

Extraction and Ameliorative Effect of *Camellia sinensis* against toxicity induced by nickel nanoparticles in Sprague Dawley Rats

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Abstract— *Camellia sinensis* is extensively cultivated in most regions of the world. *Camellia sinensis* is known to have several pharmacological effects such as hypoglycemia, hypocholesterolemia, antioxidant, laxation, fungicide and appetite stimulation. Extraction of *Camellia sinensis* was done in Analytical lab of GC University Faisalabad. After extraction the extract were subjected to phytochemical analysis. The goal is to determine the association between nickel nanoparticle induced toxicity and the therapeutic effect of *Camellia sinensis*. In this experimental work, rats were randomly divided into four groups. The control group will receive drinking water and food second group received saline third group received nickel nanoparticle and last group received nickel nanoparticle as well as *Camellia sinensis* plant for 14 alternative days. After 14 days rats were sacrificed and liver organ collected for hematological and histopathological analysis.

key words— *Camellia sinensis*, Nickel nanoparticles, Toxicity, Liver, Histochemistry, Rats

1 INTRODUCTION

Nanoparticles are characterized as the particulate scatterings or strong particles with a size in the scope of 10-1000nm. Medication is disintegrated, captured, typified or joined to a nanoparticle lattice. Various gatherings incorporate fullerenes, metal NPs, artistic NPs, and polymeric NPs. The NPs have one of a kind physical and compound properties because of their high surface region and Nano scale size (Vaseem et al., 2013). Lately, the biodegradable polymeric nanoparticles, especially those covered with the hydrophilic polymer, for example, poly (ethylene glycol) (PEG) known as long-coursing particles, have been utilized as potential medication conveyance gadgets on account of their capacity to flow for a drawn out period time focus on a specific organ, as transporters of DNA in quality treatment, and their capacity to convey proteins, peptides and qualities (Kommareddy et al., 2005). Nickel are silver-white metallic compound components that are normally present in Earth's outside (Arita et al., 2011). In view of its extraordinary physical and substance properties, being extreme, harder, ferromagnetic, having great pliancy and profoundly impervious to rusting and erosion, nickel and its mixes are generally utilized in the business (Reck et al., 2008). Nickel is basic component for at any rate a few creature animal varieties. These creature considers partner nickel hardship with discouraged development, decreased regenerative rates, and changes of the serum lipids and glucose. Nickel is known as a perhaps damaging part for individuals. Its concentration in the earth can rise as a result of mechanical activities (Barceloux and Barceloux, 1999) At this little size the particles

and iotas work in an unexpected way, act in general unit as far as its properties and transport, give an assortment of points of interest. Where traditional strategies arrives at their cutoff points, nanotechnology gives chances to clinical applications (Pal et al., 2011; Tiruwa, 2016). Nano harmfulness is most unmistakable antagonistic impact brought about by NPs when they cooperate with climate and the living frameworks. Introduction of NPs to living creatures initiates different sorts of harmful credits, for example, cytotoxicity (causing apoptosis, autophagy, and mitoptosis), genotoxicity (coming about mutagenicity, clastogenicity, and aneugenicity), and epigeneticity (Schrand et al., 2010; Jennifer and Maciej, 2013)(Mckay et al., 2020). They have been utilized in a numerous of utilizations due to recognizing qualities of the nanoparticles tallying makeup, excellence items, sunscreens, toothpaste, sun salves, paints, self-cleaning windows, fillers, stain-safe pieces of clothing, opacifiers, semiconductors and impetuses. In assembling of elite tires, nanoparticles are additionally utilized in merchandise like golf, tennis and bowling balls, helpful medicines and drug items. Nanoparticles of the metal oxide are broadly utilized in assortment of utilizations, for example, food, natural and synthetic sciences. Nanoparticles are additionally second-hand in layers and channels with other ecological options for water cleaning. Nanoparticles are utilized free glass, sun powered cells and gas locators. So due to extensively utilization of them we need to control their unfavorable impacts.

