

EFFECT OF COMBINED FEEDING OF VARIOUS DOSES OF HONEY AND BLACK CARAWAY OIL ON SOME BIOCHEMICAL AND HAEMATOLOGICAL PARAMETERS IN NORMAL HEALTHY RATS

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ABSTRACT

Background: Both Black caraway oil and Honey feeding have shown some favourable effects on some biochemical parameters experimentally and these substances have been use as medicinal remedies in treatment of various diseases.

Objective: This study is design to determine the effect of combined feeding of various doses of Black caraway oil and Honey on some biochemical and haematological parameters in normal healthy white albino rats.

Methods: Thirty albino rats of Wister strain were separated in groups and fed growers mesh. In addition, the tests groups were administered various doses of honey and black caraway oil either alone or in combination into the stomach directly, through gastric intubations. Group I served as normal control fed on only growers mesh and water, while groups II and III served as black caraway oil and honey controls to which in addition to the growers' mesh and water were also given 920mg and 1420mg of black caraway oil and honey respectively. Groups IV VI served as tests and in addition to feeding with growers mesh, they were given various doses of honey and black caraway oil.

Results: Both the Back caraway oil and honey controls showed some degree of hypoglycaemia and hypocholesterolaemia with insignificant increased in plasma triglycerides and albumin, but no effect on the other parameters when compared with the normal control. However, the combined Back caraway oil and honey fed showed significant decrease in plasma total cholesterol and increase in serum glucose and triglycerides with insignificant decreased in total protein and albumin. No changed in urea, sodium, potassium as well as no significant change in all the haematological parameters were noticed among the groups.

Conclusion: The combined feedings have hypocholesterolaemic, hyperglycaemic and hypertriglyceridaemic effects with insignificant hypoproteinaemic effect. It has no effect on the renal as well as haematological systems.

Key words: *Combined feeding, Black Caraway oil, Honey, Biochemical Parameters, Rat*

INTRODUCTION

Since time immemorial to the present varieties of plants and their products have been used by humans as either food or drugs in the treatment of many diseases.¹

Black caraway oil, a plant product and honey which has some of its ingredients derived from plant traditionally have been used since the Ancient time as therapeutic agents in the management of diseases.²

Nigella sativa (Black caraway) is frequently used as a natural remedy for many ailments (diabetes mellitus, hypertension) and a lot of work has been done to evaluate the bases of these uses.^{2,5} *Nigella sativa* in combination with other herbs have been found to lower blood glucose in diabetes.⁶⁻⁸ The volatile oil of *Nigella sativa* alone has also been found to produce significant hypoglycaemic effect in normal and alloxan-induced diabetic animals without changes in insulin levels.^{8,9} Similarly, it was reported to have significantly decreased blood sugar level as well as having hypolipidaemic effect on healthy human volunteers.⁹ Other effects of black caraway oil include decreasing of blood pressure. It also has anti-oxidant, anti-inflammatory, and antimicrobials properties.^{10, 11, 12} Black caraway has protective effect against haematological, hepatic, and renal toxicity induced by anti-cancer drugs and

increased immunity in the same patients.¹⁴

Honey is widely believed to increase the therapeutic potencies of most herbal medicines and its effectiveness as a therapeutic agent has been unequivocally demonstrated.¹⁵

¹⁷ These include; honey as anti-bacterial¹⁵⁻¹⁶ and an antioxidant.¹⁷ Diabetic patients have also used honey, as an alternative to sugar, however there are few reported study to verify these benefits. In view of these previous works carried out separately on the effect of black caraway oil and honey on some biochemical parameters in normal and diabetic rats and the fact that these substances have been traditionally used as herbal remedy, this study was designed to determine the effects of combined feeding of black caraway oil and honey on some biochemical and haematological parameters in normal healthy rats.

MATERIALS AND METHODS

Materials

The Black Caraway oil was obtained from the Kingdom of Saudi Arabia, while the honey was obtained from the Maiduguri Monday Market, Borno State.

Experimental animals

Thirty (30) Wister albino rats 6 weeks, weighing between

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200mg and 250mg were used for the study. They were obtained from Animal House of Department of Biochemistry, University of Maiduguri, Maiduguri.

All the rats were fed with growers' mesh (ECWA, Jos, Nigeria) containing 54% carbohydrates, 10% proteins, 3% fats and 20% normal supplement and tap water. They were given various doses weight of honey and Black caraway oil using gastric intubations. The rats were weighed on weekly bases. The rats were divided into six groups of five rats each.

Group I served as normal control. These rats were not given either honey or black caraway oil except the normal feeding and water.

Group II- served as black caraway oil control. These rats apart from the normal feeding and water, were given 1ml of Black caraway oil, which is equivalent to 0.92g(920mg).

Group III- served as honey control. These rats were given 1ml of honey, which is equivalent to 1.42g (140mg) in addition to their normal feeding and water.

Group IV-served as Test_I (T_I). These rats in addition to their normal feeding and Water, were also given both honey and Black caraway oil of 1.5ml each, equivalent to 2.23mg (2130mg) and 1.38g (1380mg) respectively.

