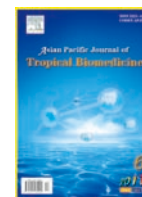




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# Knowledge of aflatoxin contamination in groundnut and the risk of its ingestion among health workers in Ibadan, Nigeria

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## ABSTRACT

**Objective:** To assess the awareness and knowledge of aflatoxin contamination in groundnut and the risk of its ingestion among health workers in Ibadan. **Methods:** The study was a descriptive cross-sectional study. Study instrument was a semi-structured self administered questionnaire. The respondents were health workers from a public health facility. **Results:** A total of 417 health workers participated out of which males were 60.2%. The mean age of respondents was (28.0±4.9) years old. Doctors made up 83.0% while others were nurses. 95% of the respondents had previous awareness of aflatoxin and class room lectures was the most common source of information (56%). Occupation and religion both showed a significant association with previous awareness of aflatoxin ( $P<0.05$ ). Knowledge regarding aflatoxin contamination in groundnut and the risk of its ingestion was obtained showing knowledge score range of 0 to 14. In all, 80.6% had good scores of 11 to 14. None of the respondents had ever told their patients about the risk of aflatoxin ingestion. **Conclusions:** There is a need to explore the possibility of incorporating aflatoxin awareness into routine health talk to increase the level of awareness of patients and their relatives.

## 1. Introduction

Mycotoxin is a teratogen and a potent mutagen which has presented health risks to both human and animal populations. The food-borne mycotoxins likely to be of greatest significance in Africa and other tropical developing countries are the fumonisins and aflatoxins<sup>[1]</sup>.

Aflatoxin has also been associated with the increasing incidence of human gastrointestinal and hepatic neoplasms in Africa, Philippines, and China particularly the aflatoxin B1 strain<sup>[2]</sup>. Aflatoxin B1 has been described as one of the most potent hepatocarcinogenic compounds<sup>[2]</sup>. It is also associated with several other health conditions including jaundice, decreased levels of serum vitamins A and E, liver cancer, and even death<sup>[3–6]</sup>. Most of the mycotoxin-poisoning incidences occur in the sub-Saharan Africa where maize and groundnuts are dietary staples. These agricultural commodities become contaminated either before harvest or under post-harvest conditions<sup>[7]</sup>. Certain products like corn, groundnuts and tree nuts have also been known to be easily contaminated, However, aflatoxins

occur mostly in maize and groundnuts<sup>[8]</sup>. Bearing in mind the public health significance of aflatoxins, it is essential to know the level of awareness of aflatoxin contamination in groundnut and the risk of its ingestion among health workers. The health workers are at a strategic point in educating the masses on the harmful effects of the consumption of aflatoxin contaminated groundnut. Aflatoxin risks can be reduced through information diffusion by awareness campaigns<sup>[9]</sup>. This study therefore aims to assess the knowledge of aflatoxin contamination in groundnut, the risk of its ingestion among health workers in Ibadan, and level of information diffusion.

## 2. Materials and methods

The survey was conducted at the University College Hospital, Ibadan—a foremost tertiary health institution in Nigeria. A descriptive cross-sectional study was carried out between May and June 2010. A semi-structured self administered questionnaire was used to collect data on respondents' socio demographic characteristics, previous awareness of aflatoxin and knowledge regarding aflatoxin contamination in groundnut and the risk of its ingestion. A total of 417 respondents participated the study. Total

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sampling of all doctors and nurses working in the outpatient clinics and wards during the study period was used. Obtainable knowledge score ranged from 0 to 14. The 75th percentile was used as the cut off so that those with scores of 10 and below were rated as having low level of knowledge while scores of 11 and above were rated as good knowledge. Data were analyzed using SPSS version 15. *Chi*-square test was used to explore associations between variables of interest at 5% level of significance.

**3. Results**

The response rate was 99%. Table 1 showed the socio demographic characteristics of respondents. The mean age was 28.0±4.9 years. Males were the majority 251 (60.2%). In all 325 (77.9%) were less than 30 years old. Doctors made up 346 (83.0%) of the respondents.

**Table 1**  
Socio-demographic characteristics of respondents [n (%)].

Variables	Number
Sex	
Male	251 (60.2)
Female	166 (39.8)
Age	
Less than 30	325 (77.9)
30 and above	92 (22.1)
Occupation	
Doctor	346 (83.0)
Nurse	71 (17.0)
Years of Practice	
Less than 5 years	354 (84.9)
Above 5 years	63 (15.1)
Religion	
Christianity	371 (89.0)
Islam	46 (11.0)

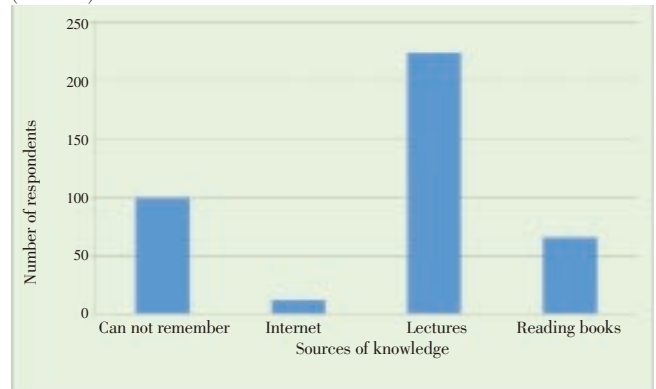
In all 95% of the health workers had previously heard about aflatoxins. Figure 1 showed that knowledge was most often acquired through class room lectures (223, 56%) followed by personal reading (66, 16%) and internet (12, 3%). Those that could not remember the source of their knowledge made up (99, 25%).

