

Tenebrio molitor larva: New food applied in medicine and its restrictions

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Dear Editor,

As we know, edible insects are considered a noteworthy alternative food for humans in the future. Among them, yellow mealworm (*Tenebrio molitor*) is consumed widely in a number of countries such as Korea, Thailand, China and Mexico. In particular, *T. molitor* larva can be recommended as a food with many different types (whole, chopped or ground). In addition, it can be processed in the form of powder or freeze-dried yellow mealworms. *T. molitor* larva is also used as an ingredient in different food products such as snacks, biscuits, pasta-based dishes. In fact, this natural material is a good source of energy for human and is rich in nutritional value, contains high protein content and provides essential amino acids for humans. The previous study revealed that *T. molitor* larva contains vitamins (B2, B5, and B12), minerals (Cu, Fe, Mg, Mn, Na and Zn), and phenolic compounds.¹ Based on the issues mentioned above, this is a food that could replace the other, more traditional foods (beef, pork, and chicken). However, in Vietnam and other countries, customers are not very interested in this food and consider insect eating to be culturally unacceptable and disgusting. Insect eating also incurs the risk of allergies for humans.

One of the most exciting things about *T. molitor* is that it can be targeted in the pharmaceutical and medical fields. In Indonesia, *T. molitor* is used as a drug to decrease blood sugar levels, while Samsul et al. also reported that *T. molitor* powder is a potential drug to prevent diabetes.² Moreover, there is a lot of evidence showing that *T. molitor* possesses anti-Alzheimer's disease, anti-obesity, anti-osteoporosis, anti-oxidation and anti-inflammation activities. One of the newest findings of the effects of *T. molitor* in 2020 is that the defatted *T. molitor* larva fermentation extract ameliorates steatosis, inflammation and intestinal microflora in chronic alcohol-fed rats. In particular, it can prevent alcohol-induced hepatocellular damage.³ Based on the evidences mentioned above, they pointed out that the pharmacological potential of *T. molitor* larva is extremely large. So, it is necessary to research this material deeply in the future.

In general, all experiments were conducted *in vitro* as clinical practices had not yet been performed. Almost all of these studies stated that *T. molitor* could be considered a functional food ingredient or food supplement for the treatment of human diseases. However, sensory evaluation is unacceptable for the majority of consumers; in my opinion, there are many disadvantages to the application of *T. molitor* in the medical field which must be resolved, such as microbial contamination (microbes therein, including pathogens), parasites, antibiotic use, pesticides, toxins and allergens. These issues are a huge challenge for the medical field, which explains why the products from *T. molitor* (oil, extract, etc.) are not used for *in vivo* experiments in humans. Although there are safety concerns surrounding *T. molitor*, until now, most of the countries have not had any regulations or laws to manage the quality of *T. molitor* "from farm to table" or "from farm to medicine". Therefore, we must establish specific regulation in each country. Moreover, the customers have to be tolerant and acceptable of new nutritious foods developed as a medicine to prevent disease. Based on that, I hope that products that originate from *T. molitor* will become popular and provide greater benefits for human health. In addition, new medical effects remain to be discovered.

REFERENCES

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