

Behavioral Deficits in Wistar Rats Secondary To Altered Androgen Levels After Treatment With Chicken Feed And Raw Soybean

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Abstract— Chicken meat is the most favorite consumable commodity current days. The eminent demand for the chicken meat is satisfied through the poultry farms operational day and night feeding the chicken feed as a chief basis for the untimely growth and weight growth of the chickens. The aim of the present study was to investigate the consequences of the commercially available chicken feed and raw soy bean on mood alteration in rats. Seventy five female albino wistar rats were used in the experiment. Animals were randomly allocated to three groups (n=25), control rats fed on standard rodent chow, chicken feed treated rats and raw soybean treated rats for a period of 6 weeks. Serum androgens levels were estimated before and after the treatment. After 6 weeks behavioral alterations like lateral attacks, biting and muricidal behavior was monitored in rats. Components of chicken feed were analyzed through Pakistan council of scientific and industrial research (PCSIR) laboratories. The present study showed that the behavioral deficits and serum androgen levels of the feed treated group rose significantly as compared to control group and spinach treated group. It was as a result, concluded that the chicken feed treated rats showed increased serum androgen levels with increase in lateral attacks, biting and muricidal behavior. The finding maybe suggested that the potential alterations in mood and behavior are due to chicken feed additives of animal by products that may lead to increase androgen levels in chickens. This finding may be of relevance to the dietary inclination of population more towards chicken products which may lead to alteration in androgen levels and behavioral changes.

Key words: chicken feed, muricidal behavior, spinach and testosterone.

1 INTRODUCTION:

Chicken expenditure has augmented extremely these days more than the consumption of beef, mutton and vegetables despite of the fact that development of the modern broiler has taken place more than a century ago [1]. The chicken's compliance has allowed it to be grown internationally under a wide range of husbandry upbringings. Chicken provision in wide range of environments is developed rapidly with prompt growth to market weight with the good effectiveness of feed use [2]. In past two decades month old broilers necessitate approximately 3.5 kg of feed to yield 1.40 kg of weight. Under better husbandry conditions and a high-energy diet now a 2.44-kg broiler produced on 3.66 kg of feed [3]. The main purpose of poultry industry is to boost the carcass yield with improved taste and quality of meat [4]. The amplification in poultry meat consumption has aimed at the course of fast-growing broilers with utilization of commercially obtainable feed [5]. Intensive collection of feed containing nutrients for better growth and development has led to great progress in economic qualities such as body weight gain and breast yield to

convene the demands of consumers [6]. To aid the production of lean meat, different feeding strategies for poultry production are taken [7], [8]. Poultry feeds are composed principally of amalgamation of a variety of feedstuffs such as cereal crumbs, soybeans, animal by-product, fats, mineral premixes, vitamins, steroids and antibiotics [3]. It is established that chicken feed is greatly enhanced with animal fat, poultry remains, blood, fish, and bones to chicken feed [9].

These animal by products are the source of cholesterol generation which in turn is precursor of steroidal hormones namely estrogens, progesterone and androgens. Estrogens and progesterone are predominantly present in higher concentrations in females while among androgens testosterone is present in males [10]. These steroidal sex hormones are responsible for the growth, sexual development and mood alterations in the living organisms. Progesterone decreases brain excitability, whereas estrogens increase it by increasing the concentration of neurotransmitters such as serotonin, dopamine, and norepinephrine affects their release, reuptake and enzymatic inactivation [11]. Testosterone on other hand counts for the muscular body, male hair pattern, sexual desire and mood. The hormone is the prime driver of puberty, responsible for the deepening of the voice, the development of muscles, and the growth of pubic hair [12]. The low testosterone levels that result can leave men feeling less energetic, less self-assured, and less manly. However, raised testosterone levels cause anger, hostility, irritability, assertiveness and self-esteem [13]. Before the time of chicken feed the poultry was used to be raised on grains and grit on open lands and even today poultry in country side are bred mostly on grains with no commercial chicken

