Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL15, ISSUE 1, 2024

The effect of Coca-Cola, chicken sausage, chicken broth cubes, and Indomie on laboratory mice

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Abstract :- biochemical study was conducted on laboratory white mice to ascertain the effectiveness of the treatments selected in light of the most popular goods on the Iraqi market. The animals were divided into five groups: control group C, a group given free Coca-Cola B, a group given 30% chicken sausage mixed with diet S, a group given 3% chicken broth cubes mixed with diet M, and the last group was fed Indomie at 30% A. The experiment continued for four weeks, after which the animals were slaughtered and the biochemical tests included in the study were conducted on them.

When comparing the concentration of the dangerous peroxynitrite radical for groups M, S, and A to the control group, there was a notable rise in the results. The SOD concentrations of the M, S, and A groups were likewise significantly lower in the results than in the control group . In , glutathione dropped in all treatments. Additionally, all groups' fasting glucose levels rose in comparison to group C.

Compared with the control group, group B had higher serum calcium levels than groups M and S. The blood serum of animals treated with chicken sausage showed a significant increase in lipid levels, especially total cholesterol, triglycerides, and harmful cholesterol, compared to the other groups that also showed an increase in their lipid levels. The high activity of liver enzymes in the blood serum indicates that the group of animals treated with chicken broth cubes was exposed to liver injury, hepatic cell necrosis, and the excretion of enzymes into the bloodstream compared to the control group.

Keywords:- Indomi , Maji , coca cola , color Additives , lipid profile ,Oxidative stress and antioxidants .

Introduction:- Food additives are used to improve the food's texture, flavor, freshness, and safety. Heavy metals in food may be harmful to human health depending on the absorbed dose, exposure mode, and duration of exposure [(1)].

Food has had to have a lot of chemicals added to it in recent years due to advancements in food manufacturing, marketing, and consumption. These chemicals include preservatives, flavors, and dyes, which improve the food's taste and nutritional value while also drawing consumers in as a marketing tactic [(2)] . Due to their widespread usage, food colors are regarded as significant food and medication additives. With a yearly production rate over 8 million tons, there are over 2,500 different varieties [(3)] . Given that 95% of food colors used in recent years are industrial dyes because of their low cost and simplicity of production, these dyes could have a natural or synthetic origin [(4)].

Food dyes have long been added to many staple foods such as ice cream, cheese, fried fish, meat products, jams, and sweets (5). Numerous commercial food dyes have been the subject of recent studies that have clearly highlighted their harmful or carcinogenic properties, leading to the restriction of some of them and controversy surrounding their use.. There is much research that included studies on the metabolic and toxic disorders that occur due to these artificial dyes on rats and some other types of milk. In addition, many azo compounds have a toxic or carcinogenic effect on laboratory animals [(6)].

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The manufacture of soft drinks and juices is one of the most common and widespread industries throughout the world [7], as it has become an indispensable product and the demand for it is increasing with the rise in the standard of living of consumers [8].

The dangers of dyes lie after eating foods containing them, as they are reduced to aromatic amines by reductase enzymes after they move from the wall of the small intestine to the liver. They are entirely reduced to aromatic amines, which oxidize to N-hydroxy derivatives when oxidation enzymes like Cytochrome-P450 are present (It is a large and diverse group of enzymes that catalyze the oxidation of organic materials.). The majority of mammals, including humans, undergo this biotransformation [9]. Food dyes have a direct or indirect risk of cancer or toxicity. Long-term human use of these dyes can result in a number of diseases, including anemia, dyspepsia, neuropathy in the brain, liver, kidney, and spleen diseases, growth deficiencies, allergic reactions, skin rashes, and asthma, among other metabolic disorders caused by the biotransformation of azo compounds [10].

Many researchers have studied the metabolic and toxic effects of most food additives on rats and other animals. Many researches have indicated that these food dyes have harmful effects on the DNA in liver and kidney cells, and also lead to a decrease in body weight and high-density HDL cholesterol, an increase in liver enzymes in the blood [11], an augment in the level of total fats, and an augment in the level of triglycerides, which It should be noted that high levels of triglycerides are a risk factor for coronary heart disease, as it is considered one of the possible causes of damage to the walls of the arteries [12], and that high free radicals in the body's cells lead to increased oxidation in the body, and this leads to reduced effectiveness. Lipoprotein lipase (LPL) is an enzyme found in various tissues of the body, and this decrease leads to an imbalance in lipid levels and an augment in the level of triglycerides in the blood [13].

