Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2019, 11(8):14-18

Research Article

ISSN: 0975-7384
CODEN(USA): JCPRC5

Prevalence of Intestinal Parasites and Determination of Some Physio-Chemical Parameters in Calabash Chalk (Nzu)

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ABSTRACT

The study was carried out at different locations where calabash chalk can be extracted and the prevalence of intestinal parasites/ova/egg of helminthes were investigated using sugar flotation method. The different samples were dried at room temperature and sieved through 100μm sieves where three aliquots (2 g each) of sieved products were processed and examined for colour, presence of adult parasites or ova microscopically. The analysis of physicochemical parameters followed the utilization of 20 g of the air dried soil sieved through 2 mm mesh guaze into 50 ml beaker from where the parameters were evaluated. The physicochemical parameters measured were PH, Ca, Mg, Fe, Cu, Mn, Pb, Zn, V, Na with the values 6.2+2.9, 6.3+0.9, 9.0+1.8, 0.18+0.10,0.15+0.05, 0.0+0.0, 0.1+0.05, 0.1+0.02, 8.50+2.4 respectively. Out of the 480 samples that were examined, 167(34.8%) were positive for intestinal parasites. The calabash extraction site had the highest contamination of 54(45%) and the edge of path/gully had the lowest contamination of 29(24.2%). The intestinal parasites found include A. lumbricoides, E. histolytica, E. vermicularis, S. stercoralis, G. lamblia, H. nana and Trichuris trichiura, A. lumbricoides 18(15.0) had the highest values and E. histolytica 15 (12.5%) had the lowest values in the calabash chalk site. The presence of heavy metals in the results and intestinal parasites poses danger to the consumers of the calabash chalk.

Keywords: Calabash chalk; Parasites; Contamination; Poisonous; Geophagy

INTRODUCTION

The practice of eating clay or soil known as geophagy has been observed in traditional society by pregnant and lactating women and children mainly on the African continent, in Asia, and in North and South America [1]. These clay products, termed as traditional clay products, have African names such as calabash chalk, white clay, calabar stone, Nzu [2]. Different names have been given to calabash chalk which is consumed in different ethnic groups across the globe. In Nigeria the Ibos call it 'Nzu' while the French people call it Argile and lingala of Congo respectively. The compositions of this chalk are aluminum silicate hydroxide which derives from kaolin clay group. For instance many believe that eating of 'Nzu' helps to alleviate early morning sickness; as mineral supplement due to high concentration of calcium and for the treatment of rash and women take it during pregnancies. However, this habit of eating 'Nzu' is without negative effects. Some of the negative effects have been observed to result to constipation and poisoning. This is because of its high concentration of lead [3]. Use of clay products is influenced by social and cultural factors, such as culturally ingrained food preferences, supplementing the diets for spiritual reasons or to promote fertility, while some pregnant women use these products against morning sickness or to prevent miscarriage [4]. Contamination of clay products for oral use is a recognized problem. Contaminants include toxic constituents such as mercury, lead, cadmium, persistent organic pollutants, microbes or parasites [2,5]. Lead and Arsenic are poisonous substance which may result in death of the consumer [6]. Exposure to this higher levels of lead by pregnant and breastfeeding women possess a range of mental development disorders in unborn babies and breastfeeding infants [7].

For the salted calabash chalk (SCC) the combination of clay and mud is mixed with other ingredients which include sand, wood ash, salt and little water and the resulting product was moulded and then heated on local oven to produce the final product. The non-salted calabash chalk (NSCC) is prepared the same way the salted types is prepared but the difference there is that salt is not added to the combination before sun drying. An ova and parasite (O & p) examination which was evaluation that was used to look for parasite that has infected the gastrointestinal tract [8] was conducted. The parasites are shed from the gastrointestinal tract into the feces. This eventually contaminates the soil through open defecation. The aim of this study is to evaluate the presence of ova/parasites in the various locations where calabash chalk were obtained in Mbano, Imo State and determination of the physico- chemical parameters of the calabash chalk.

MATERIALS METHODS

Collection of Soil Sample

A sterile plastic container was used to collect soil samples from the part where the calabash chalk is excavated from the different sites. The sites were edges of washed out paths/gullies, termite mounds, clay materials from wall of huts.

Analysis of Soil Samples for Helminth Eggs

Using the sugar flotation method, about 50 g of collected soil samples were dried at room temperature and sieved through 100 µm sieves. Three grams (3 g) of the sieved product were processed as described by Schulz and Kroeger [9]. About 1 g of the sieved product was dissolved in 5 ml physiological saline, stained with Lugol's iodine and viewed microscopically. The sediments were re-suspended and centrifuged at 1000 rpm for 2 minutes. The supernatant was discarded and resuspended in 10 ml formalin. The smears made were examined immediately for the presence of ova of *Ancylostoma duodenale.*

Analysis of Some Chemical Parameters

2 mm mesh gauze was used to sieve about 20 g of air-dried soil and dissolved in 50 ml beaker of water according to the modified method of Black 1965 [10]. 20 ml of distilled water was added and allowed to stand for 30 minutes and the P^H was read with the P^H meter. Using the flame photometer and the modified method, the Ca^{2+} was determined. Using the modified method of Golterman and Chymo 1971 [11], Mg^{2+} was determined using the colorimetric method.

The Heavy Metal Analysis

Copper(CU), Lead (Pb), Zinc(Zn), Iron (Fe), Manganese(Mn), Cadmium(Cd), Vanadium(V), Chromium(Cr) and Nickel (Ni) were determined. 10 ml of the sample mixture was digested using Aluminium block digester after adding 4 ml of Perchloric acid, 20 ml of Conc. Nitric acid and 2 ml of Conc H_2SO_4. The mixture was heated until white fumes evolved a clear solution was obtained. The values of CU, Fe and other metals were estimated with 21D spectrophotometer.

