

## ARTIKEL

### **What's *Curcuma xanthorrhiza* Roxb. extract benefit for Systemic Lupus Erythematosus' Patients**

**“M.Caecilia N.Setiawati”<sup>1</sup>, Ikawati<sup>2</sup>, Kertia Nyoman<sup>3</sup>**

<sup>1</sup> Sekolah Tinggi Ilmu Farmasi, Yayasan Pharmasi Semarang 50193 Indonesia

<sup>2</sup> Faculty of Pharmacy UGM, Yogyakarta 55281 Indonesia

<sup>3</sup> Faculty of Medicine UGM, Yogyakarta 55281 Indonesia

[caecil\\_nanny@yahoo.co.id](mailto:caecil_nanny@yahoo.co.id)



**SEKOLAH TINGGI ILMU FARMASI YAYASAN PHARMASI SEMARANG**

**2020**

HALAMAN PENGESAHAN

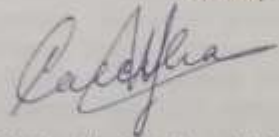
1. Judul Penelitian *What's Curcuma xanthorrhiza Roxb. extract benefit for Systemic Lupus Erythematosus Patients.*
2. Ketua Peneliti
- a. Nama Lengkap Dra. Maria Caecilia Nanny Setiawati, M.Sc, Apt
  - b. NIP/NIY YP. 031096005
  - c. NIDN 0619056201
  - d. Jabatan fungsional Lektor
  - e. Jabatan struktural -
  - f. Fakultas/Jurusan Program Studi Profesi Apoteker
  - g. Pusat Penelitian Farmasi
  - h. Alamat institusi Letjen Sarwo Edie Wibowo km1 Piamongansari Semarang 50193
  - i. Telepon/fax/e-mail 024 6706147 / 6706148/  
[caecil\\_nanny@yahoo.co.id](mailto:caecil_nanny@yahoo.co.id)

Menyetujui,  
Ketua  
STIFAR Yayasan Farmasi Semarang

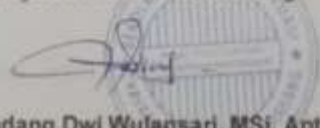
Semarang, Agustus 2020

Peneliti,

  
Dr.apt. Sri Haryanti, M.Si.  
NIDN : 0613056101

  
Dr. Apt. M. Caecilia N. Setiawati, M.Sc  
NIDN: 0619056201

Mengetahui,  
Ketua Lembaga Penelitian dan Pengabdian pada Masyarakat  
STIFAR Yayasan Farmasi Semarang

  
Dr. Endang Dwi Wulansari, MSi, Apt.  
NIDN : 0617077703

## HALAMAN PENGESAHAN

1. Judul Penelitian  
What's *Curcuma xanthorrhiza* Roxb. extract benefit for Systemic Lupus Erythematosus' Patients
  
2. Ketua Peneliti
  - a. Nama Lengkap  
Dra. Maria Caecilia Nanny Setiawati, M.Sc, Apt
  - b. NIP/NIY  
YP. 031096005
  - c. NIDN  
0619056201
  - d. Jabatan fungsional  
Lektor
  - e. Jabatan struktural  
--
  - f. Fakultas/Jurusan  
Program Studi Profesi Apoteker Farmasi
  - g. Pusat Penelitian  
Letjen Sarwo Edie Wibowo km1 Plamongsari Semarang 50193
  - h. Alamat institusi  
024 6706147 / 6706148/  
[caecil\\_nanny@yahoo.co.id](mailto:caecil_nanny@yahoo.co.id)
  - i. Telepon/fax/e-mail

Menyetujui,  
Ketua  
STIFAR Yayasan Pharmasi Semarang

Semarang, Agustus 2020

Peneliti,

**Dr.apr. Sri Haryanti, M.Si.**  
NIDN : 0613056101

**Dr. Apt. M.Caecilia N.Setiawati, M.Sc**  
NIDN: 0619056201

Mengetahui,  
Ketua Lembaga Penelitian danPengabdian pada Masyarakat  
STIFAR Yayasan Pharmasi Semarang

