Original Article

Factors Associated with Snuff Usage and its Neurocognitive Effects among Women in Ndola Urban, Zambia

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ABSTRACT

Objectives: To investigate the factors associated with snuff usage and its neurocognitive effects among women.

Design: A cross sectional study encompassing a sample of 73 females with an average age range between 18 and 60 years was employed. Participants in this study came from three townships namely Masala having 28 (38.4%), Mushili with 25 (27.4%) and Kabushi with 20 (34.2%) and primary as their education level.

Measures: Validated snuff questionnaire was used to determine the factors to snuff usage then Trail Making test and WAIS-III Symbol Search test were used to measure attention and working memory. The Statistical Package for Social Sciences (SPSS) version 20 computer software was used to analyse quantitative data in order to generate simple descriptive statistics in form of frequencies and tables. An analysis of the correlation with Pearson analysis was conducted to find out the relationship between the frequency of snuff usage with attention and working memory among women.

Results: From the Trail Making test administered, 62 (84 %) had deficits on attention and 56 (77%) had severe memory impairment according to WAIS III Symbol Search test. Concurrently, most women use snuff for physical (body weight loss /gain, sexual pleasure whitening of teeth, energy for ADL etc) and Pharmacology (Cure for headache, toothache, flu, regulate Bp, siphoning vagina fluid, boost immune system etc) factors.

Conclusion: The analysis from this study showed a statistically significant relationship between frequency of snuff usage (1-10 times per day) with attention and working memory as snuff impairs both attention and memory. The more one uses snuff the more impairment in memory and attention. In addition, the study revealed social, pharmacology and physical as most factors leading to the use of snuff among women. It is hoped that the results of this study will open research prospects on women using snuff and policy makers to come up with intervention measures in order to arrest this mushrooming problem among women.

INTRODUCTION

Tobacco use is the leading cause of non-infectious diseases and neurocognitive disorders and has been projected that mortality related to tobacco use will increase from 3 million deaths to 8.4 million deaths by 2020 Worldwide[1]. There is evidence to suggest that tobacco use is on the increase in developing countries compared to developed countries. However, among Smokeless Tobacco products, snuff has become so popular in a number of

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developing countries like Zambia. For example, Goma[2] in his study revealed that 70% of women in Zambia use smokeless tobacco and WHO[3] reports an increase of 1.2% as compared to the previous years. This increase in the use is linked to a number of factors such as social, cultural, pharmacology and physical which results into impairment of attention and working memory.

Snuff scientifically known as nicotina-rustica or nicotiana-tabacum[4,5] is one of smokeless tobacco processed from a Virginia type of tobacco-dried leaves into powder. It is of two major types, dry and moist usually dark brown in colour. It contains nicotine an extremely addictive drug that acts as both central nervous system stimulant and depressant[6].

In Zambia, snuff is popularly known as 'Insunko' in Bemba and 'Kaponda' in Nyanja. It is made from pulverized leaves mixed with ashes from the corncobs, banana leaves, soda or daga. Most women in Zambia consume snuff through the nose a most common mode, mouth and vaginal inserting like in other countries[7]. It is used for different factors such as medicine for toothache, headache, Blood pressure (Bp), colds, stress, anxiety and depression[12]. It acts as religious cleansing of evil spirits and vaginal siphoning for dryness, leading to increased sexual pleasure and restoration of vaginal elasticity[8].

On contrary, snuff has increased risk of oesophagus, mouth and vaginal cancer, cardiovascular diseases, fatal stroke and Oral pathologies[9]. Apart from general effects, snuff usage results into complex neurocognitive effects because of nicotine content. It impairs attention, verbal information processing, visual attention and working memory[10]. At the same time, it enhances human cognition by releasing excess neurotransmitters including dopamine that is associated with pleasure and motivation[11]. Hence, this study investigated factors related to snuff usage and its neurocognitive effects among women in Zambia.

