



## COMPUTATIONAL STUDY OF ACTIVE COMPOUNDS CURCUMA ZANTHORRHIZA (TEMULAWAK) IN PREVENT DISEASE CANCER

Eko Nevriansyah<sup>a</sup>, Andre Agustin<sup>b</sup>, Fitrah Mey Harmi Siregar<sup>c</sup>, Jumasari Siregar<sup>d</sup>

<sup>a</sup>Magister Programme of Biochemistry, Postgraduate, Universitas De La Salle, Philippines

<sup>b</sup>Department of Chemistry, Faculty of Mathematics and Natural Science (FMIPA), Universitas Negeri Padang, JL. Prof. Dr. Hamka, Air Tawar Barat, Padang Utara, 25171 Indonesia

<sup>c</sup>Magister Programme of Educational Chemistry, Postgraduate, Universitas Negeri Padang, JL. Prof. Dr. Hamka, Air Tawar Barat, Padang Utara, 25171 Indonesia

<sup>d</sup>Magister Programme of Educational Chemistry, Postgraduate, Universitas Negeri Medan, JL. William Iskandar Ps. 5 Medan Estate, North Sumatera, 20221 Indonesia

\*Corresponding email: [andreagustin47@gmail.com](mailto:andreagustin47@gmail.com)

### ABSTRACT

Curcuma or Curcuma xanthorrhiza Roxb is plant which often used as ingredient medicine, including in ethnic group meeting (Zingiberaceae) and found a lot in Forest tropical. Benefit from writing this article is we know content compound active which contained in Curcuma which could used for prevent disease cancer that is protein amyloid A4. Utility ginger by medical Among other prevent cancer, treat disease digestion, pain yellow, whiteness, increase power stand body and take care health.

**Keywords:** Curcuma (Curcuma xanthorrhiza Roxb); cancer; curcumin; Demethoxycurcumin.

### 1. INTRODUCTION

Curcuma is plant original Indonesia which shape similar with turmeric [1,2]. This is plant drug which found in ethnic group[3]. Rhizome Timurawa contain 48-59.64% starch, 1.6-2.2% curcumin and 1.48-1.63% oil essential[4]. As which we know together, Curcuma contain compound active physiological that is curcuminoids and oil essential[5,6]. Curcumin which make rhizome Becomes yellow, own effect antibacterial, anti cancer, antitumor and anti-inflammatory, as well as antioxidants[8,9,10]. rhizome temurawa could hinder growth Bacillus cereus, Escherichia coli, Rhizopus oryzae and Penicillium[7].

Curcuma xanthorrhiza Roxb or normal called Curcuma, including family ginger. Plant this has many used as plant drug by Public Indonesia specifically Java. Part plant which Very many utilized is rhizome (Print et al., 1992). Content rhizome Timurawa which succeed analyzed Among other starch (48.18-59.64%), fiber (2.58-4.83%), parsley, chalk moth, turmeric, cineole, borneol and xanthorrhizol as well as oil essential other (1.48 - 1.63%) ), Besides that there is curcumin, as curcumin and demethoxycurcumin (1.6 - 2.2%) Ingredient in rhizome magnolia iron which no found on

type turmeric other is oil essential xanthorrhizol. A number of study has report that xanthorrhizol own activity antibacterial, antiseptic and antibiotics

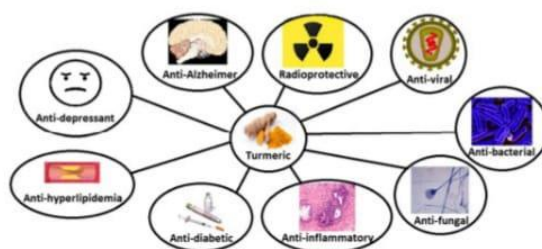
Benefit other from Curcuma (Curcuma xanthorrhiza) is refreshing, speed up metabolism, healthy function heart, Upgrade lust eat, as well as play a role as immunomodulator and agent hepatoprotective[11,12]. And magnolia iron (Curcuma xanthorrhiza) also used for Upgrade power stand and power hold a studies by Kim (2007) show that extract magnolia iron (Curcuma xanthorrhiza) could induce activity system immunity body, and studies by Kosim et al (2007) report that , Giving Curcuma (Curcuma xanthorrhiza) could Upgrade response immune chicken which vaccinated to flu bird[13,14]. Curcuma Xanthorrhiza many used in treatment traditional for treat disease system digestion, disease yellow, whiteness, Upgrade power stand body and guard health.

