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Research Article
Outcome of Red and White Blood Cell Indices of Smokeless Tobacco (Snuff) Consumers in Nigeria

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Abstract

Background and Objective: Smokeless tobacco is a drug substance that is consumed over the world despite its adverse effect on health. This study was done to determine the red cell count, total white cell count and total differential white cell count of smokeless tobacco Consumers in Ugep, Yakurr Local Government Area, Cross River State, Nigeria. **Materials and Methods:** A total of 130 subjects (65 snuff users and 65 non-users) were used and complete information needed for the study was obtained. Venous anticoagulated blood was gotten, analysed using the automated haematology analyzer smart FI and manual microscopy method. **Results:** The Hb, Hct, Rbc, TWBC and Neutrophil (141 g L^{-1}, 0.43 L L^{-1}, 5.37×10^9 L^{-1}, 12.7×10^9 L^{-1} and 73.5%) of snuff users respectively were seen to be significantly raised, while the MCV, MCH, MCHC and lymphocyte count (78 fl, 23 pg, 141 g L^{-1} and 18.1%) were significantly reduced when compared with non-users. There was 15.4, 41.5 and 43.1% of microcytic hypochromic, microcytic normochromic and normocytic normochromic red cell morphology of snuff users when compared with non-users (7.7, 10.8 and 81.5%). Their red cell lacked the normal discoid shape, revealing bubble-like and spine-like protrusions under the microscope. **Conclusion:** The use of smokeless Tobacco (Snuff) has a great effect on the red cells of its users, the significant increase in TWBC and Neutrophil could be attributable to the higher doses of nicotine in the snuff. Quick intervention among young and old users can help prevent the initial testing of this substance to add later in life. There was no significant difference with users based on age, gender and duration.

Key words: Smokeless tobacco (snuff), red cell indices, white cell indices, neutrophil, cell haemoglobin, bronchopulmonary inflammation, dipping tobacco

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Tobacco is a plant grown for its leaves which are dried and fermented before being put in tobacco products. Nicotiniatobaccum, a common name of the plant comes in different forms. People can smoke, sniff or chew tobacco. For this study, we will be centred on dry snuff, a smokeless tobacco product that is grounded into fine powder. Curiosity, peer pressure offered by friends and acquaintances contribute to the initiation of its use[1] this might be one of many reasons that prompt the intake of tobacco by the Yakurr people. Medically, the leaves were supposed to be well steamed and used as a poultice to relieve swollen throat and steamed into the body for those suffering from rheumatism[2].

Tobacco is mostly consumed in the form of smoking, chewing, snuffing or dipping tobacco. One of the forms of smokeless tobacco is snuff. Snuff is a smokeless tobacco made from ground or pulverised tobacco leaves[3]. It is inhaled or "snuffed" into the nasal cavity, delivering a swift hit of nicotine, it can be processed to fine grains and packaged either in cans or pouches. Its user takes a “pinch”, “dip” or “quid” and places it between the lower lip or cheek and gum and suck on it[4]. Another route for the use of snuff, though rare is by sniffing, i.e., nasal use. This route is common among Nigerian users. Recently, common flavours have been added to entice the user such flavours include coffee, chocolate, honey, cola and whisky etc, although these flavours add no changes to the effect of the product[5].

Smokeless tobacco use is associated with an increase in the white blood cell count. This association has been attributed to bronchopulmonary inflammation and/or infection, due to inhalation of the snuff through the nasal cavity[6]. Increased WBC counts in the chronic inflammatory changes in various tissues, due to exposure to toxic substances in tobacco snuff. Furthermore, the blood of tobacco snuffers is reported to contain a significant concentration of nicotine[7]. Smokeless tobacco also contains lipopolysaccharide which serves as an antigen that causes chronic inflammation on the mucosal surface thus inducing the recruitment of white blood cells. Nicotine is known to cause the release of adrenalin and this increases leukocytes in the peripheral blood, bone marrow and spleen[6].

Tobacco contains the chemical nicotine which is an addictive substance which is why people who use tobacco find it difficult to quit. Despite the existence of various published studies, regarding the effects of tobacco on its users, little or no efforts have been made to ascertain its effect on red cell indices. This study, therefore, determines its (tobacco) effect on haemoglobin, haematocrit, red cell count, red cell indices (mean cell volume, mean cell haemoglobin and mean cell haemoglobin concentration), red cell morphology, total white cell count and total differential white cell count.