Group V-which served as test_{II} (T_{II}) were given 1ml, equivalent of 0.92mg (920mg), each of Black caraway oil and 1ml, equivalent of 1.42g (1420mg) each of honey, in addition to normal feeding and water.

Group VI- served as Test_{III} (T_{III}) each were given 0.5ml of Black caraway oil, equivalent to 0.46g(460mg) and 0.5ml of honey, equivalent to 0.71g (710mg).

The administrations of both honey and Black caraway oil were done through gastrointestinal intubations using a feeding tube. The experiment lasted for 7 weeks, after which the rats were scarified and the blood collected for the following analysis.

Blood for PCV was collected by cutting the tail tip of the rats with a sterile blade. The sample was collected in a capillary tube as the blood oozed out freely. In addition, blood samples for WBC and differential were collected immediately after sampling for PCV, using leukocyte-diluting pipette to exactly 0.5 marks. Samples for biochemical parameters were collected by scarifying the rats and blood collected into a plain specimen tube. The samples were allowed to clot and then centrifuged at 5000rpm for 5 minutes. The clear serum was separated and stored frozen until analysis within 72hrs. The biochemical parameters that were analyzed include blood were glucose, total cholesterol, triglycerides, total protein, albumin, sodium, potassium, and urea. Analyses of biochemical parameters were carried out by standard methods¹⁸ Glucose, Total protein,¹⁹ Albumin,²⁰ Total cholesterol²¹, Triglycerides,²² Sodium and potassium,²³ and urea.²⁴

Parked cell volume (PCV) was determined using the

micro-haematocrit method and white blood cell and differentials count was done by haemocytometer as described by Schalm.

RESULTS

There was no death recorded during the experimental period neither were there cases of weight loss in all groups.

Table 1 shows the values of biochemical parameters analyzed for the controls and treated groups.

When group II, which were given 1ml-equivalent to 920mg Kg of body weight of black caraway oil, were compared with group I. There was decrease in serum glucose, total protein, and total cholesterol, which was not statically significant. There was slight increased in serum albumin and triglycerides even though it was not significant.

Similarly, when group III were compared with group I and there was a statistically significant decrease in serum total cholesterol with significant decrease in both serum glucose and total protein. No significant changed in urea, sodium or potassium was noticed.

When group IV was compared with group I, there was a significant increase in triglycerides with no significant increase in serum glucose. There was also a significant decrease in serum total cholesterol with significant decrease in serum total protein and albumin. There was no significant change observed in serum urea, sodium, or potassium.

In addition, when group V was compared with group I, there was a significant increase in triglycerides while that of glucose was not significant. There was also a significant decrease in serum total cholesterol but the decrease in both total protein and albumin were insignificant. While there are no significant changes was observed in serum urea, sodium and potassium levels.

Likewise when group VI and I was compared, there was a significant increase in both serums glucose and triglycerides and a significant decrease in serum total cholesterol but the decrease in both total protein and albumin were insignificant. In addition, there were no significant changes in urea, sodium, and potassium.

Meanwhile when Black caraway oil and honey controls were compared with the test groups the hyperglycaemic effects of the combined feeding became more pronounced. However, the hypocholesterolaemic as well as hypertriglycedaemic effects were insignificant. The haematological parameters did no show any changes. Table 2 shows the Haematological parameters determined in both controls and treated rats.

There was a significant increase in white blood cell count when all the other groups were compared with group I. However, the increase in eosinophils, PCV, and monocytes were not significant.

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In addition, when group V was compared with group I, there was a significant increase in triglycerides while that of glucose was not significant. There was also a significant decrease in serum total cholesterol but the decrease in both total protein and albumin were insignificant. While there are no significant changes was observed in serum urea, sodium and potassium levels.

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In addition, when group V was compared with group I, there was a significant increase in triglycerides while that of glucose was not significant. There was also a significant decrease in serum total cholesterol but the decrease in both total protein and albumin were insignificant. While there are no significant changes was observed in serum urea, sodium and potassium levels.

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Table 1: Mean±SD values of biochemical parameters analyzed in each group.

| Doses of caraway Oil and honey | Group I (NC) 0.00mg | Group II (CC) 920mg | Group III (HC) 1420mg | Group IV (T _I) 1400mg 2100mg | Group V (T _{II}) 920mg 1420mg | Group VI (T _{III}) 480mg 720mg |
|--------------------------------|---------------------|---------------------|-----------------------|--|---|--|
| Glucose (mmol/L) | 4.70±0.68 | 4.48±0.33 | 4.55±0.62 | 5.40±0.30 | 5.33±0.30 | 5.60±0.22 |
| Total protein (g/L) | 35.75±3.49 | 36.00±3.67 | 36.00±4.06 | 35.33±1.25 | 35.74±1.48 | 5.60±0.22 |
| Albumin (g/L) | 75.00±11.25 | 73.78±9.55 | 71.00±9.27 | 73.25±0.49 | 73.25±5.07 | 72.33±11.03 |
| Total Chol. (Mmol/L) | 2.05±0.09 | 1.90±0.36 | 1.33±0.19 | 1.50±0.14 | 1.65±0.21 | 1.57±0.09 |
| Triglycerides(mmol/L) | 0.48±0.08 | 0.50±0.07 | 0.70±0.07 | 0.80±0.14 | 0.65±0.05 | 0.70±0.00 |
| Potassium (mmol/L) | 8.2±0.28 | 8.2±0.20 | 8.2±1.09 | 7.8±1.09 | 7.9±0.39 | 7.9±0.38 |
| Sodium,(mmol/L) | 2.0±0.01 | 1.8±0.85 | 1.8±0.90 | 1.8±0.60 | 1.8±0.30 | 1.8±0.70 |
| Urea(mmol/L) | 3.4±0.49 | 3.5±0.24 | 3.3±0.83 | 3.3±0.72 | 3.3±0.93 | 3.3±0.74 |