Nickel NPs discover likely applications in different fields including gadgets, attraction (Hyeon, 2003), energy innovation (Karmhag et al., 2000), and biomedicines (Mariam et al., 2014). Because of their high reactivity, operational straightforwardness, and eco-accommodating properties they are utilized to catalyze different natural responses including chemoselective oxidative coupling of thiols (Saxena et al., 2007), decrease of aldehydes and ketones (Alonso et al., 2008), hydrogenation of olefins (Dhakshinamoorthy and Pitchumani, 2008)(Mckay et al., 2020), blend of stilbenes from liquor through Wittig-type olefination (Alonso et al., 2009), and α -alkylation of methyl ketone (Alonso et al., 2008). They are additionally catalyze certain inorganic responses like disintegration of smelling salts (Li et al., 2005). One of their ongoing applications is their part in the manufacture of carbon nanotubes (CNTs) (Li et al., 2006). They additionally find natural bundles in field of adsorption of hazardous color and inorganic contamination and therefore assume an imperative function in the tidiness of environmental factors (Pandian et al., 2015).

Internal breath or maintenance through the gastrointestinal lot results exceptional destructiveness in individuals. The technique for nickel hurtfulness has been concentrated recently. Quickly, the significant heading for the lethality of nickel is anyway by the exhaustion of glutathione levels and sticking to the sulfhydryl get-togethers of proteins (kampa et al., 2003). US Ecological Security Office (US EPA) indicated that nickel treatment causes unalterable lung hurt, strange aspiratory capacities, renal cylindrical rot, iron lack, eosinophilia, and nasal septum ulceration. Adjustment of physiological science by diminishing nitrogen upkeep, glucosuria, phosphaturia, and urinary release of calcium molecule and zinc molecule following nickel treatment has too been represented. The prevention of ATPase development can cause neurologic issue, fits, and daze state. Deadly presentation caused diminished nictinamide can disturb upset oxidative phosphorylation. Nickel is known as the conceivably destructive component for the people. Its focus in climate can ascend because of mechanical exercises (Sunderman, 1977; Rae, 1981; Pulido and Parrish, 2003; Eliades et al., 2004; Ruff and Belsito, 2006; Alsop et al., 2014)(Sania et al., 2020). The human introduction to nickel or its mixes can possibly create an assortment of the obsessive impacts, which may incorporate cutaneous irritations, for example, growing, blushing, dermatitis and tingling on the skins, and may likewise incorporate hypersensitivity responses and teratogenicity in human body. Most significant antagonistic wellbeing impacts because of nickel introduction are lung fibrosis and cellular breakdown in the lungs (Kasprzak et al., 2003; Zhao et al., 2009). The epidemiological investigations have demonstrated that the word related presentation to nickel expanded rate of some human tumors, for example, the lung, head, neck and nasal diseases, etc (Cragle et al., 1984;

Roberts et al., 1985; Raithel et al., 1988; Bar-Sela et al., 1992; Hilt et al., 1997; Yiin et al., 2009; Khlifi et al., 2013; Chen et al., 2014; Chiou et al., 2014). Nickel mixes have been for some time named human cancer-causing agents as indicated by International Agency

Since ancient times, plants have been an exemplary source of the medicine. Traditional system of the medicine is found to have utilities as many accounts. Due to the population rise adequate supply of the drug and high cost of the treatment in side effect along with the drug resistance has been encountered in the synthetic drugs, which has led to an elevated emphasis for use of plants to treat human diseases. Affordability of herbals has been also drawn attraction towards their use(Mckay et al., 2020).

Unani and Homoeopathy. Green tea has been consumed throughout ages in India, China, Japan, Malaysia and Thailand.

Scientific Classification:

Kingdom : Plantae
Order : Ericales
Family : Theaceae
Genus : Camellia
Species : C. sinensis
Binomial name : Camellia sinensis (L.) Kuntze
Common Names:
India : Chha
China : Cha
Russia : Chai
Africa : Itye
Italy : Te
England : Tea plant
United State : Tea

Camellia sinensis local to territory China, South, India and Southeast Asia, yet it is today developed across world in the tropical and the subtropical areas. It is an evergreen bush or little tree that is normally managed to under 2 meters (6 feet around about) when developed for its leaves. It has a solid taproot. The leaves are four to fifteen centimeters in length and two to five centimeters wide. Youthful, light green leaves are ideally gathered for tea creation. They have short white hairs on the underside. More established leaves have further green tones. Diverse leaf ages produce the varying tea characteristics, since their synthetic structures are unique. Typically, tip (bud) and initial 2-3 leaves are collected for preparing. This hand picking is rehashed each 1 to 2 weeks(Sania et al., 2020).