MATERIALS AND METHODS

Study area: The cross-sectional study design was employed in this study. The subjects were recruited and gathered at the Agoi-Ekpo community, in Ugep, Yakurr Local Government Area of Cross River State. The study was carried out at the Department of Haematology (Laboratory), University of Calabar, Teaching Hospital from August to December, 2019.

Data collection: A total of one hundred and thirty subjects was enrolled in this study and it comprises fifty individuals who are indigenes of the said locality, who consume snuff and another fifty age-matched subjects who are non-snuff users nor any tobacco other product consumers.

Recruitment of subjects was carried out and only those who give their consent was used for the study. Individuals who are on medication and those who will not give their consent will not be used.

Experimentation: From each compound (house) in the community, subjects were chosen randomly since the collection was strictly based on consent, (i.e.) no equal number of males and females. Two millilitres of blood was aseptically collected by venipuncture from the median cubital vein of both each subject and each control into an EDTA (ethylenediaminetetraacetic acid) sample container, having 0.04 mL of commercially made tripotassium ethylenediaminetetraacetic acid (10% K_3EDTA). The bottle was gently inverted to enable the sample to mix properly with an anticoagulant to avoid clots. After collection, the samples were placed on a soft gaze placed on ice in a large but portable flask. The ice which provides a cooling effect to the samples, preserve them for the time being until the samples are taken to the point of analysis (The University of Calabar Teaching Hospital Laboratory). The samples were used to carry out Haematocrit (Hct), Haemoglobin estimation (Hb), Mean Cell Volume (MCV), Mean Cell Haemoglobin (MCH), Mean Cell Haemoglobin Concentration (MCHC), red cell morphology, total white cell count and total differential white cell count.

The samples were processed by using a haematology autoanalyser, which was done with a smart FI haematology analyzer (3 Part, Model: HA6000, China Jiangsu Nanjing).

Data analysis: Statistical analysis will be carried out using SPSS version 20. 0. The relationship between the parameters will be determined using the student t-test and ANOVA. A $p<0.05$ will be considered as statistically significant. The result obtained was expressed clearly with tables.

RESULTS

The comparison of haematological parameters among consumers of snuff and non-consumers is shown in Table 1. The RBC and Hb of snuff consumers were slightly elevated ($5.37\pm1.04\times10^{12}$, 141.06 ± 21.47 g L^{-1}) when compared with the control group ($4.76\pm0.94\times10^{12}$, 128.86 ± 22.25 g L^{-1}) However, the MCV, MCH and MCHC of snuff consumers were slightly decreased (78.12±6.04 fl, 25.32±2.68 pg and 140.77 ± 14.89 g L^{-1}) when compared with the control group (84.55±5.74 fl, 27.52±4.83 pg and 332.46 ± 12.83 g L^{-1}). The mean total white blood cell count of snuff consumers was 6.17±2.42 while that of non-snuff consumers was 5.32±1.21, which showed a significant increase in snuff consumers when compared to non-consumers with a p-value of 0.013. The mean neutrophil count of snuff consumers was 55.50±8.15 while that of non-snuff consumers was 48.21±7.78, which showed a significant increase in snuff consumers when compared to non-consumers with a p-value of 0.000. The mean eosinophil count of snuff consumers was 3.90±5.55 while that of non-snuff consumers was 482.80±1.16. However, at $p<0.05$, there was no significant difference in snuff consumers when compared to non-consumers with a p-value of 0.122. The mean lymphocyte count of snuff consumers was 34.06±7.56 while that of non-snuff consumers was 42.39±8.14, which showed a significant increase in snuff consumers when compared to non-consumers with a p-value of 0.000. The mean monocyte count of snuff consumers was 7.39±3.76 while that of non-snuff consumers was 6.49±3.20. However, at $p<0.05$, there was no significant difference in snuff consumers when compared to non-consumers with a p-value of 0.143.