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feed that contains addition of steroids, antibiotics and animal by products in it [14]. Such free ranger poultry is mainly fed on soybean. Soybean from legume family is considered as an absolute diet on presence of carbohydrates, fats and more importantly proteins with containing almost all vital amino acids in it [10]. Soybean meal is a major and cheap source of protein for animal fodder and numerous prepackaged meals, soybean goods as textured vegetable protein are components in many meat and dairy analogues [11]. Together, soybean oil and protein content report for about 60% of dry soybeans by weight (protein at 40% in addition to oil at 20%) with 35% carbohydrate and about 5% ash [12]. Soybeans are measured to be source proteins with the essential amino acids that body is unable to synthesize [13]. Meta-analysis on the outcome of soy protein intake on serum lipids has revealed that soy protein is associated with significant decline in serum cholesterol, LDL and triglycerides [14]. Previously chickens diets comprised of natural grains and grit with no addition of animal and fish by products result in the normal course of development in poultry but the current availability of the chicken feed with supplementation of additives lead to hurried and early development of poultry shorter than due course of time required [3], [15].

2 MATERIALS AND METHODS

75 female albino wistar rats (90-110g) were taken and divided into three groups. Group one was labeled control group and given with standard rat chow, group two was treated with chicken feed and group three with raw soybeans for a period of six weeks. The rats were kept for 12 hr day and night cycle with ambient room temperature of 22+2oC at the animal house of Baqai Medical University, Karachi. Base line serum androgen levels of rats of the groups were measured. After six week of experiment final serum androgens levels were estimated and behavioral deficits like aggression towards coinhabitants, lateral attacks, biting and muricidal activities of the rats were evaluated. Data was analyzed by one-way ANOVA. Individual comparison were made by Tukeys HSD test; p values <0.01 were considered significant.

3 RESULTS

Table 1 shows food provisions of the chicken feed obtainable commercially for chickens from market.

TABLE 1
THE FOOD COMPONENTS OF COMMERCIALY AVAILABLE CHICKEN FEED

Energy per 100gms =786kcal
Wheat

Sorghum
Maize
Soybean
Rice
Maize bran
Animal bone
Animal meat
Animal fats
Bone marrow
Fish
amino acids

Table 2 shows the components present in naturally occurring raw soybean. Table 3 shows androgen levels in inhabited rats for a period of six weeks while Table 4 shows behavioral deficits of lateral attacks, biting and muricidal behavior in rats. Data analyzed by one way ANOVA showed significant increase in androgen levels in the rats treated with chicken feed (F=859,324.034, df=2,72, p<0.01). Post hoc analysis by tukeys HSD test showed as significant increase in serum androgen levels in chicken feed treated rats compared to control and soybean treated rats. Serum androgen levels show non significant effect in soybean treated rats as compared to control rats.

TABLE 2
SHOWS COMPONENTS OF RAW SOYBEAN

Energy per 100gms = 446 kcal
Carbohydrates
Fats
Protiens
Amino acids
Vitamins
Minerals
Trace elements
Trace metals
Vitamin and mineral supplements

Significant aggressive behavior towards the inmates in terms of lateral attacks and muricidal behavior were seen in chicken feed treated rats. One way ANOVA revealed a significant increase in lateral attacks (F=166,666, df=2, 72, p<0.01) and muricidal behavior (F=41,666, df=2, 72, p<0.01). Post hoc tukeys HSD showed a significant increase in lateral attacks and muricidal behavior of chicken feed treated rats against the coinhabitants of the cage as compared to control and soybean treated rats.

TABLE 3
SHOWS THE SCORE OF BEHAVIORAL DEFICITS IN RATS

Rats	Lateral attacks	Muricidal behaviour
Control rats	1+0.02	1+0.02
Chicken feed treated rats	3+0.01*	2+0.01*
Raw soybean treated rats	1+0.01*+	1+0.01*+

Values are mean \pm standard deviation (n=25 with score=0-4). Significant difference by tukeys HSD test; *P<0.01 vs control group fed with rat chow; + P<0.01 vs chicken feed treated rats.