**Dr. Endang Dwi Wulansari, MSi, Apt.**  
NIDN : 0617077703

## ABSTRAK

Systemik Lupus Erythematosus (SLE) adalah suatu penyakit autoimun, merupakan kelainan kronis, inflamasi, ditandai dengan keterlibatan sistem multiorgan. Temulawak (*Curcuma xanthorrhiza Roxb*) banyak digunakan sebagai imunostimulan dalam pengobatan tradisional (jamu) di Indonesia. Penderita SLE di Indonesia tidak berani menggunakan temulawak, meskipun kurkumin (dari temulawak) memiliki banyak khasiat terutama sebagai antiradang, antioksidan dll, karena memiliki efek imunostimulan dari temulawak. Penelitian tentang pengaruh temulawak bagi penderita SLE sangat jarang. Uji klinis *double-blind*, terkontrol plasebo selama empat minggu dilakukan pada 14 pasien SLE (10 sebagai kelompok perlakuan: mendapatkan kapsul berisi 50 mg kurkuminoid yang berisi ekstrak *Curcuma xanthorrhiza Roxb*. dan 4 pasien sebagai kelompok kontrol mendapatkan plasebo). Skor VAS (*Visual Analogue Scale*) dan SF 36 diperiksa, konsentrasi  $\alpha$  TNF diukur pada serum subjek sebelum dan sesudah perlakuan. Setelah 4 minggu perlakuan, tidak ada 1 pasien pun yang mengalami *flare*. Konsentrasi  $\alpha$  TNF dari subjek pada kelompok perlakuan secara signifikan lebih rendah dari sebelumnya (p <0,001). Kualitas Hidup secara signifikan lebih tinggi dari sebelumnya (p 0,025). Skala Analog Visual lebih rendah dari sebelumnya (p 0,001). Penelitian ini menunjukkan bahwa ekstrak *Curcuma xanthorrhiza Roxb* dapat menurunkan konsentrasi serum TNF  $\alpha$  dan secara klinis menurunkan skor nyeri (VAS), serta meningkatkan Quality of Life pada pasien SLE serta tidak berbahaya bagi pasien SLE.

**Kata kunci:** *Curcuma xanthorrhiza Roxb*. Ekstrak, pasien SLE, TNF  $\alpha$ , VAS, Kualitas Hidup

## ABSTRACT

Systemic Lupus Erythematosus is an autoimmune, chronic disorder, inflammatory, characterized by multiorgan system involvement. Temulawak (*Curcuma xanthorrhiza* Roxb) is widely use as immunostimulant in traditional medicine (jamu) in Indonesia. Indonesian SLE' patients won't use temulawak, although curcumin (from temulawak) has many effect especially as an anti-inflammatory, antioxidant etc, because of its immunostimulant effect. The research about effect of Temulawak for SLE' patients is very rare. A four-weeks double-blind, placebo-controlled clinical trial was conducted in 14 SLE patients (10 as treatment group: get capsule contains 50 mg curcuminoids obtained from *Curcuma xanthorrhiza* Roxb. extract and 4 patients as control group get placebo). The VAS (Visual Analogue Scale) score and SF 36 was examed, TNF  $\alpha$  concentration was measured in the serum subjects before and after treatment. After 4 weeks treatment, the TNF  $\alpha$  concentration from subjects in treatment group were significantly lower than before (  $p < 0.001$ ). The Quality of Life were significantly higher than before (  $p 0.025$ ). The Visual analogue Scale were lower than before (  $p 0.001$ ). This study demonstrate that *Curcuma xanthorrhiza* Roxb extract can decrease serum TNF  $\alpha$  concentration and reduce clinically the pain score (VAS), also increase the Quality of Life in SLE' patients.

**Keywords:** *Curcuma xanthorrhiza* Roxb. Extract, SLE' patient, TNF  $\alpha$  , VAS ,Quality of Life

## INTRODUCTION

Systemic Lupus Erythematosus (SLE) is an autoimmune, chronic disorder, inflammatory, characterized by multiorgan system involvement <sup>(1,2)</sup>. Increased concentrations of TNF $\alpha$  are found in acute and chronic inflammatory conditions, such in Sytemic Lupus Erythematosus patients <sup>(3)</sup>.