Cancer is disease which caused by growth cells network body which no normal so that causing enhancement number death from year to year. Group disease which often suffered Public is disease on system digestion, start from mouth until channel disposal. A number of disease which including in group this Among other diarrhea, constipation, sick stomach, indigestion, constipation, ulcer, sick mouth, gas excessive, sick tooth, and hemorrhoids[15,16]. A number of data show that disease system digestion is serious problem and need maintenance quick.

## 2. LITERATURE REVIEW

### 2.1 Curcuma

Web of Science and PubMed databases were used for literature search to find relevant studies assessing the safety and toxicity of curcumin or turmeric in animals and humans[17]. The keywords and search terms that were used included Curcuma longa, toxicity, safety, turmeric, curcuminoids, oral administration, intravenous administration, intraperitoneal administration, pathological effects, adverse effects, mutagenicity, genotoxicity, cytotoxicity, reproductive toxicity, double-blind randomized placebo controlled clinical trials, acute toxicity, sub-acute, and sub-chronic toxicity[18, 19].



**Figure 1.** A schematic of some actions of turmeric  
(Source: wileyonlinelibrary.com)

## 2.2 Cancer

Cancer is a disease caused by an irregularity in the passage of hormones that results in the growth of flesh in normal body tissues or often known as malignant tumors[20] . It is also known as a malignant neoplasm and is often characterized by characteristic cell cycle abnormalities that give rise to the cell's ability to: uncontrolled growth (cell division exceeds normal limits), attack nearby biological tissue . migrate to other body tissues through the blood circulation or lymphatic system , is called metastasis [21, 22] .

These three malignant characters distinguish cancer from benign tumors [23]. Most cancers form tumors, but some do not, such as leukemia[24] . The branch of medical science that deals with the study, diagnosis, treatment, and prevention of cancer is called oncology . This disease is often known by the public as a tumor , even though not all of them are cancer. Tumors are all abnormal lumps, and are divided into 2 groups, namely benign tumors and malignant tumors . Cancer is a general term for all types of malignant tumors . This disease can afflict everyone, in any part of the body, and in all age groups, but is more common in people aged 40 years. Generally, before the cancer expands or damages the surrounding tissue, the patient does not feel any complaints or symptoms [25]. If there are complaints or symptoms, usually the disease is advanced. There are 7 symptoms that need to be considered and further examined by a doctor to confirm the presence or absence of cancer, namely:

1. When defecating or urinating there is a change in habits or disturbances.
2. Digestive organs are disturbed and difficult to swallow.
3. Hoarse voice or cough that doesn't go away
4. Breast or elsewhere there is a lump ( tumor ).
5. Andeng-andeng (mole) that changes its nature, becomes bigger and itchy.
6. Abnormal blood or mucus discharge from the body
7. There are scabs or ulcers that won't heal.

## 3. EXPERIMENTAL

Hardware, Software and Web server Study this use method literature review or approach SLR (systematic literature reviews) for study study, study and interpret as well as gather information about compound which contained in Curcuma and the role in help healing cancer[26]. Hardware Personal laptop MOBILE PHONE, software which used is <https://phytochem.nal.usda.gov/phytochem/search>, <https://pubchem.ncbi.nlm.nih.gov/>,

