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Histological Effects of Nano-Synthesized Particles of *Nagilla Sativa* Seeds Extract on Digestive System of Male Albino Mice

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Abstract

This revision considers the belongings of Tartrazine and black seed nanoparticles on body mass and cardiac histology in male albino mice. Group of male mice were separated into 4 clusters: a regulator cluster getting physiological saline, other cluster preserved with Tartrazine (20 mg/kg), another cluster getting equally Tartrazine with N. sativa nanoparticles (100 mg/kg), while last cluster preserved solely besides to N. sativa nanoparticles (100 mg/kg). The assumptions confirmed an important escalation in body mass in the Tartrazine cluster associated with the regulator, portentous that Tartrazine could inspire metabolic lanes. Co-administration of N. sativa nanoparticles with Tartrazine occasioned in a straight more proliferation in body mass, representing a potential synergistic consequence. However, N. sativa nanoparticles on their own showed no notable effect on body weight. Histological analysis of cardiac tissues revealed no structural alterations across all treatment groups, suggesting that the administered doses did not cause cardiotoxic effects. These fallouts propose that although Tartrazine significantly disturbs body mass, it does not alter cardiac histology below the disorders calculated., The revision targeted to reveal the bearing of lately synthesized nanoparticles on hemolytic anemia finished the behind specific intentions: Synthesis of iron nanoparticles., Planning of N. sativa quotation nanoparticles at capricious meditations., Analysis of the possessions of N. sativa seed nanoparticles on minor intestine healthiness.

Keywords: Hemolytic, anemia, cardiac, Investigation, nanoparticles

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INTRODUCTION

Nano-specks have established courtesy in technical investigation outstanding to their compensations besides requests in numerous arenas [1]. The dimension of nano-specks is fewer than one hundred nano-beats; besides it is because of this minor dimension that gives them characteristic possessions equal to other constituents that are greater in dimension [2, 3].

Its other distinctive properties include constancy, solubility, and cellular interest [4]. The small intestine is a complex organ with a unique histological assembly and physiological purpose that enables it to effectively pump blood throughout the body [5, 6].

HISTOLOGY OF THE INCONSEQUENTIAL INTESTINE

The slight intestine wall is collected of numerous layers, apiece with explicit meanings and cellular configurations:

Mucosa

The deepest layer comprises dedicated epithelial cells that stash phlegm, enzymes, besides gastric acid. It is separated into three sublayers.

Epithelium

Poised of modest columnar cells that secrete mucus to protect the insignificant intestine facing from sour and enzymatic harm, Lamina Propria: A connective tissue coat comprising kinship bowls, lymphatics, and protected cells, Muscularis Mucosae: A thin stratum of level muscle that supports in the resident measure of the mucosa to encouragement in the release of glandular secretions. Submucosa: A dense connective tissue layer that supports the mucosa and contains blood vessels, nerves, and lymphatics. It provides elasticity to the small intestine and facilitates the expansion and contraction of the small intestine during digestion. Muscularis Externa: This stratum entails three strata of charming muscle characters (longitudinal, spherical, and prejudiced). The coordinated contraction of these muscles helps in churning and mixing the small intestine contents, aiding in mechanical digestion. Serosa: The furthest layer poised of connective nerve and a simple squamous epithelium. It serves as the protective outer covering of the small intestine and reduces friction between the small intestine and surrounding organs [7].

PHYSIOLOGY OF THE MINOR INTESTINE

The small intestine performs several key physiological functions:

