1969).

Quantitatively, $1Bq$ = 1 disintegration per second; $1C_i$ = 1g of radium that gives 3.7×10^{10} disintegration per second; 1 Roentgen liberates 8.330×10^{-6} joule of energy per gram of air at s.t.p by ionization and this implies that 1 Roentgen is equivalent to the amount of gram radiation lost in air. Others are Rad which is equivalent to 0.01 Joule/kg and 1 Rem is equivalent to 10^{-2} Jkg^{-1} which equals 1 Rad. According to the Nuclear Regulating Commission, 10Ci-10mci, 0.3 Roentgen per week or 3.7×10^{-8} Bq have been respectively found to be the permissible dose of radiation that is not harmful to the body (Fremlin, 1964). Based on this research on the radiation exposure or consumption limitation, there is need to research on the radiation concentration in the synthetic and local stimulants often taken for one curative or preventive reason or the other, since radiation effects increase cumulatively in the life span of the individuals (Whicker and Pathway, 1987).

MATERIAL AND METHODS

In this research, the stimulants used were selected from local stimulants, synthetic stimulants and stimulating beverages. The measuring instruments used were the Digilert Nuclear

Radiation monitor, N0-60760 NRM, and the aiding materials were retort stand with clamps, mortar and pestle, electric oven, spatula, cellophane bags, electrical weighing balance and a beaker.

Specifically, the measurements were performed and recorded separately for local stimulants, synthetic stimulants and stimulating beverages. Local stimulants obtained from markets and herbalists in Uyo, Akwa Ibom State, Nigeria were each sliced to smaller sizes and washed. Using the electrical balance, the masses were recorded before and after drying the stimulants as initial preparation (Table 1).

Table 1: Samples of local stimulants showing weight loss during the initial preparations

Code	No.	Sample	Mass (in Grams)	
			Before drying	After drying
1		Ginger	67.832	11.270
2		Kola nut	25.074	7.731
3		Paradise grains	10.733	8.162
4		Onions	30.887	3.612
5		Pepper (Small)	10.094	7.931
6		Garlic	11.835	3.262
7		Wonderful Kola	52.706	25.497
8		Coffee (leaves)	40.000	13.830
9		Pepper fruit	39.297	6.840
10		Hot leaf fruit	44.189	10.273
11		*Ntokon eto*	20.000	17.182
12		*Badondo*	40.000	33.724
13		*Ntinnya*	12.506	9.955
14		*Nyaan*	120.000	67.058
15		*Ata*	9.678	4.000
16		*Fagara (Nkek)*	10.517	6.907
17		Pepper (big)	12.141	5.321
18		Hot leaves	10.621	3.192
19		Marijuana	10.002	9.812
20		Tobacco	20.500	16.125

Each of the samples was pulverized using mortar and pestle to granulated form. With spatula, the samples were collected and stored in different cellophane bags. The beaker was washed with water using acetate and then dried; 3.0g of the granulated samples of the local stimulant was put inside the beaker and then placed directly below the mica window of the Digilert clamped vertically on a retort stand at a height of 5.5cm. Simultaneously, the Digilert monitor and the stop watch were switched on for 10 minutes, and the total count on the Digilert radiation monitor was recorded. For each sample of the local stimulants measured for radioactivity, the background counts (without sample) were obtained first before the sample counts. Measurement of radioactivity was repeated for the entire sample and the average results were obtained and recorded (Table 2). The corrected count (N) is the different between the sample counts (Ns) and the background count (N_b), that is

$$N = N_s - N_b \tag{1}$$

The corrected counts per 10 minutes were converted to mBq/g as shown in equation 2.

$$\text{mBq/g} = \text{count rates} \times 10^3/\text{mass of sample} \tag{2}$$

Measurements of radioactivity of nine synthetically derived stimulants and ten stimulating beverages were also respectively performed using the same procedure with 3.0g of each sample as a source of stimulant. The results were as presented in Tables 3 and 4 for synthetically derived stimulants and stimulating beverages.

