

## **Effects of Tetramethylpyrazine and Icariin on tibial dyschondroplasia incidence, tibial angiogenesis, performance and characteristics via regulating HIF-1 $\alpha$ /VEGF/WNT4 signaling in chickens (Abstract)**

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### **ABSTRACT**

Tibial dyschondroplasia (TD) is main bone problem in fast growing poultry birds that effect proximal growth plate of tibia bone. TD is broadly defined as non-vascularized, non-mineralized, and enlarged GP with tibia bone deformation and lameness. Tetramethylpyrazine (TMP) is widely used to treat neurovascular disorders and pulmonary hypertension, whereas icariin (*Epimedium sagittatum*) is a traditional Chinese medicine, which is commonly practiced in the treatment of various bone diseases. But, there are no reports about the promoting effects of TMP and icariin against TD chickens. Therefore, a total of 280 broiler chicks were equally divided into four groups; Control, TD, TMP and icariin groups. All groups were offered ad libitum regular diet. The TD, TMP and icariin group were fed same diet as control group but with the addition of tetramethyl thiuram disulphide (thiram) 50 mg/kg of feed from day 3-7 post hatch to induce TD. After induction of TD on day 8 the TMP and icariin group was fed with standard normal diet with the addition of 30 mg/kg/day TMP and 10 mg/kg/day icariin respectively, until the end of experiment. Whereas, TD group was given standard normal diet without adding thiram, just like control group. During the experiment mortality rate, chicken performance indicators (daily weight, average daily feed intake, average daily weight gain and feed conversion ratio), tibia bone indicators (weight, length, width of tibial and the size of GP) in addition to gene and protein expression of hypoxia inducible factor-1 $\alpha$  (HIF-1 $\alpha$ ), vascular endothelial growth factor (VEGF) and wingless type member 4 (WNT4) were examined. The results showed that TMP and icariin administration restore the GP width, increase growth performance, and mitigated the lameness in broiler chickens. The expression of HIF-1 $\alpha$ , VEGF increased, while WNT4 decreased significantly in TD affected thiram induced chicks. The TMP treatment significantly down-regulated HIF-1 $\alpha$  and VEGF genes and proteins expressions, whereas icariin treatment up-regulated WNT4 and down regulated VEGF gene and protein expressions significantly. This is the first study that explains the effect of TMP and icariin in thiram-induced TD chickens. The present study demonstrates that TMP and icariin play important role in angiogenesis during the impairment and recovery of GP in TD by regulation of the HIF-1 $\alpha$ , VEGF and WNT4 signaling in chickens.

**Keywords:** Tibial dyschondroplasia, growth plate, chickens, TMP, icariin.

