

List of figures

Figure no.	Title	Page no.
Chapter-1		
Figure-1	Diagrammatic presentation of chromium ion reduction and free radical generation	3
Figure-2	Exposure and elimination routes of chromium (VI)	4
Figure-3	Experimental Design of the research study	26
Chapter-2		
Figure-1	Changes in the serum ALP activity at different doses of chromium treated rats	36
Figure-2	Changes in the serum AST activity at different doses of chromium treated rats	37
Figure-3	Changes in the serum ALT activity at different doses of chromium treated rats compared to control	37
Figure-4	Change the ALP activity of liver at different doses in response to chromium	38
Figure-5	Changes in the AST activity of liver following exposure to chromium at different doses	38
Figure-6	Change in the ALT activity of liver following exposure to chromium at different doses	39
Figure-7	Change in the ALP activity of lungs in response to chromium at different doses.	39
Figure-8	Change in the AST activity of lungs in response to chromium at different doses	40
Figure-9	Change in the ALT activity of lungs after chromium treatment at different doses	40
Figure-10	Changes in the serum ALP activity in duration dependent study of chromium treated rats	41
Figure-11	Changes in the serum AST activity in duration dependent study of chromium treated rats	41

Figure-12	Changes in the serum ALT activity in duration dependent study of chromium treated rats	42
Figure-13	Change in the ALP activity of liver in response to chromium in duration dependent study	42
Figure-14	Change in the AST activity of liver in response to chromium in duration dependent study	43
Figure-15	Change in the ALT activity of liver following exposure to chromium in duration dependent study	43
Figure-16	Change the ALP activity of lungs following exposure to chromium in duration dependent study	44
Figure-17	Changes of the AST activity of lungs following exposure to chromium in duration dependent study	44
Figure-18	Changes in the ALT activity of lungs following exposure to chromium in duration dependent study	45
Figure-19	Changes the body weight of chromium treated rats	45
Figure-20	Changes in the MDA level of liver and lungs after chromium treatment when compared to control.	46
Figure-21	Changes in the Conjugated Dienes level of liver and lungs in Cr (VI) treated rats compared to control.	47
Figure-22	CAT activity using liver and lungs homogenates in Cr (VI) treated group compared to control group.	47
Figure-23	Measured SOD activity using liver and lungs homogenates decreased much more than Cr (VI) treated group.	48
Figure-24	Changes in the GSH activities of liver and lungs in Cr (VI) treated rats compared to control	48
Figure-25	Changes in the GSSG activities of liver and lungs in Cr (VI) treated rats compared to control	49
Figure-26	Changes in the GPx activity of liver and lungs in Cr (VI) treated rats compared to control	49
Figure-27	Changes in the GR activity of liver and lungs in Cr (VI) treated rats compared to control	50
Figure-28	Changes in the GST activity of liver and lungs in Cr (VI) treated rats compared to control.	50

Chapter-3

Figure-1& 2	Changes in the MDA and conjugated dienes contents in liver and lungs mitochondria after chromium treatment	60
Figure-3 & 4	Changes in the nitric oxide production (NO) and the activity of SOD in tissue mitochondria in response to chromium	61
Figure-5 & 6	Shows variation of the activity of catalase in liver and lungs homogenate and the GSH level in liver and lungs mitochondria after exposure to chromium	61
Figure-7 & 8	Changes of the GSSG level and GPx activities in tissue mitochondria after chromium treatment	62
Figure-9 & 10	Variation of GR and GST activities in liver and lungs mitochondria after chromium exposure	62
Figure-11	Mechanism of chromium toxicity	66