METHODS

The study was a market based cross- sectional. It was limited to women snuff users of different age groups who were presented with neurocognitive effects. Using snowball sampling procedure 73 women were selected from Masala with 28, Kabushi with 25 and Mushili with 20, townships of Ndola Urban in the Copperbelt province. Women population was chosen because of rampant increase in the use of snuff bearing in mind that both cigarettes and smokeless tobacco cause cognitive impairments to foetus and new born babies in case of pregnant women resulting into an increase to disability population. This study used quantitative methods of data collection.

Instruments for Data Collection

Data was collected using validated structured snuff questionnaire which was slightly modified to suit the Zambian norms. Neuropsychological Test instruments used in this study were Trail Making Test (TMT) a series of randomly arranged black dots numbered from 1 to 25, done in 5 minutes and measured attention. WAIS-III Symbol Search test measured working memory in this study. It is a matching exercise with two shapes corresponding to one in the group of shapes and should be performed in 2 minutes without stopping or changing answers.

After permission from Biomedical Ethics Committee, Ndola City Council and consent from participants, the researcher administered the questionnaires and the tests precisely. This was done in stages:

Stage 1: Recruitment of respondent with assistance from the market officials.

Stage 2: Administering of demographic questionnaire which was completed with the help of the researcher by means of interview.

Stage 3: Interviewing respondents using validated structured snuff questionnaire and performing neuropsychological behavioural tests. The interviews were conducted in locations convenient

to the respondents for confidentiality as the study was dealing with women who are culturally respected in every society.

Data Analysis

Data was presented, analyzed and interpreted using SPSS-v20. The package was used to generate frequency tables and percentages and to cross tabulate the variables and compare neurocognitive functioning and the frequency of use among snuff users. Descriptive Analyses examined the demographic characteristics, the factors and frequency of snuff usage was used so as to come up with percentages, frequencies, means and standard deviations. An analysis of the correlation with Pearson analysis was conducted to find out the relationship between the frequency of snuff usage with attention and working memory among women.

RESULTS

Demographic characteristics

Of the 73 women enrolled who consented to participate, majority 39 (53%) of snuff users were between the age of 18-28 years with mean age of 33.92. Most participants (53%) in this study were married with majority living in Masala Township (38.4 %,) and only attained primary level (69%) resulting into economically poor. The study also found that most of the respondents were Christians (74%) and Moslems (29%) by religion and Bembas (52%) and Nyanjas (36%) by tribe (**table 1).**

Major Factors of using Snuff by women

The major significant factors of women using snuff according to this study were physical (63%), pharmacology (21.9%) and social factors (12.3%). Physical factors include weight loss, sexual enhancement while pharmacology comprise of stress and depression relief, control for Bp and Flu. Social factors include peer / parental influence, acceptability, social bond, age emancipation **(Table 2).**

Table 1: Demographic characteristics of respondents (N=73)

Demographic trait	Frequency (n)	Percent (%)
Age		
18-28	39	53
29-39	21	29
40-50	8	11
51 and above	5	7
Marital status		
Married	39	53
Single	13	18
Divorced	15	21
Cohabiting	6	8
Residence		
Masala	28	38.4
Kabushi	25	34.2
Mushili	20	27.4
Education level		
Primary	50	69
Secondary	22	30
Tertiary	1	1
Religion		
Christian	54	74
Islam	19	26
Other	0	0
Economic status		
Poor	13	18
Average	59	81
Rich	1	1
Tribe		
Bemba	38	52
Nyanja	26	36
Tonga	5	7
Lozi	1	1
Lunda	2	3
Kaonde	0	0
Luvale	1	1

Table 2: Major factors to snuff usage among women

Major reason to snuff usage	Frequency (N)	Percentage (%)
Physical Factors (weight loss, sexual enhancement)	46	63
Pharmacology Factors (Stress, depression relief, Bp, Flu)	16	21.9
Social Factors	9	12.3
Cultural Factors	2	2.7
TOTAL	**73**	**100**