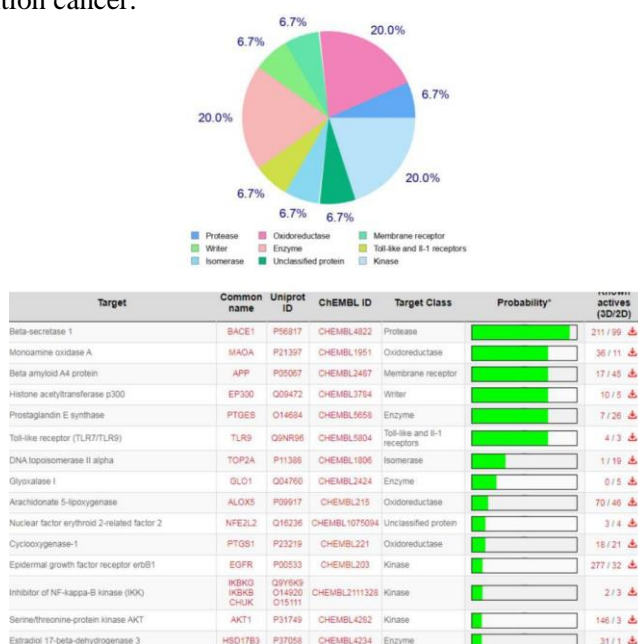
## 4. RESULTS AND DISCUSSION

### 4.1 Result

Study this reviewed from a lot Public which experience disease cancer. For prevention cancer, recommended exercise physique by routine, add activity physique as walk foot to the place work, use ladder compared to elevator, and gardening. Activity physique which regular play a role in prevention cancer with maintain heavy body ideal, Settings hormone sex, insulin, prostaglandins, and have effect which good to system immune[27, 28]. Content bioactive from Curcuma zanthorrhiza or more known with Curcuma that is various like protein, enzyme, membrane receptor, air yang already done testing works as anti cancer which where wrong one compound which there is in in protein from Curcuma zanthorrhiza or Curcuma this is beta amyloid A4 proteins [29]. Compound active here which later will in dock to ligand which where compound this which play a role as anti cancer which could prevent disease cancer. In effort overcome disease cancer, so Writer want telling you Public will importance sport and consume food which healthy, so that avoid from various disease which dangerous as disease cancer. Where disease cancer this is wrong one disease the most dangerous in the world many eat victim soul.

### 4.2 Analysis

After done test obtained compound active which own probability which big moment in test switzerland target that is Beta amyloid A4 proteins. Study this aim for knowing is compound the could used as prevention cancer.



**Figure 2.** target classes  
(source : courtesy of Andre Agustin, *et al.*)

### 4.3 Discussion

Based on analysis data so research which has done could said succeed. Curcumin is compound phytopharmaca which own a number of effect biological, that is effect antidyslipidemic, antioxidants, anti-inflammatory, antivirals, antifungal, hinder formation plaque atherosclerosis, hinder growth bacteria *Helicobacter pylori*, tie mercury and cadmium, preventing cancer, as well can protect the heart. Curcumin Act as deterrent cancer which strong with road hinder *nuclear factor-kappa B* and also bother in production product end glycation which dangerous and trigger inflammation as well as lead on mutation cancer in body. Curcumin by effective hinder breeding cell B3 epithelium lens on man which induced by rhbFGF. Curcumin found could reduce deployment cancer breast on mouse and prevent various forms cancer. Besides curcumin, demethoxycurcumin also could utilized as deterrent cancer, one of them breast cancer[30].

### 5. CONCLUSION

Based on results descriptive and analysis data on Curcuma, so obtained 4 compound active that is curcumin, D-champor, Desmethoxycurcumin and Desmethoxycurcumin . Where on curcumin contain oxidoreductase as big as 20%, membrane receptor 6.7%, writer 6.7%, enzymes 20% and protease 6.7%. Whereas on D-champor contain nuclear receptor 23.3%, oxidoreductase 20%, enzymes 20%, protease 6.7%, and secret protein 13.3%. And Desmethoxycurcumin contain oxidoreductase as big as 20%, enzymes 20%, protease 6.7% and membrane receptor 6.7%. Compound which play a role as deterrent cancer that is curcumin and demethoxycurcumin.

### ACKNOWLEDGEMENTS

Authors may acknowledge to any person, institution or department that supported to any part of study.

### REFERENCES

- [1] Rahaman, M., Rakib, A., Mitra, S., Tareq, A. M., Emran, T. B., Shahid-Ud-daula, A. F. M., ... & Simal-Gandara, J. (2021). The genus curcuma and inflammation: Overview of the pharmacological perspectives. *Plants*, 10(1), 63.
- [2] Soleimani, V., Sahebkar, A., & Hosseinzadeh, H. (2018). Turmeric (*Curcuma longa*) and its major constituent (curcumin) as nontoxic and safe substances. *Phytotherapy Research*, 32(6), 985-995.
- [3] MadJin, H. M., Hashim, N., Isa, I. M., Hussein, M. Z., Bakar, S. A., Mamat, M., ... & Zainul, R. (2020). Synthesis and characterisation of zinc hydroxides nitrates–sodium dodecyl sulphate fluazinam nano hosts for release properties. *Journal of Porous Materials*, 27(5), 1467-1479.
- [4] Guo, L., Plunkert, M., Luo, X., & Liu, Z. (2021). Developmental regulation of stolon and rhizome. *Current opinion in plant biology*, 59, 101970.

