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List of Abbreviations

AD	Alzheimer's disease
AGEs	advanced glycation end-products
ALEs	advanced lipoxidation end-products
Ca²⁺	Calcium
CAR	Carnosine
Cd	cadmium
CdCl₂	cadmium chloride
cGMP	guanosine 3', 5'-monophosphate
CN	carnosinase
DNA	Deoxyribonucleic acid
EC-SOD	extracellular Super oxide dismutase
eNOS	endothelial nitric oxide synthase
ER	endoplasmic reticulum
Fe²⁺	Ferrous
GABA	gamma-aminobutyric acid
GFR	glomerular filtration rate
GSH	glutathione
H₂O₂	Hydrogen peroxide
HCD	histidine-containing dipeptides
HNE	hydroxynonenal
I/R	ischemia/reperfusion
IL-10	Interleukin 10
IL-4	Interleukin 4

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IL-6	Interleukin 6
iNOS	Induced nitric oxide synthase
MAPK	mitogen-activated protein kinases
MDA	.....	malondialdehyde
MPO	.....	Myeloperoxidase
MT	.....	metallothionein
NADPH	.....	nicotinamide adenine dinucleotide phosphate
NO	.....	nitric oxide
NOS	.....	nitric oxide synthase
O₂	.....	oxygen
POT	.....	proton-coupled oligopeptide transporter
ROS	.....	Reactive oxygen species
SH	.....	Sulfhydryl
SOD	.....	Super oxide dismutase
STAT	signal transducer and activator of transcription
TNF-α	tumor necrosis factor- α
UV	Ultraviolet
Zn²⁺	Zinc

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Abstract

Introduction: Cadmium (Cd) is one of the most toxic non-essential toxic metals, an environmental and occupational pollutant endangering human and animal health. **Aim of the study:** Due to carnosine's multifunctional properties, the present study was designed to study the effect of carnosine as potential antioxidant agent on cadmium-induced lipid peroxidation and renal oxidative stress in aged rats. **Materials and Methods:** The present study was performed on 45 female Wistar rats, weighing at the start of the study between 280-380 g. During the experimental protocol the animals were maintained in the animal room at the physiology department with 12 hours periods of light and darkness under standard conditions of boarding with environmental temperature 20-25°C, and received food and tap water ad libitum. Animals were left for 10 days to acclimatize, housed in animal acrylic cages (45x38x18cm). **Results:** The results encountered in the present study reflect the changes in serum urea, creatinine, albumin, superoxide dismutase, malondialdehyde, nitric oxide, tumor necrosis factor- α and interleukin 10 levels, as well as blood and renal tissue cadmium levels, renal tissue superoxide dismutase, tumor necrosis factor- α and nitric oxide levels in control, cadmium, and carnosine treated groups. **Summary and Conclusion:** Due to carnosine's multifunctional properties, the present study was designed to study the effect of carnosine as potential antioxidant agent on cadmium-induced renal oxidative stress and lipid peroxidation.

Keyword: Protective Effect, Cadmium-Induced

INTRODUCTION

Cadmium (Cd) is one of the most toxic non-essential toxic metals, an environmental and occupational pollutant endangering human and animal health (*El-Boshy et al., 2014; Satarug et al., 2003*). Cigarette smoking is a significant source of environmental Cd exposure (*Elinder et al., 1983*). The kidney, skeleton and lungs are the tissues most affected by chronic Cd toxicity, with chronic exposure to Cd, approximately 50% of the accumulated dose is stored in the kidneys (*Johri et al., 2010*).

Aging in most species associates with impaired adaptive and homeostatic mechanisms that leave an individual susceptible to environmental or internal stress followed by increasing rates of disease and death (*Anderson et al., 2009; Ning et al., 2013*). Kidney is a typical target organ of age-associated tissue damage, and the increased incidence of chronic kidney disease in the elderly is a health problem worldwide (*Coresh et al., 2003*).

Histidine-containing dipeptides like carnosine and arnesine have protective functions in both health and disease (*Peters et al., 2015*). The best-characterized histidine-containing dipeptide is carnosine (*Boldyrev et al., 2013; Budzen and Rymaszewska, 2013*), which is stored in

several tissues (*Bex et al., 2014*), it plays many roles in maintaining health, including antioxidant activity (*Babizhayev et al., 2013; Boldyrev, 1993; Mozdzan et al., 2005*) and the ability to scavenge carbonyls (*Barski et al., 2013; Negre- Salvayre et al., 2008; Vistoli et al., 2009*), inhibits glycation (*Alhamdani et al., 2007*), and inhibits angiotensin-converting enzymes (*Hou et al., 2003; Nakagawa et al., 2006*).

Thus, it was important to probe the possible role of carnosine in protecting the kidneys from cadmium exposure in aged individuals.