Various types of Camellia sinensis

Green tea

It is set up from the unfermented leaves contrasted with leaves of oolong tea which are mostly matured and the dark tea which are completely aged. Green tea is wealthy in assortments of valuable synthetics with most extreme constructive outcomes on the individuals.

Dark tea

It account owed for the roughly 72% of world's overall tea creation. While limit of cell reinforcements are oxidized sooner or later of the maturing technique, dark tea keeps an extreme assortment of cancer prevention agents polyphenols comprising of flavonoids. These cell reinforcements help free assemblage of hazardous contaminations.

Oolong tea

Oolong tea is an incompletely aged tea and has flavor and the wellness characteristics of the each unpracticed and dark teas. It joins an unreasonable scope of the cancer prevention agents, which secures the healthy skin cells and maturing technique eases back down.

Pu'erh tea

This kind of tea originates from the large leaf kind of the tea plant and might be picked any season of a year. Its handling is a lot of like the dark tea. What makes this tea remarkable is that after it's far picked; it is heaped and matured for such a long time as fifty to hundred years.

Rooibos or "Red" tea

It originates from the bush in South Africa. It is normally caffeine free – settling on it a decent decision for pregnant ladies or breastfeeding ladies. Rooibos tea has high number of cell reinforcements.

Green and oolong tea are all the more by and large benefited from inside the Asian nations like India, China, Japan, Malaysia and Thailand, while dark tea is greatest famous inside the Western nations. The more prominent leaves are matured, lower polyphenol content, and higher caffeine content material. Yung, Yao, Jyh, and Jen (2003) in correlation caffeine and catechins in equivalent tea anyway engineered by methods for explicit maturation procedures to find that phase of caffeine inside the remarkable made teas turned out to be so as dark tea more noteworthy than oolong tea extra than unpracticed tea and green tea have extra than new tea leaf, yet the degrees of EGCG and all out catechins had been all together green tea > oolong tea > shining tea leaf > dark tea.

Camellia sinensis unequivocally has for a long while been regarded by people at some stage in world for its remedial properties. A real number of animal and legitimate examines suggest that substance parts inside the *Camellia sinensis* plant

play an essential circumstance in the contributing basic human wellbeing. Prosperity focal points deduced through use of the tea is summarized underneath,

Green tea is acknowledged to be an amazing wellspring of the important cell fortifications, like that found in finish and vegetables. Green tea is unequivocally rich in polyphenols, alongside catechins, theaflavins and thearubigins, which can be thought to make duties to clinical points of interest of green tea. Animal exploration give an absolutely intriguing opportunity to survey responsibility of malignant growth avoidance specialist homes of green tea and green tea polyphenols to physiological aftereffects of the green tea association inside the specific models of oxidative weight. Leaf boasts presence an outstanding malignancy counteraction operator, among which epigallocatechin-gallate similarly as different first class patching substances, including fluoride, catechins, and tannins. Various assessments have demonstrated that free radicles looking through enthusiasm of EGCG inside the vitro and inside the vivo look at. Green tea catechins were set out to be higher cell fortifications than supplements C and E, tocopherol and carotene.

