



ELSEVIER

ORIGINAL ARTICLE

Impaired enzymatic antioxidant defense in erythrocytes of women with general and abdominal obesity[☆]

Farshad Amirkhizi^{a,*}, Fereydoun Siassi^b, Mahmoud Djalali^b,
Soudabeh Hamed Shahraiki^c

^a Department of Nutrition, Faculty of Health, Zabol University of Medical Sciences, Zabol, Iran

^b Department of Nutrition and Biochemistry, Faculty of Public Health, Tehran University of Medical Sciences, Tehran, Iran

^c Department of Epidemiology and Biostatistics, Faculty of Health, Zabol University of Medical Sciences, Zabol, Iran

Received 29 May 2012; received in revised form 29 July 2012; accepted 31 July 2012

KEYWORDS

Obesity;
Abdominal obesity;
Antioxidants;
Erythrocytes

Summary

Objective: The aim of this study was to investigate erythrocyte antioxidant enzyme activities in general and abdominal obese women.

Methods: In this study, 160 women 20–45 years old were randomly selected. General information data were gathered from each sample using questionnaires and face-to-face interviews. Activities of erythrocyte antioxidant enzymes were also evaluated by measuring activities of copper zinc-superoxide dismutase (CuZn-SOD), glutathione peroxidase (GSH-Px) and catalase (CAT) in selected subjects.

Results: Mean activity of CuZn-SOD was significantly lower in overweight and obese groups compared to normal weight group (721 ± 81 vs. 987 ± 84 , $p < 0.01$ and 638 ± 74 vs. 987 ± 84 , $p < 0.001$, respectively). Furthermore, both erythrocyte GSH-Px (97.6 ± 45.2 vs. 148.7 ± 54.2 , $p < 0.01$) and CAT (184.2 ± 37.8 vs. 316.7 ± 65.8 , $p < 0.01$) activities was significantly lower in obese women compared to normal weight women. In addition, women with abdominal obesity had lower erythrocyte CuZn-SOD (632 ± 76 vs. 871 ± 84 , $p < 0.001$), GSH-Px (103.6 ± 52.8 vs. 154.7 ± 62.4 , $p < 0.01$) and CAT (216.6 ± 76.4 vs. 298.3 ± 71.1 , $p < 0.05$) activities compared to women with normal body fat distribution. Moreover, multiple linear regression analysis suggests higher prediction of waist circumference (i.e. higher R^2) on antioxidant enzyme activities in relation to other adiposity indicators.

[☆] This study was funded by the Research Council of School of Health, Zabol University of Medical Sciences.

* Corresponding author at: Department of Nutrition, Faculty of Health, Zabol University of Medical Sciences, Shahid Rajaie St., Zabol, Iran. Tel.: +98 542 2244800; fax: +98 542 2226025.

E-mail address: amirkhizi.f@gmail.com (F. Amirkhizi).

Conclusion: Our results provides further evidence suggesting that obesity and, especially, abdominal adiposity associated with decreased antioxidant enzyme activities which in turn, may contribute to oxidative stress related to obesity.

© 2012 Asian Oceanian Association for the Study of Obesity. Published by Elsevier Ltd. All rights reserved.

Introduction

Over the last two decades overweight and obesity have become a major threat to public health worldwide [1]. Of particular concern are emerging data showing that the obesity epidemic is not confined to developed countries [2,3] but is starting to affect many developing countries [4]. Furthermore, obesity is a major risk factor for important illnesses including hypertension, type-2-diabetes, dyslipidemia and cardiovascular disease [5,6]. There are two types of obesity among literature: general and abdominal obesity [7]. Despite much evidence which indicate both general and abdominal obesity has been especially related with increased incidence of metabolic syndrome and cardiovascular events, the risk of these diseases is higher in those with central fat distribution [8,9]. Unfortunately, the abdominal obesity prevalence has increased by 50% among Iranian women during last two decades [10].

It has been reported that oxidative stress may play a critical role in the pathogenesis and development of obesity-related diseases, in particular cardiovascular diseases [11], hypertension [12] and type-2-diabetes [13]. In our preliminary evaluation, plasma levels of malondialdehyde (MDA), which is an oxidative stress marker, were markedly increased in both general and abdominal obesity [14]. Nevertheless, the mechanisms contributing to increased free radical production in obesity are not well understood. Since previous studies suggest that oxidative stress is a state of imbalance between the production of reactive oxygen species (ROS) and antioxidant defences [15], we hypothesized that lower antioxidative defence either due to lower enzymatic, or non-enzymatic antioxidants may contribute to increased ROS and related diseases in obese subjects.

Enzymatic antioxidants, such as copper zinc superoxide dismutase (CuZn-SOD), glutathione peroxidase (GSH-Px) and catalase (CAT) protect cells against harmful effects of free radical by scavenging or inhibiting their formation [16]. On the other hand, decreased activities of these enzymes may also contribute to increased oxidative stress. Although, previous studies have investigated the antioxidant enzyme activities in general obesity

[17,18] but, to our knowledge, no previous study has investigated the activities of these enzymes in abdominal obesity.

The purpose of this study is to investigate whether general and abdominal obesity is associated with main antioxidant enzyme activities in erythrocytes, irrespective of nutritional habits. To test this hypothesis, we assessed the activities of main antioxidant enzymes, CuZn-SOD, GSH-Px and CAT in erythrocytes of selected apparently healthy women.

Methods

Study subjects

The subjects include in this study were selected from women under the cover of rural health centers of Kerman province, Iran. In total, 370 women aged 20–45 years selected by a multiple cluster random sampling method. After excluding pregnant, lactating and smoker women (former and current smokers) and participants with a prior history of cancer, cardiovascular disease, diabetes, renal or liver diseases, and those taking vitamin or mineral supplements, 160 women (mean age: 31.5 years) remained for the current analysis.

The study protocol was based on the World Health Organization (WHO) stepwise approach to surveillance (STEPS) of risk factors for non-communicable disease [19]. STEPS uses different levels of risk factor assessment, including collecting information by questionnaire (step 1), taking physical measurements (step 2), and taking blood samples for biochemical assessment (step 3).

Informed written consent was obtained from subjects before entering the study. Data collecting form included demographic characteristics (age, number of pregnancies and education), detailed medical history and lifestyle habits, such as smoking status and physical activity. The whole study was planned according to the ethical standards detailed in the Declaration of Helsinki and ethical committee and research council of the Tehran University of Medical Sciences approved the research proposal.

Download English Version:

<https://daneshyari.com/en/article/3003700>

Download Persian Version:

<https://daneshyari.com/article/3003700>

[Daneshyari.com](https://daneshyari.com)