*Curcuma xanthorrhiza* Roxb., namely temulawak in Indonesia, is one of traditional herbal medicine that's widely used as an immunostimulant<sup>(4)</sup>. The antimicrobial activity of the oil showed significant inhibitory activity against the human pathogenic bacteria <sup>(5)</sup>. The rhizome of this plant, contained the derivatives of xanthorihizol, camphene and curcumene, monoterpene hydrocarbons, oxygenated monoterpenes, sesquiterpene, hydrocarbons and other minor compounds. It rich in sesquiterpenes (like xanthorhizol) also contains curcuminoids (1–2%). The curcuminoids of temulawak extract consist of curcumin and demethoxycurcumin, and a few component of bisdemethoxycurcumin <sup>(6)</sup>. The activities of curcumin were explored as an Antinociceptive, Antipyretic and AntiInflammatory <sup>(7)</sup> also as an antidepressan <sup>(8)</sup> and as an antioxidant <sup>(9)</sup>

The aim of this pilot clinical study was to determine the safety and effectiveness of *Curcuma xanthorrhiza* Roxb. extract containing 50 mg curcuminoids in SLE' outpatients on the 4-weeks double-blind placebo-controlled clinical trial, by evaluating the TNF  $\alpha$  concentration, VAS and also the patients' Quality of Life

## MATERIALS AND METHODES

**Design and subjects.** The study was a 4-week, double-blind, randomized, placebo-controlled clinical trial. Patients were included in the study if they were (i) women, 20-59 years old, (ii) fulfilled at least four criteria of American College of Rheumatology (ACR) and (iii) agreed to sign the patient informed consent. Patients who undergoing regular hemodialysis and being flares were excluded from the study.

**Study drug.** Drug was provided in no 00 hard gelatin capsule contains 50 mg curcuminoids obtained from *Curcuma xanthorrhiza* Roxb. extract. The study drugs had passed the contamination test (concentration of lead  $<0,01$  mg/kg and arsen  $< 0,1$   $\mu$ g/kg with ICP methode) and also passed the bacterial contamination rate ( $<1 \times 10^1$  cfu/g with dilution methode)

### Preparation of the study drug

Temulawak rhizomes are collected from plantation in Tawangmangu, washed clean, chopped transversely, dried at a temperature of 40-60 ° C for 3 days. Dry rhizomes are made into powder, 9 kilograms of powder macerated with 18 liters of 70% alcohol are stirred until smooth and leaved for 3 days. Being filtered and the filtrate was concentrated by inserting it in a rotary evaporator machine for 3 hours. Temulawak rhizome extract is mixed homogeneously with starch, dry in the oven 40 ° C until it becomes a dry extract. Filling it into the capsule using a semi-manual capsule filling machine. Weighed 171 grams of the contents of the capsules into a filling machine and filled homogeneously into 300 body capsule shells and then

covered with capsule caps (570 mg/capsule). The contents of the study capsules: temulawak rhizome extract, containing 50 mg of curcuminoid and starch (8.72% curcuminoid) by TLC

**Patients.** There were Fourteen SLE patients who fulfilled the inclusion criteria, they participated in this study and divided into 2 groups (treatment 10 and placebo 4 persons). The subjects were treated with either 3 times per day, the study capsule or placebo together with methylprednisolone and mycofenolate mofetyl (as the main therapy for SLE) .

**Blood samples.** The peripheral blood were drawn through venipuncture of the antecubital veins in all subjects. Serum was obtained by centrifugation (3000 rpm for 15 min), and separated sera were kept in aliquots at  $-80^{\circ}\text{C}$  until the time of assay (in Parasitology lab Faculty of Medicine Gadjah Mada University). Commercially available enzyme-linked immunosorbent assay kits (Quantikine HS, R&D Systems) were used for measurement of sera TNF- $\alpha$  concentrations by ELISA, carried out in accordance with the manufacturer's instructions.

**Clinical data collection.**

The pain VAS is a single-item, an unidimensional measure of pain intensity, which has been widely used in diverse adult populations. The pain VAS score is self-completed by the physician.

For Quality of Life, the SF 36 questioner is used. All the participants answered the inventories.

**Ethics statement.** This study was approved by the ethics committee at Faculty of Medicine, Gadjah Mada University Ref :KE/FK/884/EC and informed written consent was obtained from each participant.

**Statistical analysis.** Independent t- test was used to compare TNF $\alpha$  concentrations, VAS and QoL score between groups. Paired sample t test was used to compare TNF $\alpha$  concentrations, VAS and QoL score before and after treatment in each group (with SPSS 16).

