

Royal Jelly supplementation induces the longitudinal growth and increases plasma growth hormone and estradiol levels in growing rats

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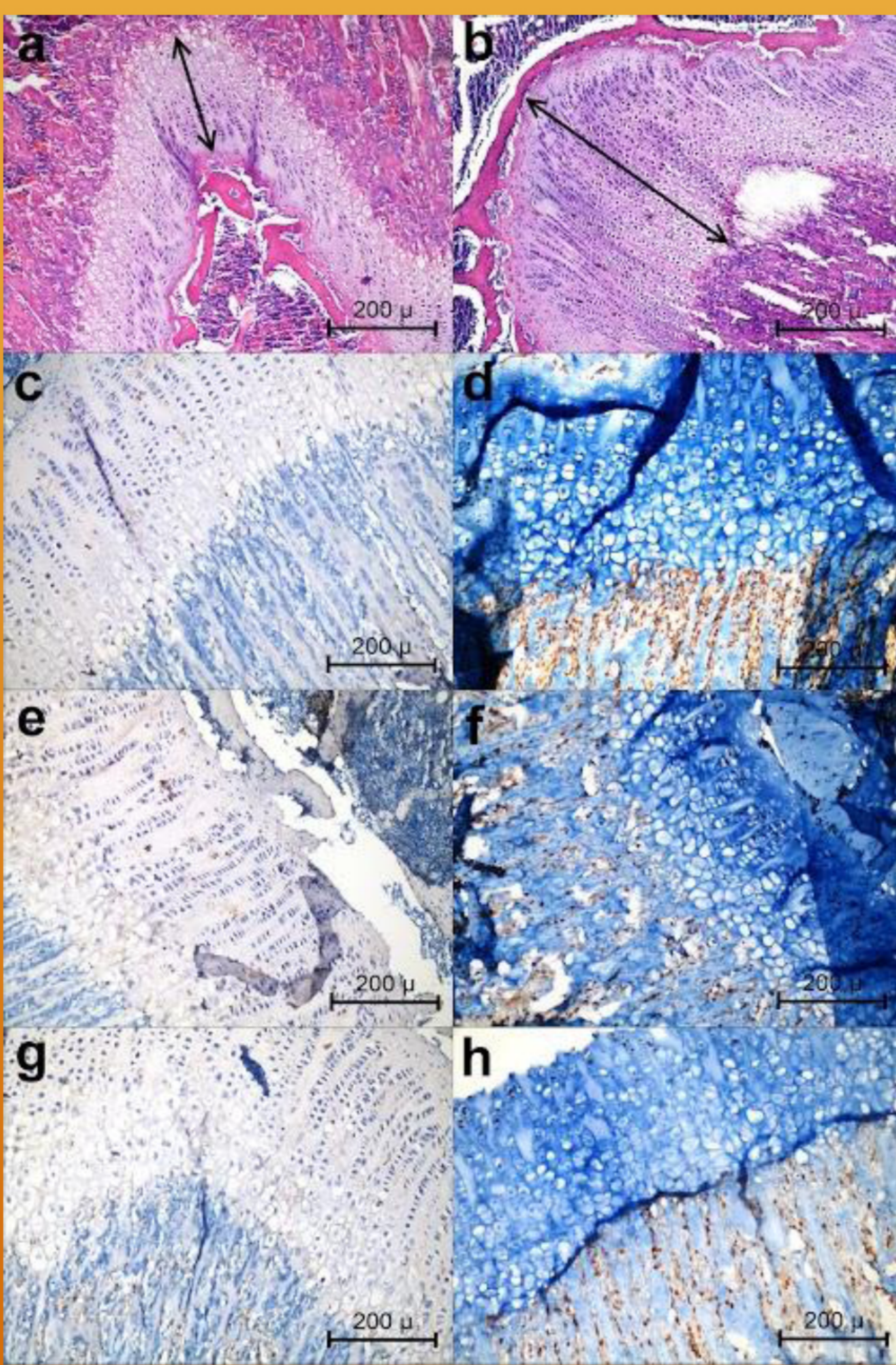
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Background: The purpose