

## RESEARCH ARTICLE

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## The Effect of Thelison Use in The Etiology of Lung Disorders among Homeless People

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**Background:** Thelison, the adhesive synthetic material that bind surface together, is widely used in industry and domestic purpose along with epoxy, glue and putty. The aim of this study was to detect the effect of thelison use in the etiology of lung disorders among homeless people in Khartoum State, Sudan.

**Materials and method:** This was a descriptive cross sectional study conducted in homeless people in Khartoum State. Sputum smears samples from 80 alcohol fixed homeless thelison user were collected. After the collection of the sample, Argyrophilic Nucleolar Organizer Region (AgNOR) technique and papanicolaou (PAP) stains were applied to each sample. A questionnaire to obtain essential data about respondents was also provided for each participant.

**Results:** Participant's ages range was 10-37, while the mean age was 17. The range of participants duration of use per years was 1-10, while the mean was 3 years. Number of thelison dose use per day was ranged between 1-10, while the mean was 5 years. The majority of participants (80%) showed no cellular change and 20 % showed chronic inflammation. Results showed that 31 of the study population were males (77.5%), while the female population of the study was 9 (22.5%). The mean of AgNoR score was ranged between 1-4, while the mean AgNOR score was 1. AgNoR showed insignificant association with gender, duration and number of thelison dose used per day ( $p>0.05$ ), but showed significant association with cytomorphological and age ( $p<0.05$ ).

**Conclusion:** AgNoR score showed insignificant association with gender, duration and number of thelison dose used per day ( $p>0.05$ ), but showed significant association with cytomorphological and age ( $p<0.05$ ).

**Keywords:** AgNoRs score, cytological changes, sputum, homeless thelison users

### Introduction

Worldwide lung cancer remains the most common cancer diagnosis and the greatest cause of cancer-related death.<sup>1</sup> Thelison, the adhesive synthetic material that bind surface together, is widely used in industry and domestic purpose

along with epoxy, glue and putty. Now this thelison is used by homeless children as an alternative to drugs and alcohol abuse by placing the thelison in cloth or sack in mouth and inhaled. No literature found regarding correlation between thelison use and lung cancer, although it is well known as an addictive compound.

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A literature study aimed to compare the efficiency of selected cytological techniques in lung lesion by seeing the correlation with histopathology, cytological specimens included sputum, bronchial wash, bronchial brushing, fine needle aspiration and cell block. That study concluded that despite the limitations of the cytological procedures and the recommendation of using cell block and immunocytochemistry to evaluate cytological samples, in many cases, it is able to replace a conventional histopathology.<sup>2</sup>

Papanicolaou (PAP) stains was introduced by Dr. George N. Papanicolaou in 1942 and modified by him in 1954 and 1960, and is used universally throughout cytology until today.<sup>3</sup> PAP stain is recommended for routine diagnostic cytology because it characterized by good nuclear detail, differential counter staining and cytoplasm transparency. The PAP stain is a highly developed polychrome stain that demonstrate nuclei blue or black and cytoplasmic staining show a broad spectrum of colors ranging from yellow in highly keratinized cells through ranges of orange or pink in superficial cells and green or blue in intermediate and parabasal cells, metaplastic cells may show amphophilia and will often stain green and pink together.<sup>4</sup>

Argyrophilic Nucleolar Organizer Region (AgNOR) staining is useful for evaluate the degree of tumor activity. The AgNoR smear may be useful cytology tool to predict prognosis of malignant tumors in human. The AgNoR in tumor cell were assessed without counter stains, it showed high accuracy and used as prognostic and diagnostic tests detect malignant and premalignant changes.<sup>5</sup> Malignant cells contain more AgNORs than in normal cells.<sup>6</sup>

Because of above reasons, we aim to detect the effect of thelison use in the etiology of lung disorders among homeless people in Khartoum State, Sudan.

## Materials and methods

### *Study Design and Samples Collection*

This was a descriptive cross sectional study conducted in homeless people in Khartoum State from July to December 2021. Participant of this study was recruited randomly from homeless people live in different streets, and sputum smears samples from 80 alcohol fixed homeless thelison user were collected. After sputum specimen was collected and AgNOR technique and PAP stains were applied to each sample. A questionnaire to obtain essential data about respondents was provided for each participant.

### *Data Collection*

Data was obtained from the laboratory results and questionnaire. PAP stain procedure was applied as the known method<sup>7</sup>, and AgNOR technique performed. The air dried smears were stained according to the AgNOR staining method. Working solution was freshly prepared by mixing one volume of 2% gelatin in 1% formic acid solution and two volumes of 50% aqueous silver nitrate solution. All smears were incubated with this silver solution for 30 minutes at room temperature in a dark area and were protected in the dark until each slide was analyzed.