DATA ANALYSIS

The data obtained from measurements were first presented in Tables 2, 3, and 4. Each sample of the particular class of stimulants in the table was given a code number in order to allow for plotting of the samples with the count rate in mBq/g for count rate per gram comparison.

Table 2: Nuclear Radiation from Local Stimulants: Weight of sample 3.0g measurement time: 10 minutes

Code No.	Sample	Background (N_b) per 10 mins.	Sample counts (N_s) per 10 mins.	Corrected counts (N) per 10 mins.	Count rate per second	mBq/g
1	Ginger	107	110	3	0.0050	1.667
2	*Nyaan*	116	124	8	0.0133	4.433
3	*Ntinnya*	119	128	9	0.0150	5.000
4	*Fagara*	90	100	10	0.0167	5.567
5	Pepper (big)	89	101	17	0.0200	6.667
6	*Ata*	92	105	13	0.0217	7.233
7	Coffee (leaves)	81	98	17	0.0283	9.433
8	*Ntokon eto*	90	110	20	0.0333	11.100
9	Hot leaf fruit	93	114	21	0.0350	11.667
10	Onion	104	180	26	0.0433	14.433
11	Marijuana	88	120	32	0.0530	17.667
12	Paradise grains	106	180	24	0.0400	12.333
13	*Badondo*	69	90	21	0.0350	11.667
14	Hot leaves	92	109	17	0.0283	9.433
15	Pepper (small)	93	109	16	0.0267	9.900
16	Tobacco	81	94	18	0.0217	7.233
17	Kola nut	100	112	12	0.0200	6.667
18	Garlic	106	116	10	0.0167	5.567
19	Pepper fruit	104	112	8	0.0133	4.433
20	Wonderful kola	90	96	6	0.0100	3.333

Table 3: Nuclear radiation from Synthetic Stimulants Sample weight: 3.0g, measurement time: 10 Minutes

Code No.	Sample	Background (N_b) per 10 mins.	Sample counts (N_s) per mins.	Corrected counts (N) per mins.	Count rate per second	mBq/g
1	*Boska*	100	107	7	0.0117	3.889
2	Cascara	97	108	11	0.0183	6.100
3	Ephedrine	89	107	18	0.0300	10.000
4	Amphetamine	93	112	19	0.3017	10.567
5	Phenolphthalein	88	110	22	0.0367	12.533
6	*Lexotan*	98	119	21	0.0350	11.667
7	Caffeine	96	114	13	0.0300	10.000
8	*Senna*	90	102	12	0.0200	6.667
9	Cafegot	96	106	10	0.0161	5.557

For local stimulants, a graph of mBq/g was plotted against the sample code number using Table 1. Results shown in Fig. 1. Synthetically derived stimulants, and stimulating beverages graphs of mBq/g were also plotted against code numbers (Figs. 2 and 3 respectively).

Table 4**:** Nuclear radiation from Stimulating Beverages: weight of sample: 3.0g Measurement time: 10 Minutes.

Code No.	Sample	Background (N_b) per 10 mins.	Sample counts (N_s) per 10 mins.	Corrected counts (N) per mins.	Count rate per second	mBq/g
1	Bon vita	90	94	4	0.0067	2.233
2	*Kolevita*	107	117	10	0.0167	5.567
3	Bourn vita	97	109	12	0.0200	6.667
4	Milo	90	105	15	0.0250	8.333
5	Tea (Lipton)	102	121	18	0.0300	10.000
6	Nescafe	113	133	20	0.0333	11.111
7	Top tea	98	115	17	0.0283	9.444
8	Ever vita	103	118	15	0.0250	8.333
9	Pronto	98	110	12	0.0200	6.667
10	Oval tine	95	105	7	0.0117	3.889

