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ORIGINAL ARTICLE

Gross Parameters of Litter's Model when Comparing Dietary Composition in Maternal Rats

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ABSTRACT

Objective: Comparing gross parameters of litters on the basis of different dietary composition
Methodology: An experimental study consisting of 12 female albino rats was conducted at Al-Tibri medical college. The albino rats were divided into three different groups based on the diet they were to be given, Group A was the control group placed on normal animal diet, Group B placed on high carbohydrate diet, and Group C placed on High fat diet. Gross parameters of the litters produced by the albino rats were studied which included weight and the length of the litters
Results: The weight of litters on the 1st, 21st, and 35th day was 5.0 ± 0.0, 44.8 ± 0.83, 70.0 ± 1.22 for group A, 5.4 ± 0.54, 42.0 ± 2.12, 73.4 ± 2.30 for group B, and 5.0 ± 0.0, 40.2 ± 0.44, and 80.6 ± 1.34 for Group C, with significant difference being seen when comparing Group A with Group C on the 21st ($p<0.001$), and 35th day (<0.001). Parameters of length of litters, also showed no significant difference.
Conclusion: Most of the gross parameters of litters showed no significant difference between different diets.
Keywords: High fat diet,

INTRODUCTION

Health care improvement worldwide has allowed pregnancy and childbirth to become very safe, especially if someone is residing in a developed country. Global death rates of mothers, stillbirth, and late fetal death rates have all gone onto decrease. This largely is due to the fact that there has been improvement in overall hygiene, sanitation, and most importantly nutrition[1]. Having a balanced, and health diet has allowed for mothers to attain optimal health not just for themselves but for their infants as well[2]. Foods that are rich in unsaturated fats, vegetables, and fibre rich carbohydrates should be promoted, especially if the women are diabetic, obese, and overweight[3]. If malnourishment is present there is a change in the nutritional plane of the woman during pregnancy that can become highly detrimental to the unborn baby[4]. While we had talked earlier that substantial health care improvement has taken place in developed countries, the same can't be said to those residing in developing countries, where maternal under nutrition plays a huge factor in contributing to terrible outcomes of pregnancy. Data suggests that conditions such as over or under nutrition have a negative impact on the growth and metabolic patterns have can led to detrimental on the offspring[5]. This adverse effect is not just an issue restricted to the mother and the offspring, but it also affects the economic productivity of the individuals living in the society as well as a burden with additional costs to the health care system[6]. Proper nutritional support during pregnancy is detrimental to the final outcome of the offspring as normal fetal growth and development will ultimately come down to a healthy and constant supply of nutrients especially proteins, fats, and carbohydrates[7]. In this study we will be comparing the dietary composition of high fat and carbohydrates and their outcomes on the litter's of rats through the evaluation of their gross parameters.

METHODOLOGY

This experimental longitudinal study took place at the Anatomy department of Al-Tibri Medical college, Isra University following ethical approval from the institutional review board. The study spanned for a period of six months from August 2022 to Jan 2023. The number of subjects that were incorporated into this study were 12 and were divided into 3 different groups. Albino rats that were chosen for this study were allowed to acclimatize for one week and were succumbed to normal circadian rhythm of 12 hours of light and 12 hours of darkness. The animals were divided into three different groups through probability random sampling technique, with each group containing different types of diets and having four participants.

Group A served as the control group and was maintained on normal animal diet (NAD). Comprises of 26% fat, 54% carbohydrate and 20% of protein

Group B was given High Carbohydrate Diet (HCD). Contained 12% of fat, 70 % carbohydrate and 18 % protein

Group C were maintained on high fat diet two week prior to the pregnancy, during pregnancy and throughout lactation and weaning period. High fat diet (HFD) comprised of fat, carbohydrate and protein in a proportion of 58%, 22% and 20% respectively.