The comparison of red cell and white cell indices of snuff consumers based on sex and age is seen in Table 2 and 3. The

Table1: Comparison of red cell and white cell Indices among consumers of snuff and non-consumers

Parameters	Consumers (n = 65)	Non-consumers (n = 65)	t	p-value
Rbc ($\times10^{12}$)	5.37±1.04	4.76±0.94	2.921	0.031*
Hb (g L^{-1})	141.06±21.47	128.86±22.25	3.218	0.009*
Hct (l L^{-1})	0.43±0.07	0.40±0.07	1.850	0.067
MCV (fl)	78.12±6.04	84.55±5.74	-3.220	0.003*
MCH (pg)	25.32±2.68	27.52±4.83	-3.218	0.038*
MCHC (g L^{-1})	140.77±14.89	332.46±12.83	10.583	0.000*
RDW (fl)	15.76±1.21	15.86±2.75	-0.281	0.780
T. WBC ($\times10^{9}$ L^{-1})	6.17±2.42	5.32±1.21	2.512	0.013*
NEU (%)	55.50±8.15	48.21±7.78	5.217	0.000*
EOSIN (%)	3.90±5.55	2.80±1.16	1.559	0.122
LYMPH (%)	34.06±7.56	42.39±8.14	-6.049	0.000*
MONO (%)	7.39±3.76	6.49±3.20	1.474	0.143

Values are represented as Mean±Standard deviation, n: Number of subjects examined, Rbc: Red blood cell, Hb: Haemoglobin, Hct: Haematocrit, MCV: Mean cell volume, MCH: Mean cell haemoglobin, MCHC: Mean cell haemoglobin concentration, RDW: Red cell distribution width, T. WBC: Total white blood cell, NEU: Neutrophil, EOSIN: Eosinophil, LYMPH: Lymphocyte, MONO: Monocyte,*Statistically significant and $p<0.05$

Table 2: Red cell and white cell indices of snuff consumers based on gender

Parameters	Male (n = 48)	Female (n = 17)	t	p-value
Rbc ($\times10^{12}$)	5.47±1.11	5.08±0.76	1.008	0.115
Hb (g L^{-1})	142.85±22.62	136.00±17.40	1.285	0.207
Hct (l L^{-1})	0.43±0.07	0.41±0.05	1.192	0.247
MCV (fl)	75.29±6.31	77.65±5.36	0.406	0.687
MCH (pg)	25.30±2.84	25.38±2.22	- 0.128	0.899
MCHC (g L^{-1})	332.54±12.41	332.24±14.34	0.075	0.938
RDW (fl)	15.80±1.27	15.63±1.01	0.570	0.572
T. WBC ($\times10^{9}$ L^{-1})	6.13±2.50	6.23±2.31	- 0.148	0.883
EOSIN (%)	3.08±2.28	5.61±9.10	- 1.256	0.223
NEU (%)	54.65±8.26	57.29±7.80	- 1.251	0.218
LYMPH (%)	34.40±7.66	33.30±7.50	0.528	0.600
MONO (%)	8.05±3.20	6.02±4.51	1.852	0.074*

Values are represented as Mean±Standard deviation, n: Number of subjects examined, Rbc: Red blood cell, Hb: Haemoglobin, Hct: Haematocrit, MCV: Mean cell volume, MCH: Mean cell haemoglobin, MCHC: Mean cell haemoglobin concentration, RDW: Red cell distribution width, T. WBC: Total white blood cell, NEU: Neutrophil, EOSIN: Eosinophil, LYMPH: Lymphocyte, MONO: Monocyte,*Statistically significant and $p<0.05$

Table 3: Red cell and white cell indices of snuff consumers based on age

	Age (years)					
Parameters	25-43 (n = 9)	44-62 (n = 35)	63-81 (n = 16)	82-100 (n = 5)	F	p-value
Rbc ($\times 10^{12}$)	5.13±0.75	5.47±0.96	5.59±1.12	4.37±1.38	2.159	0.102
Hb (g L^{-1})	145.11±19.65	140.86±18.92	145.81±23.50	120.00±27.95	2.073	0.113
Hct (l L^{-1})	0.43±0.06	0.43±0.06	0.44±0.07	0.36±0.09	1.752	0.166
MCV (fl)	75.78±5.89	78.94±5.48	78.12±7.51	76.60±5.77	0.765	0.518
MCH (pg)	25.47±2.66	25.19±2.66	25.78±2.96	25.32±2.68	0.348	0.790
MCHC (g L^{-1})	339.00±12.29	329.31±13.17	336.31±11.04	330.40±12.22	2.110	0.108
RDW (fl)	15.96±1.21	15.63±1.29	15.96±1.12	15.62±1.22	0.368	0.777
T. WBC ($\times 10^{9}$ L^{-1})	6.05±2.00	6.04±2.31	6.53±2.86	4.16±0.00	0.409	0.747
NEU (%)	52.91±5.40	56.23±8.50	55.36±8.83	56.00±0.00	0.390	0.761
EOSIN (%)	2.00±1.60	4.52±7.22	3.41±2.28	8.90±0.00	0.813	0.491
LYMPH (%)	36.99±5.52	33.37±7.18	34.09±9.04	31.00±0.00	0.591	0.623
MONO (%)	8.43±1.82	7.21±4.21	7.41±3.66	4.10±0.00	0.501	0.683

