Aflatoxin Exposure and Viral Hepatitis in Cirrhotic Somalian and Egyptian Patients

Thesis

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List of Abbreviations

Abbre.	Full term
AF	: Aflatoxin
AFB1	: Aflatoxin B1
ALT	: Alanine aminotransaminase.
AST	: Aspartate aminotransaminase.
CDC	: Centers for Disease Control
CLD	: Chronic liver disease
DAA	: Direct acting antivirals
EDHS	: Egyptian Demographic Health Survey
ELISA	: Enzyme linked immunoassay
FDA	: Food and drug administration
GST	: Glutathione-S-transferase
HBV	: Hepatitis B virus
HCC	: Hepatocellular carcinoma
HCV	: Hepatitis C virus
HIV	: Human immunodeficiency virus
HPS	: Hepatopulmonary syndrome
LD	: Lethal dose
MELD	: Model for End Stage Liver Disease
PEG-IFN	: Pegaylated interferon.
PPB	: Part per billion
SD	: Standard deviation
UV	: Ultra-violet

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Abstract

Cirrhosis of the liver is thought to be a major cause of morbidity and mortality in sub-Saharan Africa, but no controlled studies on the etiology of cirrhosis have been conducted in this region.

This study is aimed to find out the relation between Aflatoxin B1, hepatitis B virus and hepatitis C virus in cirrhotic Somalian and Egyptian patient's as a comparison.

The result of this work has indicated that cirrhotic Somalian patients had higher levels of AFTB1compared to control subjects, which increase the susceptibility relationship between AFT B1 and liver cirrhosis.

The tests also revealed that the Somalian group had higher rates of AFTB1 levels than the Egyptian group.

Introduction

Cirrhosis of the liver is thought to be a major cause of morbidity and mortality in sub-Saharan Africa, but no controlled studies on the etiology of cirrhosis have been conducted in this region.

Dietary exposure to aflatoxin, primarily through ingestion of contaminated maize and groundnuts (peanuts), is also widespread largely because of the lack of clinical and research infrastructure, rigorous investigation into the etiology and characteristics of chronic liver disease in sub-Saharan Africa has been limited. Chronic infection with hepatitis B virus (HBV) is endemic in sub-Saharan Africa, and hepatitis C virus (HCV) infection is also present ***(Kuniholm et al., 2008).***

Certain fungi that can grow on food such as dried fruits, nuts, and cereals, legumes and spices produces naturally-occurring toxins called Mycotoxins. The most commonly observed mycotoxins that found are aflatoxins (B1, B2, G1 & G2) and ochratoxin-A. Aflatoxins directly damages DNA and have been shown to cancer contribution to food contamination, including mycotoxins. Aflatoxins could cause liver damage in the laboratory, besides the economic loss due to be more hazard to human health ***(Ayman, 2014).***

Hepatitis C is a blood-borne virus that is transmitted through exposure to previously contaminated blood. In remote hospitals and care stations, inadequately sterilized syringes and needles and the sharing of injection equipment lead often to HCV infections. Injected drug use outside hospital settings, contaminated body piercing and tattooing needles have also contributed to the epidemic. HCV can be transmitted sexually, though rarely, but not through breast milk, water, food or by hugging and kissing ***(Guardian liberty voice, 2014).***

Hepatitis B virus can cause an acute illness with symptoms that last several weeks, including yellowing of the skin and eyes (jaundice), dark urine, extreme fatigue, nausea, vomiting and abdominal pain. Hepatitis B prevalence is highest in sub-Saharan Africa and East Asia. Most people in these regions become infected with the hepatitis B virus during childhood and between 5–10% of the adult population is chronically infected ***(Guardian liberty voice, 2014).***

In this study, we will investigate the diagnosis of liver cirrhosis via a noninvasive, validated ultrasound scoring system among individuals with suspected liver disease in Somalia, horn of Africa. Then, we will examine environmental exposures for cirrhosis, including viral, dietary, and lifestyle risk factors in this population. Finally, we explore interactions between HBV and aflatoxin exposure to more precisely describe the etiology of this major public health problem in a sub-Saharan African population.

Aim of the Work

We aimed to evaluate the association between aflatoxin and viral hepatitis exposures in cirrhotic Somalian and Egyptian patient's as a comparison.

Chapter (1)
Aflatoxins

Introduction

Among the most common toxigenic fungi affecting the human food chain are *Aspergillus* species, infecting major agricultural commodities such as corn, peanuts, cotton, sorghum, and other oil-seed sources. *Aspergillus parasiticus* produces the polyketide mycotoxin aflatoxin (AF), one of the most mutagenic and carcinogenic natural compounds described to date. Ingestion of food contaminated with AF has been associated with hepatotoxicity, teratogenicity, immunotoxicity, and even death ***(Calvo et al., 2004).***

Aflatoxin is a common contaminant of foods, particularly in the staple diets of many developing countries. This toxin is produced by fungal action during production, harvest, storage, and food processing, and it is considered by the US Food and Drug Administration (PDA) to be an unavoidable contaminant of foods ***(Williams et al., 2004).***

Mycoses and Mycotoxicoses

Fungi are major plant and insect pathogens, but they are not as important as agents of disease in vertebrates, i.e., the number of medically important fungi are relatively low. Frank growth of fungi on animal hosts produces the diseases collectively called mycoses, while dietary, respiratory, dermal, and other exposures to toxic fungal metabolites produce the diseases collectively called mycotoxicoses **(Barrett J. 2000).**

Mycotoxins are secondary metabolites produced by microfungi that are capable of causing disease and death in humans and other animals. Because of their pharmacological activity, some mycotoxins or mycotoxin derivatives have been used as antibiotics, growth promotants, and other kinds of drugs ***(Bennett and Klich, 2003).***

The term mycotoxin is used to describe pharmacologically active mold metabolites characterized by vertebrate toxicity, Mycotoxins usually enter the body via ingestion of contaminated foods, but inhalation of toxigenic spores and direct dermal contact are also important routes. Molds may be present without producing any toxin. Thus, the demonstration of mold contamination is not the same thing as the demonstration of mycotoxin contamination ***(Bayman et al., 2002).***

Mycotoxin-producing mold species are extremely common, and they can grow on a wide range of substrates under a wide range of environmental conditions. For agricultural commodities, the severity of crop contamination tends to vary from year to year based on weather and other environmental factors. Mycotoxins occur, with varying severity, in agricultural products all around the world. The estimate usually given is that one quarter of the world's crops are contaminated to some extent with mycotoxins ***(Fink-Gremmels, 1999).***