Chapter-4

Figure-1	Picture of <i>Andrographis paniculata</i> Nees plant	71
Figure-2 (A, B & C)	Shows the MDA level in liver and lungs mitochondria after administration of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in chromium treated rats	76
Figure-3 (A, B & C)	Represent variations of the conjugated dienes content in liver and lungs mitochondria after supplementation of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in chromium treated rats	77
Figure-4 (A, B & C)	Shows the production of Nitric Oxide (NO) in tissue mitochondria after co-administration of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in chromium treated rats	78
Figure-5 (A, B & C)	Variation of the SOD activity in liver and lungs mitochondria after co-administration of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in chromium treated rats	79
Figure-6 (A, B & C)	Changes of the GSH level in liver and lungs mitochondria after co-administration of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in chromium treated rats	80

Figure-7 (A, B & C)	Shows GSSG level in tissue mitochondria after co-administration of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in chromium treated rats	81
Figure-8 (A, B & C)	Changes of the activity of GPx in liver and lungs mitochondria after co-administration of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in chromium treated rats	82
Figure-9 (A, B & C)	Represent variation in GR activity in liver and lungs mitochondria after co-administration of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in chromium treated rats.	83
Figure-10 (A, B & C)	Depicts the activity of GST in tissue mitochondria after co-administration of AE-AP250 & 500, ME-AP250 & 500 and PEE-AP250 & 500 in response to chromium	84

Chapter-5

Figure-1	Changes of MDA concentration in liver and lungs mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	94
Figure-2	Shows the conjugated dienes content in liver and lungs mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	95
Figure-3	Shows the production of nitric oxide (NO) in tested organ mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	95
Figure-4	Changes of the SOD activity in liver and lungs mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	96
Figure-5	Shows the level of GSH in tested organ mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	96

Figure-6	variation in the GSSG level in liver and lungs mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	97
Figure-7	variations of GPx activity in liver and lungs mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	97
Figure-8	Changes in GR activity in liver and lungs mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	98
Figure-9	Shows the changes of activity of GST in tested organ mitochondria after co-administration of mixed solvent water and methanol in the ratio of (70:30), (60:40), (50:50) & (40:60) in chromium treated rats	98

Chapter-6

Figure-1 & 2	Shows the membrane cholesterol and phospholipids levels after supplementation of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	114
Figure-3 & 4	Changes in membrane Total ATPase and Na ⁺ -K ⁺ -ATPase activities after supplementation of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	115
Figure-5, 6 & 7	Effect of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> on Mito ETC Complex-I (DPNH-coenzyme Q reductase), Mito ETC Complex-II (succinate dehydrogenase coenzyme Q reductase) and Mito ETC Complex-III (coenzyme Q cytochrome c reductase) respectively in chromium-induced rats	116
Figure-8 & 9	Changes of the Pro- and Anti-inflammatory cytokines level in liver after supplementation of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	117
Figure-10 & 11	Changes of the Pro- and Anti-inflammatory cytokines level in lungs after supplementation of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	118

Figure-12	Effects of chromium and it's supplementation with Hydro-Methanol (60:40) extract of <i>A. Paniculata</i> on intracellular ROS induction in lymphocytes.	119
Figure 13	Effects of chromium and it's supplementation with Hydro-Methanol (60:40) extract of <i>A. Paniculata</i> on morphology of lymphocytes	119
Figure-14	Nuclear morphologic changes al of lymphocyte after supplementation of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	120
Figure-15	Changes of the cytokines level in lymphocytes after supplementation of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	121
Figure-16	Estimation of Caspase-8, Caspase-3 and pAKT from lymphocytes after supplementation of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	121
Figure-17	Study of the Histological changes in Liver tissues after co-administration of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	122
Figure-18	Study of the Histological changes in Lungs tissues after co-administration of Hydro-Methanol (60:40) extract of <i>A. paniculata</i> in Cr-treated rats	123

Chapter-7

Figure-1	Molecular structure of Andrographolide	132
Figure-2	Identification of andrographolide (ANDRO) by HPTLC	135
Figure-3	Identification of ANDRO detected by FT-IR; a) isolated ANDRO, (b) pure standard ANDRO.	136
Figure-4	The quantification of isolated ANDRO (blue) was performed with standard pure ANDRO (black)	137