Two cytopathologists examined and interpreted the silver-stained cells under light microscope Olympus BX-51 (Olympus, Tokyo, Japan) at 10x and 40x magnification. All smears were screened horizontally from left to right and AgNOR was counted in the nuclei of the first 50 non-overlapping, inner layers, nucleated epithelial cells. Superficial cells with pyknotic nuclei not counted. AgNORs, which were visible as black-dark brown dots locate within the nuclei of the cells, was then counted. Overlapped black dots counted as one structure.<sup>8,9</sup>

### *Ethical Consideration*

Ethical approval for this study was obtained from the National University Ethical Research Committee in accordance with the Declaration of Helsinki Principles, and the agreement was taken from all hospital administrations before taking sample and collecting data. The patient's information were highly secured and not used for other purposes than scientific inquiry. Each participant was asked to sign a written ethical consent form during the interview, before the specimen was taken. The informed ethical consent form was designed and approved by the ethical committee of the Faculty of Medical Laboratory Research Board, National University-Sudan (No. NU-RES/07-021-03).

## Results

Participant's ages range was 10-37, while the mean age was 17. The range of participants duration of use per years was 1-10, while the mean was 3 years. Number of thelesion dose use per day was ranged between 1-10, while the mean was 5 years. The majority of participants (80%) showed no cellular change and 20 % showed chronic inflammation. Results showed that 31 of the study population were males (77.5%), while the female population of the study was 9 (22.5%) (Table 1).

**Table 1. PAP stain cytological screening findings in relation to gender, age group, duration and number of use thelesion per day in study population.**

Variables		Cytological Screening [n (%)]		p-value
		Normal	Chronic Inflammation	
Gender	Male	26 (83.9%)	5 (16.1%)	0.348*
	Female	6 (66.7%)	3 (33.3%)	
Age groups	<15 years	11 (91.7%)	1 (8.3%)	0.121*
	15-19 years	12 (63.2%)	7 (36.8%)	
	20-25 years	6 (100%)	0 (0%)	
	>25 years	3 (100%)	0 (0%)	
Duration of use	Less than 5 years	19 (86.4%)	3 (13.6%)	0.430*
	5 years and more	13 (72.2%)	5 (27.8%)	
Number of use per day	Less than 5 times	13 (86.7%)	2 (13.3%)	0.686*
	5 times and more	19 (76.0%)	6 (24.0%)	

Tested with Fisher's Exact test. \*p-value>0.05 considered as statistically insignificant.

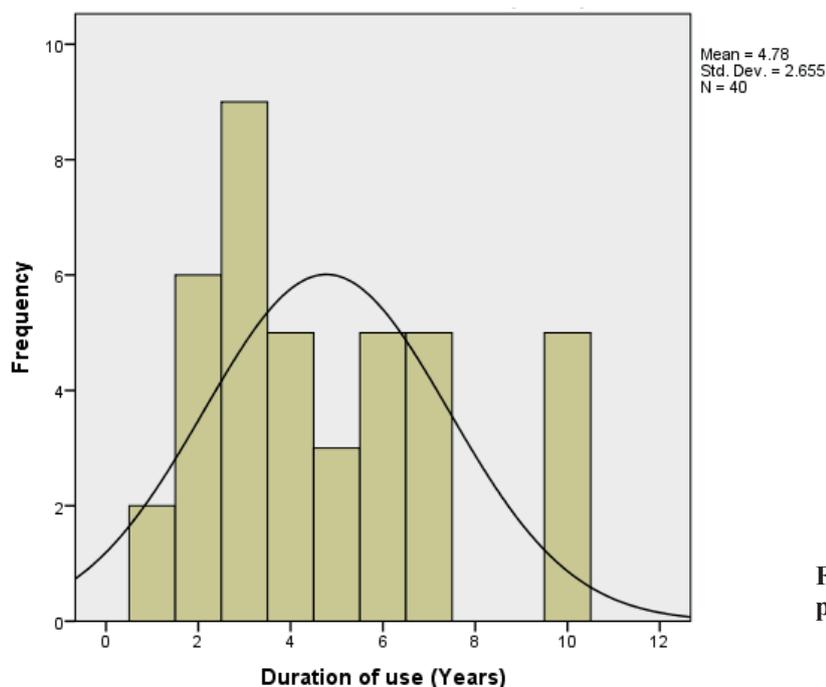
The mean of AgNoR in current study samples was ranged between 4-1, while the mean was 1. Figure 1 showed the mean duration of use thelesion per year's among participant. Participant duration of use per years were ranged between 1-10, while their mean 3. Figure 2 showed the mean number of tkelsion use per day in studied samples. Number of thelesion use per day was ranged between 1-10 while their mean was 5.