Chicken sausage is a meat product made from minced, salted and spiced meat, with a cylindrical shape. Thinking has begun about the necessity of introducing poultry meat into the sausage industry, after the great expansion of the poultry industry in all parts of the world and the presence of a surplus of it. Sausage made from poultry meat can be made from It is a quick-prepared breakfast, lunch, or dinner meal with high nutritional value and cheap [14] Because duck and goose meat contain high levels of fat and energy, higher than chicken and turkey meat [15], and this high level of fat is linked to health problems such as obesity, heart disease, high cholesterol, and diabetes in Many countries. What is worth noting is: Indomie is one of the wheat products that represents the number one crop in the world in terms of its importance, its cultivated area, and the volume of its global production. Although the global rate of production of cereal crops such as wheat, barley, rice, and yellow corn per unit area has increased to nearly double what it was at the beginning of the twentieth century, However, the gap between global production and demand still exists and is constantly increasing, and the imported Indomie product currently represents an important source of food for children and adults. Indomie is considered one of the appropriate media for the growth of fungi and contamination with mycotoxins, as infection with fungi occurs either during the manufacturing process or the infection occurs. They were present in the field, and when appropriate conditions of temperature and humidity are available, this leads to their production of mycotoxins that cause health problems for humans and animals [16].

Martial and Methods :- In the current study, high-purity chemicals prepared by international companies were used .

Preparing the transactions: The treatments were chosen based on the most consumed food products (Coca-Cola, chicken broth, chicken sausage, and Indomie), were purchased from the local markets .

Forty French albino mice, prepared by the state company for drugs industry and medical appliance - Samarra, were used in this study. They weighed between twenty-five and thirty grams each. The creatures were housed in cages made of plastic mesh.. The floor of the cages was furnished with sawdust, and the cleanliness of the cages was taken into account, as the floor was replaced (3-4) times a week. The cages were placed in a place with a temperature ranging between (20-25) °C and with good ventilation conditions. The animals were subjected to a 12-hour light period followed by a 12-hour dark phase., and the animals were given water and prepared Turkish rations freely.

The totals were separated into:-. The group C was given free feed and water. G1: - Coca-Cola and feed were given free of charge. G2: Chicken broth mixed with feed was given at 2%. G3: - Chicken sausage mixed with feed at 30%. G4: Indomie was given at a 30% dose mixed with the feed.

Collection of Blood Samples:- Blood samples were collected from animals by slaughtering animals, a method that was adopted for the purpose of collecting an amount of (2.5 ml) blood. The blood was collected in single-use glass Gel tubes free of anticoagulant

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and equipped with a gel mixed with a coagulation stimulus. The serum was separated by Centrifuge at a speed of 3000 cycles/min for 15 minutes and divide the obtained serum into four parts with Eppendorf tubes (to avoid repeated thawing and freezing of the sample).

Measurement of biochemical variables in the serum of experimental animals:

A-Oxidative stress parameter was estimated to knew treatments effects on laboratory animals such as peroxy nitrate according [17]

B-The levels of antioxidants in the experimental animals were also tracked by measuring the levels of glutathione GSH according [18] ، and the enzyme super oxide dismutase SOD according [19] .

C- Blood Glucose was estimate according [20] , The level of calcium in the blood was also measured according [21]

D- Lipid profile were estimated in the experimental animals .

E- Liver Function were estimated in the experimental animals .

Ethical approval: For the experiments on mice, the University of Mosul College of Veterinary followed the Ethical approval established by the responsible committee on animal experimentation the official form numbered 621/7/3with the date of 29/5/2023, at the University of Mosul and supplied the mice for the experiments.

Results and Discussion:- The increase in the level of peroxynitrite in groups of animals given chicken cubes, chicken sausages, and Indomie possibly as a result of the rise of free radicals resulting from dye metabolism, especially the direct O2-superoxide radical, which neutralizes with NO to produce ONOO-. Inflammation brought on by dyes prompts cells to release cytokines, which in turn activate macrophages, white blood cells, and neutrophils to increase the release of O2-superoxide. To react with NO to form effective oxygen species and effective nitrogen species [22-23]. At the same time, an interaction occurs between the amino group and nitrate or nitrite present in the stomach or food, thus nitrosamine is formed and when metabolized it increases the oxidative state [24-25]. As showed in table (1)

table (1)(mean ± S.D) of oxidative stress parameter and antioxidants parameters in experimental mice