## **RESULT AND DISCUSSION**

**Concentration of TNF  $\alpha$  .** The mean  $\pm$  SD interval of the concentration of TNF  $\alpha$  on the treatment group before treatment was 11.77 $\pm$ 8.37 pg/mL (range 4,75 – 34 pg/mL) and after treatment was 6.11 $\pm$ 8.67 pg/mL (range 0- 28,62 pg/mL), shown in Table 1. The concentration of TNF  $\alpha$  after treatment were significantly lower than before treatment p <0,001 but not in the control group . There were significant correlation between TNF  $\alpha$  concentration and VAS (p 0,003) and QoL score (p 0,010) after treatment

Curcumin shows anti-inflammatory power, by decreasing inflammatory markers such as TNF- $\alpha$  and CRP <sup>(10,11)</sup>. People with SLE in the treatment group, showed decreasing measures of sera TNF  $\alpha$  concentration, compared with those receiving placebo. Curcumin inhibits multiple proinflammatory pathways and is affordable, this phytochemical should be further explored for prevention and treatment of various chronic diseases. <sup>(12)</sup>

Curcumin is a highly pleiotropic molecule, is able to interact with many molecular targets involved in inflammation. <sup>(13)</sup> Only a few clinical studies have been reported on the effect of administration of curcumin on inflammatory diseases. However, curcumin has been known to possess anti-inflammatory activity in experimental animals. <sup>(14)</sup>Curcumin also decreases the expression of Th-1 cytokines (e.g., IFN- $\gamma$ , TNF- $\alpha$ ) <sup>(15)</sup>. Curcumin has the same activity as an anti-TNF medicine, but the side effects are not dangerous, research is needed to compare them <sup>(16)</sup>

## **VAS**

After treatment, there was a significant decrease in VAS scores in the treatment group from an average of  $5.0 \pm 2.21$  to  $3.0 \pm 2.87$  (p.0,001) and in the control group, up from a mean of  $3.75 \pm 2.06$  to  $4.25 \pm 2.63$  (p.0,664). The mean VAS in the treatment group subjects was reduced while the mean VAS in the control group had increased.

Curcumin therapeutic effects on several diseases have been carried out, among others, cancer, cardiovascular disease, diabetes, arthritis, neurological diseases and Crohn's <sup>(17)</sup>. Curcumin anti-inflammatory effects occur because of its ability to inhibit cyclooxygenase-2 (COX-2) <sup>(18)</sup>. Curcumin, xanthorrhizol and flavonoids in the ginger rhizome play a role in inhibiting the expression and activity of COX enzyme so that the conversion of arachidonic acid to an inflammatory mediator does not occur. With this inhibitory system it caused a decrease in pain in the nociceptive nerve which could be observed from the decrease in stretching of test animals <sup>(7,19)</sup>

### **Quality of Life**

After treatment, the QoL score in control group were decreased, but there was an increase in PCS, MCS and QoL scores in the treatment group. meaning the administration of the capsule containing 50 mg of curcuminoids improved the quality of physical, mental and total quality of life. The mean PCS score rose significantly from  $49.96 \pm 11.39$  to  $59.77 \pm 12.93$  (p 0.024). The mean MCS score rose, but not significantly, from  $55.40 \pm 10.60$  to  $62.82 \pm 11.15$  (p 0.118). The average QoL score increased significantly, from  $51.36 \pm 9.19$  to  $61.29 \pm 10.80$  (p 0.025).

Curcuminoids are natural polyphenols, a strong antioxidant and have anti-inflammatory properties<sup>(20)</sup>. It is known for improving immune system, so it still doubting if used for an autoimmune disease such as SLE, but this research can proof that giving Curcumin as an adjuvant therapy for SLE patients, can significantly

increase their Quality of Life . This is indeed in accordance with the decreasing of level TNF  $\alpha$  and VAS score on the treatment group.

**CONCLUSIONS:** This study demonstrate that *Curcuma xanthorrhiza* Roxb extract can reduce inflammation by decreasing serum TNF  $\alpha$  concentration and reducing clinically the pain score (VAS), also increasing the Quality of Life in SLE' patient, so it is effective for SLE'patients

#### **LIMITATION**

The therapeutic dose was relatively small and the subjects' amount were too little, but hope it can be a preliminary study for the next researcher, in Asia, especially in Indonesia.

#### **ACKNOWLEDGMENT**

This work would not have been possible without the financial support of the Indonesian' Ministry of Research, Technology, and Higher Education.