Table 2 showed Ag-NoR results in relation to gender, duration and number of use thelesion per day, p-value>0.05

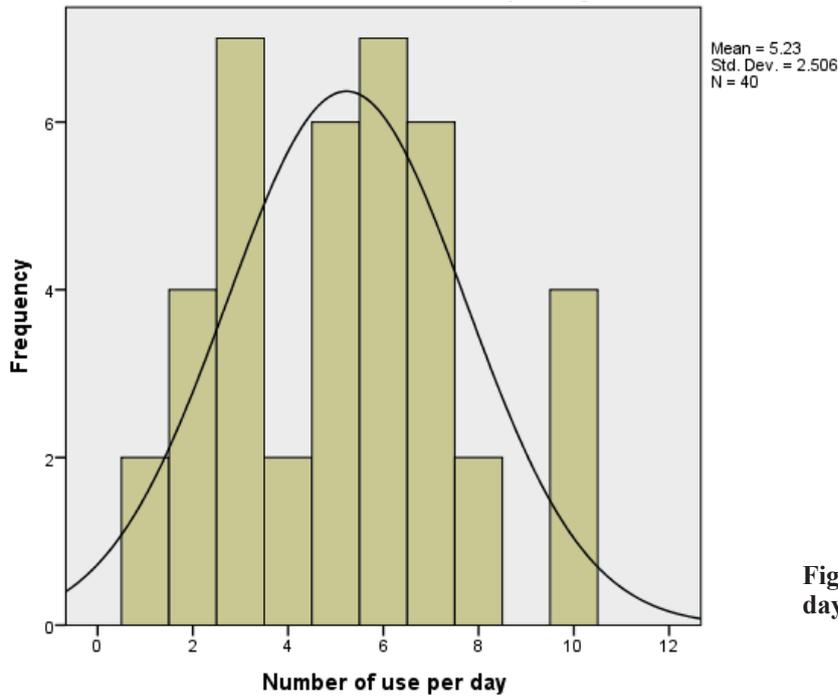
which was consider as statistically insignificant. Meanwhile Table 3 showed AgNOR findings in relation tothe cytomorphological and age, p-value<0.05 that's considered as statistically significant.

### Discussion

In this cross sectional study, cells in sputum of 80 respondents divided into 40 smears stained with PAP and 40 with Ag-NOR. By using PAP stain concerning individuals who use thelesion, the percentage of thelesion users from



**Figure 1. Duration of use thelesion in study population.**



**Figure 2. Number of thelison dose use per day in study population.**

different age, according to gender, 9 (22.5%) were females and 31 (77.5%) were males, so the percentage in male is higher than female, because most of males were in streets and lack community and health care.

By using PAP stain technique, regarding thelison using and their duration, cellular changes have shows normal cell when thelison using in less than 5 times, 19 cases normal and 3 cases inflammation, 5 years and more than 13 cases normal and 5 inflammation. Thelison using and their number per day cause cellular changes, which showed normal cell

when thelison using per day (less than 5 times, 13 normal and 2 inflammation; 5 times and more, 19 normal and 6 inflammation).

The mean of Ag-NOR dots ranged between 1-4 while their mean was one. Comparison between cytological screening results and Ag-NoR revealed that ( $p$ -value<0.05) which considered as statistically significant. The age in relation to Ag-NOR results showed ( $p$ -value<0.05) which considered statistically significant. Other studies also reported similar findings.<sup>10-14</sup>

**Table 2. AgNOR results in relation to gender, cytological screening finding, duration and number of use thelison dose per day in study population.**

Variables	n	Ag-NoR (%)			p-value	
		Mean	SD	SE		
Gender	Male	31	1.35	0.877	0.158	0.716*
	Female	9	1.22	1.202	0.401	
Cytological screening	Normal	32	1.16	0.847	0.15	0.022**
	Chronic inflammation	8	2.00	1.069	0.378	
Duration of use	Less than 5 years	22	1.09	0.684	0.146	0.083*
	5 years and more	18	1.61	1.145	0.27	
Number of use per day	Less than 5 times	15	1.33	0.488	0.126	0.966*
	5 times and more	25	1.32	1.145	0.229	

Tested with Independent T-Test. \* $p$ -value>0.05 considered as statistically insignificant; \*\* $p$ -value<0.05 considered as statistically significant.

**Table 3. AgNoR results in relation to cytomorphological findings and age group of study population.**

Variables	n	Ag-NoR (%)			p-value
		Mean	SD	SE	
Cytomorphological findings	Normal	32	1.16	0.847	0.049**
	Lymphocytosis	6	1.83	0.753	
	Lymphocytosis/macrophage	2	2.5	2.121	
Age groups	Less than 15 years	12	0.92	0.793	0.018**
	15-19 years	19	1.32	0.82	
	20-25 years	6	2.33	1.033	
	More than 25 years	3	1.00	1.000	

Tested with Independent T-Test. \*\* $p$ -value<0.05 considered as statistically significant.

AgNoR in relation to gender, duration of use thelison and number of use per day revealed  $p$ -value>0.05 which is considered as statistically insignificant. No previous studies regarding the same techniques and correlation categories found in Sudan literature.

## Conclusion

The study revealed no correlation between use thelison and malignant changes in sputum, but cause chronic inflammation. Results of AgNoR ranged between 1-4, while the mean was 1. Cytological screening in relation to AgNoR considered as statistically significant. Gender, duration of use thelison and number of use per day in relation to AgNoR considered statistically insignificant.

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