Green tea is represented to contain very nearly 4000 bioactive blends of which 33% is contributed by polyphenols (Mahmood et al., 2010). Other than polyphenol that blends alkaloids (caffeine, theophylline and theobromine), amino acids, starches, proteins, chlorophyll, eccentric regular blends (fabricated materials that speedily produce exhaust and add to the aroma of tea), fluoride, aluminum, minerals are accessible and moreover minor segments (Mahmood et al., 2010). Polyphenols found in green tea are for the most part flavonoids (Sumpio et al., 2006). The polyphenols, a tremendous get-together of plant artificial materials that consolidates catechins, are accepted to be obligated for clinical points of interest that have been commonly credited to green tea (Cabrera et al., 2006). Critical catechins are (-)-epicatechin gallate (ECG), (-)-epicatechin (EC), (-)-epigallocatechin (EGC) and (-)-epigallocatechin gallate (EGCG). For the most part unique and abundant catechin in green tea is epigallocatechin-3-gallate (EGCG) (Wu and Yu, 2006). Green tea is incredibly adequate wellsprings of supplement C.

1. MATERIALS AND METHODS

Current study was entitled "Extraction and analysis of *Camellia sinensis* and its amilorative effect of *Camellia sinensis* against induced toxicity by nickel nanoparticle in rats" was approved out in the Analytical laboratory of Government College University Faisalabad. Current experimental span was of 14 days, and animals were sacrificed at 15th day and target organ (liv-

er) and blood was collected for further bioassays. The bioassays performed were

- Assessment of Ni accumulation in liver
- Hematological study of blood
- Histological studies of liver

2.1 Chemical and reagents

Following reagents were used in current study:

Hydrochloric acid, Ferric chloride, Dragendroff's reagent, Chloroform, Nitric acid, Perchloric acid, Sodium chloride, Methanol, Distilled water, Ni-NPs, Sodium hydroxide, Sulphuric acid.

2.2 Collection of *Trigonella foenum graecum*

The *Camellia sinensis* was collected from Ayub Agriculture research institute Faisalabad. The sample was cleaned by using sieve to remove dust particles. The sample was then grinded by using pastel and mortar to get the fine powder and further grinding was done with grinding machine. After grinding 960 g of fine powder of *Camellia sinensis* obtained.

2.3 Preparation of plant methanolic extract

The methanolic extract of *Camellia sinensis* was prepared by using 5 beakers of 1000ml. 200g of fine powder was soaked in 700ml of methanol for seven days at room temperature. Continuous stirring was done twice a day in the interval of 7 days. After 7 days, the mixture was filtered and residue was separated. Filtrate was evaporated under reduce pressure at 45°C, by using rotary evaporator and then dried. Dried extract was then weighed and yield was calculated. After calculating the yield, the extract was stored at -4°C in refrigerator for further phytochemical extract analysis.

2.4 Phytochemical qualitative analysis

The chemical test was carried out in the extracts using as per the standard procedures for the identification of phytochemicals.

2.4.1 Flavonoids

Test was separate in ethanol, warmed and game plan were filtered then magnesium metal chips were added to the filtrate followed by relatively few drops of conc. HCl. Advancement of red to purple or pink, orange tone in course of action indicated the presence of flavonoids.

2.4.2 Phenols

In 5ml of refined water 500mg concentrate was mixed. Relatively few drops of 5% ferric chloride game plan included, a green tone shows the presence of phenols.

2.4.3 Tannins

About 0.25 g of test was vortexed in 5.0 ml of refined water and thereafter isolated. To 2.0 ml of the filtrate barely any drops of 1% FeCl₃ were incorporated. Improvement of green, blue-green or blue-dim tone in course of action showed the presence of tannins.

2.4.4 Alkaloids

In 2% sulphuric destructive 0.2g concentrate warmed for two minutes. Filtered the course of action and incorporate barely any drops of dragendroff's reagent included improvement of orange red ppt. show the presence of alkaloids.

2.4.5 Triterpenoids

To the test game plan CHCl₃, conc. H₂SO₄ was incorporated. Improvement of red tone in plan showed the presence of triterpenes.

2.4.6 Lipids

Iodine course of action was added drop sharp to the test plan. Disappearing of iodine special tone in course of action showed the presence of lipids.

2.4.7 Protein

2-4 drops of ninhydrin were incorporated test course of action and kept in foaming water shower for 2-3 min. A purple concealing course of action advancement showed the presence of free amino acids.

2.4.8 Polysaccharides

Hardly any drops of iodine plan were added to test course of action. Course of action of blue concealing game plan showed the presence of polysaccharides.