#### **REFERENCES.**

- 1.Dias SS, Isenberg DA, 2014,Advances in systemic lupus erythematosus, *Medicine* **42**:3, 2014, Elsevier
- 2.Jung JH, Soh, MS, Ahn, YH, UmYJ , Jung,JY, Suh,CH, et al., 2016, Thrombocytopenia in Systemic Lupus Erythematosus Clinical Manifestations, Treatment, and Prognosis in 230 Patients, *Medicine (Baltimore)*. 2016 Feb; 95(6): <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4753950/> e2818. doi: [10.1097/MD.0000000000002818](https://doi.org/10.1097/MD.0000000000002818)
3. Gvili AG, Leonard Leibovici, Yair Molad,2013, Elevation of inflammatory markers in patients with systemic lupus erythematosus is associated with poorer outcome, *Biomed & Pharmacother* **67** (2013) 48–52

4. Pamadyo S, Mujahid R, Clinical trial of herb immunostimulant' effect on renal and hepar function, *Jurnal Ilmu Farmasi dan Farmasi Klinik*, Sept 2014  
DOI [10.31942/jiffk.v0i0.1195](https://doi.org/10.31942/jiffk.v0i0.1195)
5. Mary HPA, Suheela GK, Jayasree S, Nizzy AM, Phytochemical characterization and antimicrobial activity of *Curcuma xanthorrhiza* Roxb, *As Paci Journal of Trop Biomedicine* 2(2):S637–S640 · February 2012 DOI: [10.1016/S2221-1691\(12\)60288-3](https://doi.org/10.1016/S2221-1691(12)60288-3)
6. Ruslay, S., Abas, F., Shaari, K., Zainal, Z. Maulidiani, Sirat, H., Israf, D.A., Lajis, N.H, 2007, Characterization of the components present in the active fractions of health gingers (*Curcuma xanthorrhiza* and *Zingiber zerumbet*) by HPLC–DAD–ESIMS, *Food chemistry*, **104**(3), 1183-1191
7. Al Tahan, F.J., 2012. Exploration of Antinociceptive, Antipyretic and AntiInflammatory Activities of Curcumin in Male Rat. *Iraqi Journal of Science*. **53** : 786-93.
8. Bergman J, Miodownik C, Bersudsky Y, et al., Curcumin as an add-on to antidepressive treatment: a randomized, double-blind, placebo-controlled, pilot clinical study. *Clin Neuropharmacol.*;2013;**36**(3):73–77 ([PubMed](#))
9. Panahi Y, Hosseini MS, 2015, Antioxidant and Anti-Inflammatory Effects of Curcuminoid-Piperine Combination in Subjects with Metabolic Syndrome: A Randomized Controlled Trial and an Updated Meta-Analysis, *Clinical Nutrition* pii(15) · January 2015, DOI: [10.1016/j.clnu.2014.12.019](https://doi.org/10.1016/j.clnu.2014.12.019)
10. Banerjee S, Sarkar RN, Mullick OS, et al. A cross-sectional study to assess the association of systemic lupus erythematosus disease activity with levels of high sensitivity C-reactive protein. *Indian J Rheumatol*. 2013;8:61-64
11. Gupta SC, Patchva S, Aggarwal B, 2013, Therapeutic Roles of Curcumin: Lessons Learned from Clinical Trials., *AAPS J*. 2013 Jan; **15**(1): 195–218. Published online 2012 Nov 10. doi: [10.1208/s12248-012-9432-8](https://doi.org/10.1208/s12248-012-9432-8)  
[www.ncbi.nlm.nih.gov/pmc/articles/PMC3535097/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3535097/)
12. Jurenka JS, Anti-inflammatory properties of curcumin, a major constituent of *Curcuma longa*: a review of preclinical and clinical research. *Altern Med Rev*. 2009 Jun;14(2):141-53.