Groups	P.N µmol\L	SOD U\L	GSH *10^{-5} mol\L
Control C	61.52 ± 12.97 c	4.13 ± 0.45 a	35.15 ±3.67 a
Coca Cola B	63.86 ± 6.22 c	3.73 ± 0.25 ab	33.40 ± 2.75 c
Chicken Broth Cubes M	94.09 ± 26.67 ab	3.30 ± 0.42 c	33.24 ± 2.12 c
Chicken sausage S	101.00 ± 2.12 a	2.95 ± 0.75 c	33.93 ± 9.16 b
Indomie A	71.67 ± 24.42 b	3.12 ± 0.78 b	34.03 ± 0.42 b

Curing salts including sodium nitrite and sodium nitrate are used to make dry sausages. The most widely used ingredient in sausages of all kinds is nitrite. Sausage made in the dry manner is the only food that uses nitrates. Over time, bacteria that are either endogenous or introduced change nitrates into nitrites [26] Usually, processed beef products have a nitrite content of less than 40 ppm. Lower salt levels can be achieved in sausage production by using additives such as potassium nitrite and potassium nitrate. It takes other components to counterbalance the bitter aromas that the potassium form gives. Saltpeter is used in older recipes, although it's not advised. There is a 1.7 gram limit for both potassium and sodium nitrite per kilogram. Potassium and sodium nitrites are exceedingly hazardous to humans [1].

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The results indicate a significant decrease in SOD concentration at the probability level (P≤0.05) in all groups except the Coca-Cola group compared to the Control group. The sausage group also recorded the largest decrease in enzyme levels among the groups.

The formation of active oxygen species (ROS) in any organ is linked to reducing the level of enzyme activity, which leads to an increase in the oxidative state resulting from an imbalance or disturbance of the balance between free radicals and antioxidants [27]. The excessive increase in the of active oxygen species (ROS) production when exceeding The critical level can cause a disturbance in the antioxidant system, causing an oxidative state. The action of antioxidants in the cell, such as the SOD enzyme, protects the cell from death through radical toxicity, thus reducing the level [28]. The damage of the oxidative state does not depend on the nature and quantity of free radicals only, but also depends on the moment and duration of tissue exposure to the free radical [29].

This enzyme constitutes a first line of defense against oxidative stress and a detoxifier of active oxygen. It is found in the mitochondrial filling, cytoplasm, and between cells and is classified into two types depending on the type of element present [30].

The study also confirmed that SOD provides more protection to cells from oxidative damage through its work in the cellular system and that the level of free radicals can be controlled through enzymatic and non-enzymatic antioxidants [31].

On the contrary, monitoring the activity of antioxidant enzymes such as SOD is a clear indicator of antioxidant regulation and its decrease is an important indicator of the state of oxidative stress [32].

The results indicate a significant decrease in glutathione concentration at the probability level (P≤0.05) for the four groups compared to the group C. The group of Coca-Cola and chicken broth cubes also recorded the lowest level of GSH compare the groups.

The removal of toxic substances resulting from these treatments is done through their attachment to the thiol group of GSH by the action of the GST enzyme, which is an enzyme antioxidant that removes toxicity by stimulating the coupling of various substances with the thiol group of GSH, turning them into more water-soluble substances that can be Excretion from the body [33].

The results indicate that there is a rise in glucose concentration at the probability level (P≤0.05) for the four groups compared to the group C. The Indomie group also recorded the highest increase among the groups. As showed in table (2)

Table (2) (mean ± S.D) of Glucose and Calcium in experimental mice

Groups	Glucose mg\dl	Calcium mg\dl
Control C	113.47 ± 9.29 c	241.96 ± 6.69 b
Coca Cola B	124.77±0.22 b	259.62±44.17 a
Chicken Broth Cubes M	135.69±19.86 ab	251.10±14.19 ab
Chicken sausage S	142.95±47.86 ab	249.84±49.07 ab
Indomie A	157.84±88.07 a	217.35±19.59 c

This result was consistent with [34], as it indicated that there was a rise in the level of fasting blood glucose in the groups treated with sodium nitrate and sodium glutamate contained in chicken broth cubes, chicken sausage and indomie. The reason for this increase can be attributed to the high level of oxidative stress by generating large amounts of free radicals that attack and destroy pancreatic β-cells, and this stimulates the inflammatory and immune state in the body, which leads to an increase in the total number of WBCs, especially lymphocytes. In addition, hydrogen peroxide and free radicals resulting from the interaction of food additives act as cell signals that stimulate the production and attraction of defensive cells (WBCs) by stimulating the production of cytokines such as (Leukotriene, TNF-α) as well as the participation of H_2O_2 in the Fenton reaction with Transition

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elements to produce a number of free radicals, especially the OH radical, and these radicals generate a state of oxidative stress and stimulate the state of inflammation and the immune system [36].