All the female albino rats were weighted, tagged, and kept in plastic cages with one male rat being assigned for matting purpose in each group. Pregnancy was confirmed in all of the female albino rats and after parturition was completed, litters were then weighted on the 1st, and 21st day, and then at the end of the weaning period which is the 35th day. Morphological parameters which included the weight and length of the litters were studied. All the data was collected and analyzed using the statistical package of social sciences (SPSS) Version 20.0. Continious variables were reported through Mean ± Standard deviation. One way ANOVA was used and the P-value was set at ≤ 0.05 as statistically significant.

RESULTS

Table 1: Shows the comparative results with analysis in weight of the litter on 1st, 21st, and 35th day in different groups. Significant difference was seen on both the 21st and 35th day between group A and Group C.

Table 2: Shows the comparative results with analysis in weight of the litter on 1st and 21st day in different groups.

Table 1: Shows the comparative results with analysis in weight of the litter on 1st, 21st, and 35th day in different groups

	litters weight on 1st day Mean ± SD	p-value	litters weight on 21st day lactation period Mean ± SD	P value	litters weight on 35th weaning period day Mean ± SD	p-value
Group A	5.0 ± 0.0	0.314	44.8 ± 0.83	0.009	70.0 ± 1.22	0.052
Group B	5.4 ± 0.54		42.0 ± 2.12		73.4 ± 2.30	
Group A	5.0 ± 0.0	>0.999	44.8 ± 0.83	<0.001	70.0 ± 1.22	<0.001

Group C	5.0 ± 0.0		40.2 ± 0.44		80.6 ± 1.34	

Table 2: Shows the comparative results with analysis in weight of the litter on 1st and 21st day in different groups.

	Length of litters on 1st day Mean ± SD	p-value	Length of litters on 21st day Mean ± SD	p-value
Group A	3.9 ± 0.14	0.714	11.6 ± 0.54	0.402
Group B	4.0 ± 0.0		12.6 ± 0.26	
Group A	3.9 ± 0.14	0.353	11.6 ± 0.54	0.724
Group C	3.7 ± 0.25		11.3 ± 0.44	

DISCUSSION

Studies have been ongoing in Pakistan as to find ways as to provide best nutrition to women during their pregnancy and after. These studies are designed to guide government and many agencies in the investing of different nutritional programs taking place in Pakistan, especially women that are pregnant and lactating[8]. Our study was designed to determine if gross parameters of litters produced will be affected by either a high fat diet or high carbohydrate diet or not. Our study found that when it came to the time for unfolding of pinna of ears, time for eruption of teeth, time for eye opening, and length of litters there was no significant difference seen between groups. The only significant difference our study was able to find was of the weight of the litters that should significant difference on the 21st (<0.001) and 35th (<0.001) day between the control group and the high fat diet group. Evidence is present that high fat diet unfortunately can led to fetal death and decrease neonatal survival chances 9. High fat diet in pregnancy should be taken with caution during pregnancy as there is a chance that it can lead to poorer outcomes in neonates after hypoxic brain injury[10]. High fat diet in pregnancy should be avoided as it leads to adverse effects, which also includes adverse effects on β-cell development and resulted in hyperglycemia as well[11-12]. Maternal high fat diet will affect the development of the nervous system of the offspring leading to long-term consequences on the brain health as well as the behavior. These findings should be taken seriously, as they can significantly impact the long term health of the mother and the offspring ultimately affecting the quality of life[13]. Fat is a major contributor to obesity, which is a major global health problem whose prevalence has increased dramatically since 1980, with that trend continuing with data projecting that all adults will become overweight or obese by 2030[14]. The notion is that high fat diet not just in pregnant women but should be avoided in general due to its scientifically proven adverse effects that can significantly hamper quality of life. Our study analyzed the aspect of gross parameters of litters, future studies can be done to assess other different parameters whether it be morphologically, biochemically, or histologically.

CONCLUSION

Most of the gross parameters of litters showed no significant difference between different diets. However, the weight of litters showed significant difference between the control group and high fat diet group on the 21st and 35th day of the litters birth. We still recommend that mothers shouldn't be given excessive fat or high fat diet as it will lead to adverse natal outcomes.

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