2.5 Experimental work plan

2.5.1 Animals

15 Healthy male Sprague Dawley rats weighing (80g-150g) were purchased from the animal house of Government College University Faisalabad. The rats were kept in the ventilated steel cages underneath standard lighting conditions after the agreement from the local moral committee of the Government College University Faisalabad. The animals were given free admittance to water and food. After acclimatization of 7 days the animals of similar weight divided into following groups.

2.5.2 Grouping of experimental animals

Rats were divided into following five groups

- Control group (No treatment)
- Saline group (0.9% normal saline)

- Ni-NPs treating group (5mg/kg body weight)
- *Camellia sinensis* treated group (100 mg/kg body weight)
- Ni-NPs + *Camellia sinensis* treated group (5mg/kg + 100mg/kg body weight)

2.5.3 Selection of Doses

The control group was fed with usual water and food (No treatment). Saline group was exposed to 1 ml of 0.9% normal saline. Nanoparticle treated group (5mg/kg body weight of Ni-NP). Plant treated group (100mg/kg body weight) of plant dose orally. Nanoparticle and plant treated group exposed to (5mg/kg + 100mg/kg body weight). Body weight of each group was determined on alternative days before administration of doses. After 14 days, animals were sacrificed and the selected organ (liver) was collected for further analysis.

2.6 Biochemical Analysis

Following biochemical assays were performed:

3.8.1 Hematological analysis of blood

Blood from each animal was collected in the EDTA tubes for complete analysis

- Blood analysis (CBC)
- LFT (liver function test)

2.6.1 Metal accumulation

Metal accumulation is checked by atomic absorption spectrophotometer. Samples were digested by using Nitric acid and

perchloric acid. Then add 5ml perchloric acid and 10ml nitric acid. 1g of liver organ of each group animal was taken in a beaker, added 5ml of perchloric acid and 10ml nitric acid. Af-

ter that beaker was kept on hot plate until the volume of solvent remain 2ml. After that samples were cooled and distilled water was added to make the final volume upto 50ml. It was then stored in plastic bottle to check the Ni accumulation in liver of male Sprague Dawley rats.

2.6.2 Statistical Analysis

Data were analyzed by using ANOVA to compare the means of different treatments by using mini tab 17 and results were analyzed at significant level $p < 0.05$.

3. RESULTS AND DISCUSSION

3.1 Body weight

Following the first week no difference was observed between the control group and all treated group. Body weight of nickel nanoparticle treated group following two weeks indicated critically decrease in body weight of the rats compared with control. In first week after administration of doses no significant decrease but in some animals decrease observed to a greater extent. Following 14 days treatment with nickel NPs treatment was recorded and revealed that treatment had affected on the body weight compared with control.

Weekly body weight of the all treated groups of male *Sprague Dawley* rats were examined among control and all treated groups. In table 4.1 all the groups showed the body weight of each week from the start of experiment till the end of experimental period of 14 days on alternative days.

Table 4.1 Body weight of the all treated groups of male *Sprague Dawley* rats

Sr. No	1 st day	2 nd day	3 rd day	4 th day	5 th day	6 th day	7 th day
Control group	98g	99g	105g	111g	115g	119g	124g
	102g	105g	110g	116g	120g	123g	130g
	107g	112g	115g	119g	125g	127g	132g
Nanoparticle	139g	132g	135g	137g	136g	135g	137g
	129g	117g	118g	117g	110g	107g	100g
	128g	118g	117g	111g	106g	106g	109g

Nanoparticle + Plant	119g	117g	119g	129g	128g	126g	129g
	112g	110g	118g	117g	123g	121g	128g
	120g	117g	110g	104g	99g	94g	94g
Plant	100g	101g	101g	98g	111g	121g	119g
	108g	105g	106g	112g	110g	111g	115g
	105g	100g	102g	103g	103g	105g	101g

4.2 Hematological analysis

In the current study hematological changes were seen because of subcutaneous injection of nickel nanoparticle in male *Sprague Dawley* rats examination of fluctuation for hemoglobin concentration, WBC, RBC, platelets, MCH, MCHC appeared in the tables. Profound huge changes were found in all treatment groups following 14 days exposure. Table 4.2 indicates the fluctuation of WBC, RBC, MCHC, MCV PLT and hemoglobin. Significant difference was found in the all treated groups compared to control groups.