Values are represented as Mean±Standard deviation, n: Number of subjects examined, Rbc: Red blood cell, Hb: Haemoglobin, Hct: Haematocrit, MCV: Mean cell volume, MCH: Mean cell haemoglobin, MCHC: Mean cell haemoglobin concentration, RDW: Red cell distribution width, T. WBC: Total white blood cell, NEU: Neutrophil, EOSIN: Eosinophil, LYMPH: Lymphocyte, MONO: Monocyte and $p<0.05$

Table 4: Red cell and white cell indices of snuff consumers based on the duration of consumption

	Duration (years)					
Parameters	1-10 (n = 30)	11-20 (n = 19)	21-30 (n = 7)	31-40 (n = 9)	F	p-value
Rbc ($\times 10^{12}$)	5.24±0.87	5.54±1.14	5.54±1.36	5.33±1.20	0.397	0.756
Hb (g L^{-1})	141.40±21.15	144.21±20.82	140.00±26.29	134.11±22.19	0.447	0.720
Hct (l L^{-1})	0.43±0.06	0.44±0.07	0.42±0.09	0.40±0.06	0.663	0.578
MCV (fl)	77.90±6.23	78.68±5.16	80.00±4.83	76.22±7.51	0.579	0.631
MCH (pg)	25.54±2.81	25.15±2.33	24.93±2.64	25.23±3.31	0.139	0.936
MCHC (g L^{-1})	332.67±11.79	329.42±14.18	340.43±12.20	332.00±13.05	1.279	0.290
RDW (fl)	15.65±1.35	16.06±1.23	15.50±0.89	15.69±1.11	0.577	0.632
T. WBC ($\times 10^{9}$ L^{-1})	6.06±2.29	6.19±2.45	6.52±2.32	6.13±3.19	0.071	0.975
NEU (%)	55.08±7.65	57.78±9.67	55.25±6.09	51.97 ±7.18	1.120	0.348
EOSIN (%)	2.71±2.00	6.10±9.30	4.52±2.54	2.14±0.90	1.882	0.142
LYMPH (%)	34.62±8.24	31.92±7.50	34.65±6.38	36.54±6.19	0.926	0.434
MONO (%)	7.63±3.39	6.75±4.63	5.86±3.24	9.44±2.47	1.611	0.196

Values are represented as Mean±Standard deviation, n: Number of subjects examined, Rbc: Red blood cell, Hb: Haemoglobin, Hct: Haematocrit, MCV: Mean cell volume, MCH: Mean cell haemoglobin, MCHC: Mean cell haemoglobin concentration, RDW: Red cell distribution width, T. WBC: Total white blood cell, NEU: Neutrophil, EOSIN: Eosinophil, LYMPH: Lymphocyte, MONO: Monocyte and $p<0.05$

total number of male snuff consumers was 44 while the number of female snuff consumers was 21. The mean red cell indices, total white blood cell count, eosinophil, neutrophil and lymphocyte counts, have been shown. At $p<0.05$, there was no statistically significant difference in the above parameters of the male snuff consumers when compared to female snuff consumers. The number of snuff consumers who fell in the age range of 25-43 was 9, those who fell under the age range of 44-62, 63-81, 82-100 were 35, 16 and 5, respectively. However at $p<0.05$, there was no significant difference in the red cell indices, mean total white blood cell count, eosinophil, neutrophil and lymphocyte counts.