13. Aggarwal B, Potential Therapeutic Effects of Curcumin, the Anti-inflammatory Agent, Against Neurodegenerative, Cardiovascular, Pulmonary, Metabolic, Autoimmune and Neoplastic Diseases, *Int J Biochem Cell Biol*, 2009; 41(1): 40-50
14. Jagetia GC, Aggarwal BB. "Spicing up" of the immune system by curcumin. *J. of Clin Immunol.* 2007;27(1):19–35.
15. [Zhang Z](#), [Kelly Maurer](#), [Juan C. Perin](#), [Li Song](#), and [Kathleen E. Sullivan](#), 2010, Cytokine-Induced Monocyte Characteristics in SLE, *J of Biomed and Biotech* , Article ID 507475, 13 pages <http://dx.doi.org/10.1155/2010/507475>
16. Chandran B., Goel A, A randomized, pilot study to assess the efficacy and safety of curcumin in patients with active rheumatoid arthritis, *Phytother Res* 2012 Nov;26(11):1719-25, doi: 10.1002/ptr.4639. Epub 2012 Mar 9.
17. Anand P, [Kunnumakkara AB](#), [Robert A. Newman](#) and [Bharat B. Aggarwal](#), 2007, Bioavailability of Curcumin: Problems and Promise, *Mol. Pharmaceutics*, 4 (6), pp 807–818 ([PubMed](#))
18. Menon V.P., Sudheer A.R. ,2007, Antioxidant and anti-inflammatory properties of curcumin. *Adv. Exp. Med. Biol.*, 595, 105–125. [[PubMed](#)]
19. Wilmana, P.F., Gunawan, S.G., 2012. Analgesik-antipiretik, Analgesik. Antiinflamasi nonsteroid dan Obat Gangguan Sendi Lainnya : *Farmakologi dan Terapi*. Edisi 5. Jakarta: Departemen Farmakologi dan Terapeutik FK UI pp. 230-237
- 20 [Cho JW](#), [Lee KS](#), [Kim CW](#).2007, Curcumin attenuates the expression of IL-1beta, IL-6, and TNF- alpha as well as cyclin E in TNF-alpha-treated HaCaT cells; NF-kappaB and MAPKs as potential upstream targets. [Int J Mol Med.](#) ;19(3):469-74.

Table 1. Test Result after administration of *Curcuma xantorrhiza* Roxb extract contains 50 mg curcuminoids and placebo

Result						
Parameter	Treatment (mean±SD)		p	Control (mean±SD)		P
	Before	After		Before	After	
TNF $\alpha$ (pg/ml)	11.77 $\pm$ 8.37	6,11 $\pm$ 8,67	<0.001	12.41 $\pm$ 7.21	8.63 $\pm$ 6.28	0.089
VAS (score)	5,0 $\pm$ 2,21	3,0 $\pm$ 2,87	(p.0,001)	3,75 $\pm$ 2,06	4,25 $\pm$ 2,63	p.0,664
PCS (score)	49,96 $\pm$ 11,39	59,77 $\pm$ 12,93	0,024	58,70 $\pm$ 14,27	50,88 $\pm$ 13,40	0,201
MCS (score)	55,40 $\pm$ 10,60	62,82 $\pm$ 11,15	0,118	63,61 $\pm$ 16,21	64,10 $\pm$ 3,33	0,949
QoL (score)	51,36 $\pm$ 9,19	61,29 $\pm$ 10,80	0,025	61,15 $\pm$ 14,69	57,49 $\pm$ 8,16	0,462