Snuff Usage in the past three months

Considering the past three months, the study found that most women had used snuff up to ten times (37.0%) per day; 11 to 20 times (34.2%) and 21 to 30 times (23.3%). Fewer women had used snuff for more than 31 times (2.7%) or not used it at all (2.7%). A mean of 2.00 and standard deviation of .986 indicate that the women had used snuff frequently up to 30 times in the last three months. In addition, most women used snuff within an hour (mean 2.29 and standard deviation .979) upon waking up. The study further found that only 4 (6%) of the 73 respondents had visited a doctor for advice in the past 12 months. Those who visited a doctor (6%) did so only 1 to 3 times (**Table 3).**

Table 3: Showing Snuff Usage in the Past Three Months

	Frequency	Percent
1 - 10 times	27	37.0
11 - 20 times	25	34.2
21 - 30 times	17	23.3
Above 30 times	2	2.7
0 times	2	2.7
Total	**73**	**100.0**

Test for examining attention of women snuff users using Trail Making Test Instrument

TMT was conducted on the respondents to measure attention and the results showed that majority of the respondents 62 (84. %) had deficits on attention while the minority 11 (16%) were on average in terms of attention **(Table 4).**

Table 4: Showing results from Trail Making Test on women using snuff

Scores	Frequency	Percent
0 to 29 (average)	11	15.1
30 and above (deficit)	62	84.9
Total	73	100.0

Test for examining memory of women snuff users using WAIS III Symbol Search

A 120 seconds test was conducted at random to search for signs and symbols. The total score on this concentration test was 60. Basing on the results from WAIS III Symbol Search Test, the findings significantly showed that majority of women 56 (77%) who use snuff had severe memory impairment while 10 (14%) had moderate memory impairment and only 7 (10%) were mildly impaired **(Table 5).**

Scores	Frequency	Percent
30 - 39 scores (mild impairment)	7	9.6
20 -29 scores (moderate impairment)	10	13.7
19 and below (severe impairment)	56	76.7
Total	73	100.0

Cross tabulation of Snuff usage against Attention and Working Memory

The findings according to this study revealed a statistically significant relationship between high frequency of snuff usage and attention with f (20.069) at P<0.001. The high frequency usage was therefore, comparable with respect to education levels of women **(Table 6).**

Frequency of snuff usage in a week	Scores for Attention (Trial Making Test)		X^2 (p value)
	0-29 (average)	30 and above (deficit)	
Daily	6	49	
Two days	0	11	
One day	5	2	20.069
TOTAL	11	62	**(P< 0.001)***

Using a cut off GDS ≥ 0.5 to indicate neurocognitive impairment of 73 participants, 56 (76.7%) using snuff daily and twice in a week had severe memory

impairment while 7 (9.6%) had mild and 10 (13.7%) moderate memory impairment. This is clearly an indication that there was a great significant relationship between daily usage of snuff and working memory with f (138.18) at P<0.001

Table 7: Cross tabulation of snuff usage against scores from WAIS III Symbol Search Test

Frequency of Snuff usage in a week	Scores for Memory (WAISIII Symbol Search Test)				X^2 (P value)
	40 & above (normal)	30-39 (mild impairment)	20-29 (moderate impairment)	19 & below (severe impairmen)	
Daily	0	0	0	55	
Two days	0	0	10	1	
One day	0	7	0	0	138.18 (P< 0.001)*
TOTAL	0	7	10	56	

insertions (12). A study carried out among South African young woman demonstrates that women often insert snuff as a reference point of tightening the vagina and feeling tight like that of a child (7). Another study carried out in Tanzania 70% and South Africa 80% (13) of women confirmed that vaginal temperature regulation is a very common use of snuff though the idea is uncommon in Western countries (3) who favour condoms. In Zimbabwe 60% of women do not favour condoms as heat lubricant but snuff (8). Correspondingly, in this study a high percentage (63%) of participants displayed physical factors as major reasons for using snuff bringing out sexual enjoyment, vaginal tightening raising body temperature and weight loss **(table 2).**

DISCUSSION

Demographic Characteristics

The results from this study shows that majority (53%) of the participants were between 18 and 28 years of age, married and had only attained primary level of education (69%). This is similar to the two studies done in Tanzania (4) which revealed that the peak age range of using snuff was around 15 – 40 years, though Warren and friends (13) revealed that the prevalence of using snuff starts as early as 12 years in young ladies because of peer pressure and envying their role models.