of the present study was to examine the hormonal, histomorphometric and immunohistochemical effects on the growth plate of young rats of Royal Jelly (RJ), which is a growth supplement commonly used by parents for children. Royal jelly (RJ) is the most commonly used product of apitherapy and is in frequent use by parents as a dietary supplement for children

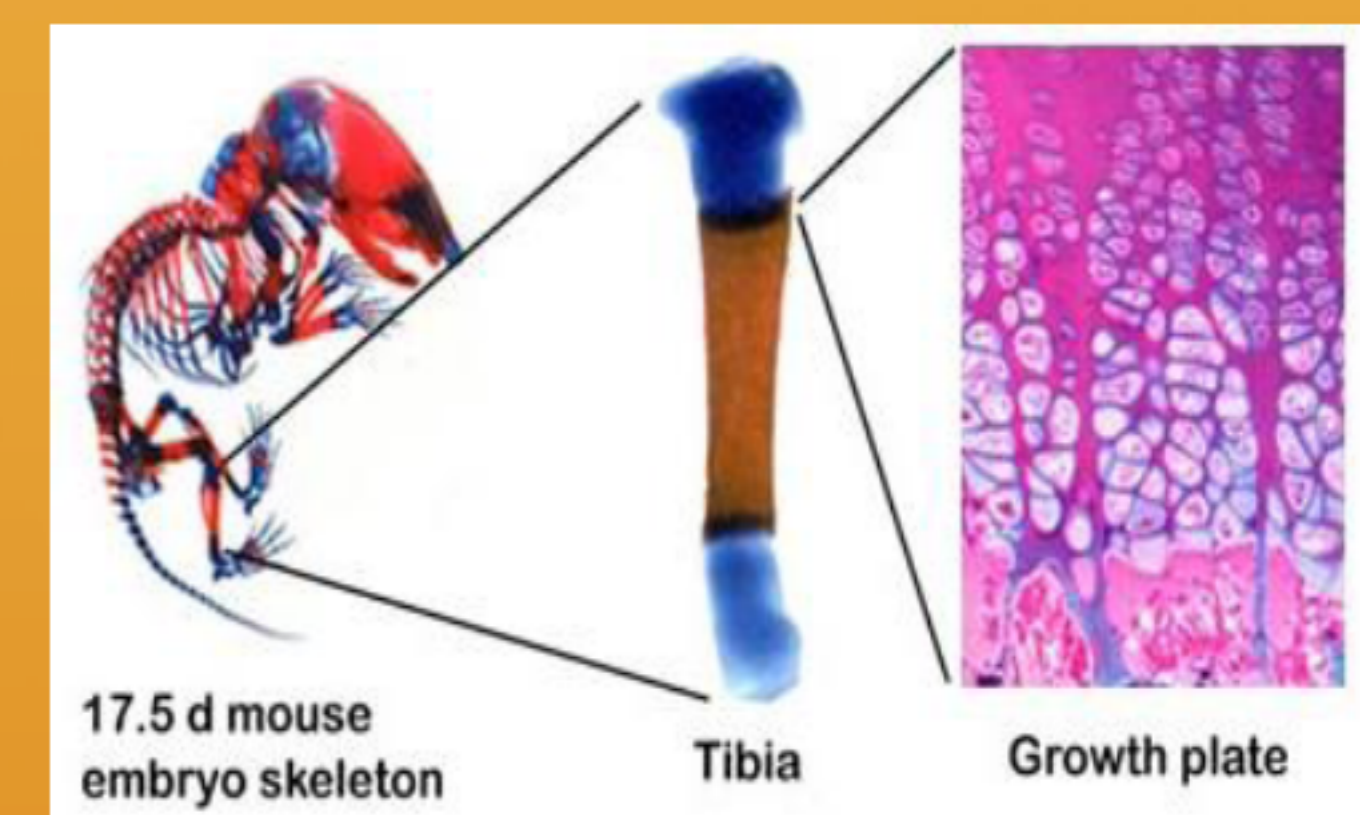
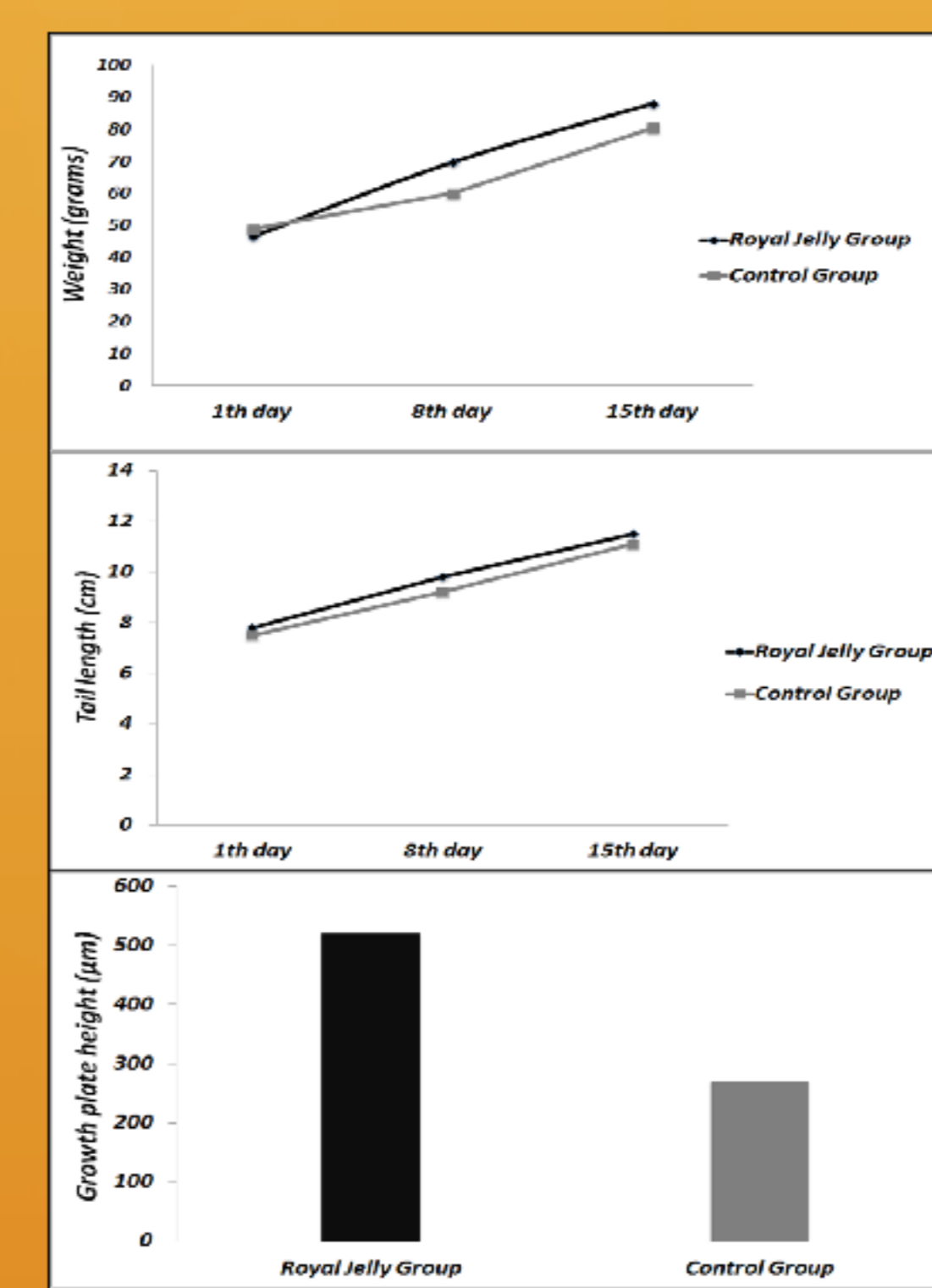
Methods: A total of 30 female rats aged 7 days were randomly divided into two groups of 15. For 15 days, 50 mg/kg of RJ was administered once a day by gavage to RJ group.