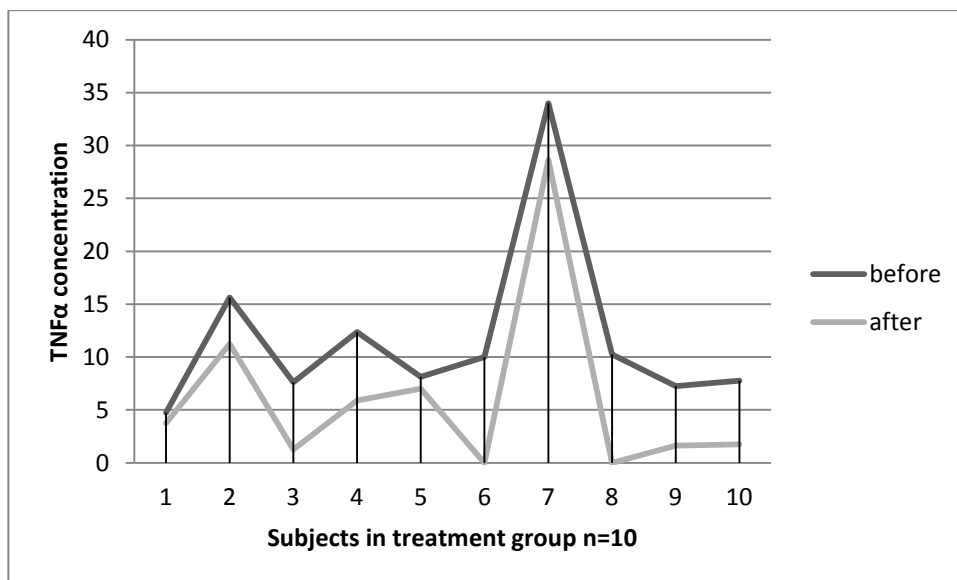


Figure 1. TNF  $\alpha$  concentration in treatment group who received *Curcuma xantorrhiza* Roxb extract capsules contains 50 mg curcuminoids

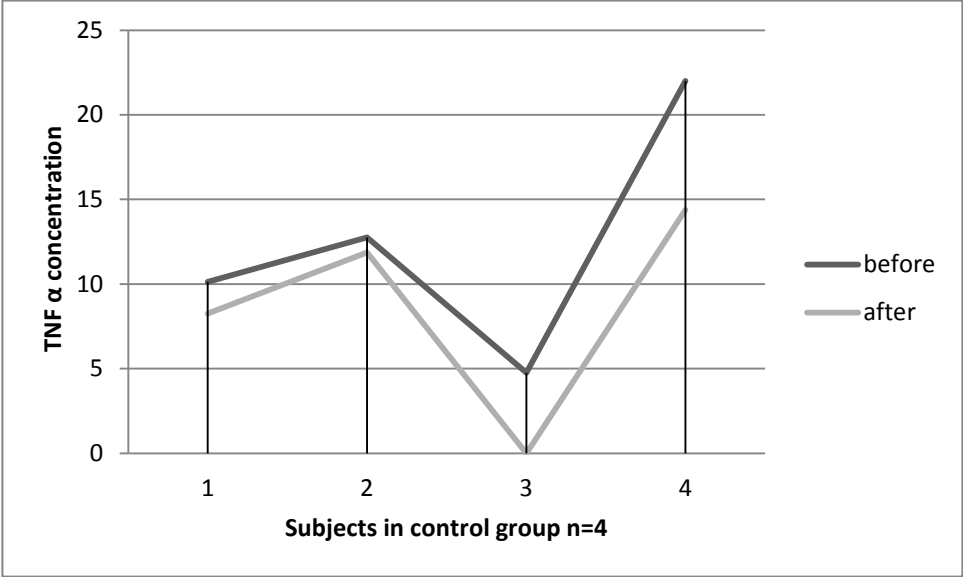


Figure 2. TNF  $\alpha$  concentration in control group who received placebo capsules



**SEKOLAH TINGGI ILMU FARMASI YAYASAN PHARMASI SEMARANG**  
**LEMBAGA PENELITIAN DAN PENGABDIAN MASYARAKAT**

Jalan Letnan Jendral Siswo Edjo Wibowo Km. 1 Plamongansari - Pucanggading - Semarang - 50193  
Telepon : 024 - 6706147 ; 6725272 ; Faksimile : 024 - 6706148  
Email : stifa\_yaphar@yahoo.com  
Website : www.stifa.ac.id

**SURAT TUGAS**

No. 066/EDW-SW/LPPM/STP/VIII/2020

Yang bertanda tangan dibawah ini :

Nama : Dr. apt. Endang Dwi Wulansari, S.Si., M.Si.  
NIY : 040203015  
Jabatan : Ketua LPPM STIFAR YAYASAN PHARMASI SEMARANG

Memberi tugas kepada :

No.	Nama	NIY	Jabatan
1.	Dr. apt. Maria Caecilia Nanny Setiawati, M.Sc.	YP. 031096005	Dosen

Untuk melaksanakan penulisan artikel publikasi dengan judul **What's Curcuma Xanthorrhiza Roxb. Extract Benefit For Systemic Lupus Erythemathos' Patients.**

Demikian surat tugas dibuat kepada yang bersangkutan untuk dapat dilaksanakan dengan penuh rasa tanggung jawab.

Semarang, 8 Agustus 2020  
Ketua LPPM STIFAR  
YAYASAN PHARMASI SEMARANG

Dr. apt. Endang Dwi Wulansari, S.Si., M.Si.  
NIY. YP. 040203015