4.3 Metal accumulation

Metal accumulation the liver is checked by atomic absorption spectrophotometer to determine the concentration of nickel nanoparticle accumulated in the liver of nanoparticle treated group. The values

4.4 Phytochemical qualitative analysis

Phytochemical analysis confirmed the presence or absence of phytochemicals present in the seeds of *Camellia sinensis*.

Table 4.3 Presence or absence is indicated

Compound	Presence or Absence
Flavonoid	+

of metal NPs in the liver organ of rat compared to NPs + Plant were given in the table. The values have a significant difference in the both group.

Table 4.2 The values have a significant difference in the both group

Serial no.	NPs group	NPs + Plant
1	1.046mg/L	0.772mg/L
2	1.052mg/L	0.652mg/L
3	0.591mg/L	0.11mg/L

Phenols	+
Alkaloid	+
Tannins	+
Terpenoids	-
Saponins	+
Alkaloids	+

4.5 Histopathology examination

Perception of histological segments of liver from control rodents shows ordinary cell structure of liver tissue with all around planned liver cells transmitting from the focal vein isolated from the vein by

sinus creatures, and the liver cells contain focal pale recolored cores. Be that as it may, in rodents treated with carbon tetrachloride, histological segments indicated huge blockage of sinusoids (coagulation rot), which was ineffectively characterized. Broadening of liver cells in the liver of this gathering and expansion in the cytoplasm in vacuo (frothy or swell degeneration), with broad changes in fat levels, and development of the cores (dim spots), which at that point become hyperchromatic. Actually, there is surprising leukocyte invasion in the gateway groups of three (triaditis) and sinusoids around the frothy hepatocytes as an indication of irritation. Liver pieces of rodents treated with fenugreek seeds indicated great recuperating with less putrefaction and greasy plan.

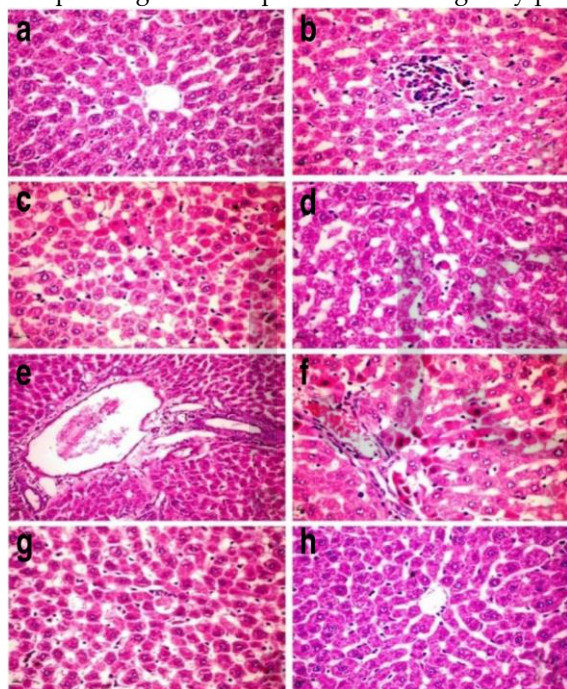


Fig. 1 Photomicrograph of sections of rat liver poisoned with NiNPs (H and E \times 400). group I shows normal liver parenchyma. II. Group focal area b of hepatocellular necrosis infiltrated by mononuclear cells, c polyploid hepatic cells represented by hepatic cytokaryomegaly, binary degraded hepatocytes, which with Kupffer cell activation and sporadic cell necrosis d apoptosis, e oval cell proliferation, biliary hyperplasia epithelium and newly formed bile duct formation and f periportal sporadic liver cell necrosis. g III of necrosis of individual cells. group. h A IV. group shows normal liver parenchyma

DISCUSSION

Nickel nanoparticle used extensively in different fields due to its different unique qualities. Nickel nanoparticles used in food, industry, medicines and in the production and making of different

products. On the other hand nickel nanoparticles are toxic in nature and cause severe abnormalities in human being. Nickel nanoparticle produce skin allergies, lung cancer, liver damage, kidney disease, cardiovascular diseases and many other abnormalities in the living organism.