- *Secretion of Gastric Juices:* The small intestine secretes approximately 2–3 liters of gastric juice daily, containing hydrochloric acid (HCl), pepsinogen (an inactive form of the enzyme pepsin), intrinsic factor, and mucus. HCl creates an acidic environment (pH 1.5–3.5) that denatures proteins, activates pepsinogen to pepsin, and kills pathogens.
- *Assimilation:* The tart situation of the insignificant intestine, lengthways through the enzyme pepsin, cessations down proteins into slighter peptides. The small intestine also plays a role in the digestion of lipids through the enzyme gastric lipase, although most lipid digestion occurs in the small intestine.
- *Mechanical Socializing:* The muscular contractions of the small intestine wall mix the food with gastric juices to form chyme. This mechanical process ensures that the food is broken down into small particles, increasing the surface area for enzyme action.
- *Instruction of Gastric Emptying:* The pyloric sphincter panels the announcement of chyme from the trifling intestine hooked on the duodenum. Gastric emptying is regulated by hormonal and neural signals that respond to the volume and composition of the small intestine contents.
- *Fortification of the Gastric Mucosa:* The slight intestine padding is dwindling from personality-ingestion by a bushie stratum of mucus besides bicarbonate, which nullifies the acerbic near the epithelial cells. The trouble of this shielding obstruction can be central to settings like gastritis and peptic abscesses [8].

MEASURABLE AND PROCESS

The study was steered on 24 male albino mice achieved from the Iraqi Center for Tumor Research and Medical Genetics in Baghdad, matured 9–11 weeks, and weighing 230–265 grams. The tentative faunas were transported to the visceral stock and positioned in plastic crates roofed with metal mesh concealments with scopes of 20 × 30 × 50 cm. The bottom was roofed with sawdust then cotton, then the eiderdown was different twofold a week, in accumulation to intermittent scrubbing and disinfection of the coops. The creatures were missing to accustom in the animal dynasty for fourteen days formerly opening the test. Through the 30-day research, the animals were endangered to supreme test bed settings like all assemblages, such as heat, striking, and stickiness. The animals were provided

with healthy drinking water, where the animals were divided into three groups the control group (6 mice) with only physiological solution, the group treated with tartrazine 20 mg/kg (6 mice), the group treated with tartrazine and nano-extract of black seed (6 mice) at a concentration of 100 mg/kg, the third group (6 mice) treated only with nano-extract of black seed at a concentration of 100 mg/kg.

N. sativa was purchased from the markets of Najaf/Iraq. It was then minced into residue in a relentless apparatus. Concocting the quotation since *N. sativa* residue, this method was supported out beneath the surroundings pronounced hitherto [9] with some variations. An amount of 400 ml of marine was auxiliary to (200 g) of *N. sativa* precipitate, besides this route was through three spells for six days in a gloomy incubator stirrer, then it was cleaned with sifter broadsheet [10]. The histological study included preparing tissue sections of the small intestine based on [11, 12].

RESULTS

The revision fallouts were scrutinized exhausting the numerical software compendium SPSS (Social Sciences), version 24. The t-Test was laboring to analyze the alterations in animal masses before and after management, and the F-test, concluded Exploration of Modification (ANOVA), was used to determine significant differences at the level of $P \leq 0.05$ between the means.

The influence of handling through Tartrazine, Tartrazine with N. sativa nanoparticles, besides N. sativa nanoparticles on the entire frame weight (kg) in male albino mice.

The results indicate a significant increase in the total body weight of mice treated with Tartrazine compared to the control group. The mean body weight in the Tartrazine group (20 mg/kg) was 337.4 ± 2.182 g, which was knowingly sophisticated than the rheostat assembly (298.0 ± 13.9 g) per a P-charge of 0.0044. Equally, the assemblage dried per Tartrazine then *N. sativa* nanoparticles (100 mg/kg) showed a further significant increase in body weight, with a mean of 383.3 ± 2.731 g and a P-value of 0.0040. However, in the group treated with only *N. sativa* nanoparticles (100 mg/kg), the mean body weight was 259.6 ± 4.488 g, and this change was not statistically significant compared to the control group, with a P-value of 0.3271. This suggests that while Tartrazine and its combination with *N. sativa* nanoparticles significantly influence body weight, the nanoparticles alone do not have a significant effect on the total body weight of the mice (Table 1 and Figure 1).

Table 1. The consequence of dealing with Tartrazine, Tartrazine with *N. sativa* nano-specks, besides *N. sativa* nano-specks on the aggregate body mass (g) in male albino mice.