Results:

1. At the end of the study, the changes of the mean weight and tail length measurements were significantly higher in the RJ group than in the control group.
2. Plasma estradiol and growth hormone levels were significantly higher in the RJ group than in the control group.
3. The total height of the growth plate in the RJ group was measured significantly higher than that of the control rats (p<0.001).
4. Estrogen receptor expression on the growth plate was stated as 81.3% in the proliferative zone of RJ group, and as 14.3% in the control group (p<0.001).



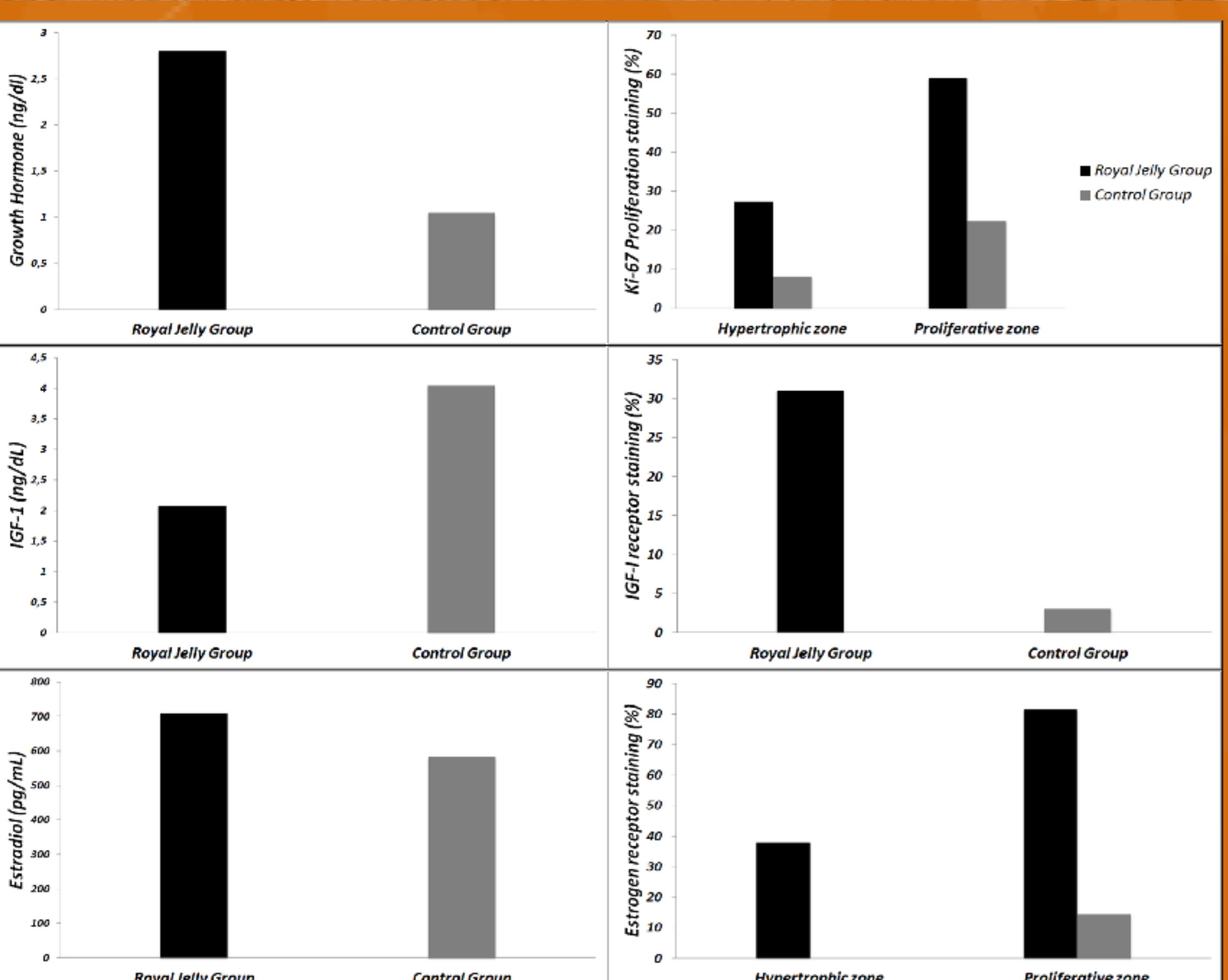
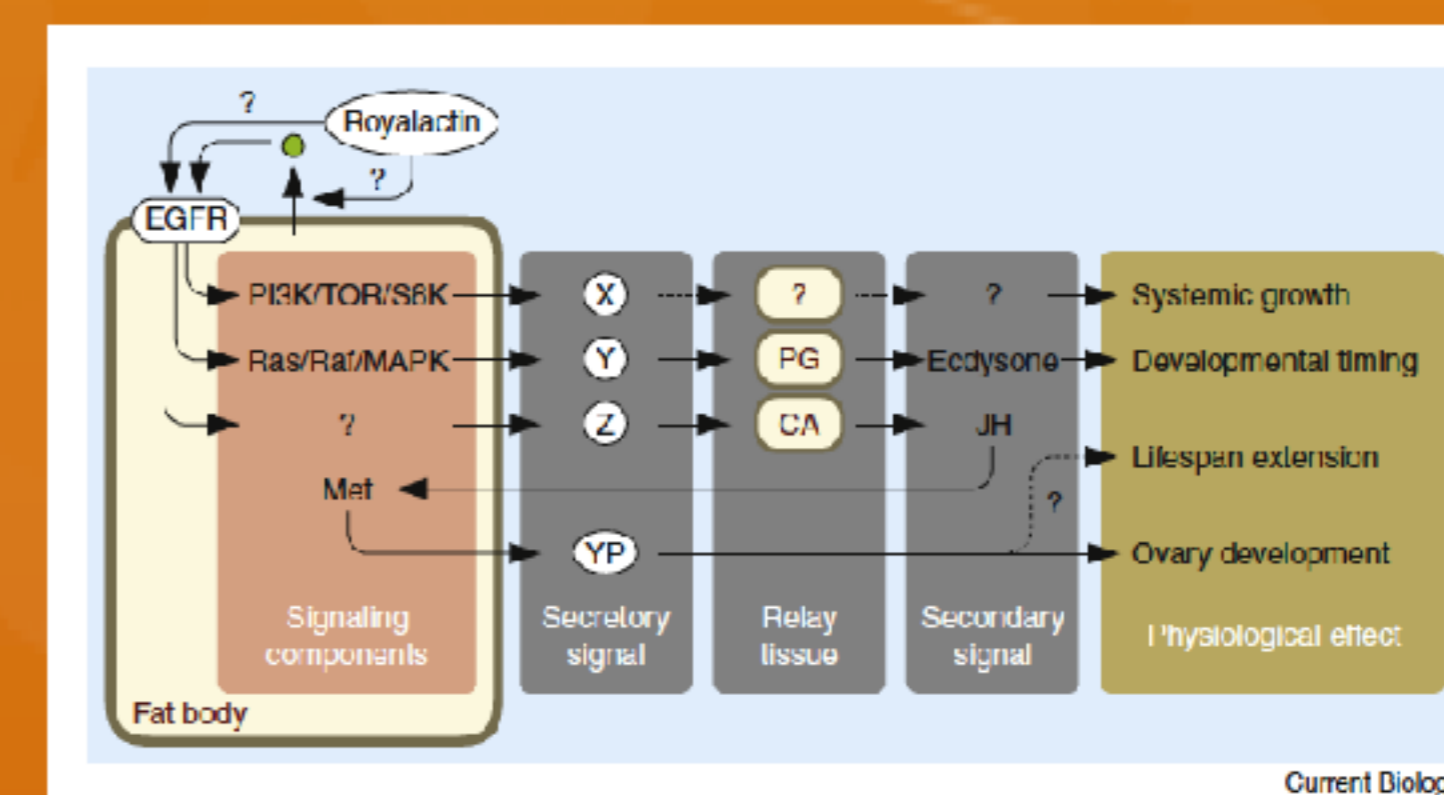
	Royal Jelly	Control	p
n	15	15	
Weight (grams)			
Baseline	46.5 ± 6.1	48.7 ± 3.4	0.756
8 th day	69.7 ± 9.2	59.9 ± 4.4	0.001
15 th day	87.9 ± 11.9	80.3 ± 6.7	0.04
Changes (1-15th days)	41.4 ± 7.1	31.5 ± 4.8	<0.001
Tail length (cm)			
Baseline	7.8 ± 0.5	7.5 ± 0.3	0.161
8 th day	9.8 ± 0.5	9.2 ± 0.4	0.04
15 th day	11.5 ± 0.5	11.1 ± 0.4	0.06
Changes (1-15th days)	3.7 ± 0.6	3.6 ± 0.3	0.04



	Royal Jelly	Control	p
Estradiol (pg/mL)	708 ± 353	582 ± 85	0.03
Growth hormone (ng/dl)	2.8 ± 5.7	1.05 ± 0.6	0.04