Table 2: Mean±SD of haematological parameters measured in each group of rats.

| Doses of caraway oil and honey | Group I (NC) 0.00mg | Group II (CC) 920mg | Group III (HC) 1420mg | Group IV (TI) 1400mg 2100mg | Group V (TII) 920mg 1420mg | Group VI (TIII) 480mg 720mg |
|----------------------------------|---------------------|---------------------|-----------------------|-----------------------------|----------------------------|-----------------------------|
| WBC x 10 ⁹ /L | 6.14±0.29 | 6.10±0.32 | 6.07±0.37 | 6.30±0.30 | 6.20±0.30 | 6.10±0.42 |
| PCV % | 44.1±29 | 46.4±1.74 | 45.3±1.21 | 45.3±1.07 | 44.9±1.23 | 45.5±1.32 |
| Neutrophils x 10 ⁶ /L | 32.0±1.15 | 32.0±1.90 | 31.8±1.82 | 34.0±2.22 | 32.6±1.43 | 32.4±1.23 |
| Eosinophils x 10 ⁶ /L | 6.37±0.72 | 6.50±0.79 | 5.60±0.77 | 5.27±0.72 | 5.12±0.70 | 5.38±0.68 |
| Lymphocytes x 10 ⁶ /L | 55.9±1.63 | 54.8±1.53 | 52.3±1.47 | 55.2±1.87 | 54.8±1.26 | 54.9±1.89 |
| Monocytes x 10 ⁶ /L | 6.20±0.80 | 6.53±0.42 | 6.37±0.85 | 6.34±0.77 | 6.22±0.61 | 6.34±0.78 |

DISCUSSION

This study has clearly demonstrated that the combined feeding of honey and black caraway oil have hyperglycaemic as well as hypertriglyceridaemic effects which were not dose dependent because it was also observed at the lower doses of the substances. It has also showed its hypocholesterolaemic and hypoproteinaemic effects. These were also not dose dependent. However, there was no effect on urea, sodium, and potassium. Similarly, the combined feeding has shown to increase total white cell count, packed cell volume, eosinophils, and monocytes with no effect on neutrophils and lymphocytes. Black caraway oil is rich in minerals and amino acids, but it is poor source of carbohydrates, protein and vitamins (El-Sayeed, 1994).²⁵ On the other hand honey is a good source of carbohydrates, minerals and vitamins but a poor source of lipids and proteins (Molan, 1998).¹⁵ Therefore, combined feeding will give good sources of carbohydrates, lipids, minerals, and vitamins with poor source for protein.

The two substances are good sources of antioxidants as shown in this and other studies.^{12,17} When either honey or black caraway oil was feed alone, there were hypoglycaemic, hypocholesterolaemic, hypoproteinaemic, and hypertriglyceridaemic effects. These could be explained by the hypoglycaemic effects of both substances as demonstrated in other studies.^{8,9} While the hypocholesterolaemia may be because of the antioxidant effects of these substances facilitating cholesterol metabolism since there is decreased lipid peroxidation in presence of adequate antioxidants.

The significant increase in both triglycerides and glucose are not dose dependent. The rich minerals and vitamins of the two substances may facilitate carbohydrates metabolism with effective conversion of other monosaccharides to glucose and this will leads to increase conversion of glucose to triglycerides in the peripheral tissues resulting in hypertriglyceridaemia.

The combine feeding of black caraway oil and honey may therefore be useful in treatment of Diabetes mellitus complementing the effect of hypoglycaemic agents, due to the hypocholesterolaemic effects and as a good source of minerals and vitamins. They could similarly be effective in the treatment of nephritic syndrome since one of the major metabolic derangements in this disease is hypercholesterolaemia. In addition, they will also be good sources of energy in these patients who have depleted energy supply. The combined feeding may also be useful in those at risk in developing arteriosclerosis. The hypocholesterolaemic as well as the antioxidant effects could be useful either in the prevention or in treatment of the disorder. The combined feeding could therefore be tried in experimental animals with diabetes mellitus, nephritic syndrome and in those at risk of developing arteriosclerosis to observe the above effects.

The combined feeding has also shown the tendency to increasing immunity especially by the increased total white cell count, eosinophils, and monocytes.

The two substances even in combined feeding may be non-toxic on the renal system since there was no effect in urea, sodium and potassium.

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