The major significant method of using snuff according to this study was nose sniffing (mean 1.99 and standard deviation 1.173) as this is the commonest tradition way of using snuff even in other African countries (6, 4). While the study found sniffing to be the major method of taking snuff, other methods are also used including smoking, chewing, drinking the juice and vaginal insertion (7)

The Physical factors leading to the use of snuff

References to the use of snuff tightening the vagina also reflect how women described snuff vaginal

Pharmacology Factors leading to the use of snuff

Snuff was significantly regarded as medicine to different diseases and conditions such as headache, flu, Bp, toothache, stress and depression. 21.9% of the 73 participants affirmed the use of snuff for pharmacology purposes (table 2). This is in agreement with the study done in Madagascar which revealed that snuff is a control measure of neuropsychological disorders such as stress, anxiety and depression giving 41% (10), though not concurrent with the study done in South Africa (3) which revealed that snuff does not reduce stress and Bp levels.

Social factors leading to the use of snuff

Results 9 (12.3%) of participants in this study, shows social factors to be less significant in the use of snuff giving details of strengthening a bond as friends and being known in the world of snuff users as shown in table 2. The results are in line with a study carried out in SA with 43 (19.5%) out of 220 participants who acknowledged that snuff usage helps women to form a strong bond of friendship, putting an invitation to a friend which they regard as sacred and family

identification (14). This is in concurrent with a study done in Congo DR. 27 (50.1%) of 53 (3) which revealed that peer / social network is a strong risk factor for both the initiation and progression to regular use.

Cultural factors leading to the use of snuff

The study found that using snuff was not significantly culturally born as only 2 (2.7%) out of 73 participants agreed to this claim though it is a practice that has a long history in the Zambian rural set up among old women. This is contrary with a study done in South America, which confirmed that snuff usage is a preservative of culture and identity especially to women, like the South American Indian tradition (77%) use it for purification, connection with the divine, and recreation (3, 13).

Frequency of snuff usage among women

Research has shown that majority of women in this study use snuff regularly and within an hour (mean 2.29 and standard deviation .979) upon waking up. On average women (69%) use snuff 1-10 times a day (table 3). The study correlates with a study carried by Karolinska Institute in 2005 which availed that, one in five men and a growing proportion of women take snuff on a daily basis, and more than 5 times a day (3). The study is also similar with a survey done in Sweden which revealed that the majority (89.2%) of women normally used snuff only one pouch at a time (15).

Relationship between frequency of snuff usage with attention and working memory

The findings of this study revealed that there exists a significant relationship between frequency of snuff usage with attention and working memory which may eventually lead to impairment. A Pearson Chi Square test was performed to determine the relationship between the two variables. There was a positive relationship between frequency of snuff usage with attention and working memory. These results give an indication that women who frequently use snuff are at a risk of possibly having impaired attention in activities for daily living such as paying attention to house chores like cooking, cleaning their homes and paying attention to learning new ideas especially computational, as well as loss of memory in recalling learnt tasks. Levin and Kumari (6, 10) in agreement reported that users of substances with nicotine experience decreased cognitive function, which impairs concentration, attention and memory especially regularly users show significant positive effects on their memory and attention.

Therefore, from the two tests performed by participants, results from this study significantly shows that frequency use of snuff (average 1-10 times) every day impairs attention and working memory as this is shown by the majority of respondents 62 (84.%) in **table 4** and 56 (77%) in **table 5** respectively. This is in harmony with a study by Levin (5) which indicates that, 60% of adults diagnosed with attention deficit disorder take snuff frequently as compared to less than 30% of those who take cigarettes frequently.