- 
- [5] Kharisma, V. D., Ansori, A. N. M., Dian, F. A., Rizky, W. C., Dings, T. G. A., Zainul, R., & Nugraha, A. P. (2021). MOLECULAR DOCKING AND DYNAMIC SIMULATION OF ENTRY INHIBITOR FROM TAMARINDUS INDICA BIOACTIVE COMPOUNDS AGAINST SARS-COV-2 INFECTION VIA VIROINFORMATICS STUDY. *Biochemical and Cellular Archives*, 3323-3327.
- [6] Husna, T., & Zainul, R. (2019). The Effect of Acid Bases Learning Media Using Android-Based Chemical Triangle Applications on Learning Outcomes of Class XI High School Students 3 in Padang City. *International Journal of Progressive Sciences and Technologies*, 15(1), 53-57.
- [7] Mandar, S., Purnamsari, D., & Zainul, R. (2020, March). Catalytic activity of nano ZnO/Cu for degradation humic acid under illumination outdoor light. In *Journal of Physics: Conference Series* (Vol. 1481, No. 1, p. 012038). IOP Publishing. DOI:[10.1088/1742-6596/1481/1/012038](https://doi.org/10.1088/1742-6596/1481/1/012038)
- [8] Pisoschi, A. M., Pop, A., Iordache, F., Stanca, L., Predoi, G., & Serban, A. I. (2021). Oxidative stress mitigation by antioxidants-an overview on their chemistry and influences on health status. *European Journal of Medicinal Chemistry*, 209, 112891.
- [9] Luo, C., Zou, L., Sun, H., Peng, J., Gao, C., Bao, L., ... & Sun, S. (2020). A review of the anti-inflammatory effects of rosmarinic acid on inflammatory diseases. *Frontiers in pharmacology*, 11, 153.
- [10] Pfeffer, C. M., & Singh, A. T. (2018). Apoptosis: a target for anticancer therapy. *International journal of molecular sciences*, 19(2), 448.
- [11] Rahmat, E., Lee, J., & Kang, Y. (2021). Javanese turmeric (*Curcuma xanthorrhiza* Roxb.): Ethnobotany, phytochemistry, biotechnology, and pharmacological activities. *Evidence-Based Complementary and Alternative Medicine*, 2021.
- [12] Nurashikin, A. A., Isa, I. M., Hashim, N., Ahmad, M. S., Zainul, R., Siti, N. A. M. Y., ... & Mukdasai, S. (2020). Synergistic Effect of Zinc/Aluminium-Layered Double Hydroxide-Clopyralid Carbon Nanotubes Paste Electrode in the Electrochemical Response of Dopamine, Acetaminophen, and Bisphenol A. *International Journal of Electrochemical Science*, 15(8), 9088-9107.
- [13] Chung, I. M., Malathy, R., Priyadharshini, R., Hemapriya, V., Kim, S. H., & Prabakaran, M. (2020). Inhibition of mild steel corrosion using *Magnolia kobus* extract in sulphuric acid medium. *Materials Today Communications*, 25, 101687.
- [14] Adri, M., Zainul, R., Wahyuningtyas, N., Wedi, A., Surahman, E., Aisyah, E. N., ... & Adnan, E. (2020, July). Development of Content Learning System in Professional Education Subjects for Educational Institutions in Indonesia. In *Journal of Physics: Conference Series* (Vol. 1594, No. 1, p. 012022). IOP Publishing. doi:10.1088/1742-
- [15] Savira, D., & Zainul, R. (2021). Efektifitas Variasi Plat 4//4 dan 5//5 Elektroda Al/Cu terhadap Kinerja Generator Penghasil Gas Hidrogen. *Ranah Research: Journal of Multidisciplinary Research and Development*, 3(2), 89-96. DOI: <https://doi.org/10.31933/rrj.v3i2.377>
- [16] Aziz, I., Whitehead, W. E., Palsson, O. S., Törnblom, H., & Simrén, M. (2020). An approach to the diagnosis and management of Rome IV functional disorders of chronic constipation. *Expert review of gastroenterology & hepatology*, 14(1), 39-46.
- [17] Kim, K. T., Eo, M. Y., Nguyen, T. T. H., & Kim, S. M. (2019). General review of titanium toxicity. *International journal of implant dentistry*, 5(1), 1-12.
- [18] Sharif, S. N., Hashim, N., Isa, I. M., Bakar, S. A., Saidin, M. I., Ahmad, M. S., ... & Zainul, R. (2021). Chitosan as a coating material in enhancing the controlled release behaviour of zinc hydroxide nitrate–sodium dodecylsulphate–bispyribac nanocomposite. *Chemical Papers*, 75(2), 611-627. <https://doi.org/10.1007/s11696-020-01331-x>
- [19] Mazzoni, A., Salvati, L., Maggi, L., Capone, M., Vanni, A., Spinicci, M., ... & Cosmi, L. (2020). Impaired immune cell cytotoxicity in severe COVID-19 is IL-6 dependent. *The Journal of clinical investigation*, 130(9), 4694-4703.
- [20] Zheng, R. S., Sun, K. X., Zhang, S. W., Zeng, H. M., Zou, X. N., Chen, R., ... & He, J. (2019). Report of cancer epidemiology in China, 2015. *Zhonghua zhong liu za zhi [Chinese journal of oncology]*, 41(1), 19-28.
-