Table 1. Pysicochemical Parameters Analyzed

Parameters	Salted Nzu (Clay)	Non salted Nzu (clay)
PH	6.2 ± 2.9	5.0 ± 1.0
Ca	18.4 ± 1.8	16.1 ± 1.1
Mg	6.3 ± 0.9	7.2 ± 1.8
Cu	0.18 ± 0.10	1.2 ± 0.2
Mn	0.15 ± 0.05	0.3 ± 0.08
Pb	0.0 ± 0.0	0.0 ± 0.0
Fe	9.0 ± 1.8	11.2 ± 2.2
Zn	0.1 ± 0.05	0.0 ± 0.0
Ni	0.0 ± 0.0	0.0 ± 0.0
Cr	0.0 ± 0.0	0.0 ± 0.0
V	0.1 ± 0.02	0.0 ± 0.0
Na2+	8.50 ± 2.4	8.1 ± 2.0
Cd	0.0 ± 0.0	0.0 ± 0.0

Table 1 shows the presence of Zinc, Iron, Vanadium and Cadmium in the calabash chalk analyzed.

Table 2. The prevalence of intestinal parasites contamination among the soil samples

	Termite mound	Edge of path/gully	Wall of huts	Calabash chalk extraction site	Total (%)
No of samples examined	120	120	120	120	480
Ascaris lumbricoides	14(11.7%)	7(5.8%)	8(6.7%)	18(15.0%)	47(9.8%)

Entamoeba histolytica	13(10.8%)	8(6.7%)	9(7.5%)	15(12.5%)	45(9.4%)
Enterobius vermicularis	5(4.2%)	4(3.3%)	7(5.8%)	6(5.0%)	22(4.6%)
S. stercoralis	4(3.3%)	2(1.7%)	6(5.0%)	2(1.7%)	14(2.9%)
G. lamblia	5(4.2%)	4(3.3%)	4(3.3%)	8(6.7%)	21(4.4%)
H. nana	1(0.8%)	0(0.0%)	2(1.7%)	3(2.5%)	6(1.3%)
Trichuris trichiura	3(2.5%)	4(3.3%)	3(2.5%)	2(1.7%)	12(2.5%)
Total	45(37.5%)	29(24.2%)	39(32.5%)	54(45%)	167(34.8%)

Table 2 shows the prevalence of intestinal parasites contamination among the soil samples collected from the spot where the calabash chalk were collected. The calabash chalk extraction site has the highest prevalence of infection of 18(15.0%). *Ascaris lumbricoides* 18(15.0%) recorded the highest parasite prevalence while *Hymenolepis nana* 1(0.8 %) was the least.

RESULTS AND DISCUSSION

Geophagy has been a common practice in the south eastern part of the country, Nigeria and Africa in general. This is especially among the pregnant and breastfeeding women and they are collected from termite mound, edge of path/gullies, walls of hut and calabash chalk extraction site. One reason that account for this include its fine texture which makes its dissolution smooth in the mouth. It equally has an appealing smell when brought close to the nose which makes the populace consume them readily. However, the calabash chalk (Nzu) has been tested to contain some toxic elements by the physicochemical parameters analyzed. The results obtained showed that the quantity of this parasite and physicochemical content differ based on the sites of collection. The presence of intestinal parasites in the soil samples where the calabash chalk was extracted is suggestive of faecal contamination from man or animal origin. The present study has attempted to determine the prevalence of intestinal parasites in the soil samples studied. A total number of 480 samples were examined, out of which 167(34.8%) were positive for intestinal parasites which the calabash chalk extraction site recorded the highest contamination of 54(45%) and the edge of path/gully has the lowest contamination of 29(24.2%). These results were similar to the results obtained by Alli *et al*. [12] on the prevalence of intestinal parasites in fruits. The highest value obtained may be as a result of the water run-off which flows towards the area where the excavation of the calabash chalk is done. It is most likely that faecal contamination is highest in these areas. The edge of the path/gully recorded the lowest prevalence of parasites. This is likely due to the nature of the plain soil found in those areas and open defeacation is greatly minimized in those areas. The calabash chalk site recorded highest values of *A. lumbricoides* 18(15.0%) and equally *E. histolytica* 15 (12.5%) (Table 2). The P^H values were 6.2 and 5.0. The Calcium was 20.4 and 16.1. This indicates that the samples analyzed were rich in calcium. The magnesium was 6.3 and 7.2. This is in contrast to the values of 38.46 and 60.0 as reported in the work of Umudi [13] which were relatively high. Fe recorded the values of 9.0 and 11.2. The Cu, Zn, and V values were 0.18, 0.10 and 0.10 respectively (Table 1). These were dissimilar to the values of 1.21, 2.40 and 0.0 which were reported by Umudi [13]. However, the presence of these heavy metals in relatively smaller quantities will lead to accumulation in the body of the consumers of the calabash chalk which will eventually lead to the toxicity on the cells and metabolic system. This will eventually lead to different diseases and eventually death.

CONCLUSION

The results of this research showed the presence of intestinal parasites in the different soils that were the extraction site of these calabash chalk and the calabash chalk contained different quantities of metals (heavy metals) which had detrimental effects to health when consumed. There needs to be urgent, rapid and widespread enlightenment on the populace (especially pregnant women) on the dangerous implications of the consumption of these calabash chalks. The public health implications of this practice and public health campaign should be mounted to enlighten the people of the public on the health risk of this their most cherished habit.

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