The results indicate that The probability level has increased significantly. ($P \leq 0.05$) in the calcium level of the Coca-Cola group compared to the group C. The Indomie group also recorded the lowest calcium level among the groups, while no significant differences were recorded between the chicken broth cubes and sausages group.

The results of our current study agree with [37], where it showed an increase in the level of blood calcium in people who consumed Coca-Cola at a rate of 200 cm3 per day. The high level of calcium in the blood serum explains the release of calcium from the skeleton into the bloodstream. Which explains the occurrence of osteoporosis over time, which results in a weakening of the skeleton, and thus the bones are fragile and more prone to fracture due to calcium deficiency, hormonal change, or vitamin D deficiency [38].

Juma 2016 [37] concludes that drinking Coca-Cola in large quantities for a long time can lead to osteoporosis, the formation of kidney stones and a decrease in kidney function.

The results indicate that there was a significant increase at the probability level ($P \leq 0.05$) in the total cholesterol T.C concentration in the chicken broth, chicken sausage and indomie group compared to the group C. Significant differences were also recorded between all groups. As showed in table (3)

Table (3) (mean ± S.D) of T.C , T.G and VLDL in experimental mice

Groups	T.C mg/dl	T.G mg\dl	VLDL mg\dl
Control C	64.41±9.52 c	49.37±6.23 d	9.87±1.25 d
Coca Cola B	68.64±0.34 c	131.93±20.91 b	26.39±4.18 b
Chicken Broth Cubes M	83.13±5.70 b	100.56±32.38 c	20.11±6.48 c
Chicken sausage S	116.27±62.27 a	165.76±40.96 a	33.15±8.19 a
Indomie A	77.14±12.11 b	165.55±40.13 a	33.11±8.03 a

This result is consistent with [34] , which revealed a marked rise in the total cholesterol level in rats treated with sodium nitrate found in Indomie and chicken sausages and the sodium glutamate compound present in chicken broth cubes. Such studies indicated that giving food additives increases the level of T.C, and the reason for this increase is attributed to the increase in T.C level leads to disturbances that occur in metabolic processes resulting from eating chicken sausage/chicken broth cubes and Indomie, thus increasing the generation of free radicals that work to inhibit the cholesterol esterase enzyme [32,39] or The reason could be because of the rise in oxidative stress brought on by pigment metabolism., which affects the effectiveness of the enzymes that participate in converting cholesterol into bile acids via the enzyme cholesterol 7-α hydroxylase, which works to inhibit the enzyme and thus increases the concentration of cholesterol levels [40-41]. The reason for the increase in the number of animals treated with food additives may be due to the disturbances that occur in the processes of catabolism of cholesterol ester and the inhibition of the activity of the lipoprotien lipase enzyme, which increases the level of free fatty acids [42], or as the study indicated, to the increase in the level of cholesterol due to There is a defect or deficiency in the enzyme LCAT for lecithin cholesterol acyltransferase, which works to transfer an ester from the phospholipid phosphatidylcholine to cholesterol to form a cholesterol ester, which is stored in HDL-c, and the esterified cholesterol is transported to the liver to be transformed into bile acids [40], but he indicated Maechler et al 1993 The increase in cholesterol level is due to the loss of α-β LDL receptors. These receptors work in the processes of catabolism and control of lipoproteins and are found in the wall of blood vessels [43]. It may also lead to an increase in the level of total cholesterol in the group fed with chicken sausages as a result of an increase in the level of oxidative stress in them through the result of the previous peroxynitrite and a decrease in the activity of the enzyme superoxide dismutase, and this is what the researcher (Fajer) confirmed, as he indicated that the reason for the increase in the level of total cholesterol in the treatments under experiment As a result of oxidative stress [44] .

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The findings show a statistically significant presence of VLDL and triglycerides at the probability level (P≤0.05) for the four groups compared to the control group. Also, no significant differences were recorded between the Sausage and Indomie groups.