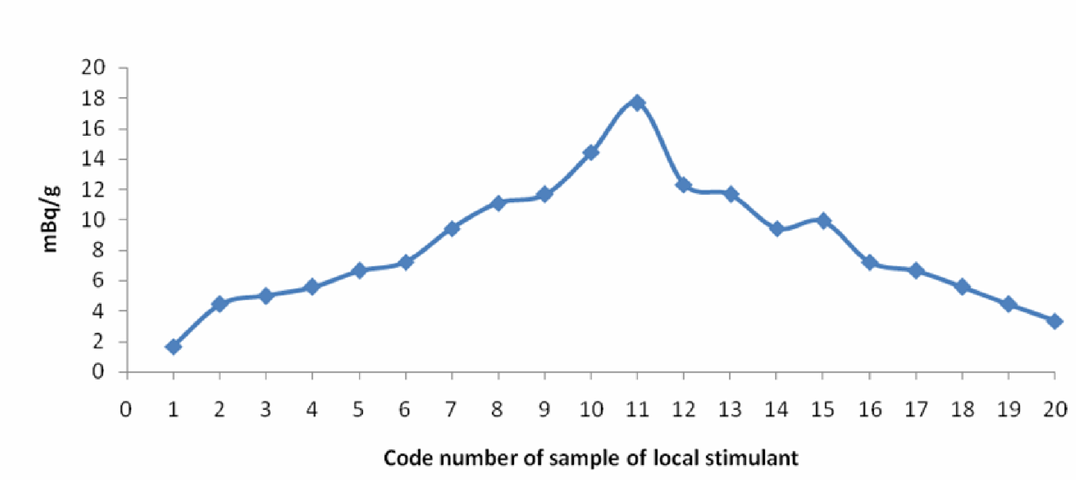

Fig.1: Variation of radioactive radiations of local stimulants

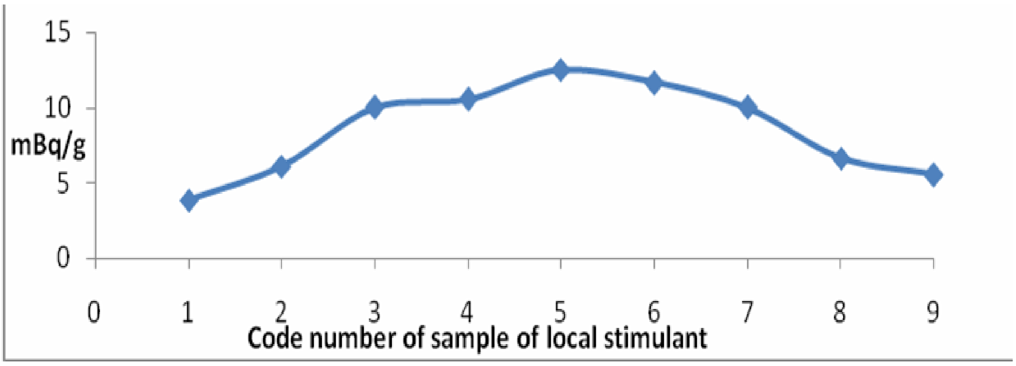

Fig 2: Variation of radioactive radiations of synthetic stimulants

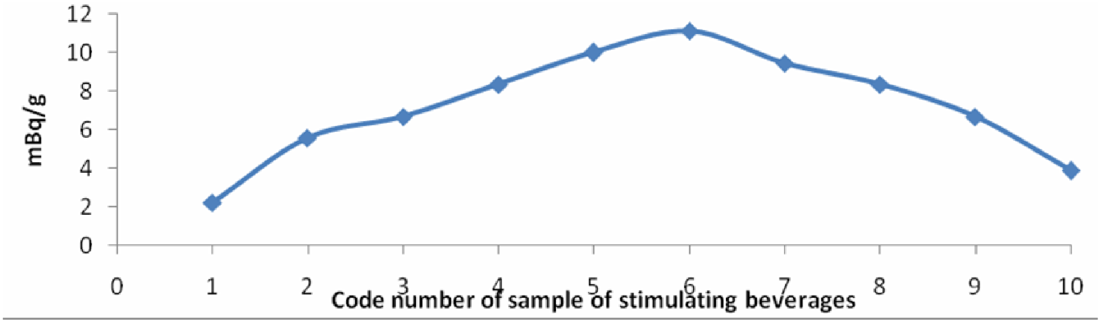

Fig. 3: Variation of radioactive radiations of stimulating beverages

RESULTS AND DISCUSSION

Firstly, radioactivity in local stimulants of twenty different samples were measured, the nuclear radiation from these local stimulants ranged from 1.66mBq/g of ginger to maximum peak value of 17.6667mBq/g for sample of marijuana. This suggests that marijuana is the most radioactive substance while ginger is the least of all the twenty different samples used as local stimulants. The graph for this class of stimulants also peaks at the code number 11 which corresponds to marijuana in Table2. In synthetically derived stimulants, the nuclear radiations ranged from a minimum of 3.889mBq/g for samples of *Boska* to a maximum value 12.533mBq/g for the sample of phenolphthalein. The graph plotted in Fig. 2 also peaks at code number 5 which corresponds to the phenolphthalein in Table 3.

Assuming for one year, 20g of marijuana is consumed; the radioactive radiation in the body of the consumer can be estimated as 365 x 20g x 17.667mBq/g which give 133.969Bq per day. Hence for forty-five years, the radiation of marijuana will be 45 x 365 x 20g x 17.667mBq/g, which is equal to 5.8036 x 10^3Bq per day. Judging from the rough estimate calculation, it can be seen that the value of 20g of marijuana absorbed for forty-five years is far below the maximum permissible limit (mpl) of 3.7 x 10^8Bq. However, it is a general notion that the effects of radiations are cumulative in one's life span. For an individual of age, A, the whole body maximum permissible radiation dosage over the entire life span is calculated as (A-18) x 5Rem. Based on this premise, over exposure or accumulation permissible level may result in potential health hazard such as skin disease, cancer, catarrh, mutation of genes and infertility in women (Ben-Boli, *et al*, 2008).