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ACRONOMY

SPSS : Statistical Package for Social Sciences
WAIS –III : Wechsler Intelligence Scale (Third Edition)
TMT : Trail Making Test
ADL : Activities for Daily Living
WHO : World Health Organisation
Bp : Blood Pressure
DGS : Global Deficit Score
DR : Democratic Republic
MoH : Ministry of Health
MoGE : Ministry of General Education
ZNUT : Zambia Nation Union of Teachers

REFERENCES

1. Muula, A. S. and Siziya, S. (2007). *Prevalence and determinants of ever smoked cigarettes among school-going adolescents in Lusaka, Zambia*. Africa, Journal of Health Science, 2007; 7: 246-252.
2. Goma. F. (2015). *The International Tobacco Control (ITC) Project. ITC Zambia National Report Findings from the Wave 1 and 2 (2012-2014) Surveys*. Executive Summary, University of Zambia in relation with University of Waterloo, Waterloo, Ontario, Canada.
3. *Global Adult Tobacco Survey (GATS). In: Tobacco Free Initiative* [website]. In *Harmful practices: Multi-country study on gender, sexuality and vaginal practices.* Geneva: World Health Organization; 2017.. Preliminary reports and findings; 2017 (http://www.who.int/tobacco/surveillance/survey/gats/en, accessed 25 June 2017).
4. Critchley, J. A. and Unal, B. *Health effects associated with smokeless tobacco: A systematic review***.** Thorax. 2008; 58(5):435-443. Ayo-Yusuf, O. A, Burns, D. M. *The complexity of harm reduction with smokeless tobacco an approach to tobacco control in low-income and middle-income countries*. Tob Control. 2012; 21:245-51.
5. Ayo-Yusuf, O. A, Burns, D. M. *The complexity of harm reduction with smokeless tobacco an approach to tobacco control in low-income and middle-income countries*. Tob Control. 2012; 21:245-51.
6. *Levin, E. D., McClernonF. J., Rezvani, A. H. Nicotinic effects on cognitive function: behavioral characterization, pharmacological specification, and anatomic localization***.** *Psychopharmacology (Berlin). 2006; 184: 523-539. 10.1007/s00213-005-0164-7.*
7. Scorgie. F., Kunene. B., Smit J. A., et al. *In search of sexual pleasure and fidelity: Vaginal practices in KwaZulu***-** Natal, South Africa. Journal of Culture, Health & Sexuality. 2009; 11(3):267–83.
8. Civic, D., Wilson. D. *Dry sex in Zimbabwe and implications for condom use***.** Journal of Social Science and Medicine. 2002; 42(1):91–8.
9. Boffetta, P., Hecht, S., Gray, N., et al. *Smokeless tobacco and cancer*. Lancet Oncol. 2008;9(7):667-675.*doi:10.1016/S1470-2045(08)70173-6. PMID 18598931.*
10. Harrison, E. L, Coppola, S., McKee, S. A. (2009). *Nicotine deprivation and trait impulsivity affect smokers' performance on cognitive tasks of inhibition and attention***.** ExpClin Psychopharmacology. 2009;17:91–98.
11. Smith R. C., Warner-Cohen J., Matute M., Butler E., Kelly E., Vaidhyanathaswamy S., et al. *Effects of nicotine nasal spray on cognitive function in schizophrenia***.** Neuropsychopharmacology 2006; 31, 637–643 10.1038/sj.npp.1300881] [Cross Ref].

12. Runganga, A., Pitts, M., McMaster, J. *The use of herbal and other agents to enhance sexual experience***.** Journal of Social Science and Medicine.2008; 35(8):1037–42.*Tobbacco Control*. 14(1):31-36.
13. Warren, C. W, Jones, N. R, Peruga, A, Chauvin, J, Baptiste, J. P, Costa, S. V, el Awa, F, Tsouros, A, Rahman, K, Fishburn, B, Bettcher, D. W, Asma, S. (2008). *Global youth tobacco surveillance*, MMWR SurveillSumm, 57:1-28.
14. Hill, K.G., Hawkins, J.D., Catalano, R.F., Abbott, R.D., Guo, J. *Family influences on the risk of daily smoking initiation. Journal of Adolescent Health*. 2005; 37(3):202–10.
15. Nilsson R. (2008). *A qualitative and quantitative risk assessment of snuff dipping.* Correction appears in Regul Toxicol Pharmacol. 29 (1):97. 28(1):1-16.