Effect of Punicalagin (Pomegranate Seed Oil Extract) and Human Chorionic Gonadotropin on Reproductive Performance of Rabbits

By

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Ph.D. Thesis

Submitted in Partial Fulfillment of the Requirements
For the Degree
of
DOCTOR OF PHILOSOPHY
In
Agriculture Sciences
(Animal Production- Animal Physiology)

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2020

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5. Summary and Conclusion

The experiment was carried out in the period from March to July 2018 in the experimental unit linked to the Poultry Production Farm, Faculty of Agriculture, Assiut University, Assiut (Upper Egypt). The aim of this study was to investigate the effects of Punicalagin (PL) and human chorionic gonadotropin (hCG) and their combination on body weight changes, reproductive performance, some blood serum constituents and lactation and growth performance.

A total of 28 healthy New Zealand White rabbit does (6 months of age with mean live body weight of 3.15 ± 0.21 kg) were divided into 4 randomly equal treatment groups. Animals were subjected to two successive mating to become pregnant. In the 1^{st} pregnancy, animals' groups were: Group I control: each doe was injected i.m. with sterilized water and considered as control group. Group II (PL): each doe was injected i.m. with 100 µg Punicalagin (PL). Animals were injected 3 times, 2 times a week pre-mating and one time 3 days post-mating. Group III (hCG): each doe was injected i.m. with a single dose of 25 IU hCG/animal 3 days post-mating. Group IV (PL+hCG), does were injected with 100 µg of PL and hCG and 25 IU of hCG. In the 2^{nd} pregnancy, all group of animals were subjected to be pregnant without treatments. This part was conducted to study if any residual effects of treatment on the 2^{nd} pregnancy outcomes.

The results are summarized as follow:

Body weight changes:

1- Treatment with PL or hCG and their combination tended to increase LBW of does during pregnancy period and at kindling, most of such difference were significant ($P<0.05$). Live body weight of does at 3^{rd} week of pregnancy and at kindling increased by about 14% and 10% due to treatment with PL, and 9% and 12% due to treatment with hCG and 17% and 18% due to treatment with PL+hCG , respectively at the 1^{st} gestation. Also, in the second gestation LBW had similar increase.

2- Among the different treatments, the most increase was found in the combination of treatment (PL+hCG) where, body weight at 3^{rd} week of pregnancy and at kindling increased by 17% and 18 % at the 1^{st} gestation and 23% and 18% at the 2^{nd} gestation ,respectively.

Reproductive performance:

1- At the 1st pregnancy, conception rate after 10 days of mating were 100 % in all treatment groups including control, while at the 2nd pregnancy, CR was 100 % in all treatment groups, while it was 85.71 % in the control.

2- NSPC/conception was not affected by treatment in the 1st pregnancy while it was lower in either PL or PL+hCG groups at the second pregnancy.

3- Gestation length (GL) was not influenced by any treatment at the 1stpregnancy , while at the2nd pregnancy, GL was significantly (P<0.05) shorter by 1.69 days in PL group than controls and tended to decrease by 1.59 and 0.97day in hCG and PL+hCG groups compared that of control.

4- Injection with PL, hCG and PL+hCG increased litter size at the 2nd gestation by about 41%, 12% and 41%, respectively.

5- Treatment with PL, hCG and PL+hCG increased LS at birth by about 32%, 42% and 39%, respectively at the 1st pregnancy, the corresponding values at the 2nd pregnancy were 180%,124% and 180%, respectively.

6- Treatment with PL, hCG and PL+hCG increased LS at weaning by about 87%, 137% and 105% respectively, at the 1st pregnancy, while the corresponding values at the 2nd pregnancy were 701%, 401% and 726%, respectively.

7- Using antioxidant (PL) with hCG may be recommended during pregnancy for fetal protection against pregnancy complications.

8- Still birth was 19.2 and 50 % at the 1 st and the 2 nd gestation in control group, while no still birth was found for treatment with PL, hCG or PL+hCG at two successive gestations.