TABLE 4
SHOWS ANDROGEN LEVELS IN RATS

Androgen levels	Control Group fed on rat chow	Chicken feed treated rats	Soybean treated rats
Baseline values	0.1+0.02	0.1+0.01	0.1+0.03
Final values after six weeks	0.1+0.02	28.4+0.15*	0.1+0.02*+

Values are mean \pm standard deviation (n=25). Significant difference by tukeys HSD test; *P<0.01 vs control group fed with rat chow; + P<0.01 vs chicken feed treated rats.

4 DISCUSSIONS

It has been studied previously that currently more preference towards the chicken meat consumption has led increased utilization of the chicken feed for the better growth and weight gain of poultry [15]. It has been seen that chicken feed contains proper rations of the basic ingredients and formed in pellets to provide proper and complete portion of diet to chickens [16]. It is revealed in this study that animal fats are present in abundance in the feed contributing to cholesterol and fat precursors in the body resulting in the greater weight gain steroidal hormones especially testosterone synthesis. Presence of increased amounts of androgens leads to behavioral changes in terms of aggression and offensive conduct

towards other coinhabitants. Among such aggressive attitudes the most commonly seen in the present study was the lateral attacks and muricidal behavior to the inmates by each other. The feed fed rats showed more aggression than the soybean treated and control rats due to absence of less fat and animal byproducts in them. The soybean and the standard rat chow allowed the normal growth and development of the rats but the chicken feed treated rats gained weight quickly and more adipose tissue around their abdomen. This study established the fact that an animal and fish remains along with of the poultry remains itself are mixed in grains and fed to the chickens nowadays resulting in their early weight gain and maturation. Such supplementation also leads to hormonal imbalance in them in particular the steroidal hormones. Among the steroidal hormones the most important are the sex hormones which are androgens, estrogens and progesterones. The estrogens and progesterone are female sex hormones and have different effects on brain [17]. Estrogens increase the blood supply, serotonin uptake, tryptophan entrance in the brain while progesterone calms brain [18]. Androgens on other hand leads to aggression and agitation of the brain with more hostile and defensive behavior [19]. This was markedly seen in the feed fad rats that showed higher incidence of lateral attacks, biting and muricidal behaviors related to rat cannibalism of the cage inmates by stronger rats. In the present study increased in the androgen levels in the chicken fed treated rats established that androgens excess occur in poultry due to the constituents of the feed they are fed upon. These increased androgens may also be the reason of more muscle mass development in chickens in short interval of time [20]. On consumption of such poultry there may arise deleterious effects on the human consumers by presence of excess androgens.

It has been recognized previously that soybean due to its complete nourishing capabilities is considered a complete diet and used for breeding chickens in past. The present study also showed that the energy yield per 100grams of chicken feed was higher than the soybean meal probably due to the additives in feed and on these basis soybean fed rats did not gain weight in short time as compared to chicken feed fed rats [21]. Rats fed on only soybean also showed that the growth and the weight gain of such rats was in accordance to growth and weight gain of control rats with no alteration in their androgen levels. It is also established through the present study that bodily hormonal variations secondary to dietary preferences are the leading cause of diseases associated with hormonal imbalances in humans namely development of cystic ovaries in females. On the other hand the old method of raising hens in the open lands with number of grains and grit gave the assurance of normal growth and development of chickens with no health issues that made them perfectly well for consumption [22].

The present study therefore, reflects on the dietary provisions to the poultry nowadays and their effects on the

poultry and subsequently on general population at large in terms of altered hormonal levels in body, behavioral alterations and associated disorders like polycystic ovaries.

5 CONCLUSIONS

It is concluded from the present study that chicken feed contains excess energy due to addition of especially animal remains and fats. These fats increase both body weight and serum cholesterol levels resulting in the excess production of androgens and mood alteration with increased aggression, lateral biting and muricidal behavior in feed fed rats. This concludes that chicken feed augments in production of testosterone levels and when such chickens fed on feed are taken in the hormonal imbalance takes place in consumers leading to mood alterations and even hormone related diseases especially cystic ovaries in women.

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