

Effect of Feeding Commercial Chicken Salad with Dressing on Body Weight and Plasma Lipid Profile of Albino Rats

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Abstract: Body weight, lipid profile, atherogenic index and coronary risk index were determined in rats fed commercial chicken salad with dressing. Twenty four weaning albino rats were divided into three groups of eight animals, baseline, rat chow (control) and chicken salad with dressing and fed respective diets, for five weeks. Body weights, serum cholesterol, serum triglycerides, HDL cholesterol and LDL cholesterol were determined using standard methods. Atherogenic and coronary risk indices were also calculated. Body weights and lipids profiles of animals on regular rat chow and chicken salad groups increased with age. Weight gain in rats fed chicken salad with dressing increased significantly ($P < 0.05$) and had higher serum cholesterol, triglyceride, HDL cholesterol and LDL cholesterol values compared with the rat chow group. The observed increases in parameters evaluated might be due to the chicken component and salad dressing comprising of both mayonnaise and salad cream. Despite the observed absolute increase in the lipid profile values of the chicken salad with dressing group, the coronary risk index, atherogenic index, HDL cholesterol/total cholesterol ratio and triglyceride/HDL cholesterol ratios were within normal range and not significantly ($P > 0.05$) different from the corresponding values for the rat chow fed group. It is however desirable that a similar study be carried out with human subjects.

Keywords: Atherogenic Index, Body Weight, Chicken Salad, Coronary Risk Index, Salad Dressing, Lipid Profile.

I. Introduction

The literature is replete with research findings associating high plasma cholesterol levels with increased risk of coronary heart disease. Many successful attempts have been made to reduce plasma cholesterol levels to those compatible with maintenance of good health through the use of drugs and dietary management. Hepner *et al* in 1979 (1) reported a reduction in plasma cholesterol levels through consumption of vegetables such as carrots, lettuce, cucumber, cabbage and potatoes. Lettuce, maize and beans have been found to reduce on consumption, total plasma cholesterol values (2).

Vegetarians have been shown to have reduced risk of cardiovascular diseases and coronary heart diseases (3). Salad is regarded as a light meal that consists of mixed vegetables, which can be consumed with or without dressing. Fish, meat or cheese may be added to the salad. Consumers of fruits and vegetables have also been shown to have lower morbidity (4) and mortality (5) rates from chronic degenerative diseases than their non-vegetarian counterparts. The reduced morbidity and mortality have been attributed to lower total serum cholesterol, LDL - cholesterol and high values of HDL cholesterol depending on the type of fruits and vegetables (6).

In Nigeria, chicken salad with dressing is a popular meal sold in some commercial food outlets and its consumption has no religious or cultural barriers. The components include vegetables chicken meat and salad dressing. Chicken meat is an important source of lipid with 35% saturated fatty acids (7) and saturated fatty acids have been linked to increased plasma cholesterol level (8).

The aim of this study was to establish the effect of the 'consumption of chicken salad with dressing on body weight, lipid profile and the corresponding indices of risks of cardiovascular diseases in rats.

II. Materials And Methods

Chicken salad with dressing was purchased at a commercial food outlet in Lagos. The rat chow was obtained from Ladokun Feeds Limited. The twenty-four weanling albino rats were purchased from the Animal House of the University of Ibadan. The chicken salad samples were air-oven dried at low temperature (60°C) and milled for the rat feeding trial. The twenty-four weaning albino rats were randomly allocated to three groups of eight animals after acclimatization. Group 1 served as the baseline, Group 2 was given rat chow and Group 3 was given chicken salad with dressing. The rats were allowed free access to water and feed *ad-libitum* (rat chow and chicken salad with dressing respectively). Blood samples obtained from the baseline rats and from the experimental rats at the end of the feeding period were used for the estimation of total cholesterol, HDL cholesterol, LDL cholesterol and triglyceride using standard methods and using cromatest kits supplied by Randox laboratory Limited. Atherogenic and coronary risk indices as well as triglyceride/HDL ratios were

calculated. Body weight changes of the experimental rats were measured. Standard Package for Social Sciences (SPSS) version 12 was applied for the statistical analysis using the Duncan approach.

III. Results and Discussion

3.1 Results

Table 1 shows the food components of chicken salad with dressing as listed on the nutrition label.

Table 1: Food components of chicken salad with dressing

- Cabbage
- Cucumber
- Carrot
- Lettuce
- Kidney beans
- Tomatoes
- Chicken meat
- Boiled Egg
- Green peas
- Mayonnaise
- Salad cream
- Ketchup
- Macaroni
- Potatoes

The nutrition label did not indicate the relative proportions of the ingredients listed above. The chicken salad with dressing is a mixture of animal and plant foods which should have high nutritional value.

Table 2 shows the weight changes of the rats fed rat chow and chicken salad with dressing.

Table 2: Body weight changes of rats fed experimental diets

	Rat chow	Chicken salad with dressing
Initial Body weight (g)	56.6 ± 2.0	58.9 ± 1.7
Final Body Weight (g)	124.9 ± 3.9	164.0 ± 2.8
Weight Gain (g)	68.3 ± 1.9	105.1 ± 1.1

NB: Values are means ± standard error of means

The rats fed regular commercial feed (rat chow) and chicken salad gained body weight. However, the rats fed chicken salad with dressing gained significantly ($P < 0.05$) more weight than those on rat chow. This could be attributed to the high nutritional quality of the food components of chicken salad with dressing such as the egg, chicken and legume components.