Camellia sinensis is a plant acknowledged in conventional medicinal drug, and it has currently been found that secondary metabolites have effective antioxidant and antiradicalaire capability in vivo and in vitro in opposition to oxidative strain induced by means of many pollutants. The aim of our studies was to research the in vivo antioxidant shielding effect as well as the phytochemical houses and bioactive compounds of camellia sinensis. In fact, inside the present paintings, some of compounds were identified by using qualitative evaluation, which includes phenols, flavonoids, tannins, alkaloids and saponins. In fact, polysaccharides found in all plant parts, including leaves, seeds, roots, and bark, were suggested to be powerful unfastened radical inhibitors and lipid peroxidation inhibitors.

In addition, Camellia sinensis had been shown to be very rich in a number of hint elements consisting of copper, magnesium, zinc, calcium and iron. The presence of trace elements which includes Zn and Cu can function a cofactor for the antioxidant enzyme (CuZn) and (Mn) SOD. In fact, herbs include some of secondary compounds, including phenols, flavonoids, glycosides, coumarins, saponins, and many others., which demonstrate their particular function and pharmacological homes, and feature also been said to increase the antioxidant energy of phenolic and flavonoid compounds in hen. Secondary metabolites of fenugreek seeds (polyphenols and flavonoids) have potent antioxidant hobby in vitro. Because nickel nanoparticles are toxic and cause toxicity in handled animals. This study confirms that nickel nanoparticles harm blood parameters, the liver, and the kidneys. In truth, the administration of nickel nanoparticles inside the blood brought on a enormous lower in WBC and platelet matter, as well as an growth in HCT content material, which can be defined through harm to hematological function. Alterations in WBC and platelet can be because of excessive storage of platelets and WBC within the spleen. The hepatotoxicity of nickel nanoparticles become also evidenced via a extensive growth in AST, ALT, that are markers of liver mobile damage. Similarly, paintings has discovered that

nickel nanoparticles are administered to rats hepatotoxicity as evidenced by means of elevations in ALT, AST, and general bilirubin. In the liver, they mainly motive observations of degeneration and necrosis. Studies show that the liver is stricken by nickel nanoparticles. The outcomes are supported by way of histological exam. Liver cells play a severe role inside the liver of handled rats (Ni-NPs) and that is manifested in cytoplasmic vacuolation and lymphocyte infiltration into the critical vein. Liver harm precipitated by means of nickel nanoparticles is properly documented with the aid of hepatic surface concave and lymphocyte infiltration inside the central vein, fatty liver degeneration, and necrosis, balloon degeneration, mitosis, calcification, and fibrosis. Interestingly, blood, liver damage (WBC, Plt, AST, ALT, ALP, LDH, serum creatinine and urea, lipid peroxidation levels, and harm to liver and kidney antioxidant structures) have been restored to close to ordinary values by early supplementation of *Camellia sinensis*. Studies show that *Camellia sinensis* was capable of normalize altered hematological and biochemical parameters. *Camellia sinensis* has a defen-

sive impact on liver tissues. This protecting effect of *Camellia sinensis* can be defined through the richness of phenols, flavonoids and other phytochemicals found in *Camellia sinensis*. Supplementation of *Camellia sinensis* considerably alleviates these damage to these organs with the presence of secondary metabolites (phenols, flavonoids, alkaloids) and trace factors wherein they display antioxidant electricity.

CONCLUSION

For many years plants have been used as a source of medicines to cure diseases. They are used as medicines due to presence of natural antioxidants for example flavonoids, phenols, alkaloids, tannins, saponins etc. Nickel nanoparticles cause toxicity in the liver of Sprague Dawley rats. Methanolic extract was given to rats to check the therapeutic effect of *Camellia sinensis*. Hematological and histopathological studies indicate that toxicity produced by nickel nanoparticle and *Camellia sinensis* minimized toxicity to some extent.

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