9- Injection with PL , hCG and PL+hCG decreased mortality rate until weaning, such differences were significant in favor of hCG at the 1 st gestation and in all treatments at the 2nd pregnancy.

Serum glucose and total cholesterol

1- The overall mean of serum glucose concentration decreased by about 30%, 30% and 43%, due to PL, hCG and PL+hCG, respectively at the 1st gestation. Also, similar result was found at the second gestation, the corresponding values were 43%, 28% and 43%, respectively,this means that polyphenols present in PL have a vital role in supporting pancreas to secrete more insulin.

2- Treatment with either PL or hCG and their combination (PL+hCG) decreased blood serum cholesterol concentration of New Zealand White does. The overall mean of serum cholesterol concentration of does decreased by about 15%, 18% and 24% due to PL, hCG and PL+hCG treatment at the 1^{st} gestation, respectively.

Estrogen, progesterone and prolactin

1- Estrogen concentration tended to be higher in treated groups, particularly at mating and pregnancy.

2- At 3 days post-mating of both the 1^{st} and the 2^{nd} pregnancies, E2 concentrations reached its peak and they were higher ($P<0.05$) in all treated groups than controls.

3- Serum concentration of estrogen was significantly affected by treatment during gestation period at both pregnancies. Estrogen concentration increased by 110%, 93% and 63% due to PL, hCG and PL+hCG treatments, respectively at 2 week of the 1^{st} pregnancy, the corresponding values during the 2^{nd} pregnancy were 113%, 48% and 42%, respectively.

4- At both pregnancies and different treatments, serum progesterone was very low at premating and mating, then increased at 3 days post-mating to reach its peak at 2 weeks of pregnancy at both gestations, then decline again until parturition and after kindling.

5- Injection with either PL or hCG increased serum progesterone at both gestations. Serum progesterone concentrations increased ($P< 0.05$) by about 72%, 41% and 67% at 3 days post-mating at the 1^{st} gestation due to treatment with PL, hCG and PL+hCG, respectively, the corresponding values at 2^{nd} gestation were 206%, 79% and 186%. Such increase in serum progesterone status during critical period of fetus implantation is necessary for maintenance of gestation.

6- Peak of P4 concentration was found at 2 wks of both pregnancies which may be useful for support the fetal during this period.

7- At both lactations, does treated with either PL and hCG had higher ($P<0.05$) concentration of PRL. The overall mean of prolactin concentrations of PL, hCG and PL+hCG were 4.9, 6.3 and 3.5 times that of control.

Antioxidants

1- Serum concentration of GPx tended to be higher in all treatment groups, particularly that of PL and PL+hCG compared to controls, during mating, pregnancy and post-kindling at both pregnancies. Its concentration at 3 day post-mating increased ($P <$

0.05) by about 33%, 8% and 37% due to treatment with PL, hCG and PL+hCG at the 1st gestation, respectively, while the corresponding values during the 2nd gestation were increased (P <0.05) by 23%, 7% and 34% , respectively.

2- The overall means of GPx concentrations were higher in PL and PL+hCG treatment groups compared to control one.
3- Serum total antioxidant (TAC) concentrations were higher in all treatment groups (PL, hCG and PL+hCG) and at most of different periods (mating , pregnancy and kindling).
4- The overall mean of TAC concentration increased by 86%, 104% and 52% of does injected with PL, hCG and PL+hCG, respectively at the 1st pregnancy, while at the 2nd pregnancy the corresponding values were 108%, 154% and 46%,respectively.

Lactation and growth performance

1- Milk yield, was calculated by does weight difference between before and after nursing for 2hrs., increased by about 65%, 68% and 21% due to injection with PL, hCG and PL+hCG, respectively at first lactation, however at the 2nd lactation there were no significant differences among treatments.
2- Body weight at birth and weaning of kits born to does injected with PL, hCG or PL+hCG were heavier than that of control at both pregnancies.
3- Also, daily gain of kits improved in treated groups compared to control at both gestations, most of such differences were significant.

Conclusion

Injection with PL and PL+hCG are consider as a new protocol for improving pregnancy outcomes of young NZW rabbits and may be recommended in rabbit's farms.