Table 3 shows the lipid profile of the baseline rats, and those fed with rat chow and chicken salad with dressing.

Table 3: Lipid profile of baseline rats, rat chow and chicken salad with dressing groups.

Lipid profiles in (mg/dl)	Baseline	Rat chow	Chicken salad with dressing
Total cholesterol	81.0 ± 1.8 ^a	112.4 ± 1.5 ^b	171.6 ± 1.8 ^c
Triglyceride	61.4 ± 1.7 ^a	87.6 ± 1.7 ^b	141.3 ± 1.4 ^c
HDL cholesterol	34.7 ± 0.9 ^a	44.8 ± 0.9 ^b	68.2 ± 1.3 ^c
LDL cholesterol	34.0 ± 0.6 ^a	50.1 ± 1.7 ^b	75.1 ± 0.4 ^c

NB: Figures with different superscripts within the rows are significantly ($P < 0.05$) different.

NB: values are means ± standard error of means

The values of total cholesterol, HDL cholesterol, LDL cholesterol and triglycerides increased with the age of the rats from the beginning to the end of the experimental period for both rat chow group and chicken salad with dressing group. However, Group 3 animals on chicken salad with dressing had significantly ($P < 0.05$) higher values of the cholesterol types and triglycerides than the rat chow group. This might be attributed to the inclusion of chicken meat, egg and mayonnaise in the chicken salad with dressing while casein was the only animal protein in the rat chow.

Table 4 shows the atherogenic index, coronary risk index and triglyceride/HDL ratio of the three groups.

Table 4: Atherogenic and Coronary risk indices and triglyceride/HDL ratio of rats in baseline, rat chow and chicken salad with dressing groups.

	Baseline	Rat Chow	Chicken salad with dressing
Atherogenic Index = $\frac{\text{LDL cholesterol}}{\text{HDL cholesterol}}$ (9)	0.98 ± 0.1	1.11 ± 0.2	1.10 ± 0.1
Coronary Risk Index = $\frac{\text{Total cholesterol}}{\text{HDL cholesterol}}$ (10)	2.33 ± 0.1	2.48 ± 0.2	2.51 ± 0.1
Trig/HDL ratio = $\frac{\text{Triglyceride}}{\text{HDL cholesterol}}$ (11, 12)	1.77	1.93	2.07

The indices in Table 4 are indicators or predictors of risks of cardiovascular diseases. Coronary risk index value of between 2 and 3 is indicative of low risk of cardiovascular diseases. For the rat chow and chicken salad with dressing the value is 2.5 which is considered desirable. For triglyceride/HDL ratio which is one of the most potent predictors of heart Diseases, a ratio of 2 or less is considered ideal. The corresponding figures for rat chow and chicken salad with dressing group are 1.93 and 2.07 which are still considered desirable.

3.2 Discussion

Comparison between the data collected from the rat chow group and chicken salad group on body weight, and lipid profile before and after the period of study indicated that body weight and lipid profile increases with age. Consumption of chicken salad with dressing promoted growth during the period of study more than the rat chow which could be due to the presence of more energy content in the chicken salad with dressing (13, 14). The rats fed chicken salad with dressing had higher lipid profile i.e. serum cholesterol, triglyceride, HDL cholesterol and LDL cholesterol than the rat chow group. These observed increases could be due to the fact that most of the components of the chicken salad with dressing e.g. chicken, mayonnaise, egg and salad cream naturally increases lipid profile. Diets very low in fat e.g. vegetables have been shown to significantly reduce total serum cholesterol but when fat was added to these diets, the serum cholesterol rose rapidly. Using data from the 1985 continuing survey of food intake by individuals, Krebs Smith et al., (15) identified salad dressing as the major source of fat in women's diet. Over the past 10years, there has been steady growth in demand for low fat salad dressings and mayonnaise (16). Although the lipid profile of the rats in the chicken salad group was higher, it still falls within the desirable lipid levels reported by NECP 2001 (17, 18) and using the data from the atherogenic index, coronary risk index, triglyceride/HDL cholesterol ratio and HDL cholesterol/cholesterol ratio which are determinants or markers of cardiovascular risk factors which indicates that the diet is still desirable which supports a previous study that says a diet rich in salad intake (like consumption of salads, vegetables and salad dressing) may improve health by assuring needs are met. The observed results for the atherogenic index and others also indicates that the diet, although rich in cholesterol might not predispose the subjected to atherogenic and coronary heart diseases and this supports the findings that suggests that the vegetables in salad are essentially fat free but rich in carotenoids which need fat to be absorbed. By choosing reduced fat or fat free salad dressings, consumer could preferentially compromise their exposure to the putative bioactivity of these carotenoids in preventing heart disease (19, 20).

IV. Conclusion

This study has demonstrated that both rat chow and chicken salad with dressing supported body weight gain in rats and increased lipid profile value. But they may not predispose to risk of heart diseases because of their desirable coronary risk index values and triglyceride/HDL-cholesterol ratios. It is however, desirable to carry out a similar study with humans.

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