The results of the current study agree with [45], as it showed a significant increase in the Concentration of triglycerides among the drinkers of Coca-Cola compared to control as a control sample.

The oxidative state that results from the dye's digestion is what causes the increase in T.G in animal groups treated with food colorsThis reduces the effectiveness of the lipase enzyme that breaks down triglycerides (T.G) into three fatty acids and glycerol, and is less effective in the lining of capillary blood vessels [40]. Thus, the blood serum level increases due to the inefficiency of the lipase enzyme in analyzing T.G. [46].

Festuccin et al 1998 also indicated that the increase in the Conc. of T.G is due to the disturbance in the metabolic processes leading to a decrease in glycogen analysis, and thus the level of stored fats, including the triglycerides T.G, increases [47]. On the other hand, the increase in the level of T.G in the groups of mices treated with azo dyes may be due to the role of the dyes in causing indigestion and metabolic processes, thus reducing the consumption of energy stores, thus reducing the decomposition of glycogen and increasing the oxidative state that works to inhibit the enzyme lipoprotein lipase further. Cholesterol esterase transferase protein (CETP) activity increases T.G level (3) [32].

Or perhaps the cause of this increase is due to an increase in oxidative stress resulting from the generation of free radicals resulting from the degradation of the pigment, which reduces the activity of the enzymes responsible for the decomposition of triglycerides, thus causing a disorder in fat metabolism [48]. However, Xiao *et al* 2003 indicated that the increase in the level of T.G. Due to oxidative stress, which leads to damage to pancreatic beta cells and thus reduces insulin secretion, the low level of insulin leads to a decrease in the level of lipoprotein lipase activity [49].

The results indicate a significant increase at the probability level ($P \leq 0.05$) for the chicken broth cubes group compared to the group C. Also, no significant differences were recorded between the other groups. As showed in table (4)

Table (4) (mean ± S.D) of liver function in experimental mice.

Groups	ALT U\L	AST U\L	ALP U\L
Control C	19.51 ± 2.08 b	18.13 ± 0.42 ab	77.81±19.44 c
Coca Cola B	20.59 ± 1.39 b	16.97 ± 0.05 b	99.04± 13.40 b
Chicken Broth Cubes M	26.57 ± 1.25 a	20.93±1.27 a	185.06±16.82 a
Chicken sausage S	18.33 ± 4.02 b	19.22±1.01 ab	97.24±13.02 b
Indomie A	19.36 ± 0.07 b	19.07±0.09 ab	130.63 ± 37.43 ab

ALT is found mainly in the cytoplasm of liver cells, so it is the most specialized in detecting liver diseases. It is also found in other tissues, but in small quantities, such as skeletal muscle, heart, kidney, pancreas, spleen, and lung [50].

Our results agreed with [32,51-52], which indicated that giving food dyes to laboratory animals leads to a clear increase in the concentration of transaminase liver enzymes, and that this increase in the concentration of ALT in the (chicken broth cubes) group reflects The extent of damage to liver tissue that occurred through the role of added chemicals in generating free radicals that damage liver tissue and thus increase the concentration of liver enzymes in response to oxidative stress due to the dye. Studies have also indicated that food dyes generate many active oxygen species that attack liver tissue and cause many pathological changes, thus increasing the concentration of liver enzymes, including ALT, in the blood plasma [53- 54].

Many previous studies conducted on food additives, such as tetrazine dye, chromosin, erythrosine, and sodium benzoate, have shown that the increase in the ALT enzyme is due to liver cell damage resulting from the toxic effects of these additives through their toxicity, as they cause hepatic swelling, necrosis, and Thickening of hepatocytes [55]

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The study also indicated that the cause of the increase in aminotransferase enzymes could be due to a disturbance and imbalance in metabolism, which leads to damage to liver cells, thus resulting in failure of vital liver functions. Or perhaps the reason for the increase in The cause of ALT is the free radicals that are produced as a result of dye metabolism [32], which interact with unsaturated fatty acids in the cell membrane, leading to the loss of the plasma membrane's function, which leads to the leakage of the enzyme into the serum, thus increasing the level in the serum. [51].

The state of oxidative stress resulting from an increase in effective oxygen groups causes the breakdown of DNA, proteins, and fats in liver cells, which leads to the necrosis and destruction of these cells, and then their contents are released into the bloodstream, including the enzyme ALT [56].