IGF-I (ng/dL)	2.07 ± 2.7	4.04 ± 4	0.175
Growth plate total height (μm)	520 ± 10	270 ± 8	<0.001
Estrogen receptor staining (%)			
Hypertrophic zone	38 ± 20	0 ± 0	<0.001
Proliferative zone	81.3 ± 17.6	14.3 ± 16.3	<0.001
Ki-67 receptor staining (%)			
Hypertrophic zone	27.3 ± 7.9	8 ± 11.6	<0.001
Proliferative zone	59 ± 14.9	22.3 ± 17.8	<0.001
IGF-I receptor staining (%)	31 ± 14.7	3 ± 5	<0.001

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Royalactin induces queen differentiation in honeybees
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Abstract
 The honeybee (*Apis mellifera*) forms two female castes: the queen and the worker. This dimorphism depends not on genetic differences, but on ingestion of royal jelly, although the mechanism through which royal jelly regulates caste differentiation has long remained unknown. Here I show that a 57-kDa protein in royal jelly, previously designated as royalactin, induces the differentiation of honeybee larvae into queens. Royalactin increased body size and ovary development and shortened developmental time in honeybees. Surprisingly, it also showed similar effects in the fruitfly (*Drosophila melanogaster*). Mechanistic studies revealed that royalactin activated p38/JNK kinase, which was responsible for the increase of body size, increased the activity of estrogen-related protein kinase, which was involved in the decreased developmental time, and increased the titre of juvenile hormone, an essential hormone for ovary development. Knockdown of epidermal growth factor receptor (EGFR) expression in the fat body of honeybees and



Conclusions:

1. The relatively low dose of RJ used in this study was determined to have some potential estrogenic effects on the growth plate of young rats.
2. Through the induction of GH and estradiol levels, RJ was observed to induce the longitudinal bone growth in growing rats, suggesting that oral RJ administration may have clinical potential in promoting longitudinal bone growth in children.
3. However, estrogens are also important for the cessation of growth by inducing growth plate closure and the estrogenic effect of RJ may diminish the final height potential in children.
4. It is also possible that the estrogenic effect of RJ may lead to early puberty in girls and pubertal gynecomastia in boys.