Total Frame mass/g	**Mean ± SD**	**P-Assessment**	
Control	298.0 ± 13.9		
Tartrazine 20 mg/kg	337.4 ± 2.182	0.0044	Significant
Tartrazine with *N. sativa* nanoparticles 100 mg/kg	383.3 ± 2.731	0.0040	Significant
N. sativa nanoparticles 100mg/kg	259.6 ± 4.488	0.3271	Non-sign

Note: The numbers represent the mean (average), while ± represents the standard error.

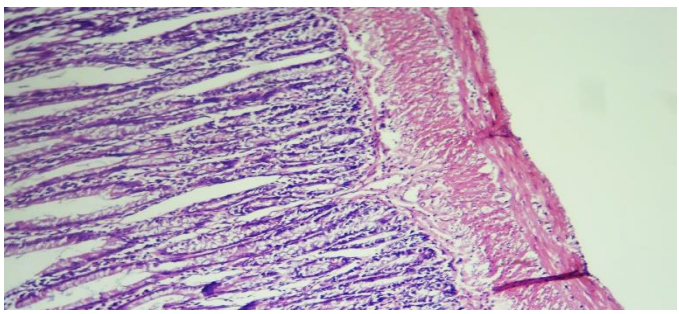

Figure 1. A histological fragment of the stomach of a test center white albino rat from the group preserved with physiological normal saline H&E 400X.

Consequence of N. sativa nanoparticle besides Tartrazine colorant on Histological assembly of minor intestine in Male Albino Mice.

A histological longitudinal piece of the cardiac muscle of test bed white albino mice since the cluster pickled with functional standard saline (Digit 1) displays standard pronged, striated cardiac myocytes through complete inserted albums and centrally sited nuclei, no histological fluctuations in the edifice of the cardiac muscle were detected. Equally, in the assembly pickled thru Tartrazine rinse at 20 mg/kg plus murky stones nanoparticles at 100 mg/kg (Digit 3), besides in the clutch salted solely per murky seed nanoparticles at 100 mg/kg (Digit 4), no histological amendments in the cardiac muscle arrangement were eminent (H&E 400X) (Figures 1–4).

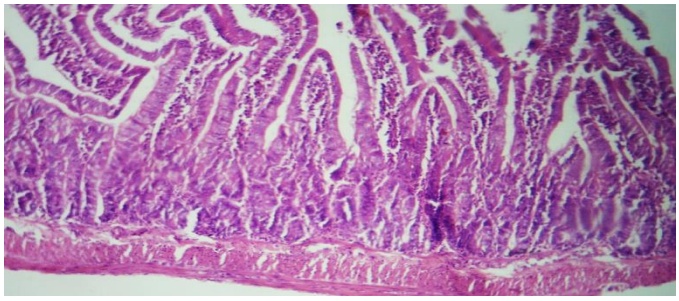

Figure 2. A histological fragment of the small intestine of the test center white albino rat from the group preserved with physiological normal saline. The image appears to be a mucosal layer with well-defined villi and crypts, typical of the small intestine's structure (H&E 400X).

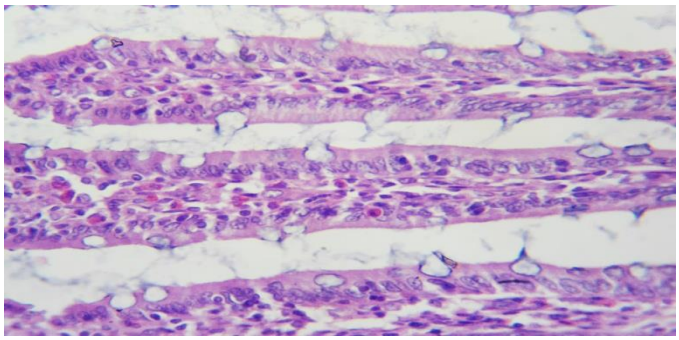

Figure 3. A histological fragment of the stomach of a test center white albino rat from the group preserved with physiological normal saline. The image appears the mucosal layer with distinct gastric glands and epithelial cells, characteristic of the stomach's structure (H&E 400X).

