1. Introduction

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Smoking harms almost every organ of the body. Globally, smoking related-diseases kills 1 in 10 adults. Smoking related diseases include cancer, heart disease, and lung diseases such as emphysema, bronchitis, and chronic airway obstruction. For every person who dies from a smoking-related disease, 20 more people suffer with at least one serious illness from smoking. Cigarette smoking increases the length of time that people live with a disability by about 2 years. On average, smokers die 13 to 14 years earlier than nonsmokers (Taurus et al., 2005).

As smoking becomes less acceptable and profitable in the developed world, tobacco companies are expanding into countries with fewer restrictions and public health warnings. Current statistics show that 84 percent of smokers live in developing countries. According to the Gates Foundation, the poorest households in Bangladesh spend almost 10 times as much on tobacco as they do on education (Taurus et al., 2005).

Zinc, copper, and magnesium are minerals involved in many homeostatic mechanisms of the body, including specific immunity, inflammation, and oxidative stress. Previous animal studies and cell cultures have shown the role of these minerals in atherogenesis and carcinogenesis. However, the evidence linking zinc, copper, and magnesium to cancer or cardiovascular disease in humans is far from conclusive, and little is known about their potential interactions (Leone et al., 2006).

The essential trace element, zinc (Zn) is an important component of biomembranes and an essential cofactor in a variety of enzymes. Zn has antioxidant-like
properties; thus, it can stabilize macromolecules against radical-induced oxidation in-vitro as well as limit excess radical production. Zn deficiency is associated with an increase in Cd, as results of the antagonistic relationships between these elements (Afridi et al., 2010).

Magnesium (Mg) ions act as endogenous vasodilators of the cerebral circulation and act pharmacologically as noncompetitive antagonists of the N-methyl-D-aspartate receptor by virtue of their role as endogenous voltage-sensitive blockers of the ion channel. The magnesium ion regulates cellular energy metabolism, vascular tone, and cell membrane ion transport (Emine et al., 2008). The magnesium disbalances are involved in various pathological states such as attention deficit hyperactivity disorders, ischemic brain injury, seizures and others (Zhang et al., 2012).

Copper is the third most abundant trace element in the human body, following zinc and iron, and is essential to all organisms. Copper participates in many biochemical processes including cellular respiration, cellular utilization of oxygen, maintenance of all cell membrane integrity, and sequestration of free radicals. Serum copper measurement provides an assessment of long term copper status (Henry et al., 2001).
1.2 Rationale

The ultimate goal of most research on tobacco is to reduce tobacco-related morbidity and mortality, by preventing people from initiating tobacco use and by helping those who use tobacco to quit. Therefore, it is important to focus on translating research into practice. The following are examples of ways in which improvements in research on culture and tobacco could advance tobacco prevention and cessation programs.

High serum copper, low serum magnesium, and concomitance of low serum zinc with high serum copper or low serum magnesium contribute to an increased mortality risk in middle-aged men.
1.3 Objectives

1.3.1 General objective
To evaluate the impact of tobacco cigarette smoking on copper, magnesium and zinc in blood serum levels among Sudanese smokers.

1.3.2 Specific objectives
\begin{itemize}
  \item To compare mean levels of serum of copper, magnesium and zinc between test group (smokers) and control group (non smokers).
  \item To correlate between the duration of tobacco smoking per year and serum levels of copper, magnesium and zinc among test group.
  \item To correlate between the number of cigarettes per day and serum levels of copper, magnesium and zinc among test group.
\end{itemize}