Table 2 showed the cross tabulation of socio demographic factors with previous awareness of aflatoxin. Being a doctor and also being a Christian were factors found to be significantly associated with awareness about aflatoxin

**Table 3**  
Knowledge of aflatoxin contamination in groundnut [n (%)].

Questions	Correct answers	Wrong answers
Have you heard about aflatoxins?	389 (95.0)	19 (5.0)
Are aflatoxins present in some food items?	397 (99.3)	3 (0.8)
Are aflatoxins caused by fungi?	371 (92.8)	29 (7.3)
Do different types of mycotoxins exist?	349 (83.7)	51 (12.8)
Are aflatoxins present in groundnut?	329 (85.2)	70 (17.5)
Do groundnut products like “Donkwa” and “Kuli kuli” contain aflatoxins?	330 (82.5)	70 (17.5)
Can aflatoxins only be found in groundnut with obvious moulds?	272 (68.0)	128 (32.0)
Can intake of groundnuts with aflatoxins have adverse health implications?	369 (92.3)	31 (7.8)
Can even small amount of aflatoxins have adverse health effects?	287 (71.8)	113 (28.3)
Do poor storage conditions promote the presence of aflatoxins in foods?	389 (97.3)	11 (2.8)
Have some liver diseases been linked to intake of aflatoxins?	347 (86.8)	13 (13.3)
Can food poisoning be caused by aflatoxins?	355 (88.8)	45 (11.3)
Can aflatoxins cause cancer?	330 (82.5)	70 (17.5)
Does acute mycotoxicity occur as a result of high exposures to mycotoxins?	318 (79.9)	80 (20.1)

(*P*<0.05).



**Figure 1.** Source of respondents knowledge of aflatoxin.

**Table 2**  
Cross tabulation of socio demographic factor with previous awareness of aflatoxin [n (%)].

Variables	Have you heard of aflatoxin?		$\chi^2$
	Yes	No	
Sex			
Male	239 (95.2)	12 (4.8)	0.073
Female	159 (95.8)	7 (4.2)	
Age			
Less than 30	312 (96.0)	13 (4.0)	1.049
30 and above	86 (93.5)	6 (6.5)	
Occupation			
Doctor	335 (96.8)*	11 (3.2)*	8.868
Nurse	63 (88.7)	8 (11.3)	
Years of practice			
Less than 5 years	339 (95.8)	15 (4.2)	0.549
Above 5 years	59 (93.7)	4 (6.3)	
Religion			
Christianity	358 (96.5)*	13 (3.5)*	8.564
Islam	40 (87.0)	6 (13.0)	

\**P*<0.05.

With regards to knowledge about aflatoxin contamination in groundnut, 77 (19.4%) had low level of knowledge while 320 (80.6%) had good knowledge. Table 3 showed the questions asked and the number and percentages of correct and wrong options.

Table 4 showed the frequency of groundnut intake by respondents and the frequency of removal of mouldy groundnut while eating. Only 1.5% of the respondents had never eaten groundnuts. Majority of the respondents 305 (78.2%)

**Table 4**

Frequency of groundnut intake by respondents and removal of mouldy groundnuts while eating [n (%)].

Questions	Always	Sometimes	Never
Frequency of groundnut intake (n=394)	58 (14.7)	330 (83.8)	6 (1.5)
Frequency of removal of mouldy groundnut while eating (n=390)	137 (35.1)	168 (43.1)	85 (21.8)

endeavoured to remove mouldy groundnuts before eating.

#### 4. Discussion

This study has investigated the knowledge of aflatoxin contamination in groundnut and the risk of its ingestion among health workers in Ibadan, Nigeria. This study showed that 80.6% of the health workers have good knowledge of aflatoxin contamination in groundnut and the risk of its ingestion. The overwhelming majority of participants did not know that aflatoxin alone can cause harmful health effects in a study done in Ghana among a population who are mainly farmers<sup>[10]</sup>. Gender, age and years of experience did not affect the level of awareness of the health workers. However, they have significant impact on the reduction of aflatoxin in groundnut production and marketing in farmers<sup>[11]</sup>. Although there are not many comparable literatures in this respect, the findings are not surprising considering that the respondents are health workers. In contrast with a previous study done among Tiv farmers in Nigeria, it is found that out of the 2 689 respondents, only 860 (32.0%) knew what mycotoxins were<sup>[12]</sup>. A study done by James *et al* in Benin, Ghana and Togo reported awareness rates of 20.8% among farmers, 26.7% among traders, 60.0% among poultry farmers and 25.2% among consumers<sup>[13]</sup>. The responses given by participants in this survey show clearly that most participants do not remove mouldy groundnut while eating, only a small proportion of them do not eat groundnut. None of all respondents had ever told their patients about the risk of aflatoxin ingestion. Majority of the health workers got to know about aflatoxin through lecture and reading. Awareness of what mycotoxins are and the dangers that they pose to human as well as animal health could be done through government bodies, private organizations, non-governmental organizations, national media networks such as radios and television programs as well as features in newspapers and magazines<sup>[14]</sup>.

Although this is a relatively small study, it has demonstrated that there is a high level of awareness and knowledge about aflatoxin among health workers in Ibadan. However, the practice of picking out mouldy nuts was not optimal. Efforts to emphasize that picking out mouldy nuts would reduce the risk of aflatoxin ingestion are required among health workers.

There is a need to explore the possibility of incorporating aflatoxin awareness into routine health talk to increase the level of awareness of patients and their relatives.

#### Conflict of interest statement

We declare that we have no conflict of interest.

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