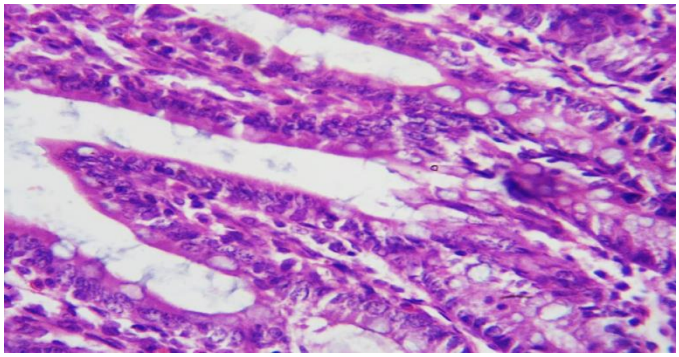

Figure 4. A histological fragment of the stomach of a test center white albino rat from the group preserved with physiological normal saline. The image appears a meticulous view of the gastric mucosa, highlighting the organization of epithelial cells and gastric glands with noticeable nuclei. The tissue appears healthy and well-structured, without any visible signs of inflammation or destruction (H&E 400X).

DISCUSSION

Arithmetic investigation expending SPSS version 24, retaining the t-Assessment and ANOVA, specified momentous disparities in the mean group mass transversely the miscellaneous conduct assemblages [13]. Assembly pickled with Tartrazine alone (20 mg/kg) presented a substantial proliferation in body weight associated with the control group, with a mean weight of 337.4 ± 2.182 g and a P-value of 0.0044. This suggests that Tartrazine may influence metabolic processes or feeding behavior, potentially through mechanisms, such as increased appetite or altered energy metabolism. The co-administration of Tartrazine and *N. sativa* nanoparticles (100 mg/kg) led to an even more pronounced increase in body weight, reaching a mean of 383.3 ± 2.731 g with a P-value of 0.0040. This could indicate a synergistic effect between Tartrazine and the nanoparticles, possibly through enhanced nutrient absorption or modulation of metabolic pathways [14]. This finding aligns with previous studies indicating that while *N. sativa* possesses various bioactive properties, such as antioxidants and anti-inflammatory effects, it does not independently affect body weight. This suggests that the nanoparticles alone may not be sufficient to influence weight gain significantly, or they may exert their effects only in the presence of other factors, such as Tartrazine [15].

Histological analysis of the stomach and small intestine revealed no structural changes across the treatment groups. The control group, treated with physiological saline, showed normal histological architecture of both the stomach and small intestine, with intact mucosal layers, well-defined gastric glands, and villi. Similar observations were made in groups treated with Tartrazine alone or in combination with *N. sativa* nanoparticles, as well as the group treated solely with nanoparticles. This suggests that, at the administered doses, neither Tartrazine nor *N. sativa* nanoparticles cause histological damage to the gastrointestinal tissues. These findings are significant as they indicate that while body weight is affected by Tartrazine and its combination with *N. sativa,* the structural integrity of the gastrointestinal tract remains preserved [16–18].

Overall, the results suggest that Tartrazine significantly impacts body weight but does not induce histological changes in the stomach or small intestine under the study conditions. The addition of *N. sativa* nanoparticles appears to enhance the weight gain effects of Tartrazine but does not independently affect body weight or gastrointestinal histology [19].

These results collectively suggest that while Tartrazine significantly impacts body weight, it does not affect cardiac histology under the conditions studied. The addition of *N. sativa* nanoparticles seems to modulate the effects of Tartrazine on body weight, although the exact mechanisms remain unclear. Further studies focusing on biochemical and molecular markers are needed to elucidate the interactions between Tartrazine, *N. sativa* nanoparticles, and their combined effects on systemic physiology and organ function [20].

CONCLUSIONS

These findings are significant as they indicate that while body weight is affected by Tartrazine and its combination with *N. sativa,* the structural integrity of the gastrointestinal tract remains preserved. Overall, the results suggest that Tartrazine significantly impacts body weight but does not induce histological changes in the stomach or small intestine under study conditions.

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