- 
- [21] Mawardi, M., Deyundha, D., & Zainul, R. (2018, April). Characterization of PCC Cement by Addition of Napa Soil from Subdistrict Sarilamak 50 Kota District as Alternative Additional Material for Semen Padang. In IOP Conference Series: Materials Science and Engineering (Vol. 335, No. 1, p. 012034). IOP Publishing. doi:10.1088/1757-899X/335/1/012034
- [22] Boire, A., Brastianos, P. K., Garzia, L., & Valiente, M. (2020). Brain metastasis. *Nature Reviews Cancer*, 20(1), 4-11.
- [23] Geng, Y., Jiang, J., & Wu, C. (2018). Function and clinical significance of circRNAs in solid tumors. *Journal of hematology & oncology*, 11(1), 1-20.
- [24] Burt, R., Dey, A., Aref, S., Aguiar, M., Akarca, A., Bailey, K., ... & Fielding, A. K. (2019). Activated stromal cells transfer mitochondria to rescue acute lymphoblastic leukemia cells from oxidative stress. *Blood, The Journal of the American Society of Hematology*, 134(17), 1415-1429.
- [25] Wang, H. Y., Li, X. L., Yan, Z. R., Sun, X. P., Han, J., & Zhang, B. W. (2020). Potential neurological symptoms of COVID-19. *Therapeutic advances in neurological disorders*, 13, 1756286420917830.
- [26] Boeckmann, L., Schäfer, M., Bernhardt, T., Semmler, M. L., Jung, O., Ojak, G., ... & Emmert, S. (2020). Cold atmospheric pressure plasma in wound healing and cancer treatment. *Applied Sciences*, 10(19), 6898.
- [27] Choudhury, N. A., Moulik, S., & Roy, D. S. (2021). Physique-based Human Activity Recognition using Ensemble Learning and Smartphone Sensors. *IEEE Sensors Journal*, 21(15), 16852-16860.
- [28] Glencross, D. A., Ho, T. R., Camina, N., Hawrylowicz, C. M., & Pfeffer, P. E. (2020). Air pollution and its effects on the immune system. *Free Radical Biology and Medicine*, 151, 56-68.
- [29] Niewiadomski, P., Niedziółka, S. M., Markiewicz, L., Uspieński, T., Baran, B., & Chojnowska, K. (2019). Gli proteins: regulation in development and cancer. *Cells*, 8(2), 147.
- [30] Chien, M. H., Yang, W. E., Yang, Y. C., Ku, C. C., Lee, W. J., Tsai, M. Y., ... & Yang, S. F. (2020). Dual targeting of the p38 mapk-ho-1 axis and ciap1/xiap by demethoxycurcumin triggers caspase-mediated apoptotic cell death in oral squamous cell carcinoma cells. *Cancers*, 12(3), 703.