Ten different stimulating beverages shown in Table 4 were subjected to measurement of nuclear radiation as described earlier. The radiations measured ranged from a minimum of 2.233mBq/g for Bonvita to maximum value of 11.11mBq/g for sample of Nescafe, and hence confirming Nescafe (code number 6) to have the highest radioactive radiation out of ten stimulating beverages used (Fig. 3).

The various traces of count rate in the various stimulants used are diagnostic of the presence of radioactivity which lurks in these products often sniffed, injected or orally taken for ameliorating one form of body numbness or the other.

The results show that dosage taken is often time small enough to go beyond the maximum permissible limit given by the Nuclear Radiation Commission as 3.7 x 10^8mBq or 0.5 rem. However, the cumulative effects of radiation intake through consumption of stimulant and other sources of radioactive radiations may grossly hinder the normal working of the body. The lurking radioactive traces in the stimulants examined on are indication of the traces of imminent danger if continuously and excessively consumed.

CONCLUSION

From the results obtained from the samples, the envisaged possibility is that stimulants with these traces of radioactive radiation could catalyze the alteration of the general body normalcy if there is a steady consumption of some of the stimulants. Therefore, consumers of marijuana and Nescafe with relatively high radioactive contents should minimize the intake of these products and similar ones not screened here. Although the minimum and maximum values of radioactive radiation screened here are far below the maximum permissible level of 0.3 roentgens per week or 3.7×10^8mBq/g, the National Agency for Food and Drugs Administration and Control (NAFDAC) and the standard organization of Nigeria (SON) should critically screen the radioactive content of goods classified as stimulants, which are manufactured locally or imported into the country. Beside these bodies, the National Drugs Law Enforcement Agency, (NDLEA) should also strategically campaign against drug trafficking and the effects of unbridled dependence on stimulants with radioactive contents, which can be identified through intensive laboratory research.

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