Table 4 shows the distribution of red cell and white cell indices of snuff consumers based on the duration of consumption. Out of the 65 subjects examined, the number of those who fell in the duration range of 1-10 was 30, those who fell under the duration range of 11-20, 21-30, 31-40 were 19, 7 and 9, respectively. However at $p<0.05$, there was no significant difference in the mean, red cell indices, total white blood cell count, eosinophil, neutrophil and lymphocyte counts. The comparison of red cell morphology between snuff consumers and non-consumers observed in Table 5 revealed that the red cell morphology of snuff consumers showed a significant elevation in the microcytic normochromic and microcytic hypochromic blood films but a significant decrease in the normocytic normochromic blood film when compared to that of the control group.

Table 6 shows the comparison of white cell indices of test subjects based on smoking other substances. Out of the 65 subjects examined, the number of those who consume only snuff was 34, those who consume both snuff and Gin was 20. 4 subjects took Snuff, Gin and Cannabis. About 3 took Snuff, Gin and Cigarette while 4 took a combination of Snuff, Cannabis and Cigarette. However at $p<0.05$, there was no significant difference in the mean total white blood cell count, eosinophil, neutrophil and lymphocyte counts.

Table 5: Comparison of red cell morphology between snuff consumers and non-consumers

Red cell morphology	Consumers (n = 65)	Non-consumers (n = 65)
Normocytic normochromic	28 (43.1%)	53 (81.5%)
Microcytic normochromic	27 (41.5%)	7 (10.8%)
Microcytic hypochromic	10 (15.4%)	5 (7.7%)
	$\chi^2 = 21.147$, df = 2, p = 0.000*	

*Statistically significant, $p<0.05$ and χ^2 = Chi-square

Table 6: Comparison of white cell indices of snuff consumers based on smoking other substances

Parameters	S (n = 34)	S, G (n = 20)	S, G, CA (n = 4)	S, G, CI (n = 3)	S, CA, CI (n = 4)	F	p-value
T. WBC ($\times 10^9$ L^{-1})	6.26±2.35	6.05±2.82	6.12±2.01	5.06±1.42	6.80±2.62	0.238	0.916
NEU (%)	56.55±8.34	53.70±8.26	53.60±4.73	49.37±1.40	62.13±7.78	1.582	0.191
EOSIN (%)	4.84±7.29	3.33±2.45	2.05±1.55	1.67±0.58	2.25±2.34	0.602	0.663
LYMPH (%)	32.75±8.00	36.20±7.37	35.33±4.25	39.37±3.10	29.25±5.90	1.502	0.213
MONO (%)	6.98±4.06	7.39±3.57	8.98±1.79	11.20±1.65	6.45±3.68	1.118	0.357

Values are expressed as Mean±Standard deviation, n: Number of subjects examined, T. WBC: Total white blood cell, NEU: Neutrophil, EOSIN: Eosinophil, LYMPH: Lymphocyte, MONO: Monocyte, S: Snuff, G: Gin, CA: Cannabis and CI: Cigarette

DISCUSSION

The slight elevation of the Red Blood Cell (RBC) count could be a result of the inflammation caused by snuffing activity. When snuff is consumed, inflammation may occur, which may affect the organs in the body like the lungs leading to hypoxia as a result of the impaired function of the lungs to deliver oxygen. Now when this happens, there is a signal to the kidney to produce erythropoietin to make more red blood cells to compensate for the oxygen loss in the body. This causes a rise in Rbc count, since there are more red cells in the system there will be an increase in Hb level. Hard drugs when taken into the body can distort the shape and size of the red cell. The nicotine contained in the snuff as a drug is a very toxic substance and it is responsible for the addictive nature of tobacco consumers. This hard drug could result in a reduction in the size of the red cell bringing about low MCV amongst snuff consumers. MCH of snuff consumers, when compared to non-consumers, was found to be significantly reduced in the present study but found to be high in the research study by Shukla *et al.*[8]. MCV is low in this study contrary to the previous study by Shukla *et al.*[8] the research article. MCHC of consumers, when compared with non-consumers in the present study, was reduced significantly, this is contrary to the study of Biswas *et al.*[9]. The altered haematological parameters in these listed studies could be a result of the selective toxicity of smokeless tobacco and its components.