The results indicate a significant increase in AST level at the probability level ($P \leq 0.05$) for the chicken broth cubes group compared to the group C. Also, no significant differences were recorded between the groups

Liver enzymes are clinically important as their level of effectiveness depends on the extent of cellular damage that leads to their release into the blood [57] .AST enzyme is found in the cytoplasm and mitochondria of liver cells as well as cells of other organs such as the heart, skeletal muscles, kidneys and brain, and therefore their concentration in the blood gives an image of the extent of their activity in those organs, especially the liver [58]

Perhaps the reason for this increase in the activity of the AST enzyme in the group of animals (chicken broth cubes) compared to the control is due to the negative effect of free radicals that are generated by the added chemicals [32], as free radicals cause changes in the tissues of the liver, muscles, intestines, and Consequently, large amounts of liver enzymes are excreted into the blood, leading to an increase in their levels [59]. Or perhaps the increase in the level of the AST enzyme is due to the destruction of most liver cell membranes Eating food additives leads to oxidative stress, which leads to an increase in free radicals resulting from metabolism. The dye thus leads to the leakage of liver enzymes into the blood serum, thus increasing this level [32]. The study indicated that the increase in the level of liver enzymes could be due to the leakage of these enzymes in large quantities from the liver tissue into the liver [60], and that the reason for this leakage reflects the extent of the damage occurring in the liver cells, Because the liver is considered one of the largest organs in the animal's body that is specialized in performing its functions. Various functions in the body, including the removal of toxins, which makes it vulnerable to harm caused by these substances and their metabolism in it [60]. Measuring the effectiveness of aminotransferase enzymes is considered a sensitive measure to determine the extent of damage to liver cells [57].

Also ALP showed significant increase in the activity of the alkaline phosphatase enzyme at the probability level ($P \leq 0.05$) for the four groups compared to the group C. The group treated with Maggi cubes also witnessed the largest increase in this enzyme among the groups, followed by the Indomie group.

Liver enzyme levels were higher in the group fed chicken broth cubes, because they contain monosodium glutamate, as this substance poses many risks to the liver. It is also addictive because it is similar to nicotine, which explains why some people want to eat more foods to which chicken broth cubes are added and become addicted to eating more food. It is also called slow poison. There is one of the substances from which "chicken stock cubes" are made and its chemical symbol is (E-621), which the World Health Organization has warned against and indicated that it is considered a toxic substance. It is a toxic substance that contributes to poisoning [34]. Rezaq also explained the occurrence of an increase in the level of liver enzymes in smokers and those addicted to nicotine as a result of its similarity to monosodium glutamate [35].An increase in the level of the alkaline phosphatase enzyme is associated with an increase in calcium in the bloodstream, because the bones are one of the places where it is manufactured. These results reinforce many previous studies that were conducted to determine the effect of many artificial food dyes on various body functions, including liver function, as these studies indicated giving Iso dyes, such as tetrazine, quartzin dye, and chocolate brown dye, lead to a difference in liver function and an increase in the effectiveness of aminotransferase enzymes (AST and ALP) and the basic phosphate enzyme ALP due to their ability to cause a state of oxidative stress, an increase in free radicals, and a clear deficiency in all types of antioxidants [52] and may be attributed to metabolic changes in the liver, which leads to toxicity and damage to liver cells and inflammation of the liver, and thus the level of ALP increases and moves into the blood at a high speed as early evidence of liver cell damage [39]. The study also showed that the increase in the activity of ALP in groups of animals given food dyes is due to a defect in liver function as a result of the accumulation of large amounts of dyes and chemicals that lead to obvious damage to the liver tissue, thus increasing the level of the ALP enzyme [62] . An increase in ALP gives a clear indication of a disorder in liver function. This enzyme is found on the surfaces of cells in most tissues, especially in the liver, bones,

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spleen, kidneys and intestines [62], and the increase in its level reflects the effect of the oxidative state resulting from the generation of free radicals. Thus, the oxidative state increases when these additives are consumed [32], and thus the enzyme level increases.

Conclusions: Through our study, we conclude that eating the food additives mentioned in the research leads to serious health consequences. Eating mainly Maggi cubes, followed by Indomie and chicken sausages, led to a rise in free radical damage, a fall in antioxidant activity, and hepatic cell damage. As for frequent consumption of Coca-Cola, it led to An increase in the level of calcium in the blood, which means an increase in its release from the bone, which leads to osteoporosis, while frequent consumption of chicken sausages leads to the occurrence of cardiovascular diseases in the future as a result of its association with a high level of damage lipids.

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