A significant increase in the total white blood cell count and neutrophil count of smokeless tobacco (snuff) consumers, when compared to non-tobacco consumers, has been shown in Table 1. Rajasekhar *et al.*[10] report on the increase in the aforementioned parameters show that there is an agreement in both findings. In this study, there was a significant decrease in the mean lymphocyte value of snuff consumers compared to their counterparts. This finding agrees with the ones conducted by Kılınç *et al.*[11], who also proposed a low lymphocyte count. The altered haematological parameters in smokeless tobacco consumers further suggest the selective toxicity of snuff and its components. The significant change suggests enhancement in the ability of blood components to phagocytose. Nicotine present in tobacco may influence suprarenal glands causing it to secrete more catecholamine which may affect leukocytosis. Yasmin *et al.*[12], who had also conducted similar research speculated that damages to tissues and inflammation might have also operated behind an increase in total leukocyte count in smokeless tobacco users. The increased neutrophil value found in snuff consumers of the present study may be associated with ongoing inflammation of tissues. Neutrophils are known to produce cytotoxic substances which adversely affect lung functions. Systemic stress potentiates the activity of the sympathetic nervous system. As such, this raises cortisol secretion which is associated with a decrease in blood lymphocyte percentage. Nicotine is also known to be stimulatory to the sympathetic nervous system as proposed by Pyrgakis[13]. Thus it may be speculated that snuff consumption or using other tobacco products may result in a similar lowering of lymphocyte percentage.

The effect of smokeless tobacco on haematological parameters based on sex has been shown in Table 2. From this study, it was evident that age is not a factor in determining the effect of snuff on the assayed parameters. This suggests that both sexes have an equal chance of incurring health-related disorders of haematological parameters imposed by snuff.

Owing to the need to assess if snuff consumption has any effect on haematological parameters, there was also a need to check if age serves as an important determinant. The mean values of the parameters have been shown in Table 3.

However, to age among snuff consumers and non-snuff consumers, there was no significant difference in the values of both groups. Like sex, it also shows that irrespective of the age group, both groups have equal chances of being affected by whatever condition that snuff presents.

Also, this study has shown that duration is not a factor in determining the effect of smokeless tobacco on haematological parameters. This is evident in the non-significant difference found among the parameters of the snuff consumers. The results of this study showed no significant difference in the haematological parameters based on the substances consumed. One thing of note is that previous works have a paucity of data on the effect of all other smoking and smokeless substances alongside snuff on haematological parameters.

The blood picture of consumers of snuff showed RBCs lacking their normal discoid shape under the microscope instead of the normal discord or biconcave shape, they reveal a bulb like protrusion and others having spines on their surfaces these are Acanthocytes and Echinocytes. The rise in the Rbc count of tobacco users shows that tobacco stimulates erythropoiesis due to insufficient pulmonary function. In this present study, Rbc and Hb level of snuff consumers were seen to be raised. This is in line with the study conducted by Mukherjee and Chattergee[14]. On the contrary, Rbc count and Hb level were decreased in the study conducted by Shukla *et al.*[8]. Thus, the evaluation of various harmful and toxic substances contained in snuff and different dosage of smokeless tobacco consumed by individuals were not included in this study. There should be further research on the prevalence alongside the dosage of consumption per day. There is a high need for nicotine replacement therapy to be undergone by snuff consumers. In pursuit of a tobacco-free world, adequate counselling about the knowledge and awareness of snuff effects should be readily disseminated.

CONCLUSION

This study was conducted in the Ugep area of Cross River State, therefore, revealing the use and addiction of this substance, smokeless tobacco has a great effect on the red cell indices of its users. This study is the first tool of diagnoses to disease which must have been caused by this addictive substance and could be useful in creating awareness on the danger of consuming even the smallest quantity of it.

It also reveals a significant increase in the total white blood cell count specifically the neutrophils. This could predispose these snuff consumers to the risk of developing leukemoid reactions and also tissue and organ damage.

SIGNIFICANCE STATEMENT

This study discovers the possible synergistic effect of Haemoglobin estimation, Haematocrit, Red Blood Cell Count and Its Indices (Mean Cell Haemoglobin, Mean Cell Volume and Mean Cell Haemoglobin Concentration) Red Cell Distribution Width, Red Cell Morphology, White Blood Cell Count and Differentials (Neutrophil, Eosinophil, Lymphocyte, Monocyte and Basophil) parameters that can be beneficial for persons that consumed Smokeless Tobacco (Snuff). This study will help the researcher to uncover the critical slight elevation of red blood cell count and Haemoglobin estimation, White blood cell count and Neutrophil could be as a result of the inflammation caused by snuffing activity and enhancement in the ability of blood components to phagocytose causing inflammation too, respectively.

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